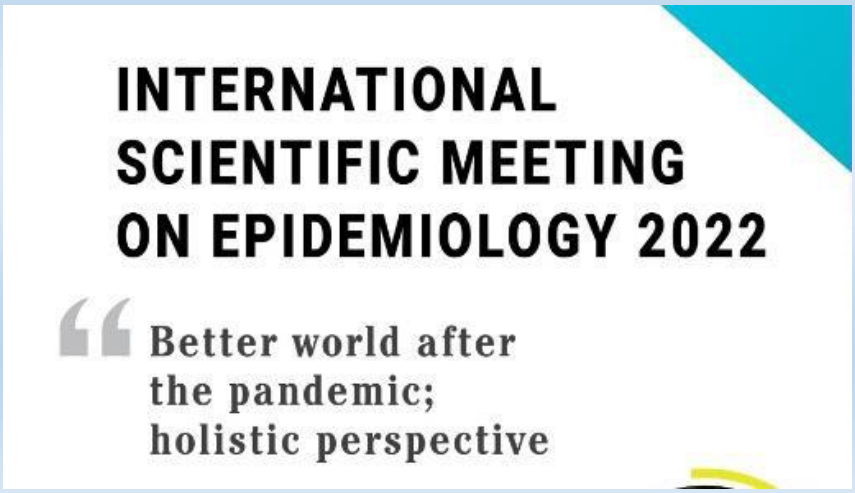

PROCEEDING BOOK OF

INTERNATIONAL SCIENTIFIC MEETING

ON EPIDEMIOLOGY (ISME)

BALI, 22-25 AUGUST 2022

PERHIMPUNAN AHLI EPIDEMIOLOGI INDONESIA (PAEI)

2022

PROCEEDING BOOK OF
INTERNATIONAL SCIENTIFIC MEETING ON EPIDEMIOLOGY (ISME)
BALI, 22-25 AUGUST 2022

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PREFACE OF THE DIRECTOR OF INDONESIA EPIDEMIOLOGICAL ASSOCIATION (PAEI)

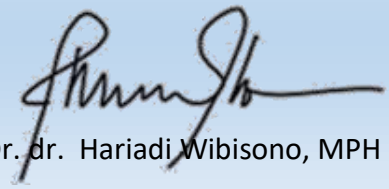
Praise be to Allah SWT because of His mercy The Proceeding of International Scientific Meeting on Epidemiology (ISME) can be compiled. This meeting was held in collaboration with the Indonesia Epidemiological Association (PAEI), the Ministry of Health, WHO Indonesia, and Safetynet.

This scientific meeting is one of the important meetings for epidemiologists and other health professionals in Indonesia and in the world by featuring international speakers who are competent in their fields. With this meeting, it is hoped that the knowledge, science, and competence of epidemiologists in Indonesia and in the world will increase.

This proceedings book contains complete scientific papers of conference participants who have been selected by a panel of editors of the Indonesian Epidemiological Association. These scientific papers include Communicable Disease, Non Communicable Disease, One Health for Zoonosis Disease, Health System And Health Policy, Occupational Health and Safety, and Environmental Health.

This proceeding is expected to be a window of knowledge for epidemiologists and scientists to improve public health program in order to improve public health degree in Indonesia and the world. We would like to thank all parties who have contributed to the organization of this meeting and the preparation of proceedings.

Jakarta, 7 October 2022
Director of Indonesia Epidemiological Association
(Perhimpunan Ahli Epidemiologi Indonesia/PAEI)



Dr. dr. Hariadi Wibisono, MPH

WELCOME REMARKS FROM THE CHAIR OF INTERNATIONAL SCIENTIFIC MEETING ON EPIDEMIOLOGY (ISME)

The COVID-19 pandemic is a worldwide crisis with a damaging impact on human lives, with the drastic change in routine, and the numbers rise more rapidly which include the physical world. Besides, the decline of economic activities due to COVID-19 have significant effects on the environment. As we still cannot figure out for how long this strives against COVID-19, will continue, the efforts to reignite the economic activities require a strong and safe return to the strategy of work. Nonetheless, we will come out of the pandemic with a more global society and this can be served as our preparation for the next crisis that will force us to enter globalization.

In politics, the pandemic has bluntly revealed two fundamental aspects of successful democracy: the extent of a certain public trust between its citizens and their government, and the capacity of the government to deliver and enforce an appropriate public health response. In social cultural, several health protocols have unwittingly caused social distance and disconnection amongst people. Meanwhile, in health sectors, this pandemic shows us the underlying causes of health inequalities among countries as well as communities. These inequalities include the access of vaccines, health facilities and laboratory tests. To reduce health inequalities going forward, we have to address the underlying causes; which are inequalities in power and resources.

Reflecting on the post-pandemic impact, the government should move to develop and implement effective programs through evidence-based policy. It uses scientific research as the basis for policy development and program planning to improve all aspects outcomes and performance as well as allowing the efficient use of resources. The evidence-based policy is important in South East Asian countries and the other countries with limited resource settings. Therefore, Epidemiologists in these countries need a place for knowledge sharing to improve their capacity in achieving development agenda in their respective countries.

In order to facilitate communication among those who involved in research and teaching of Epidemiology and to encourage its use in all fields of health including social and community life, it needs to holding both a scientific meetings and webinars. Thus, we conducted the International Scientific Meeting on Epidemiology this year. Purposes of the meeting are: 1) To develop and implement effective programs through evidence-based policy in order to improve all aspects outcomes and performance as well as allowing the efficient use of resources, 2) To share and broaden the Epidemiologists' knowledge to improve their capacity in achieving development agenda in their respective countries, 3) To facilitate communication among those involved in research and teaching of Epidemiology

and to encourage its use in all fields of health including social and community life, and 4) To obtain input from various policy makers and program implementers related to the roles, needs, and competence of Health Epidemiologist in overcoming and managing the pandemics.

The main theme of the conference was ~~is~~ *Enhancing Evidence-based Policy for Post Pandemic Life*. The main theme discussed was separated in 5 topics, including Communicable Disease and Control Program in Endemic, Epidemic, and Pandemic; NCD Control: Primary, Secondary, and Tertiary Prevention; One Health for Zoonosis Disease (including the vector borne disease); Health System and Health Policy in Endemic, Epidemic, and Pandemic; and Occupational Health and Safety; Primary, Secondary and Tertiary Prevention. The conference was conducted hybrid on 22 – 25 August 2022 in Denpasar, Bali by involving national and international participants. This conference was supported by the Ministry of Health, Republic of Indonesia, Indonesia Epidemiological Association (PAEI), South Asia Field Epidemiology and Technology Network, Inc. (SAFETYNET), and WHO Indonesia.

Thank you for all sponsors and supporters who made this meeting happened. We hope this meeting provide us the newest scientific information specifically in epidemiology and public health in general as source of health program policy development.

Director of International Scientific Meeting on Epidemiology

Dr. dr. Tri Yunis Miko Wahyono, M.Sc

LIST OF CONTENT

TRACK 1: COMMUNICABLE DISEASE PREVENTION AND CONTROL

1. Case Study of Stunting Risk in Toddlers in Kaway XVI District, West Aceh Regency

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Abstract

Background: Stunting is a chronic malnutrition problem caused by lack of nutritional intake for a long time, resulting in growth disorders in children, namely the child's height is lower or shorter than the standard age. This study aims to analyze the factors that influence the risk of stunting in children under five in Kaway XVI sub-district.
Materials and methods: This study used a cross sectional study by studying the dynamics of the correlation between risk factors and effects, by means of approach, observation, or data collection. This research used univariate and bivariate analysis.
Results: The results showed that there was a relationship between the factors of maternal parenting and the prevalence of stunting in Kaway XVI District with p value: 0.032, < 0.05. There is no relationship between sex and the incidence of stunting because p value: 0.254. This shows the need for socialization, education and information about the causes of stunting and its prevention in the community in Kaway XVI District.

Keywords: Stunting, Gender, and Parenting

Introduction

Nutritional problems are a problem in worsening the quality of life of children in achieving growth and development (Ramdhani, Handayani and Setiawan, 2020). Stunting is a chronic nutritional deficiency problem due to inadequate food supply with balanced nutrition which results in poor nutritional intake (Setyawati, 2018). The first two years of life, also known as the “golden period” or critical period or window of opportunity, is a very short period and a period that is very sensitive to the environment (Suhendra, Asworowati and Ismawati, 2020). Stunting is a problem because it is associated with an increased risk of illness and death, and causes stunted mental growth and motor development (Nurmalasari and Septiyani, 2019).

The behavior of mothers in caring for their toddlers has a close relationship with the incidence of stunting in toddlers. Mothers with good parenting will tend to have children with good nutritional status, and vice versa, mothers with less nutritional

parenting tend to have children with poor nutritional status as well. Key aspects in parenting consist of care and protection for mothers, breastfeeding and complementary feeding, food preparation, environmental hygiene and sanitation practices, and health practices at home (Gunawan, Pribadi and Rahmat, 2020).

Adequate parenting practices are very important not only for the child's resilience but also for optimizing the physical and mental development of the child as well as the good condition of the child's health. Parenting also contributes to the welfare and happiness as well as a good quality of life for the child as a whole, especially food security and children's health, can be one of the factors that cause children to suffer from stunting (Yudianti and Saeni, 2017).

Adequate food parenting is related to the good quality of food consumption for toddlers so that in the end it will affect the nutritional status of toddlers. Inadequate and premature breastfeeding and complementary feeding can increase the risk of stunting because babies tend to be more susceptible to infectious diseases. This illustrates that child care, both feeding practices, child health care and environmental sanitation have contributed to the incidence of stunting (Astuti, 2016).

Parental knowledge about the symptoms, impacts and methods of stunting prevention can determine the attitudes and behavior of parents in health care for stunting prevention so that stunting events can be suppressed (Ammar, 2021). Stunting prevention efforts cannot be separated from the knowledge of parents about stunting. With good knowledge, parents can raise awareness of the importance of stunting prevention (Lailatul and Ni'mah., 2015). Parental awareness will shape health patterns or behaviors, especially in preventing stunting, such as in fulfilling nutrition starting from pregnant women, child nutrition, maintaining good home environment and sanitation, and clean and healthy living behavior (Aramico, Sudargo and Susilo, 2016). Based on the explanation above, the researcher is interested in seeing a case study of the risk of stunting in toddlers in Kaway XVI District.

Material and Method

This research is an observational analytic study with a cross sectional study approach using nominal and ordinal categorical data. The independent variables namely Gender, Mother's Knowledge, and Mother's Parenting and the dependent variable is the incidence of stunting in toddlers. The sample in this study were mothers who had toddlers aged 6-59 months totaling 128 mothers in Kaway XVI District.

Results and Discussion

A. Relationship of Gender to the incidence of stunting in toddlers in Kaway XVI

The results of the study prove that there is no significant relationship between the sex of children under five and the incidence of stunting. The proportion of respondents who are female to the risk of stunting is as much as (70%) compared to toddlers whose other types are male as much as (30%) with p-0.254, > 0.05; OR = 0.491. This shows that female sex affects the risk of stunting, which is 0.76 times greater than that of toddlers with male sex and can be seen in (table 1).

Table 1. The relationship between sex and the incidence of stunting in children under five in Kaway XVI

Gender	Risk		Not risk		p-Value	OR	CI 95%	
	F	%	F	%			Lower	Upper
Male	15	30	28	35,8				
Female	35	70	50	64,2	0,254	0,491	0,000	2,951
Total	50	100	78	100				

The gender of toddlers is determined by asking questions about gender to mothers who have children under five, namely when conducting a survey in Kaway XVI District. From the results of data collection in the field, it was found that mothers with female children under five were more at risk of stunting compared to mothers with male children under five.

Based on the results of interviews conducted with mothers who have children under five in Kaway XVI sub-district, it can be concluded that gender does not affect the risk of stunting because based on hasanah's research it is stated that boys are more prone to malnutrition than girls. This condition can occur because of differences in eating practices given by parents. shows that boys are more prone to malnutrition than girls. This condition can occur because of differences in eating practices given by parents, so it does not guarantee that gender does not affect the risk of stunting (Hasanah, 2018).

B. Relationship between mother's parenting style and stunting in toddlers in Kaway XVI

The results showed that there was a significant relationship between maternal parenting and the risk of stunting in children under five in Kaway XVI District, West Aceh Regency. The proportion of respondents who have good parenting for toddlers is (55.6%) compared to the group of mothers who have poor parenting for toddlers

(44.4%) with p-0.042, <0.05 OR= 1.92. This shows that mothers who have poor parenting have a 1.96 times greater risk of stunting for their toddlers than mothers who have poor parenting can be seen in (table 2).

Table 2. Relationship between maternal parenting and the risk of stunting in Kaway XVI

Maternal Parenting	Risk		Not Risk		*p*-Value	OR	CI 95%	
	F	%	F	%			Lower	Upper
High	20	44,4	24	28,9				
Low	25	55,6	59	71,1	0,032	4,296	2,576	10,336
Jumlah	45	100	83	100				

The variable of mother's parenting was measured by asking questions about the pattern of caring for toddlers when giving food and taking care of toddlers. From the results of data collection in the field, it was found that almost all mothers who have toddlers at risk of stunting are mothers who have poor parenting in contrast to mothers who have good parenting, where mothers who have good parenting do not have toddlers who risk of stunting.

Based on the results of interviews conducted with mothers who have toddlers in Kaway XVI sub-district, it can be concluded that these mothers have poor parenting styles for their toddlers, causing these toddlers to be at risk for stunting. Because parenting based on research is a process aimed at improving and supporting the physical, emotional, social, financial, and intellectual development of a child from infancy to adulthood (Soetjiningsih & Ranuh, 2014).

Conclusions and Recommendations

This study found a relationship between maternal parenting and stunting. The dominant factor that affects stunting is parenting, and the gender that does not have a significant relationship with stunting is the gender of the toddler. Based on the results of the research above, the advice given is that related agencies in the health sector are expected to be able to run or improve programs related to improving the nutritional status of toddlers, socializing the provision of additional food, how to care for and care for children through counselling, health education directly to the community and carry out health promotions on balanced diets for children and toddlers so that mothers, families, caregivers can know the food intake needs needed by toddlers and children.

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2. Analysis Covid-19's Vaccination Coverage of Elderly In Sidoarjo District

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Abstract

Background: Indonesia experienced a significant increase in COVID-19 cases due to the SARS-CoV-2 virus. COVID-19 vaccination is one of the efforts to prevent and control COVID-19 which aims to reduce the transmission of COVID-19, reduce morbidity-mortality, achieve group immunity (Ministry of Health, 2021). The coverage of the Covid-19 vaccination in the elderly group of dose 1 in Sidoarjo Regency in the 3rd trimester of 2021 has still not reached the target (35.40%). The coverage of the Covid-19 vaccination in the elderly group is the lowest coverage compared to the general public. **Materials and methods**: This research is a descriptive study which is classified as an evaluation study with a system approach. Interviews were conducted on 10 informants in Sidoarjo Health Office. Determining the priority of the problem through interviews with the criteria matrix instrument (Criteria Matrix Technique) and analysis of the root causes of the problem using a fishbone diagram. Identification and priority of alternative problem solving through nominal group discussion technique (NGT). **Results**: The root cause Covid-19 vaccination coverage in the elderly at dose 1 (quarter 3) is still 35.40%. using a fishbone diagram. Input aspect consist of (1) man which is lack of trained vaccinators, cross-section of human resources sectors have not yet optimal cooperation in the implementation of vaccinations for the elderly, (2) materials and machinery which are differences in elderly vaccination coverage data between dashboards KPCPEN and P-Care a difference of about 42,768), the selection of certain types of vaccines with low AEFI in the elderly, (3) money which is unexpected assistance budget proposal flow handling COVID-19 requires a long time, (4) market which is physical and psychological conditions of the elderly with comorbidities, (5) method which is social and family support for the elderly to COVID-19 vaccination is still minimal. Process aspect is about the implementation of the covid-19 vaccination for the elderly is still not yet feasible and in conjunction with other community groups. Output aspect which is the level of morbidity, comorbidity and AEFI in the elderly is still high, the quality of life of the elderly is low.

Acknowledgements: Author are very thankful to Sidoarjo District Health Office for giving permission to get indepth interview and using their data in this research work

and also thankful to Epidemiology Department, Faculty of Public Health Universitas Airlangga Surabaya for their full support to complete this research.

Keywords: COVID-19, Elderly, Vaccination

Introduction

Public health problem is a gap or deviation that occurs between the realization compared to the expected target. Health problem analysis activities start from problem identification, problem priorities, root causes of problems, identification of problem solving alternatives, to problem solving priorities. Problem solving priorities are expected to provide specific benefits and impacts based on evidence-based studies and analysis (Kaufman, 2020). COVID-19 is an infectious disease caused by SARS-CoV-2 which has become a global health problem since it was declared a Public Health Emergency of International Concern (PHEIC). COVID-19 vaccination is one of the efforts to prevent and control COVID-19 which aims to reduce the transmission of COVID-19 (Ministry of Health, 2021). The elderly group is one of the vulnerable groups because there is a decrease in body organ function and immunity so that the potential for transmission by disease agents and comorbid rates is higher than other groups (Ministry of Health, 2022). This study aims to analyze health problems (Covid-19 Vaccination Coverage in the elderly in Sidoarjo Regency).

Materials and Methods

Observational descriptive research through interviews with program holders at the Sidoarjo District Health Office. The research was conducted in October 2021. Determining the priority of the problem using the criteria matrix technique method (Criteria Matrix Technique). This is because in the identification of health problems in the era of the Covid-19 pandemic, there are technological variables that are important points in determining problem priorities. In the Criteria Matrix Technique, there are 3 variables that become a reference in determining the priority of health problems, namely the importance of the problem (importancy), technological feasibility, and available resources (resources). While in other prioritization techniques, technology is not used as a self-assessment point or independent but enters into a sub-variable or dependent so that the weight value is less able to represent the condition of health problems in the Covid-19 era in Sidoarjo Regency. Identify and analyze the root causes of priority problems through interviews with fishbone diagram instruments

Determining the priority of alternative problem solving using the Nominal Group Technique (NGT) technique. This is because the conditions in the field allow for silent discussions to be held. All subjects/informants at the Sidoarjo District Health Office

contributed ideas without mentioning names or anonymously then collected by the facilitator and recapitulation was carried out. The facilitator must write according to the alternative problem solving ideas that have been written by the informant. This NGT technique was chosen in the hope that there will be no distraction from the ideas of each informant regarding alternative solutions to health problems that were initiated so that what was written was truly what he thought.

Results and Discussion

Identification of Health Problems in Sidoarjo Regency in 2021

1. The coverage of COVID-19's vaccination in the elderly at dose 1 in the 3rd trimester 35.40% (target >60%).

Figure 1. Coverage of COVID-19's vaccination in Elderly Dose 1 in Sidoarjo Regency as of September 29, 2021 (Source: KPCPEN, 2021)

Figure 1 shows that the coverage of Covid-19 vaccination in the elderly group dose 1 in Sidoarjo Regency as of September 29, 2021 has not reached the target of >60% as stipulated in Inmendagri No. 43 of 2021. The coverage of COVID-19's vaccination in the elderly group is the lowest coverage compared to with the general public, where the two groups are the benchmarks in determining the level of Implementation of Community Activity Restrictions (PPKM) which has been regulated in Inmendagri No. 43 of 2021 as an effort to prevent the transmission of COVID-19 in Indonesia.

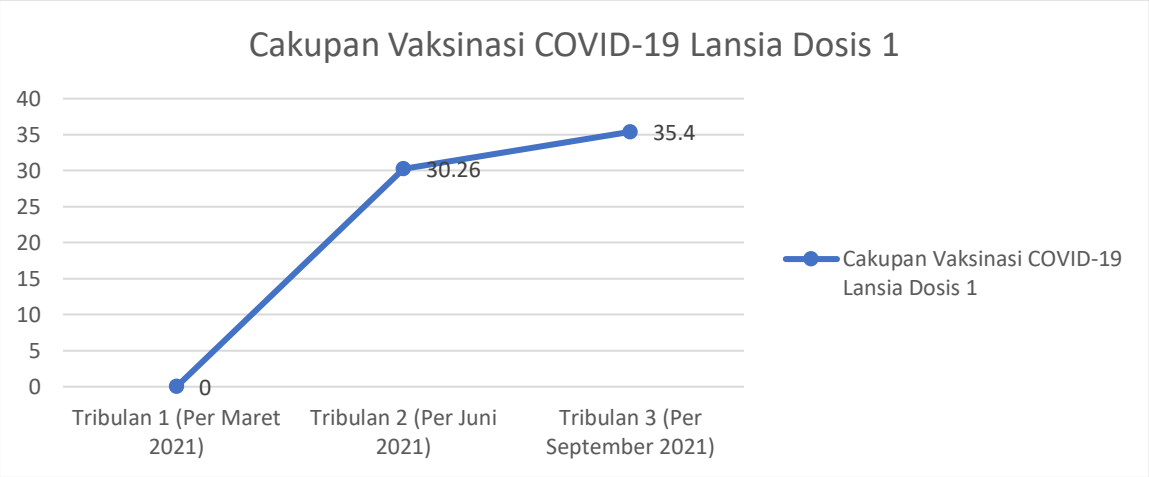

Figure 2. Coverage of Covid-19 Vaccination in Elderly Dose 1 in Trimonths 1,2,3 2021 (Source: KPCPEN, 2021)

Figure 2 shows that there is an increase in the coverage of Covid-19 vaccination in the elderly at dose 1 but it is still far from the target figure (≥60%) set in the Instruction of the Indonesian Ministry of Home Affairs Number 43 of 2021 related to the determination of the PPKM level (Kemendagri, 2021). This Covid-19 vaccination is very important considering the increasingly rapid transmission of Covid-19 and the elderly group is a vulnerable category or a high risk of Covid-19 transmission, especially in the elderly with comorbidities. In addition, massive COVID-19 vaccinations continue to be carried out to achieve herd immunity as a form of Covid-19 prevention which is carried out by observing health protocols.

2. Complete Routine Immunization Coverage (IDL) is still 51.3% (target 93.5%).

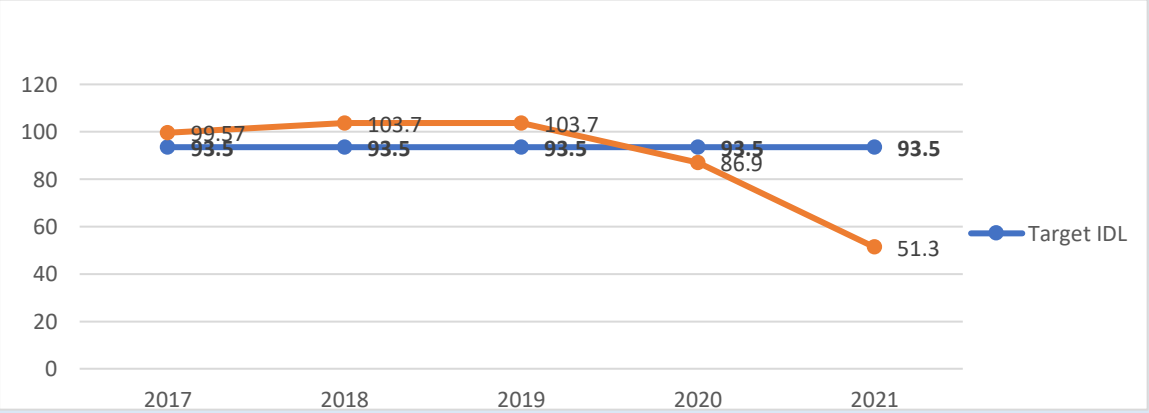

Figure 3. Trends in Complete Routine Immunization Coverage (IDL) in Sidoarjo in 2017-2021 (Source: Health Office Sidoarjo, 2021)

Based on Figure 3, the trend of complete basic immunization coverage (IDL) in Sidoarjo Regency in 2017-2021 fluctuated, but in 2020 (86.9%) and in 2021 (51.3%) there was a significant decrease. This is because the concentration of the program has been shifted to handling Covid-19 so that the immunization coverage for 2020-2021 does not meet the target.

3. Universal Child Immunization (UCI) coverage is still 73.9% or 261 villages out of 353 villages (100% target).

Table 1 Coverage of UCI in Sidoarjo District 2021

PUSKESMAS	JUML DESA	JUM DESA UCI	% DESA UCI	STATUS
SDA	9	9	100.0	Tercapai
UA	9	9	100.0	Tercapai
SK.DANGAN	6	3	50.0	Tidak Tercapai
BDR	15	15	100.0	Tercapai
CANDI	24	23	95.8	Tercapai
PORONG	10	2	20.0	Tidak Tercapai
KD.SOLO	9	4	44.4	Tidak Tercapai
JABON	15	8	53.3	Tidak Tercapai
KREMBUNG	19	19	100.0	Tercapai
TG.ANGIN	19	9	47.4	Tidak Tercapai
TULANGAN	12	12	100.0	Tercapai
KPONGAN	10	7	70.0	Tidak Tercapai
TAMAN	15	15	100.0	Tercapai
TROSOBO	9	0	0.0	Tidak Tercapai
SUKODONO	19	15	79.0	Tidak Tercapai
SEDATI	16	3	18.8	Tidak Tercapai
GEDANGAN	8	8	100.0	Tercapai
GANTING	7	2	28.6	Tidak Tercapai
WARU	11	10	90.9	Tercapai
MEDAENG	6	6	100.0	Tercapai
KRIAN	15	12	80.0	Tidak Tercapai
BR.KRAJAN	7	6	85.7	Tidak Tercapai
BL.BENDO	20	10	50.0	Tidak Tercapai
WONOAYU	23	22	95.7	Tercapai
TARIK	20	13	65.0	Tidak Tercapai
PRAMBON	20	19	95.0	Tercapai
KABUPATEN	353	261	73.9	Tidak Tercapai

Source: Sidoarjo District Health Office, 2021)

Based on Table 1 shows the coverage of Universal Child Immunization (UCI) in 26 Puskesmas in Sidoarjo Regency, there are 14 Puskesmas that have not reached the target according to the number of villages in 2021. Health centers that have not reached the UCI according to the target include Sekardangan, Porong, Kedungsolo, Jabon, Tanggulangin , Kedangan, Trosobo, Sukodono, Sedati, Ganting, Krian, Barengkrajan, Balongbendo, Tarik.

Determination of Priority Problems Using Criteria Matrix (Criteria Matrix Technique)

Based on the calculation of the Criteria Matrix Technique, the priority of health problems in Sidoarjo Regency in 2021 is obtained, namelythe coverage of the covid-19 vaccination for the elderly at dose 1 (quarter 3) is 35.40%. This has still not met the >60% target as stated in the Minister of Home Affairs Number 43 of 2021.

Root Causes of Problems Using Fishbone Diagrams

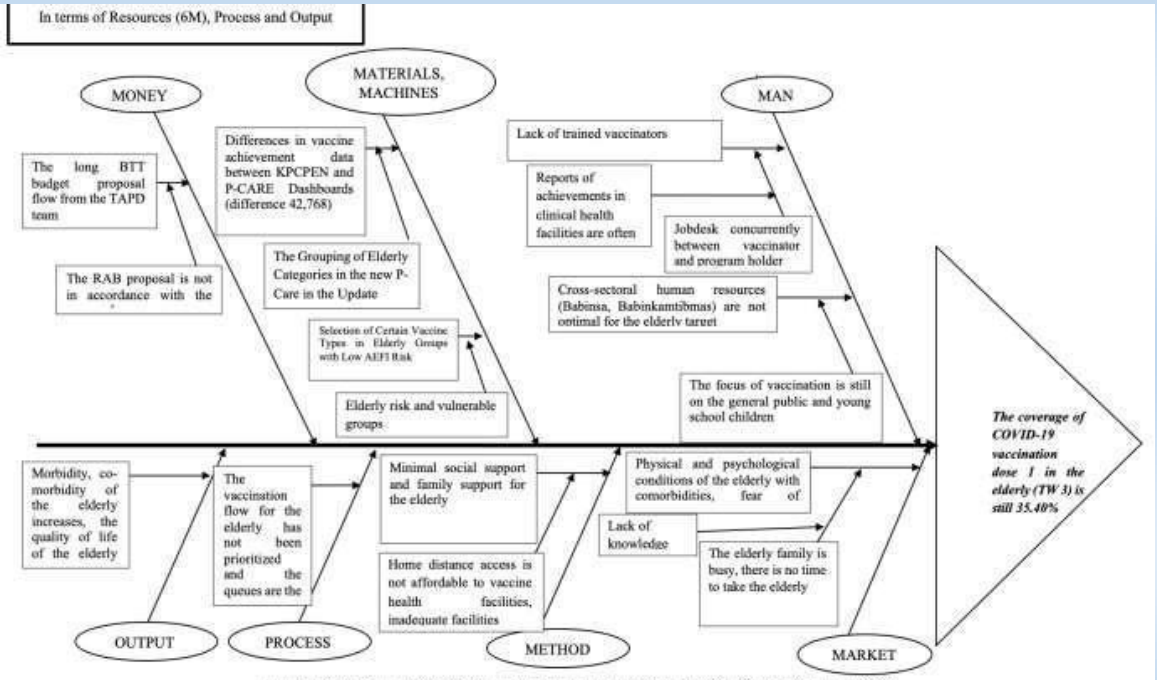

Figure 4. Fishbone Diagram COVID-19 Vaccination Coverage in the elderly dose 1 (TW 3) in Sidoarjo District is still 35.40%

Based on the priority of the problem, the root cause of the problem can be found using a process classification type approach, namely placing the main steps in the process for the coverage of covid-19 vaccination in the elderly, dose 1 (quarter 3) is still at 35.40%. Identify the cause of the problem using a classification based on resources (resources), which includes 6M (Man, Money, Material, Method, Market, Machine).

Identify and Prioritize Alternative
Problem Solving Identify Alternative
Troubleshooting

- Provide insight that can be accepted by the elderly, so that the elderly are not afraid to be vaccinated and develop a sense of personal need.
- Acceleration of vaccine logistics distribution and improvement of P-Care and KPCPEN applications.
- Cross-program and cross-sector collaboration.
- COVID-19's vaccination for the elderly is door to door.
- Increase incentives or honorariums for health workers or teams to improve performance in the field.

Based on the identification of alternative solutions to the problems that have been written, the priority of alternative solutions to the problem of Covid-19 vaccination coverage in elderly dose 1 (Tribulan 3) is 35.40%, namely door to door vaccination. Of the

10 (ten) informants who gave ideas, there were 4 (four) people who initiated door-to-door vaccination as an alternative problem solving that could be done in Sidoarjo Regency. The door to door vaccination for the elderly is meant by health workers or vaccinators directly visiting the elderly's homes to be vaccinated against COVID-19 dose 1.

Analysis of COVID-19 Vaccination Coverage in the Elderly in Sidoarjo District

Analysis of the root causes of the problem using a fishbone diagram with a process classification type approach, namely placing the main steps of the process as the major cause of the problem of Covid-19 vaccination coverage in the elderly, dose 1 (quarter 3) is still 35.40%, namely:

Input Aspects

1. Man

Lack of Trained Vaccination Personnel

Increasing capacity vaccinators and other health workers involved in the implementation of the vaccination program, as well as program managers and supervisors, require training by involving health training agencies. Therefore, the provincial health office and the district/city health office need to develop a training activity plan. The provision of COVID-19 vaccination is carried out by a doctor, nurse or midwife who has competence, as evidenced by the possession of a Registration Certificate (STR).

One vaccinator (nurse, midwife, and doctor) is estimated to be able to provide services for a maximum of 70 targets per day (Ministry of Health, 2021). So that the more vaccinators who take part in the training, the more targets for vaccination services, especially the vaccination of the elderly, who require greater efforts because they are a vulnerable group and the receptivity to vaccination is not as enthusiastic as other groups. The vaccinator personnel in Sidoarjo Regency who have participated in vaccinator training consist of 97 people in 27 health centers, 125 people in 14 hospitals, 89 people in 21 clinics so that the total vaccinators who have been trained are 311 people (Sidoarjo District Health Office, 2021). Meanwhile, based on KPCPEN data, the target group for the elderly in Sidoarjo Regency is 150,044 so that the estimation of 311 people multiplied by 70 elderly targets will get a maximum of 21,770 elderly targets.

Amount the limited number of trained vaccinators is exacerbated by the double burden of the jobdesk, which also doubles as staff in reporting vaccinations and other tasks that were the initial main tasks before the COVID-19 pandemic at health centers, hospitals and clinics in Sidoarjo Regency. This also affects the timeliness in collecting

vaccination reports that have been regulated, with a maximum limit of 18.00 WIB every day to be submitted to the Regent of Sidoarjo for consideration in policy making.

Cross-Sector Human Resources (Babinsa, Babinkamtibmas) Not Optimal in Cooperation in the Implementation of Vaccination for the Elderly

The implementation of vaccination must be supported by all parties, both across programs and across sectors. The cross-sectoral role in the implementation of dose 1 elderly vaccination is still not optimal considering that there are still many elderly targets who are afraid of safety during the implementation of the covid-19 vaccination. Lack of coordination between health workers and babinsa, babinkamtibmas are important factors in cooperation. This is also exacerbated because the focus of vaccination is still on the general public because the coverage is still 51.40%, which means that it has not reached the target according to the Ministry of Home Affairs Number 43 of 2021, which is 70%. In addition, the willingness of the elderly to vaccinate against COVID-19 is still minimal because most of them are afraid of Post Immunization Adverse Events (AEFI), especially in the elderly with comorbidities.

2. Materials, Machines

Incompatibility of Vaccination Coverage Data between KPCPEN Dashboard and P-Care

The difference in data on COVID-19 vaccination coverage on the KPCPEN Dashboard which is lower than that on P-Care is caused by centralized or national system disturbances. However, the Covid-19 vaccination coverage data on the KPCPEN dashboard is the reference or basis for declaring nationally. The difference in data on the coverage of the COVID-19 vaccination for the elderly at dose 1 at KPCPEN and P-Care is around 42,768, so this is the direct cause of the inability to achieve the coverage of the Covid-19 vaccination for the elderly in Sidoarjo Regency. In addition, an update to the recording and reporting system for the Covid-19 vaccination that is not yet feasible has triggered a delay in the coverage of the Covid-19 vaccination in the elderly.

Selection of Certain Vaccine Types in Elderly Groups with KIPI Risk

The implementation of vaccination in the elderly usually uses the Sinovac vaccine. This is because the Post-Immunization Adverse Events (KIPI) from Sinovac are minimally felt considering the elderly are a high-risk group and are prone to be aggravated if there are comorbidities. However, the availability of certain types of vaccines cannot be predicted because the droppings from the Center were given to Sidoarjo Regency and continued with distribution to Puskesmas and other health facilities not previously scheduled. So that in the field it is not uncommon to find a limited stock of Sinovac vaccine even though vaccination will be carried out for the elderly. The Sidoarjo District

Health Office in dealing with this situation, makes plans and timelines to actually prepare the distribution and availability reports of each type of Sinovac, Astrazeneca. The results of a qualitative study by Ema et al (2021) conducted in Taba Penanjung, Central Bengkulu, showed that post-vaccination self care in the elderly group had an influence on elderly vaccination. Self care related to vaccination side effects (AEFI), post-immunization self-care that can increase the elderly's knowledge about COVID-19 vaccination (Ema, 2021).

3. Money

The flow of the Unexpected Assistance Budget (BTT) for Handling COVID-19 through a long process with the approval of the TAPD team. COVID-19 pandemic has had a significant impact on other health programs. Likewise with regard to the budget, most of the budget was refocused to finance efforts to handle COVID-19, including the implementation of the Covid-19 vaccination. The budget for the implementation of the COVID-19 vaccination includes spending on food and drinks for officers, honoraria, procurement of personal protective equipment and medical waste for vaccinations as well as other supporting infrastructure. However, the proposed Budget Plan (RAB) is often not in accordance with the approval contained in the DPA (Budget Implementation Document) for Unexpected Assistance (BTT).

4. Market

Physical and Psychological Conditions of the Elderly with Comorbid, Fear of Vaccines and KIPI. The elderly are a vulnerable group and have a high risk. This is due to physical and psychological conditions that have been disrupted and other distractions. The results of a study by Gunawan, et al (2021) conducted in the working area of the Puskesmas Grogol Petamburan District showed that COVID-19 vaccination in the elderly should be prioritized because most of the elderly tend to have comorbid diseases such as hypercholesterolemia (56.13%), hypertension (27.2 %), diabetes (9.03%) and other diseases. On the basis of these comorbid diseases, the elderly tend to be reluctant to vaccinate against COVID-19, especially if they have to queue with other general public and sit longer to wait their turn because of the physical condition of the elderly who are included in the vulnerable group so that if the priority flow of COVID-19 vaccination for the elderly is carried out.

This is also exacerbated by family factors that tend to be busy or do not have time to take their elderly members to get the Covid-19 vaccination. So that persuasive efforts related to the implementation of Covid-19 vaccination in the elderly are more difficult to do than the general public. Lack of knowledge and awareness about the importance of COVID-19 vaccination for preventive measures against the COVID-19 pandemic is also important. Knowledge of both the family and the elderly themselves. Based on research Aini (2022) states that there was a relationship between sex (p=0.000), age (p=0.003), occupation (p=0.004), education (p=0.001), knowledge (p=0.000), attitudes (p=0.000) had a significant relationship with participation elderly in the COVID-19 vaccination

program at the Merdeka Health Center. So that the trend of elderly COVID-19 vaccination coverage is slow to increase compared to other groups.

5. Method

Social and Family Support Related to COVID-19 Vaccination for the Elderly is Still Minimal. Family and social roles are very important in the implementation of Covid-19 vaccination in the elderly. This is because the quality of life of the elderly, most of whom already depend on their families because they cannot be productive, so that if family and social support for the COVID-19 vaccination is minimal, it will hamper the coverage of COVID-19 vaccination. Forms of family support such as being willing to take the elderly to the vaccination site, accompanying and providing motivation related to the importance of covid-19 vaccination to achieve herd immunity and protect against transmission of covid-19. In addition, the distance from home to the vaccination site is not affordable and the facilities are inadequate so that the elderly will think twice about vaccinating and tend not to vaccinate against COVID-19. Based on research Aini (2022) states that there was a relationship between accessibility (p=0.003), family support (p=0.000) elderly participation in the COVID-19 vaccination program at the Merdeka Palembang Health Center.

Process Aspect

In the process of vaccinating the elderly for COVID-19 in Sidoarjo Regency, the flow is still not feasible, so the elderly still have to queue up and together with other community groups. This affects the participation of the elderly to attend COVID-19's vaccination.

Output Aspect

The implementation of the elderly covid-19 vaccination with coverage that has not met the target due to the high level of morbidity, comorbidity and AEFI in the elderly so that this affects the quality of life of the elderly and the participation of the elderly in the implementation of COVID-19's vaccination.

Conclusion

Implementation of door to door vaccination for the elderly target. This alternative problem solving is very important because by "picking up the ball" looking for elderly targets, the coverage of covid-19 vaccination can increase. Of course, you also have to consider various aspects ranging from targeting data collection to reporting daily

vaccination coverage data as a consideration for stakeholders in making policies related to the description of Covid-19 vaccination in the elderly dose 1 in Sidoarjo Regency.

Acknowledgment

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Declaration of Interest Statement

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analysis, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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3. Survival Life of COVID-19 Patient with Diabetes Mellitus in RSUP dr. Wahidin Sudirohusodo

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Abstract

Background: Diabetes mellitus has been identified as a risk factor that can both aggravate and cause the condition, COVID-19 patients who have diabetes mellitus as a co- morbidity have a double burden of needing to regulate their glucose levels. This study is to identify the parameters associated with the survival of COVID-19 patients with concomitant diabetes mellitus. **Methods:** An observational study using a retrospective cohort study design was used in this investigation. This study included all COVID-19 patients with concomitant diabetes mellitus who were diagnosed and treated at RSUP dr. Wahidin Sudirohusodo in the 2020 timeframe, a total of 185 persons. The entire sampling strategy was used in this study. The log rank test and the Kaplan Meier technique of survival analysis were applied in the study. **Results:** Diabetes complications (p=0.001) and nutritional condition (p=0.000) were shown to be substantially associated to the survival of COVID-19 patients with concomitant diabetes mellitus. Other characteristics, such as diabetes mellitus duration, blood glucose levels, and type of diabetic mellitus therapy, were not shown to be substantially associated. **Conclusion:** Diabetes mellitus problems and poor nutritional status are variables associated with improved survival in COVID-19 patients with concomitant diabetes mellitus at RSUP dr. Wahidin Sudirohusodo..

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Keywords: Survival; COVID-19; Diabetes Mellitus; Comorbid;

Introduction

The pathogen of this disease was quickly identified as a new virus which was later confirmed by the World Health Organization (WHO) and designated by the International Committee of Taxonomy Viruses (ICTV) with the name of the virus being Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). SARS-CoV-2 is a virus that can be transmitted person-to-person through droplets from sufferers. This virus can cause acute

respiratory disorders such as pneumonia, which is called coronavirus disease 2019 and abbreviated as COVID-19 (Zhou *et al*., 2020).

Research in the Mexican community on survival analysis of confirmed patients COVID-19. In patients who do not have comorbidities, there is a good chance of survival higher. Furthermore, in confirmed patients who have comorbid diabetes or hypertension with complications, the risk is twice as high (Sousa *et al*., 2020). Diabetes is an immune response disorder caused by the immune system inappropriately attacks pancreatic cells and destroys them. Diabetic patients have disturbances in the body's immune response to infection is related to the production of cytokinin and changes in the immune response in the activation of macrophages and T cells (Critchley *et al*., 2018). SARS-CoV-2 binds to their target cells via the angiotensin-converting enzyme 2 or angiotensin-converting enzyme 2 (ACE-2) which is expressed mainly in lung epithelial cells, intestines, kidneys, and blood vessels. ACE-2 expression is increased in type 1 .Diabetic patients and type 2 diabetes who are treated with ACE inhibitors and angiotensin II type-I receptor blockers (ARBs) (Fang *et al*., 2020).

COVID-19 is a double challenge for diabetics themselves. Diabetes mellitus has been reported to be a risk factor that can exacerbate the disease and in At the same time, COVID-19 patients with co-morbidities with diabetes mellitus have a double burden by keeping glucose levels under control. The data shows that in a number of 52 patients at Home Wuhan Jin Yin-tan sickness Among them as many as 32 patients with the status of death had disease comorbidities, namely cerebrovascular disease in 22% and diabetes in 22%. Study Another study was conducted on 173 patients with severe cases having comorbid diseases such as: hypertension (23.7%), diabetes mellitus (16.2%), coronary heart disease (5.8%), and cerebrovascular disease (2.3%). In the third study, of 140 patients who were hospitalized for positive COVID-19, 30% have hypertension and 12% have diabetes (Zhou *et al*., 2020).

Methods

The type of research used is an observational study with a retrospective cohort study design. In a retrospective cohort study, factors and diseases had occurred in the past before the start of the study, so the research variables were measured through historical records. This study was conducted from September to November 2021. The population in this study were all COVID-19 patients with comorbid diabetes mellitus who were diagnosed and received treatment at dr. Wahidin Sudirohusodo in the 2020 period as many as 185 people. The sampling technique used is the total sampling technique. The total number of samples studied by the researchers was 185 samples based on records held by the Medical Record Installation. Meanwhile, the number of samples that met the inclusion criteria were 117 samples.

The research instrument that will be used was in the form of a recording sheet. The data used in this study is secondary data obtained from the patient's medical records at RSUP dr. Wahidin Sudirohusodo during the 2020 period. The data that has been collected is then processed manually using the SPSS program including editing, coding, data entry, data cleaning, and data analysis. The analysis used is the Kaplan Meier method of survival analysis and the log rank test. Data presentation is done in the form of frequency distribution table, tabulation table, survival curve, and accompanied by narration.

Results

Based on the result of the analysis of the old factor of diabetes mellitus and the relationship between survival of COVID-19 patients and comorbid diabetes mellitus, it shows that most respondents have been diagnosed with diabetes mellitus for less than 5 years, namely 61 people. Among them there are 38 respondents (62.3%) who are still alive and 23 (37.7%) have died. Compared to the group of respondents who were diagnosed more than 5 years, there were 56 people, of which 26 people (46.4%) were still alive and 30 people (53.6%) had died. The log rank test conducted showed that there was no significant difference in the survival relationship for the group of respondents who had been diagnosed 5 years and > 5 years (log rank = 0.06).

Based on the results of factor analysis of blood glucose levels and the relationship between survival of COVID-19 patients and comorbid diabetes mellitus, it showed that the highest group of respondents had poor glycemic control, as many as 105 people. Among them there are 54 people (51.4%) who are still alive and 51 people (48.6%) who have died. While in the group of respondents who have good glycemic control as many as 12 people. Among them there are 10 people (83.3%) who are still alive and 2 people (16.7%) who have died. The log rank test conducted showed that there was no significant difference in the survival relationship between groups of respondents who had good glycemic control and those who had poor glycemic control (log rank = 0.10).

Based on the results of the factor analysis of the type of diabetes mellitus treatment and the relationship between the survival of COVID-19 patients with comorbid diabetes mellitus, it showed that the respondents mostly treated diabetes mellitus by means of oral hypoglycemic therapy and did not seek treatment at all, each as many as 38 people. In the group of respondents who did not receive treatment at all, 22 people (57.9%) had died and 16 people (42.1%) were still alive. Meanwhile, in the group receiving oral hypoglycemic therapy, 19 people (50%) were still alive and 19 people (50%) had died. The group of respondents who did the least combination therapy was 4 people, of which 2 people (50%) were still alive and 2 people (50%) had died. The log rank test conducted showed that there was no significant difference in the relationship of survival to the type of diabetes mellitus treatment that had been carried out by the respondents (log rank = 0.946).

Based on the results of the analysis of nutritional status factors and the relationship between survival of COVID-19 patients and comorbid diabetes mellitus, it shows that of the 117 respondents, the most respondents were in the normal nutritional status group, as many as 39 people. Among them 35 people (87.2%) are still alive and 5 (12.8%) have died. Respondents were at least in the group with less nutritional status as many as 2 people. Among them 1 person (50%) has died and 1 person (50%) is still alive. The log rank test conducted showed that there was a significant difference in the survival relationship between groups of respondents who had poor nutritional status, normal, overweight, level I obesity, and level II obesity (log rank = 0.000).

Tabel 1: The Relationship of Survival of COVID-19 Patients with Comorbid Diabetes Mellitus Based on Independent Variables at RSUP dr. Wahidin Sudirohusodo in 2020.

Variable	Status				n	%	*P*
	Life		Death				
	n	%	n	%			
Length Diabetes Melitus							0.062
≤ 5 years	38	62.3	23	37.7	61	100	
> 5 years	26	46.4	30	53.6	56	100	
Blood Glucose Level							0.1
Good glycemic control	10	83.3	2	16.7	12	100	
Poor glycemic control	54	51.4	51	48.6	105	100	
Type DM Treatment							0.946
No Treatment	22	57.9	16	42.1	38	100	
Oral Hypoglicemic Therapy	19	50.0	19	50.0	38	100	
Insulin Therapy	21	56.8	16	43.2	37	100	
Combination Therapy	2	50.0	2	50.0	4	100	
Complication DM							0.001
Yes	11	29.7	26	70.3	37	100	
No	53	66.3	27	33.8	80	100	
Nutritional status							0.000
Not enough	1	50.0	1	50.0	2	100	
Normal	35	87.2	5	12.8	39	100	
Overweight	19	52.8	17	47.2	36	100	
Obesity I	9	29.0	22	71.0	31	100	
Obesity II	1	11.1	8	88.9	9	100	
Total	64	54.7	53	45.3	117	100	

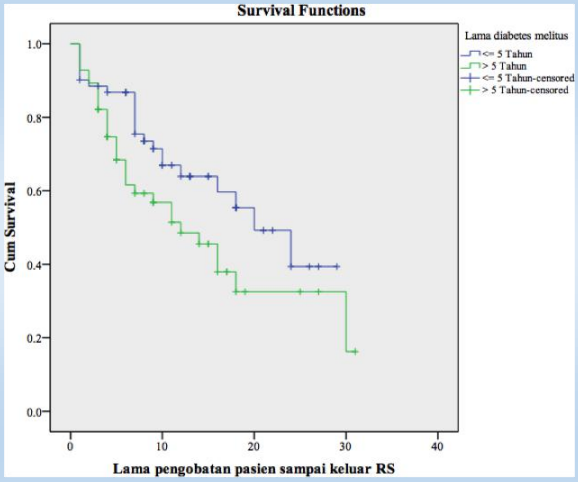

Figure 1: Survival Curve of COVID-19 Patients with Comorbid Diabetes Mellitus Based on the Duration of Diabetes Mellitus

Probability of survival of COVID-19 patients with comorbid diabetes mellitus based on the duration of diagnosis of diabetes mellitus. The probability of survival of respondents diagnosed 5 years is better than respondents who have been diagnosed with diabetes mellitus > 5 years, ie respondents who are diagnosed 5 years have a probability of 39.4% while in the respondent group who have been diagnosed with diabetes mellitus > 5 years it is 16.3 %. In addition, there are differences in the median survival of respondents who have been diagnosed with diabetes mellitus 5 years and > 5 years. Respondents who had been diagnosed with diabetes mellitus 5 years were 20 days higher, while respondents who had been diagnosed > 5 years had a median survival of 12 days.

Probability of survival of COVID-19 patients with comorbid diabetes mellitus based on blood glucose levels. Respondents who have good glycemic control have a higher probability than respondents who have poor glycemic control. The probability in the group of respondents who have good glycemic control is 76.4% while in the opposite group it is 16.8%. Both groups of respondents had a median survival of 16 days.

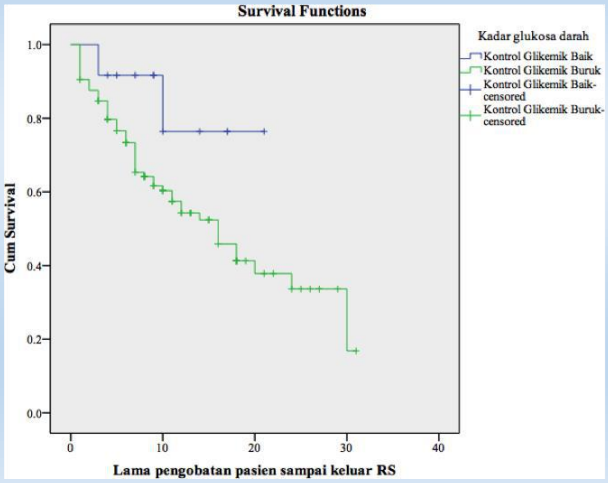

Figure 2: Survival Curve of COVID-19 Patients with Comorbid Diabetes Mellitus Based on Blood Glucose Level

Probability of survival of COVID-19 patients with comorbid diabetes mellitus based on the type of diabetes mellitus treatment carried out by the respondent. The highest probability of survival of respondents is respondents who treat diabetes mellitus with combination therapy, namely the probability of survival is 50%. The lowest probability of patient survival was the group of respondents who did not take any treatment at all, which was 19.4%. Among the four types of treatment carried out by respondents, the median survival was different. The highest median was in the group receiving treatment with insulin therapy, which was 20 days. Furthermore, the group that did not take any treatment at all had a median survival of 16 days. Meanwhile, in the group treated with oral hypoglycemic therapy and combinations, the median survival was 14 and 2 days, respectively.

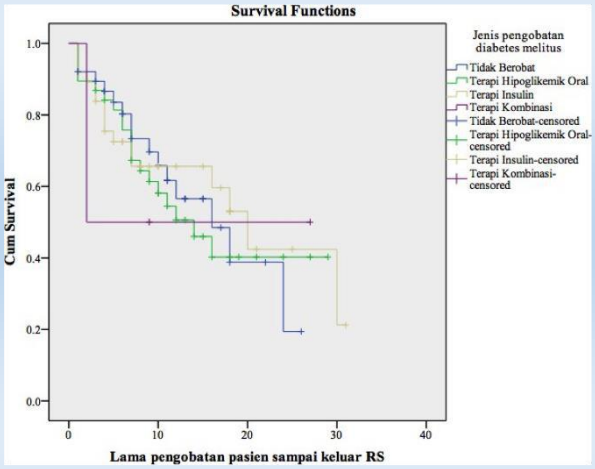

Figure 3: Survival Curve of COVID-19 Patients with Comorbid Diabetes Mellitus by Type of Diabetes Mellitus Treatment

Probability of survival of COVID-19 patients based on the presence of complications caused by diabetes mellitus. The probability of survival in the group without complications was higher than in the group with complications, which was 29.4% in the group without complications and 6.5% in the group with complications. There was a difference in the median survival of the two groups. The uncomplicated group had a higher median survival of 30 days. Meanwhile, in the group with complications, the median was 9 days.

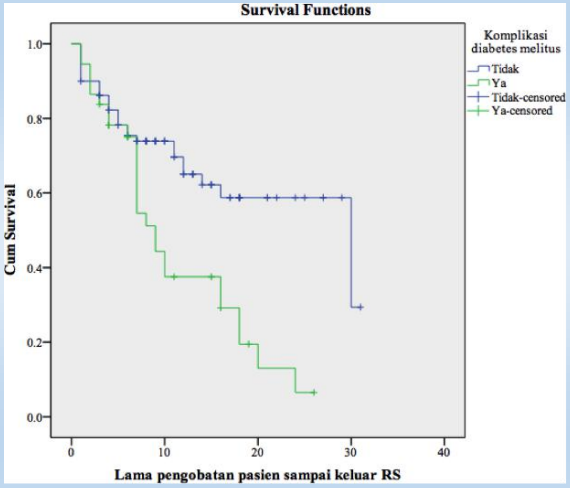

Figure 4. Survival Curve of COVID-19 Patients with Comorbid Diabetes Mellitus Based on Complications of Diabetes Mellitus

Probability of survival of COVID-19 patients with comorbid diabetes mellitus based on nutritional status. The highest probability of survival is respondents who are in the group of undernourished status, which is 50%. While the lowest probability is in the respondents who are in the obesity nutritional status group level II, which is 0%. There was a difference in median survival between all groups. The highest median survival was in the normal nutritional status group with a median survival of 30 days. While the lowest median survival was in the obesity nutritional status group level II with a median survival of 3 days.

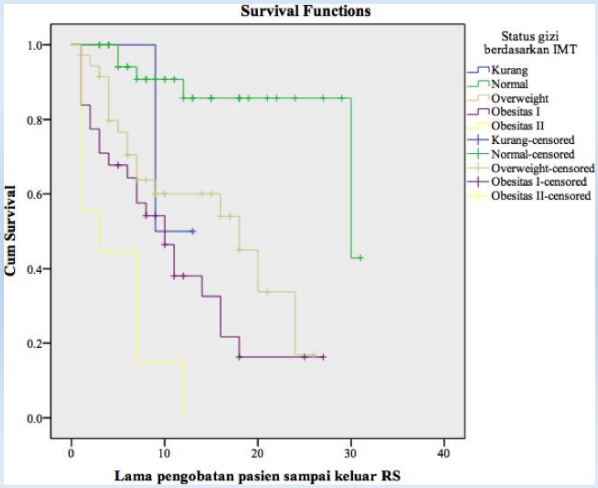

Figure 5. Survival Curve for COVID-19 Patients with Comorbid Diabetes Mellitus Based on Nutritional Status

Discussion

In this study, the factors that were significantly related to the survival of COVID-19 patients with comorbid diabetes mellitus were complications of diabetes mellitus and nutritional status. Meanwhile, other factors such as duration of diabetes mellitus, blood

glucose levels, and type of diabetes mellitus treatment were not significantly related to the survival of COVID-19 patients with comorbid diabetes mellitus. Survival in the group of respondents who have been diagnosed 5 years has a better probability of survival (39.4%) compared to the group of respondents who have been diagnosed with diabetes mellitus for > 5 years (16.3%). However, statistically this variable was not significantly related to the survival of COVID-19 patients with comorbid diabetes mellitus with p-value = 0.062. Although a person's length of time suffering from diabetes mellitus can affect complications, the longer they suffer from diabetes, the higher the risk of complications. In patients with SARS, a history of type 2 diabetes is an independent predictor of mortality and morbidity in patients (Yang *et al*., 2016). People who have a longer duration of diabetes mellitus are more likely to have diabetes mellitus complications and this leads to the severity of COVID-19 infection (McGurnaghan *et al*., 2021).

Poor glycemic control was defined when a blood glucose measurement > 140 mg/dL was taken at first hospital admission. COVID-19 patients with comorbid diabetes mellitus who have good glycemic control have a better probability of survival (76.4%) compared to the group with poor glycemic control (16.8%). The effect of good glycemic control during COVID-19 treatment in patients with diabetes mellitus has been associated with reducing the severity of COVID-19. In addition, it is associated with a lower mortality rate compared to patients with poor glycemic control (Pasquel and Umpierrez, 2020). This is related to ACE-2 receptor expression, dysregulation of immune cell number and activity, alveolar dysfunction, endothelial dysfunction, and increased systemic coagulation (Erener, 2020). Although statistically through the log rank test this variable was not significantly related to the survival of COVID-19 patients with comorbid diabetes mellitus with p-value = 0.10. respondents who have uncontrolled glycemic have a higher mortality rate and longer length of stay (LOS) than respondents who have controlled glycemic or not diabetes mellitus patients at all (Bode *et al*., 2020).

This has something to do with how to control glycemic control. The severity of being infected with COVID-19 can be caused by an extended time to clear the virus from the body. The prolongation is the result of stopping the activation of the enzyme Dipeptidyl Peptidation IV (DPP4) in the use of anti-diabetic drugs. The drug can increase insulin secretion and decrease blood glucose levels at the same time, DPP4 is an aminopeptidase in cell membranes that plays a role in various physiological processes including the body's immune response (Abdi et al., 2020). However, statistically through the log rank test this difference was not significant with p-value = 0.946 .

Statistically, through the log rank test, p-value = 0.001 was obtained, which means that the complication variable of diabetes mellitus has a significant relationship to the survival of COVID-19 patients with comorbid diabetes mellitus. Respondents who have complications of diabetes mellitus have a lower probability of survival than respondents who do not have complications of diabetes mellitus, namely 6.5% of respondents who have complications of diabetes mellitus and 29.4% of respondents who do not have

complications of diabetes mellitus. This is not in line with previous studies that conducted the Cox proportional hazard regression test to see risk factors associated with patient mortality. The result is that there is no relationship between complications of diabetes mellitus as a risk factor for the high mortality rate of COVID-19 patients with comorbid diabetes mellitus. Patients will tend to have a low chance of recovering and prolonging the length of treatment in the hospital (Wargny *et al*., 2021). Complications that may increase mortality include Cardiovascular Disease (CVD), Acute Kidney Disease (AKI), Chronic Kidney Disease (CKD), and others. This is because infection with the SARS-CoV-2 virus can cause increased levels of inflammatory mediators, such as lipopolysaccharides, inflammatory cytokines, and toxic metabolites (Lim *et al*., 2021).

The nutritional status of COVID-19 patients who have comorbid diabetes mellitus is described by an assessment based on Body Mass Index (BMI). Statistically through the log rank test, p-value = 0.000 was obtained, which means that the nutritional status variable has a significant relationship to the survival of COVID-19 patients with comorbid diabetes mellitus. respondents who have the highest probability of survival are respondents with less category that is equal to 50%. Furthermore, the normal category is 42.9%, the overweight category is 16.9%, the first level obesity category is 16.3%, and the second level obesity category is 0%. patients who have a BMI in the obesity category have a higher risk of death and lower survival than patients who are not in the obese BMI category with values of 18.9% and 88.24%, respectively. Obesity in patients with diabetes mellitus causes metabolic disorders and insulin resistance. The amount of non-esterified fatty acids, glycerol, hormones, cytokines, proinflammatory markers, and other substances involved in the development of insulin resistance is increased (Peres *et al*., 2020). Excess free fatty acids will interfere with glucose uptake by muscles so that it can cause hyperglycemia. In addition, insulin insufficiency can inhibit glucose uptake into muscle and fat cells, resulting in an increase in blood glucose (Ardiani *et al*., 2021).

Conclusion

Not having diabetes mellitus complications and having poor nutritional status are factors that are significantly related to better survival in COVID-19 patients with comorbid diabetes mellitus at dr. Wahidin Sudirohusodo. Meanwhile, other factors such as duration of diabetes mellitus, blood glucose levels, and type of diabetes mellitus treatment were not significantly related to the survival of COVID-19 patients with comorbid diabetes mellitus. This study was expected to pay attention to several significantly related factors such as complications of diabetes mellitus and nutritional status so that it can be developed to be a method of predicting the prognosis of COVID-19 in patients with diabetes mellitus so that it can reduce the severity and mortality of patients.

Declaration of Interest Statement

The authors declare that they have no conflict of interest.

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4. Characteristics of Covid-19 Patients as a Result of Epidemiology Investigations at Haji Adam Malik Hospital in 2020

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Abstract

Background: In 2020 the management of Haji Adam Malik Hospital decide the need for an epidemiology investigation (tracing) of Covid-19 cases in the hospital. This study aims to describe the characteristics of cases as a result of epidemiology investigations that have been carried out. **Materials and Methods**: This is a retrospective study conducted by interviewing respondents using the Whatsapp application. Respondents were asked to answer questions on a questionnaire. Population of the study is all of them who working at Haji Adam Malik Hospital while the samples are all them who were reported by the head of the work unit. The results of study were analyzed with univariate analyses. **Results**: There were 265 cases of Covid-19 infection were found. Most of the cases were women, health workers and were in the age group 31-40 years. Health workers who were most infected with Covid-19 were nurses, doctors and laboratory workers. The mortality rate was 0.77%. Most of the transmission came from

within the hospital. From the 263 cases who completely answered the questionnaire, most of the cases experienced symptoms and from the 262 cases that completely answered the questionnaire, most had no comorbidities. **Conclusions**: There were 265 Covid-19 cases who working at H. Adam Malik Hospital in 2020 with the mortality rate was 0.77%.

Keyword: Covid-19, Hospital, Epidemiology Investigations

Introduction

COVID-19 is the disease caused by a new coronavirus called SARS-CoV-2. COVID-19 affects different people in different ways and became pandemic in the world. The most common symptoms of COVID-19 are fever, dry cough, fatique. Other symptoms that are less common and may affect some patients include loss of taste or smell, nasal congestion, conjunctivitis (also known as red eyes), sore throat, headache, muscle or joint pain, different types of skin rash, nausea or vomiting, diarrhea, chills or dizziness. Globally, as of 6:36pm CEST, 12 August 2022, there have been 585,950,085 confirmed cases of COVID-19, including 6,425,422 deaths, reported to WHO**.**

Meanwhile in Indonesia, according to data from the Ministry of Health, as of 08 August 2022, there are 6,249,403 confirmed cases were reported, 6,042,657 cases recovered, and 157,113 cases died. From the all cases in Indonesia, 156,437 are in North Sumatra. In addition to infecting the general public, COVID-19 also infects health workers as the front line in dealing with COVID-19. WHO estimates that between 80 000 and 180 000 health and care workers could have died from COVID-19 in the period between January 2020 to May 2021, converging to a medium scenario of 115,500 deaths. Referring to LaporCOVID-19 data, there were 2,087 Indonesian health workers who died from COVID-19, as of 15 August 2022. Most of those who died were doctors, with a total of 751. Meanwhile, nurses in Indonesia who died from COVID-19 reached 670 and 398 midwives. Likewise dozens of other health workers. The highest death rate was recorded in July 2021, when Indonesia reached the peak of the second wave of the COVID-19 pandemic, which was 502 workers[4].

The exposure of health worker had a wide impact, one of which was the temporary closure of several hospitals in Indonesia. Several hospitals that were closed because their health workers were exposed to COVID-19 were IA Moeis Samarinda Hospital, Cahaya Medika Hospital (RSCM) Praya Lombok Tengah, Muyang Kute Bener Meriah Hospital, Aceh Muyang Kute Hospital, Cibabat Regional General Hospital (RSUD) in Cimahi City, Harapan Health Center in East Sentani, Papua.

To prevent the health services in hospitals closed due to the transmission of COVID-19 in hospitals, the management of Haji Adam Malik Hospital formed a special team whose task is to conduct an intensive and comprehensive epidemiology investigation in order to find cases, determine the source of transmission and the pattern of spread so that control is carried out and the transmission of COVID-19 infection in hospitals can be optimized and hospitals can still open their health services to the public. The two authors in this study are epidemiologists who are chairmen and coordinator in the team in charge of building systems and conducting epidemiology investigations. The full results of this epidemiology investigation are not yet known. Therefore, this study was conducted with the aim of to describe characteristics of COVID-19 patients in staff working at H. Adam Malik Hospital during 2020 as a result of epidemiology investigations that have been carried out.

Materials and Methods

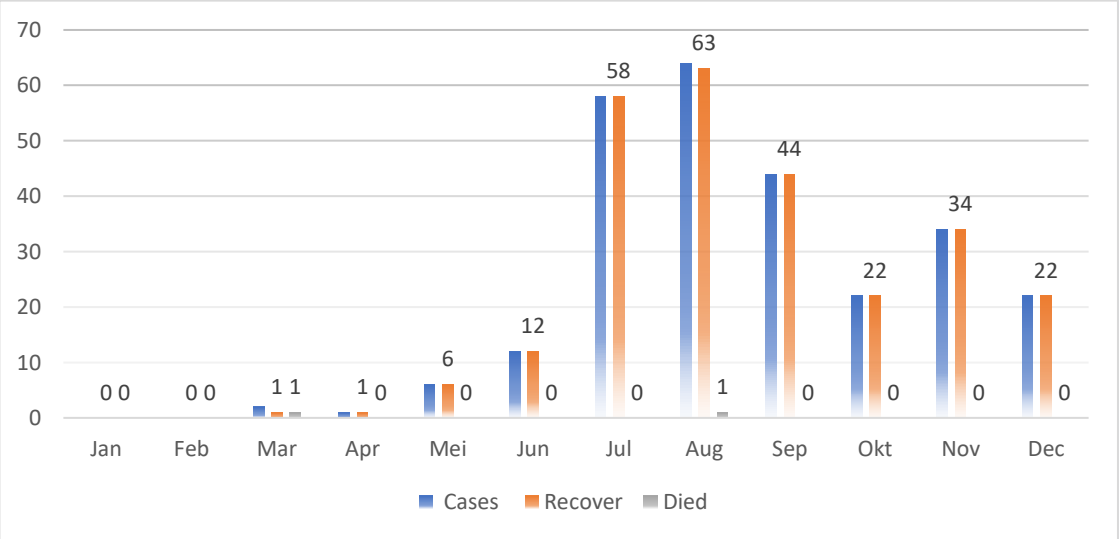
This is a retrospective study conducted by interviewing respondents or patients in writing and orally using the Whatsapp (WA) application. Respondents who were confirmed positive for COVID-19 were asked to answer a questionnaire sent by the tracing officer (tracer) after their health's condition allowed for an interview. Confirmation of cases based on the results of polymerase chain reaction (PCR) swab test at the Haji Adam Malik Hospital laboratory or other hospital laboratories.

The questionnaire used is a reference questionnaire from WHO which has been modified according to the needs of epidemiology investigations. Population of the study is all employees and staffs who working at Haji Adam Malik Hospital: staff of Haji Adam Malik Hospital, College Students of Specialist Medical Education and staff of the Faculty of Medicine from University of North Sumatra (USU), outsourcing officer from PJA Company (cleaning service officers) and volunteer health workers.

The samples are all staffs who are reported by the head of the work unit to tracer. Respondents were asked to answer questions on a questionnaire containing questions about personal data, comorbidities, history of exposure to COVID-19 infection and symptoms experienced. The results of the interviews were then recapitulated and analyzed with univariate analyses. The tracer here is the author, an epidemiologist who is competent in conducting epidemiology investigations.

Results and Discusions

Graphic 1: Trends of COVID-19 at Haji Adam Malik Hospital Staff in 2020



Because the population in this study involved staff from outside the Haji Adam Malik Hospital, that are staff and students from USU and staff from the PJA Company, authors were unable to determine the prevalence of COVID-19 because the total number of denominators was unknown.

Graphic 1 illustrates the trend of COVID-19 cases among Haji Adam Malik Hospital staff during 2020. There were 265 cases of COVID-19 found in staff working at H. Adam Malik Hospital in 2020. 265 of these cases were old and new cases. Where 5 people from all cases are reinfection cases. So the actual number of infected people is 260 people and morbidity rate is 0.77%. The first COVID-19 case entered the city of Medan in March 2020, where 2 of them were staff of Haji Adam Malik Hospital. The highest cases occurred in August. This is in accordance with the pattern that occurred in Indonesia as a whole, the highest cases occurred in August. There were 2 cases of death in 2020, 1 case in March and 1 case in August.

The case who died in March 2020 was infected when he returned from a foreign trip and hospitalized at the Haji Adam Malik Hospital, a 49-year-old man with comorbid Post Tuberculosis, Diabetes Mellitus (DM) and overweight. At that time, March 2020, was the early of the COVID-19 pandemic which was very scary and the COVID-19 clinical guidelines do not exist so that the therapy for patients was also not optimal. While the case who died in August 2020, was a 55-year-old woman and had comorbid DM and immune disorders. This woman case hospitalized outside the Haji Adam Malik Hospital and died at the hospital. Based on the results of epidemiology investigations that have been carried out, the case is part of the Patar Cluster, which is a cluster that started with the case of a male nurse named Patar who worked in one inpatient ward and then spread the infection to 22 other nurses. The transmission process occurred from August 14, 2020 to September 16, 2020 and spread to 3 other inpatient wards. It is suspected that the Patar case is a case where the virus variant spreads more quickly so that it greatly affects her health condition that has a history of immune disorders and died later.

Table 1: Characteristics of COVID-19 at Haji Adam Malik Hospital Staff in 2020

Variables	n	%
Sex		
Male	79	29.81
Female	186	70.19
Age Group (years)		
20 – 30	67	25.28
31 – 40	88	33.21
41 – 50	64	24.15
>50	45	16.98
Not accesed (NA)	1	0.38
Profession		
Health worker	236	89.06
Non health worker	29	10.94

Table 1 illustrates most cases are female (70.19%), are in the age group 31-40 years and work as health workers (89.06%). The location of this research is a hospital so it is very natural that most of the professions are health workers. As is well known, the health workers who work the most in hospitals are nurses and nurses are generally women. These nurses, especially in the age group <40 years, are placed in inpatient wards so that the possibility of contact with COVID-19 patients is greater.

Table 2 : Health profession of COVID-19 Patients at Haji Adam Malik Hospital in 2020

Professions	n	%
Nurse	116	49.15
Doctor	74	31.36
Laboratory staff	14	5.93
Medical record staff	11	4.66
Pharmacy staff	9	3.81
Nutrisionist	6	2.54
Others	6	2.54

Table 2 explain that nurses and doctors are the health workers who are most infected with COVID-19. This is because these two professions are in direct contact with patients at all times. However, the nurses and doctors who were confirmed positive were not the nurses and doctors on duty in the COVID-19 ward, but in the ordinary ward. There were no cases of COVID-19 among nurses and doctors in the COVID-19 ward at that time, probably because nurses and doctors who used to work in the infection ward were used to treating infectious patients so they were more obedient in the use of personal protective equipment (PPE). In 2020, a small cluster appeared in the clinical laboratory unit so that the cases were higher than other health workers

such as medical record staff, pharmacist staff, nutritionists and the other health workers. Other health workers referred to in the table above are physiotherapists, dentists, HIV AIDS counsellors and public health officers.

Table 3 : Transmission source of COVID-19 Patients at Haji Adam Malik Hospital in 2020

Transmission source	n	%
Within hospital	142	53.58
Direct	40	28.17
Undirect	102	71.83
Out of hospital	76	28.68
Unknown	47	17.74

Table 3 explain that the largest source of transmission came from within the hospital (53.58%). This is relevant to the hospital as a place to treat COVID-19 patients and a source of infection for various diseases. Followed by transmission from outside the hospital (28.68%) and transmission from unknown sources (17.74%). Of the 142 people who were infected in the hospital, 28.17% were infected directly from the patient or the ward of the COVID-19 patient. This is due to non-compliance with the use PPE due to the condition of health workers who are very tired and sometimes forget to wear complete PPE. For this, WHO has very clearly recommended the use of PPE to prevent the transmission of COVID-19. The remaining 71.83% were infected indirectly. Indirect transmission occurs when a case that is directly infected from a COVID-19 patient or COVID-19 ward then transmits it to other nurses while on duty in the same ward during the same office hours; more than 2 hours. The ward on duty is a closed ward that uses air conditioning for more than 2 hours so that infection transmission is unavoidable. While transmission from outside the hospital generally comes from family clusters.

Table 4 : Symptomps type of COVID-19 Patients at Haji Adam Malik Hospital in 2020

Symptoms Type	n	%
Symptomatic	195	74.14
Fever and respiratory symptoms (cough, shore throat,difficulty of breathness)	157	33.84
Smell/taste disorder	72	15.52
Muscle Pain	55	11.85
Headache	42	9.05

Diarrhea	42	9.05
Nausea/Vomiting	29	6.25
Fatique	29	6.25
Malaise	12	2.59
Sweating	11	2.37
Hipotermia	6	1.29
Conjunctivitis	5	1.08
Rash	4	0.86
Asymptomatic	68	25.86

When the interview was conducted, the patient's condition generally had not all been tested negative for their swab results. So when answering questions about the symptoms experienced, there may still be other symptoms that appear after the interview so they are not mentioned. Table 4 explain most of the cases experienced symptoms (74.14%). The data in the table above explains the percentage of each type of symptom to all existing symptoms. Generally, each case experiences more than 1 symptom at a time. For example most cases experience symptoms of fever, cough and loss of smell/taste at once. Meanwhile, there were 25.86% who did not experience symptoms at the time of the interview, meaning that this number could change because after the interview, symptoms could appear. In addition to the symptoms of fever, cough and loss of smell/ taste, symptoms of joint pain and headache are the most common symptoms experienced by cases. This is still relevant to the results of the ISARIC Clinical Characterization Group (2021) study which stated that the most common symptoms experienced were fever (69%), cough (68%) and shortness of breathing (66%). Likewise with research by Weng, LM, etc (2021) which explains that myalgia/athralgia symptoms are experienced in 1.6-61% cases and headache is experienced in 0.7-47.1% cases.

Table 5 : Comorbidities type of COVID-19 Patients at Haji Adam Malik Hospital in 2020

Comorbidities Type	n	%
Commorbid (+)	112	42.26
Obesity	36	24.49
Hypertention	35	23.81
Diabetes Mellitus (DM)	13	8.84
Gastroesophageal Reflux Disease (GERD)	8	5.44
Sinusitis	6	4.08
Hernia Nucleus Pulposus (HNP)	5	3.40

Asthma	5	3.40
Pregnancy	5	3.40
Cardiovascular disease	4	2.72
Others	30	20.41
Commorbid (-)	150	56.60
Not asssed (NA)	3	1.13

From table 5, the majority of the 265 cases (56.60%) did not have comorbidities. Meanwhile, there are 42.26% who have comorbidities. Of the 112 cases, the three most comorbids were obesity 24.49%, hypertension 23.81% and DM 8.85%. This study supports the meta-analysis study by Ng, etc (2021) said the three most prevalent comorbidities of COVID-19 were hypertension (21.3%), obesity (18.3%), and diabetes (18.1%) patients. Centers for Disease Control and Prevention (CDC), cited by Sanyaolu et al (2020) in their meta-analysis study, stated that the 5 biggest comorbidities in COVID-19 cases were hypertension, obesity, chronic lung disease, DM and cardiovascular system disease. Result of study by Osibogun. A, etc (2021) show that the comorbidities that were identified as risk factors for death were hypertension (OR: 7.36; 95%CI: 4.55–11.89), diabetes (OR: 10.67; 95%CI: 6.31–18.07).

According to WHO (2021), worldwide obesity has nearly tripled since 1975. In 2016, more than 1.9 billion adults, 18 years and older, were overweight. Of these over 650 million were obese. Also according to WHO (2021), hypertension is a major cause of premature death worldwide. An estimated 1.28 billion adults aged 30-79 years worldwide have hypertension, most (two-thirds) living in low- and middle-income countries. About 422 million people worldwide have diabetes, the majority living in low- and middle-income countries, and 1.5 million deaths are directly attributed to diabetes each year. Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades. No wonder, when the COVID-19 pandemic emerged, those who had these 3 comorbidities, became the people who were infected a lot with COVID-19 too including in Indonesia.

Conclusions

To control the spread of the COVID-19 pandemic among staff working at Haji Adam Malik Hospital, an epidemiology investigation has been carried out. This epidemiology investigation aims to find cases, determine the source of transmission and the pattern of spread so that the treatment of confirmed COVID-19 staff and its impacts can be carried out appropriately, not to close the health service to public just because many staff who are health workers are infected with COVID-19. The results of this epidemiology investigation also showed that there were 265 COVID-19 cases among

staff working at Haji Adam Malik Hospital with a mortality rate of only 0.77%. Furthermore, this epidemiology investigation will continue at Haji Adam Malik Hospital the following year because it has been proven to be able to control the spread of COVID-19 infection and reduce mortality to 0% in 2022. It is recommended that this effort is also followed by other hospitals to reduce mortality in health workers who are infected with COVID-19 or other infectious diseases.

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Declaration of Interest Statement

We declare that they have no conflict of interests.

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5. Vitamin D as Potential Protecting Factor in COVID-19 Infection and Severity: A Systematic Review

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Abstract

Background: The coronavirus disease 2019 (COVID-19) is a global public health emergency which has spread rapidly to countries around the world. Some studies have linked low vitamin D status to major human diseases. Vitamin D is also one of factors associated with COVID-19 infection and prognosis. It has been known that vitamin D increases the ratio of Angiotensin Converting Enzyme 2 (ACE 2) as potential SARS-CoV-2 receptor to ACE, thus reducing subsequent inflammatory cytokine response to pathogens and lung injury. We aim to investigate the potential protecting of Vitamin D status to prevent the infection and to decrease severity of COVID-19. **Methods:** Literature searches were conducted using Proquest, Clinical Key, PubMed, Google Scholar, along with manual handsearching and matched with inclusion and exclusion criteria. Five cohort studies had been collected to be critically appraised using Newcastle Ottawa Scale. **Results:** A study with the highest quality, by Raharusun et. al, reported an older and male case with a pre-existing condition and below normal Vitamin D levels were associated with increased odds of death. When controlling for age, sex, and comorbidity, Vitamin D status is strongly associated with the COVID-19 mortality outcome of cases. Tan, C. W. et al. reported that vitamin D exposure can reduce oxygen therapy and/or intensive care support in COVID-19 patients. Hastie et. al showed that was the ethnic differences in COVID-19 must be considered as a factor associated with comorbidity that increased mortality. **Conclusion:** Vitamin D is a potential factor for COVID-19 prevention, severity, treatment, and requirement of advanced medical care such as intensive care support and oxygen therapy. This review emphasises on the importance of vitamin D sufficiency to reduce infection risk, severity and death in COVID-19 patients, also it has potential role to treat COVID-19.

Keywords: COVID-19, Vitamin D; Protecting Factor; Supplementation; Severity

Introduction

The coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a global public health emergency [1]. Since the first case of COVID-19 pneumonia was reported in Wuhan, Hubei Province,China

in December 2019, the infection has spread rapidly to countries around the world [2].

Outbreak of coronavirus disease (COVID-19) was announced as global pandemic by WHO on March 11, 2020. This outbreak has influenced every aspect of life especially global economic heavily [3,4]. In July 8th 2020, total confirmed coronavirus cases already reached 12.026.335 along with 548.212 deaths and 58.284 critically ill patient worldwide [5].

Factors associated with COVID-19 infection and worse prognosis include old age, ethnicity, male sex, obesity, diabetes and hypertension and these also associated with deficiency of vitamin D [6]. It has been found that the entry of SARS-CoV-2 into the human cells is via a membrane exopeptidase that converts Angiotensin I to nonapeptide angiotensin named Angiotensin Converting Enzyme 2 (ACE 2) [7]. The ACE2 is expressed in lung parenchyma, and human airway epithelia especially in the oral cavity. That make ACE2 as the port of entry for infection of SARS-CoV-2 [7,8]. Experimentally, vitamin D increases the ratio of angiotensin converting enzyme 2 (ACE2) to ACE, thus increasing angiotensin II hydrolysis and reducing subsequent inflammatory cytokine response to pathogens and lung injury [6].

Considering the differences in severity and fatality of COVID-19 in the globe, it is important to understand the reasons behind it. Improvement of immunity through better nutrition might be a considerable factor. There is known about the role of vitamin D in preventing COVID-19 infection and fatality. Some studies have linked low vitamin D status to major human diseases. Vitamin D is recognised to have a host of antioxidant and immune system. Vitamin D defificiency has been linked to increased morbidity and mortality in COVID-19 infections [9]. Vitamin D supplementation has been shown to have protective effects against respiratory tract infections; Some retrospective studies demonstrated a correlation between vitamin D and COVID-19 cases and outcomes, while other studies did not find the correlation when confounding variables are adjusted [1]. There is contradictive evidence on the association between vitamin D levels and COVID-19 prevention and severity. In this study, we aim to investigate the impact of Vitamin D status to prevent the infection of COVID-19 and to decrease severity of COVID-19.

Methods

2.1. Eligibility criteria

We included cohort studies which observed the effect of Vitamin D supplementation to prevent infection and severity of COVID-19. Exclusion criteria include infection of other respiratory viruses. Studies were included in this systematic review if they fulfilled all of these criteria: focused on vitamin D and COVID-19, involved people or patient with or without comorbidities to hypertension, respiratory system disease, cardiovascular disease, diabetes mellitus, and dyslipidaemia according to the acknowledged comorbidities for COVID-19 by other systematic reviews and meta-analysis [10] and published in English. We excluded studies not

meeting the inclusion criteria, as well as articles that were not full-length (i.e., case reports, conference abstracts, review articles, and letters to the editor).

2.2. Search strategy

Authors independently conducted literature searches using Proquest, Clinical Key, PubMed, Google Scholar, along with manual handsearching using some keywords. The literature search was performed on July 7–10th, 2020. Literature selection was performed without time limitation since COVID-19 is an emerging disease and restricted the searches to only published English or Indonesian articles. We used the following keywords: 'COVID-19' or 'Coronavirus disease 2019' or 'SARS-CoV-2' or 'pandemic' and 'vitamin D' or'vit D' or 'vitamin D supplementation' and 'prevention' or 'theraupetic' or 'therapy' or 'severity'. The reference sections of retrieved articles were screened for other applicable studies.

2.3. Data collection

Two authors (DN, G) independently collected and recorded this information from each study: first author, year of publication, study time period,ethnicity and age of the patients, number of cases and controls, study design, comorbid disease, outcomes, adjusted variants, and p value. The outcome was summarized and presented using a table.

2.4. Quality assessment and data synthesis

Two independent reviewers conducted the quality assessment of thestudies (G and DN). The included studies were critically appraised using Scimago Journal and Country Rank (SJR). Any disagreements between reviewers were discussed until it reached a conclusion. Data was synthesised based on a minimum of three different and high-quality studies with consistent finding. The obtained data was analysed considering the method of variable analysis used, study size, odds/hazard ratio, along with its confidence interval.

Result

3.1. Study Selection

Total of 189 potentially applicable articles were retrieved through our search strategies. After reviewing the titles and abstracts, 127 were excluded because they were not original full-length papers (i.e., they were case reports, letters, review articles, on-going studies, or conference abstracts) or not relevant toVitamin D or COVID-19. Twenty-eight other articles were excluded because theywere duplicates. After reviewing the full text articles, another 25 were excluded because they did not

evaluate about impact of Vitamin D to COVID-19 prevention and severity and due to the usage of language other than English/Indonesian. The flow of our study selection is presented according to PRISMA Statement (Fig. 1).

3.2. Study Characteristic

Table 1 summarizes the features of each included study. All NOS scores were above 5; thus, all studies were considered to be 'high quality'. Five cohort studies were included. The studie analysed the association between Vitamin D and various effect to COVID-19, including prevention, decrease severity, and prognostic outcome.

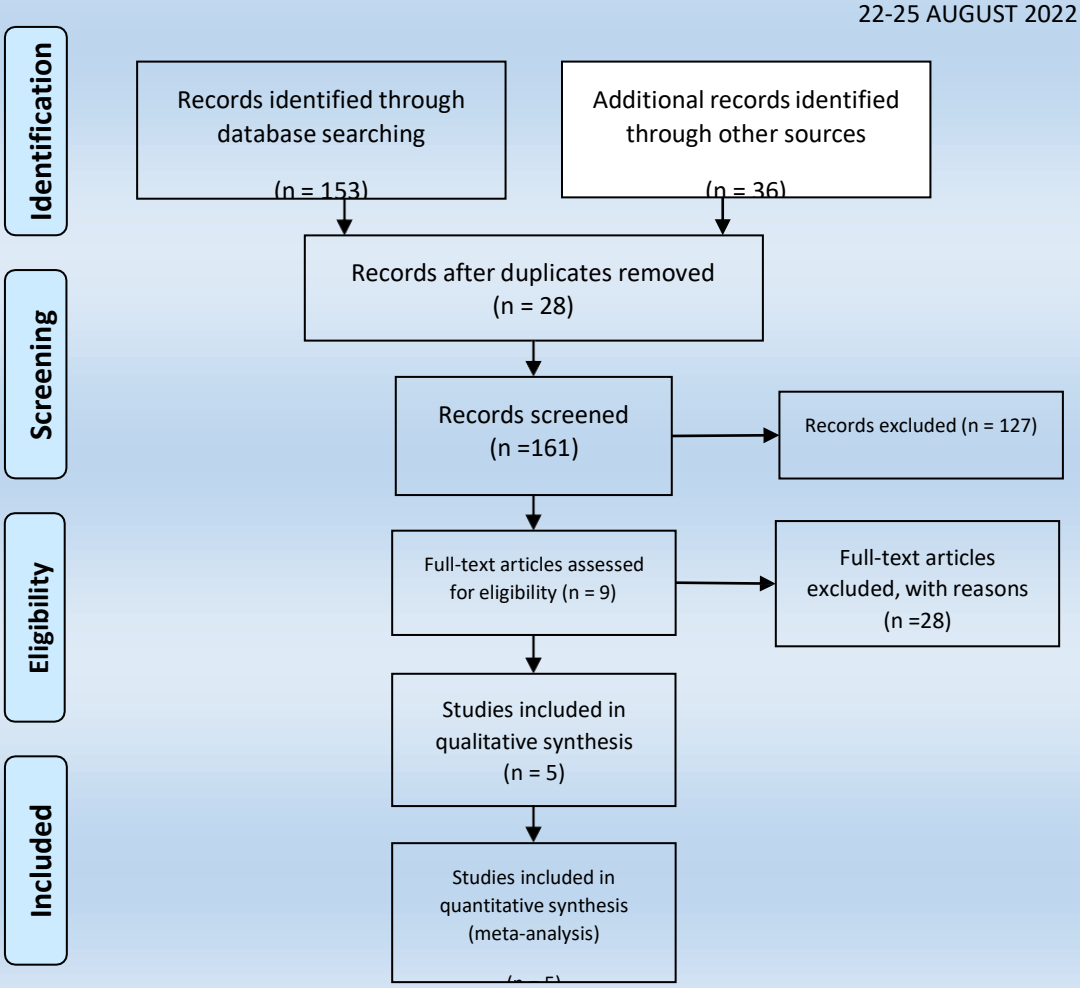
Identification
Screening
Eligibility
Included
Records identified through database searching
(n = 153)
Additional records identified through other sources
(n = 36)
Records after duplicates removed
(n = 28)
Records screened
(n =161)
Records excluded (n = 127)
Full-text articles assessed for eligibility (n = 9)
Full-text articles excluded, with reasons
(n =28)
Studies included in qualitative synthesis
(n = 5)
Studies included in quantitative synthesis
(meta-analysis)

Table 1. Summary of baseline characteristics and outcomes of the included studies.

Authors (year)	Country	Study Design	Sample Size	Population Type	Vitamin D Dose / Status	Findings
Raharusun, P. et al (2020) [11]	Indonesia	Retrospectiv eCohort	780	Asian	Serum 25 (OH)D: 1. Normal (>30 ng/ml) 2. Insufficient (21-29 ng/ml) 3. Deficient (<20 ng/ml)	Patterns of COVID-19 Mortality and Vitamin D: An Indonesian Study A significant association has been obtained between Vitamin D status and mortality. In particular, the odds of death was higher in cases with insufficient vitamin D status (OR=7,63, p<0,001). Death was approximately 10,12 times more likely for vitamin D deficient cases (OR=10,12; p<0,001).
Alipio, M. M. (2020) [12]	Philippines	Retrospectiv eCohort	212	Asian	Serum 25 (OH)D: 1. Normal (>30 ng/ml) 2. Insufficient (21-29 ng/ml) 3. Deficient (<20 ng/ml)	Vitamin D supplementation could possibly improve clinical outcomes of patients infected with Coronavirus-2019 (COVID-2019) Increase in serum 25(OH)D levels could improve clinical outcomes in COVID-19 patients. As the severity of disease increased from mild to critical, serum 25(OH)D levels decreased from 31,2 ng/ml to 17,1 ng/ml and were statistically significant with clinical outcomes (p<0,001). The odds of having mild clinical outcome increased and critical outcome decreased (OR=0,051, p<0,001), with increase in serum 25(OH)D level.
De Smet et al. (2020) [13]	Belgium	Retrospectiv eCohort	186	European	Serum 25(OH)D: 1. Normal (>20ng/ml) 2. Deficient (<20ng/ml)	Vitamin D deficiency as risk factor for severe COVID-19: a convergence of two pandemics COVID-19 patients showed lower median 25(OH)D (p=0,0016)and higher vitamin D deficiency rates (p=0,0005).
Tan, C. W. et al. (2020) [14]	Singapore	Cohort	60	Asian	Vitamin D3 1000IU	A cohort study to evaluate the effect of combination vitamin D, magnesium and vitamin B12 (DMB) on progression to severe outcome in older COVID-19 patients DMB exposure was associated with odds ratios of 0,13 (95% CI: 0,03-0,59) and 0,20 (95% CI: 0,04 – 0,93) for oxygen therapy

						and/or intensive care support in older COVID-19 patients.
Hastie, C. E. et al. (2020) [15]	United Kingdom	Cohort	449	Various population	Serum 25 (OH)D: 1. Deficient (<25 ng/ml) 2. Not deficient (>25 ng/ml) Serum 25 (OH)D: 1. Deficient (<50 ng/ml) 2. Not deficient (>50 ng/ml)	Vitamin D concentrations and COVID-19 infection in UK Biobank Deficient (<25 nmol/L) and not deficient the pattern of results was similar to those observed with vitamin D concentration entered as a continuous variable (univariable OR 1⁄4 1.37, 95% CI 1⁄4 1.07e1.76, p-value 1⁄4 0.011; adjusted OR 1⁄4 0.92, 95% CI 1⁄4 0.71e1.21, p-value 1⁄4 0.564) (Table 2). Participants were categorised into vitamin D insufficient (<50 nmol/L) and sufficient there was no association with COVID-19 infection either univariably (OR 1⁄4 1.19, 95% CI 1⁄4 0.99e1.44, p-value 1⁄4 0.068), nor multivariably (OR 1⁄4 0.88, 95% CI 1⁄4 0.72e1.08, p-value 1⁄4 0.232) (Table 2).

Table 2 Quality assessment of the included studies based on the Newcastle-Ottawa Scale.

Authors	Year	Selection	Comparability	Outcome	Total
Raharusun, P. et al [11]	2020	4	1	3	8
Alipio, M. M. [12]	2020	4	1	2	7
De Smet et al. [13]	2020	3	1	3	7
Tan, C. W. et al. [14]	2020	3	1	3	7
Hastie, C. E. et al. [15]	2020	4	1	2	7

Discussion

Facing a lack of a specific treatment against the COVID-19 pandemic, the need arises to explore pharmacological existing and known agents which reinforce or enhance the immune system. Micronutrients contribute to immune function through a variety of pathways in both innate and adaptive immune responses. Vitamins A, C, D,E, B6, and B12 and zinc and selenium support the adaptive immune response by influencing the differentiation, proliferation, and normal function of T and B cells [16]. Vitamin D has possible beneficial effects in the immune system, especially in COVID-19 patients. As example, vitamin D will increase the production of various peptides by the innate immune system, which has antiviral, antimicrobial, and antifungal activity [17].

Vitamin D has been proven to not only reduce the production of proinflammatory Th1 cytokines but also to increase the expression of anti-inflammatory cytokines by macrophages. This may be worth bearing in mind the proinflammatory cytokine environment observed in patients infected with COVID-19 and how the "cytokine storm" that leads to acute respiratory distress syndrome [18]. Angiotensin II plasma levels were found significantly elevated in infected patients and were directly proportional to the viral load and lung damage observed [19]. It means low vitamin D levels may contribute to increased risk of respiratory infection including COVID-19 [20].

The findings from the included studies acknowledged the supplementation of Vitamin D could improve clinical outcomes of patients infected by COVID-19 [12,13]. Two studies reported COVID-19 risk of severity and death was higher in cases with insufficient vitamin D status and Vitamin D deficiency. It has been suggested that vitamin D deficiency is usually associated with the hyperresponsiveness of airways and impaired pulmonary functions. Nevertheless, a study reported the combination vitamin D, magnesium, and vitamin B12 (DMB) [14], which might be related to the differences in the definition of the reported outcome (in older COVID-19 patients, oxygen therapy, and intensive care support).

This study did not differentiate body mass, lifestyle, and socioeconomic status.In light of the established immunological functions of vitamin D, it is compatible witha causal role of vitamin D deficiency that can explain variations in disease burden of COVID-19 across geographies, skin pigment type (Asian/Europe), body mass (obese),socioeconomic status (poor) and lifestyle. Studies by Raharsut et. al, Alipio et. al, and

Tan CW et. al. located in Asian that had a different lifestyle and socioeconomic status than European because obesity has reached epidemic proportions in Europe [21]. As we know, obesity is one of comorbidity in COVID-19 that might increase COVID-19 mortality. Hastie et. al showed that was not potential support between vitamin D concentrations and risk of COVID-19 infection, because of the ethnic differences in COVID-19 infection in their study [15].

In sample size aspect, study by Tan CW et al. had the smallest sample size with their findings statistically [11]. Meanwhile, a study by Raharusun et al [12], the highest

quality study in overall aspects, had a lower sample size. Older and male caseswith a pre-existing condition and below normal Vitamin D levels were associated with increased odds of death [11]. Different from other prognostic studies, this study showed a strong correlation between vitamin D deficiency and severe COVID-19 lung disease that is not explained by confounding comorbidities [13]. Nevertheless, a paper by Tan C W et al. showed Vitamin D in combination with magnesium and Vitamin B12 was associated with a significant reduction in the proportion of patients with clinical deterioration requiring oxygen support and/or intensive care support in older COVID-19 patients [14].

Taken together, this systematic review shows role of vitamin D in COVID-19 prevention, disease severity and as a potential treatment in COVID-19 patients. Hence,the results from this study are important in the aspect of prevention, severity and treatment in COVID-19.

Declaration of competing interest

The authors declare no conflict of interest.

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6. Sensitivity, Specificity And Predictive Values On The Antigen Rapid Diagnostic Test As Screening Tools Of Sars-Cov2 Infection

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Abstract

Background: The use of antigen rapid diagnostic test (RDT-Ag) can be used as one of the COVID-19 examination for screening, contact tracing, and diagnosis. Many products RDT-Ag are circulating in the market and freely accessed by the public, it is a concern the government by making policies. RDT-Ag product must have sensitivity 80 % and specificity 97%, based on the results of the evaluation independent institution has been determined by the Ministry of Health. **Materials and Methods**: Cross sectional study accompanied by laboratory testing with comparative analysis comparing the results of RDT-Ag with gold standard qRT-PCR **Results**: Comparative analysis was carried out in two groups, on group the results with a cycle threshold (CT) value of ≤ 25 and CT value of > 25. In the group with a CT value of ≤ 25, sensitivity value ranges from 53.33% - 93.33%, it shows the percentage of positive cases with RT-PCR assay, detected true positive by RDT-Ag. The specificity and positive predictive value, almost brands of RDT Ag show 100%, but not for the two brands of RDT Ag, it has a positive predictive value of only 92.31% and 76.67% so that both have a false positive probability of 7.69%. - 23.33%. In the other group, all RDT Ag products have low performance. **Conclusions**: The sensitivity and specificity of RDT Ag was very good in the positive group of RT-PCR result with a cycle threshold value of ≤ 25. The use of an antigen rapid test is recommended for the diagnosis of symptomatic COVID-19 cases. For screening population must confirmed by NAAT.

Introduction

Two years more Indonesia and global experienced the COVID-19 pandemic. The number of people infected with this virus is increasing day by day, even recent developments have found new variants of the coronavirus that mutation with different clinical manifestation. At the beginning of the pandemic, in many countries, laboratories were developed to detect the SARS-CoV-2 virus using nucleic acid amplification tests such as real time reverse transcription polymerase chain reaction (rRT-PCR) or rapid moleculer (TCM). However, access to these molecular tests faces many challenges, particularly in Indonesia. These challenges include long distances to laboratories with PCR facilities, long queue makes waiting times, the test results are not obtained immediately and the high cost examination,

are causing not all levels of society to access the information quickly to find out the possibility of being infected with the corona virus.

The development diagnostic tools of SARS-CoV-2 continues to be carried out getting more affordable and faster, and then referred namely as rapid test. The first diagnostic rapid test is widely circulated, also in Indonesia is called the antibody rapid test. This method detects quickly and easily IgM and or IgG antibodies, that will be formed by the body after exposure with the coronavirus. In the other words, when these antibodies are detected in a person's blood, the person's body is or has been infected with the coronavirus. However, this test has very low accuracy for the preliminary diagnostics, because the antibodies increase concentration takes time several days. IgM antibodies (acute infection) begins increasing in the blood takes five days after the virus entry to the body, while IgG antibodies takes time 14 days later. Negative result of antibody rapid test are not always free from Covid-19 infection, it's probable likely that they have been infected but not detected because the IgM antibodies have not been formed or the titer is low and can't readable on the device. If the result is positive, the treatment is too late and the infected person can spread the virus next to others around him. WHO expressly does not recommend to antibody rapid test be used to detect acute infection with COVID-19.

The progress development of the COVID-19 diagnostic tool is running dynamically, and starting found an antigen rapid test. Antigens are molecules capable of stimulating the immune response, these molecules can be proteins, polysaccharides, lipids or nucleic acids. The SARS-CoV2 virus has antigens in nucleocapsid phosphoproteins and spike glycoproteins. This antigen rapid test were working method uses sandwich immunology-detection with an easy-to-use lateral groove test format, detecting antigen nucleocapsids on the surface of the virus capsule.

The Indonesian government issued Decree of Ministry Health of Republic Indonesia Number HK.01.07 / MENKES / 446/2021 concerning the use of rapid diagnostic antigen test in the COVID-19 test. The use of rapid diagnostic antigen test (RDT-Ag) under certain conditions, can be used as one of the Covid-19 examination methods to screen, contact tracing, and diagnosis enforcement.

The use of RDT-Ag, which uses the target of nasopharyngeal swab samples and or oropharynx or nasal, must attention to the selection criteria, usage criteria, examination flow, examination facilities and inspection officers, specimen management, biosafety, recording and reporting, quality assurance of examinations, and management of examination waste.

To improve the achievement of testing and tracing targets in the early detection of Covid-19, the government has stipulated the use of RDT-Ag in primary health care service facilities (Puskesmas), for the benefit of epidemiologically rapid diagnosis including tracing of suspect cases and contact, improving the scope of tracing becomes wider and action can be taken to

quickly separate positive cases from healthy people so that the chain of transmission can be minimized.

The use of antigen rapid diagnostic test (RDT-Ag) under certain conditions, can be used as one of the COVID-19 examination methods for screening, contact tracing, and diagnosis. There are many products RDT-Ag that are circulating in the market and can be freely accessed by the public, is a concern for the government by making policies. The RDT-Ag products used by public are those that already have a distribution permit from the Ministry of Health and fullfill one of the criteria: or the recommendations of the WHO Emergency Used Listing (EUL); or the recommendations of the US-FDA Emergency Used Authorization (EUA); or the recommendations of the European Medicine Agency (EMA). However, the products must have sensitivity ≥ 80 % and specificity ≥ 97 %, which evaluated in acute phase and based on the results of the NHIRD evaluation or an independent institution has been determined by the Ministry of Health.

Validity is the ability of a test to correctly (accurately) show which individuals are rightly suffering from pain, and which are not. This Validity Test is reflected by sensitivity and specificity. Whether a diagnostic test is valid or not, compared to the results of the gold standard test, which is the best test available and widely accepted. This RDT Antigen validity study aims to determine the sensitivity value, specificity, positive prediction value (NPP), negative prediction value (NPN) and the accuracy value of an Ag RDT

Material and Method

a. The Design of research : cross sectional study accompanied by laboratory testing with comparative analysis comparing the results of antigen rapid diagnostic test (RDT-Ag) with the gold standard qRT-PCR

b. Inclusion Criteria specimens :

   Specimen were used must consider some inclusion criteria :

   New nasopharyngeal and or oropharyng swab that stored in VTM transport media without lysis buffer, with sampling of swab time less than or equal to 24 hours. Each product of RDT-Ag were tested using 90 swab specimens, with sampling quota :

   30 specimens that positive result of moleculer test with cycle threshold less than equal to 25 (CT value ≤ 25); 30 specimens that positive result of moleculer test with cycle threshold more than 25 (CT value > 25); and also 30 specimens negative results

c. Exclusion Criteria specimens :

   The specimen is a nasopharyngeal/oropharyngeal swab that stored in VTM transport media containing buffer lysis, sampling of swab time more than 24 hours, and the final moleculer results showed inconclusive

d. All specimens that using test to product RDT-Ag, are tested with real time reverse transcription polymerase chain reaction (rRT-PCR) by gold standar method CDC protocol. Extraction reagents are using standard reagents Qiamp Viral RNA Mini Kit, Reagen Mix PCR SuperScriptTM III PlatinumTM One Step qRT-PCR kit, and the target genes N1 and N2 with cutt off positive interpretation of gene N if the threshold line cycle threshold value less than equal to 40

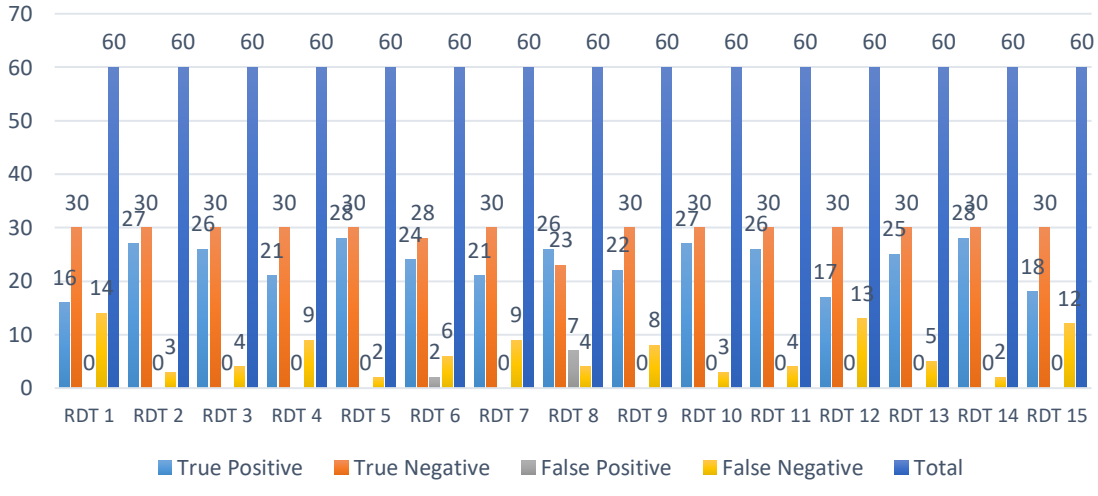
e. The number of product antigen rapid diagnostic test what tested validity, were 15 brands. Each of brands was tested approximately 90 until 100 kits.

f. Time of reseach from February to December 2021

Result and Discussion

The SARS-CoV-2 standard gold examination still uses NAAT, namely RT-PCR, so it is important in the analysis of RDT Ag results compared to the results of RT-PCR examination, to see the consistency of RDT Ag results against clinical conditions. Comparative analysis was carried out in two groups, namely on the results of the gold standard test with a cycle threshold (CT) value of ≤ 25 and CT value of > 25. In the RT-PCR results of the positive group with a CT value of ≤ 25, out of the 15 RDT Ag brands tested, showed mixed performance variations

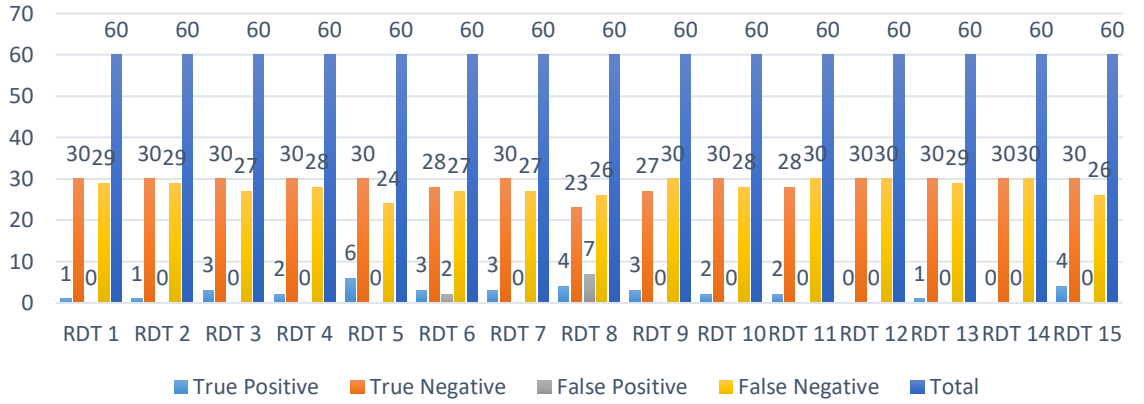
Figure 1. Chart Distribution From The RDT-Ag Results Compared with The qRT-PCR Results in The CT value ≤ 25 Group and The Negative Results



In the positive cycle threshold (CT) value group ≤ 25 that showed at Figure 1, fifteen RDT Ag still showed sufficient to good diagnostic performance in detecting *true positives* with a percentage range of 53% - 93%. In the positive CT value group ≤ 25, fifteen RDT Ag still showed sufficient to good diagnostic performance in detecting true positives with a

percentage range of 53% - 93%. However, false positive results were found in two products, that are in RDT 6 and RDT 8. High false negative were found in RDT 1, RDT 12 and RDT 15.

Figure 2. Chart Distribution From The RDT Ag Results Compared with The qRT-PCR Results in The CT value > 25 Group and Negative Results



At Figure 2 describe that all RDT Ag products were tested showed very low performance in detecting of the SARS-CoV-2 virus. The ability to show true positive results of the SARS-CoV-2 virus is very low in all Ag RDTs and occur the increase in false negative results. WHO and CDC literature states that RDT Ag COVID-19 often produces positive when the concentration of the virus (viral load) is high and cases in conditions are highly infectious, usually 1-3 days before the onset of symptoms and for 5-7 days after the onset of symptoms. However, when the concentration of the virus begins to decrease which is characterized by an improvement in symptoms or becomes cured, which on RT-PCR examination can detected the CT more than 30-35 where RDT- Ag will show a false negative result.

Sensitivity is the ability of tests to show which individuals are actually suffering from sick among the total population of sick people. Specificity is the ability of the test to show the correctly individual is not sick among the total population of people who are not sick. Positive prediction value (NPP) is the probability value of a positive test in people who actually suffer from the disease, and also negative prediction value (NPN) is the probability value of a negative test in people who are really not sick

Table 1. Tabulation of Sensitivity and Specificity of RDT Antigen and qRT-PCR Based on The PCR Result Positive with CT value ≤ 25

RDT Ag	CT Value ≤ 25				
	Sensitivity	Specificity	NPP	Npn	Accuracy
	(%)	(%)	(%)	(%)	(%)
RDT 1	53,33	100,00	100,00	68,18	76,67
RDT 2	90,00	100,00	100,00	90,91	95,00

RDT 3	86,67	100,00	100,00	88,24	93,33
RDT 4	70,00	100,00	100,00	76,92	85,00
RDT 5	93,33	100,00	100,00	93,75	96,67
RDT 6	80,00	93,33	92,31	82,35	86,67
RDT 7	70,00	100,00	100,00	76,92	85,00
RDT 8	86,67	76,67	78,79	85,19	81,67
RDT 9	73,33	100,00	100,00	78,95	86,67
RDT 10	90,00	100,00	100,00	90,91	95,00
RDT 11	86,67	100,00	100,00	88,24	93,33
RDT 12	56,67	100,00	100,00	69,77	86,67
RDT 13	83,33	100,00	100,00	85,71	91,67
RDT 14	93,33	100,00	100,00	93,75	96,67
RDT 15	60,00	100,00	100,00	71,43	96,67

At Table 1 describe, out of the 15 RDT Ag brands tested, showed mixed performance variations. The sensitivity value ranges from 53.33% - 93.33%, meaning that it shows the percentage of positive cases with RT-PCR detected positive by the RDT-Ag. A good sensitivity value according to WHO recommendations was at ≥ 80%, it was shown that nine products of RDT Ag from 15 RDTs Ag tested were RDT 2, RDT 3, RDT 5, RDT 6, RDT 8, RDT 10, RDT 11, RDT 13 and RDT 14. RDT Ag, which has a sensitivity of 93.33%, meaning that they have performance of 93.33% to detect people who are really sick with COVID-19 among the population of people who are sick, and there are around 6.64% of people who are sick with COVID-19 who are not detected positive / undiagnosis. A total of six brands of RDT Ag have a low sensitivity value (below 80%) with the lowest value of 53.33%, which only has the ability to 53.33% detect positive COVID-19 in people who are actually infected with COVID-19 so that are many as 46.67% of the population who are sick with COVID-19 can pass being detected with these six brands of RDT Ag.

According to the CDC and WHO states, the sensitivity value of RDT Ag varies but remains below the performance of most NAAT methods in detecting SARS-CoV2. The limited ability/accuracy of RDT Ag detection is influenced by the level of concentration of viral antigens in the specimens collected, the time of course of disease/onset of infection, the quality and process of retrieving specimens, as well as the exact formulation of the RDT product itself.

For the average specificity value of all brands of RDT Ag products this shows 100% except in RDT 6 (93.33%) and RDT 8 (76.67%). These two Ag RDTs have a positive prediction value of only 92.31% and 76.67% so they have a false positive probability of 7.69% - 23.33%. The specificity value of RDT Ag is usually higher than NAAT if used according to the insert manual kit in the RDT Ag. Despite the high specificity in RDT Ag, *false positive* results can arise, especially if used in populations with a low prevalence of the disease. The CDC considers low

prevalence when positive NAAT results in the past 14 days are less than 5% or 20 new cases of Covid-19 per 100,000 people in the past 14 days.

The values of positive predictions and negative predictions on all in vitro diagnostic tests (benchmarking analysis of NAAT and RDT antigens) vary depending on the probability of pre-test, considering between the high prevalence of infection in the community and the person being tested is symptomatic. If the prevalence rate in the community is high and the person being tested is symptomatic, then the probability of pre-testing is high. If the prevalence rate in the community is low, the person being tested is asymptomatic/ asymptomatic, and there is no known history of contact with people infected with Covid-19, then the pretest probability will be low, so the probability of a false positive result will be high.

Table 2. Tabulation of Sensitivity and Specificity of RDT Antigen and qRT-PCR Based on The PCR Result Positive with CT value > 25

RDT Ag	CT Value > 25				
	Sensitivity	Specificity	NPP	Npn	Accuracy
	(%)	(%)	(%)	(%)	(%)
RDT 1	3,33	100,00	100,00	50,85	51,67
RDT 2	3,33	100,00	100,00	50,85	51,67
RDT 3	10,00	100,00	100,00	52,63	55,00
RDT 4	6,67	100,00	100,00	51,72	53,33
RDT 5	20,00	100,00	100,00	55,56	60,00
RDT 6	10,00	93,33	60,00	50,91	51,67
RDT 7	10,00	100,00	100,00	52,63	55,00
RDT 8	13,33	76,67	36,36	46,94	45,00
RDT 9	10,00	100,00	100,00	52,63	55,00
RDT 10	6,67	100,00	100,00	51,72	53,33
RDT 11	6,67	100,00	100,00	51,72	53,33
RDT 12	0,00	100,00	#DIV/0!	50,00	50,00
RDT 13	3,33	100,00	100,00	50,85	51,67
RDT 14	0,00	100,00	#DIV/0!	50,00	50,00
RDT 15	13,33	100,00	100,00	53,57	56,67

The table 2. above shows the performance of the 15 RDT Ag compared to the results of the RT-PCR method with a cycle threshold value of >25, where the 15 (fifteen) brands of RDT Antigen products have low performance in detecting Covid-19. There are even 2 Ag RDTs that have no sensitivity value. Thus, this RDT Ag product is not able to properly detect people who are sick / infected with Covid-19 with a viral load or low virus concentration levels (high CT value above 25). The results of this test are in accordance with several studies that state that RDT Ag has better sensitivity in cases with a low ct value that is considered to have a high viral load. The test results in this group, the negative prediction value has a very low value where this RDT Ag is very likely to show a high false negative result

Some studies state that infectious possibilities related to high viral load from the RT-PCR cycle threshold value below 25-30, and usually 1-3 days before the onset of symptoms and for 5-7 days the onset of symptoms. Positive cases with higher ct values are considered non-infectious. False negative rapid antigen test results in specimens with low viral load characterized by high ct values (usually around the threshold value of ct values 30-35), and when the case is about to recover. As a result, the negative Ag RDT result does not indicate free from active Covid-19 infection, it is necessary to carry out re-testing of confirmation with NAAT if possible especially for cases with symptoms.

The WHO recommendation states that RDT Ag has good sensitivity in detecting acute phase symptomatic cases or low RT-PCR cycle threshold (ct) values ≤ 25 or > 106 copies of the viral genomics/mL).

Conclusion

The use of the Antigen rapid test should be carried out to detect symptomatic cases, both suspect and close contact, and used in screening asymptomatic populations with or known history of close contact with Covid-19 cases, should be further confirmed by NAAT examination. To get good performance on many RDT Ag products circulating in the Indonesian market, it is mandatory to evaluate sensitivity tests, pre-market and post-market specificities, so that they can detect the SARS-CoV2 virus in the community quickly and precisely.

Recommendation

a. RDT Ag can be used as a rapid diagnostic tool for the detection of symptomatic, and asymptomatic, suspected cases of COVID-19 with a contact history of covid-19 confirmed cases
b. Use of RDT Ag if possible in areas with access to NAAT examination, confirmed with NAAT especially in asymptomatic cases with or without a contact history of COVID-19 cases
c. It is necessary to evaluate the RDT Ag circulating in the market, both pre-market evaluation and post-market evaluation per three months
d. The Ministry of Health disseminates the results of the RDT Antigen validity test which has been carried out by six independent laboratories that have been appointed
e. The Ministry of Health carries out a discussion on monitoring the evaluation of the implementation of the RDT Antigen validity test on six laboratories that have been appointed to discuss scientifically the results of the evaluation of the validity of the Antigen RDT
f. Analyzing the feasibility of an Antigen RDT that has been tested for the validity of the Antigen RDT by at least two different laboratories

g. The national reference laboratory conducts testing of the validity of the Antigen RDT if discordant is found between the two results of the same RDT Antigen product validity test conducted by two different laboratories
h. The National laboratory conducts a feasibility analysis of an Antigen RDT together with the Ministry of Health, both pre-market and post-market evaluations
i. Conducting regular evaluation monitoring meetings with other laboratories and Directorate Supervisioan of Medical Devices, Ministry of Health, to discuss scientific matters that can be mutually agreed upon so that standardization is achieved.

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7. Surveillance of Sentinel Influenza Like Illness in DKI Jakarta Province in 2021

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Abstract

Background*:* Influenza is a virus that infects the respiratory tract and has the potential to cause a pandemic. WHO estimates that annually there are 290,000 to 650,000 deaths related to respiratory problems associated with seasonal influenza. The purpose of ILI Surveillance is to conduct the epidemiology and characteristics of the influenza virus. **Materials and methods**: The sub-district health center that has been selected as the ILI sentinel site detects ILI cases based on the Operational Definition, performs case management, conducts interviews, collects oropharyngeal and nasopharyngeal swab specimens and manages the specimens and sends them to BBTKLPP Jakarta for Influenza examination using the PCR method. Operational definition of suspect ILI is an acute respiratory tract infection with fever 38^{o}C and cough not more than 10 days. **Results**: The distribution of suspected ILI cases from 5 sentinel sites showed that 57% were male, 59.5% aged 1-<5 years, 61.3% did not worked. All suspects had fever and cough, with 70.6% having colds, 32.2% sore throat, 23.5% nausea and vomiting, and 23.5% experiencing malaise. The results of laboratory tests showed that 26.1% were positive for influenza and 73.9% were negative for influenza. Positive specimens consisted of 77.4% for Flu A Subtype H3, 3.2% for Flu A Subtype H1 Pandemic 2009 , and 19.4% for Flu B. The results of the examination of positive influenza showed 74.2% men, 35.5% of the age group 1 to less than five years, and 83.8% had fever, cough, and cold. **Conclusions:** The results of the influenza examination using the PCR method showed that 26.1% were positive for influenza. Positive specimens consisted of 19.4% positive for Flu B, 77.4% positive specimens for Flu A Subtype H3, and 3.2% positive specimens for Flu A Subtype H1 Pandemic 2009.

Keywords: Influenza, Flu A, Flu B, Subtype

Introduction

Flu is a contagious respiratory illness caused by influenza viruses that infect the nose, throat, and sometimes the lungs. It can cause mild to severe illness, and at times can lead to death. Hospitalization and death occur mainly among high risk groups. Worldwide, these

annual epidemics are estimated to result in about 3 to 5 million cases of severe illness, and about 290 000 to 650 000 respiratory deaths (WHO, 2018).

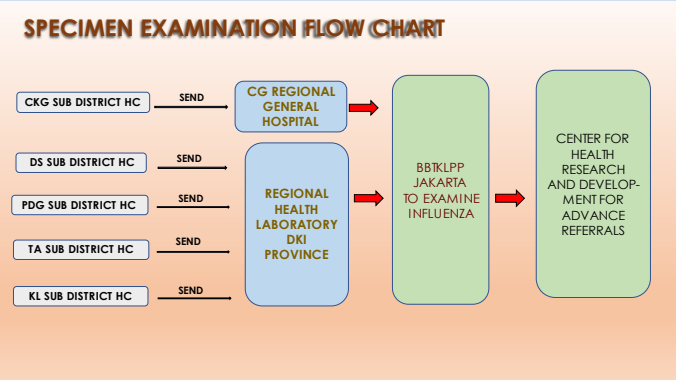
There are 4 types of seasonal influenza viruses, types A, B, C and D. Influenza A and B viruses circulate and **cause seasonal epidemics** of disease. Currently circulating in humans are subtype A(H1N1) and A(H3N2). Influenza B viruses are not classified into subtypes, but can be broken down into lineages. Currently circulating influenza type B viruses belong to either B/Yamagata or B/Victoria lineage. Influenza C virus is detected less frequently and usually causes mild infections, thus does not present public health importance. Influenza D viruses primarily affect cattle and are not known to infect or cause illness in people.

Influenza surveillance is very important to monitor the trend of influenza activity in Indonesia. This surveillance also conduct to detect disease early and respond to unusual influenza trends that suggest a novel influenza virus with pandemic potential. Influenza surveillance in Indonesia consists of Indonesian Severe Acute Respiratory Infection (SARI) and Surveillance and Influenza Like Illness (ILI) surveillance. There are 5 sentinel locations for ILI Surveillance in DKI Jakarta Province, TA Sub District Health Center, PDG Sub District Health Center, DS Sub District Health Center, KL Sub District Health Center and CKG Sub District Health Center. The purpose of ILI Surveillance is to conduct the epidemiology and characteristics of the influenza virus

Materials and Methods

This surveillance activity is carried out through detecting cases ILI, filling out case forms, collecting throat and nasopharyngeal swab specimens. The sentinel site sends specimens to the DKI Regional Health Laboratory for Covid-19 examination (except for CKG Sub District, sending specimens for Covid-19 examination to CKG Hospital), and send to BBTKLPP Jakarta for influenza examination. BBTKLPP Jakarta send the specimens to Center For Health Research And Development for Advance Referrals.

Figure 1. Specimen Examination Flowchart

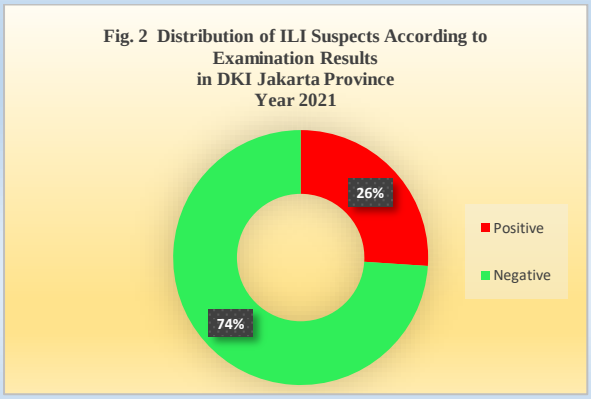


Operational definition of suspected ILI is an acute respiratory tract infection with fever 38^{o}C and cough accompanied by the start date of symptoms (fever or cough) not more than 10 days and temperature measurements are taken when the patient comes to the Sub District Public Health.

Results and Discussion

The number of ILI suspects in 2021 is 119 suspects. The distribution of suspected ILI showed that 57% were male, 59.5% aged 1-<5 years, and 61.3% did not worked. All suspects had fever and cough, with 70.6% having colds, 32.2% sore throat, 23.5% nausea and vomiting, and 23.5% malaise.

Distribution of suspected ILI Based on the laboratory examination by PCR, showed that 31 specimens (26.1%) were positive for influenza and 88 specimens were negative for influenza (73.9%) (Figure 2).



The results of the influenza examination using the PCR method showed that 26.1% were positive for influenza. In this surveillance, the proportion of influenza infection was higher when compared to research in Bali which shows 16.8% (Putu et al 2010).

Positive specimens consisted of 19.4% positive for Influenza B, 77.4% positive specimens for Influenza A(H3), and 3.2% positive specimen for Influenza A (H1N1) Pandemic 2009. The results of this examination are different from the research of Wahyuni et al (2014) which showed that Influenza B was more cases compared to Influenza A. The varied results are certainly influenced by several things, including the the study population, and the research area that will affect the circulation of the virus in the area.

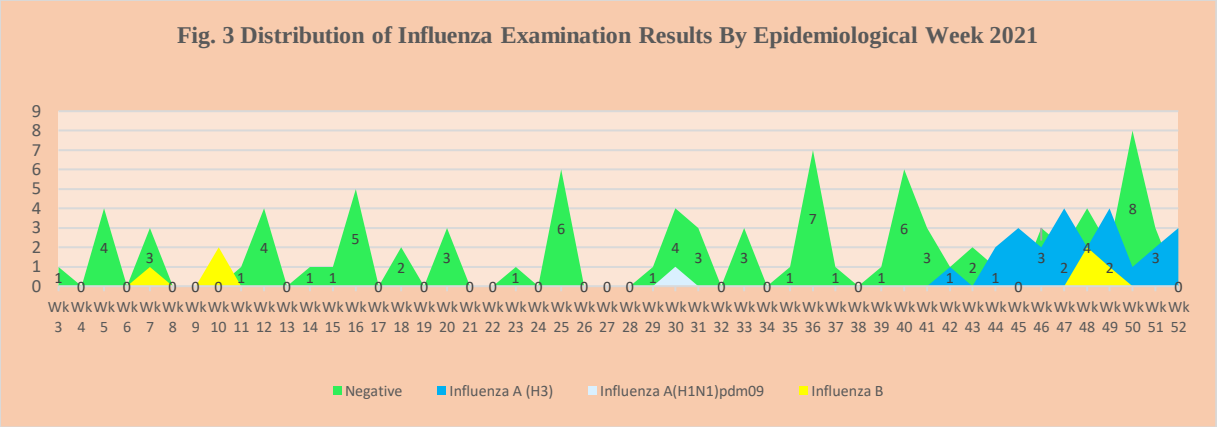


Figure 3 shows that many positive cases occurred in the Epidemiology Week from Week 45 until Week 52. Putu S et al (2010) shows influenza increases in October until December 2005 at the beginning of the rainy season.

Fig. 4 Distribution of Influenza Test Results By Age in DKI Jakarta Province 2021

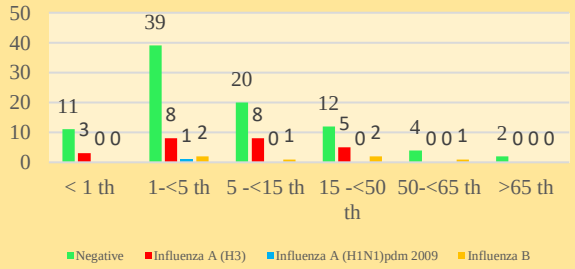
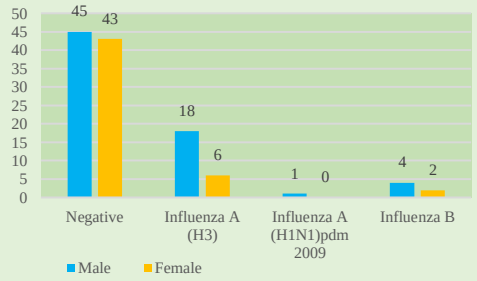


Figure 4 shows that influenza occurs most in the age group 1 to less than 5 years and the age group 5 - 14 years. These results are in accordance with the WHO which states People at greater risk of severe disease or complications when infected are children under 59 months (2018).

Fig. 5 Distribution of Influenza Test Results By Gender in DKI Jakarta Province 2021



The results of the examination of specimens with influenza positive in Figure 5 shows showed greater in male (74.2%) compared to female. The results correspond to Wahyuni et al (2014) which show that positive influenza cases are more prevalent in male.

Fig. 6 Distribution of Influenza Test Results By Sentinel Site in DKI Jakarta Province 2021

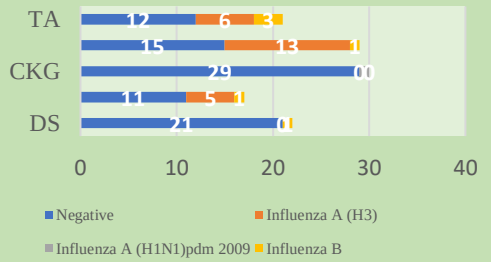


Figure 6 shows of the influenza examination showed that the largest positive specimens came from the PDG Sub District Health Care (48.3%), followed by the TA Sub District Health Care 42.9%.

Fig. 7 Distribution of Influenza Test Results According to Symptoms in DKI Jakarta Province 2021

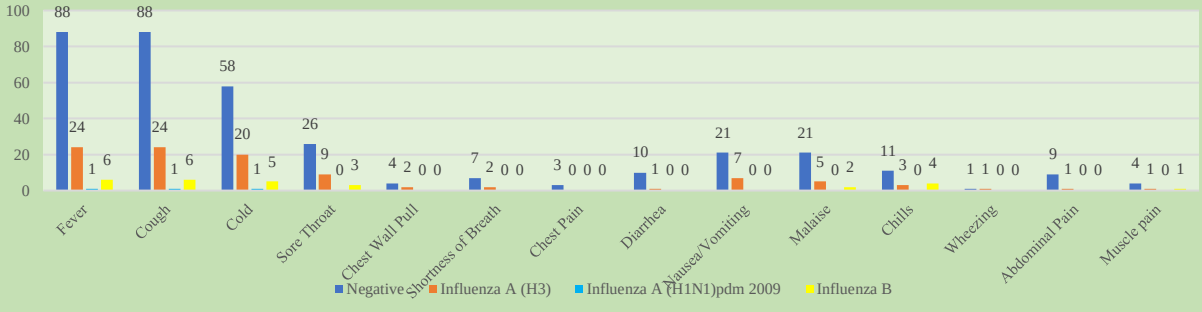


Figure 7 shows All positive cases suffer from fever and cough. Other symptoms that were the biggest were Cold by 83.87%, sore throat by 37.8%, nausea /vomiting by 22.58%,

malaise by 16.13%, chills by 9.68%, pulling of the chest wall and shortness of breath by 6.45%, diarrhea, wheezing, abdominal pain and muscle pain by 3.2%.

Conclusion

Most of the suspects were male (57.1%), Most of them aged 1 to less than 5 years (42%), and most of them did not (61.3%). Distribution of suspected ILI Based on the laboratory examination by PCR, showed that 31 specimens (26.1%) were positive for influenza and 88 specimens were negative for influenza (73.9%). Positive specimens consisted of 19.4% positive for Influenza B, 77.4% positive specimens for Influenza A(H3), and 3.2% positive specimen for Influenza A (H1N1) Pandemic 2009

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TRACK 2: NON-COMMUNICABLE DISEASE (NCD): PRIMARY, SECONDARY, AND TERTIARY PREVENTION

1. Profile of Stroke Patients Participants of the 2015-2020 National Health Insurance (JKN) Indonesia Treated in Advanced Referral Health Facilities (FKRTL)

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Abstract

Background: Stroke is a disease that causes the highest mortality rate in Indonesia, based on the Institute for Health Metrics and Evaluation (IHME) stroke is a non-communicable disease that causes the highest death. The purpose of this research is to get a profile picture of stroke patients in Indonesia. **Materials and methods**: The research method is a quantitative cross sectional study design and statistical data analysis of Chi Square bivariate. The study used sample data from the 2015-2020 Social Health Insurance Agency (BPJS Kesehatan) with a sample size of 2,200,960 participants and those using services, advanced referral health facilities (FKRTL) with a sample size of 1,762,637 participants. While contextual sample data for stroke is information on sample data that has been diagnosed with stroke based on the International Classification of Diseases (ICD)10 at FKRTL when accessing advanced referral health facilities, with a diagnosis of ICD 10 code, namely G45, I60, I61, I62, I63 and I64. and classified into 3 types of stroke, Transient Ischemic Attack (TIA), Haemoragic Stroke, and Ischemic Stroke. **Results**: The prevalence of stroke among JKN participants was 1.8%, while based on sex, men were significantly higher than women (1.9% vs. 1.6%). The types of stroke that occurred were ischemic stroke (93.5%), hemorrhagic stroke (4.4%) and TIA (2.1%). JKN participants with higher membership classes, the greater the prevalence (2.7% vs 1.8% vs. 1.4%). Meanwhile, based on the membership segment of non-employees and non-wage workers, the prevalence is significantly higher compared to other segments (6.7% and 3.6%). **Conclusions**: Stroke is a non-communicable disease that often occurs in JKN participants with a prevalence of 1.8%, prompt and appropriate prevention and treatment measures will reduce the occurrence of disability or mortality. The informal worker participant segment has an indication of having a stroke significantly higher than the formal worker and contribution assistance participant (PBI).

Acknowledgments: BPJS Kesehatan, Mugi Wahidin, Euis Ratnasari

Keywords: stroke, ischemic stroke, hemorrhagic stroke, National Health Insurance

Introduction

Stroke is a disease with the highest mortality rate in Indonesia [3]. Stroke is a condition that occurs when the blood supply to the brain is reduced due to a blockage (ischemic stroke) or rupture of a blood vessel (hemorrhagic stroke). Without blood, the brain will not get oxygen and nutrients, so the cells in the affected brain area will die soon. Stroke is a medical emergency because brain cells can die in just minutes. The death of brain cells causes parts of the body controlled by the damaged area of the brain to not function properly. Prompt treatment can minimize the level of damage to the brain and the possibility of complications.

Stroke is a disease with high medical costs in Indonesia and stroke is the 3rd disease that consumes the most health budget in the National Health Insurance (JKN) program and has increased quite significantly in the last 3 years [1]. As for out-of-pocket financing, it is not known the amount of costs that have been spent in Indonesia.

Stroke is a disease with a high and increasing cost, this is as noted from various countries such as in America in 2008, the direct cost of treating stroke is estimated at US $ 18.8 billion, with the estimated average cost for ischemic stroke is US $ 18,963 - US $ 21,454/patient [6]. In China in 2003 the government financed stroke treatment in hospitals was RMB 1.17 billion, while in 2009 RMB 8.19 billion (CAGR+117%) and 2011 RMB 40 billion (10x increase) [5]. While in Indonesia, based on BPJS Health's financial reports for the National Health Insurance (JKN) program, stroke is a disease with high medical costs and stroke is ranked 3rd, and has increased quite significantly in 3 years (2016-2018) ranging from IDR 1.4 trillion to IDR 2.6 trillion per year [1]. Stroke cost components include medical costs, non-medical costs, room costs and other costs. While each of these costs has a component of direct and indirect costs. In Indonesia, the stroke rate for the National Health Insurance (JKN) program is based on the Indonesia Case Base Group (INA CBG).

Based on the Basic Health Research (Riskedas 2018) [4] showed the prevalence (per mile) of stroke based on a doctor's diagnosis in the population aged 15 years nationally is 10.9‰. And the incidence of stroke is dominated by old age where at the age of 55-64 years the prevalence of stroke is 32.4‰, age 65-74 years is 32.4‰ and age over 75 years is 50.2‰. Meanwhile, based on the province, the Riskesdas data shows that the population of the provinces in Java island and Kalimantan island have a prevalence above the national prevalence.

The National Health Insurance Program (JKN) was launched in early 2014 and in the early years covered 134 million Indonesians, although the social health insurance program had previously been initiated by prioritizing the poor. The JKN program is an implementation of the Law on the National Social Security System (SJSN) (UU no 40 of 2004). Currently, the total participants of the JKN program are more than 230 million participants. The purpose of this study was to obtain an overview of the profile of stroke patients in Indonesia who are covered by the National Health Insurance (JKN) program so that it helps to plan for incident prevention and minimize severity. By minimizing the incidence and severity, it will help the government to reduce health costs and increase the productivity of its population.

Materials and Methods

Materials

The study used sample published data from the 2015-2020 Social Health Insurance Agency (BPJS Kesehatan) with a sample size of 2,200,960 participants and those utilize services in advanced referral health facilities (FKRTL) with a sample size of 1,762,637 treated event from participants, and it consist of 309,407 participants utilized advanced referral health facilities (FKRTL) [2]. From 309,407 samples, it was 7,110 participants diagnosed as stroke patients.

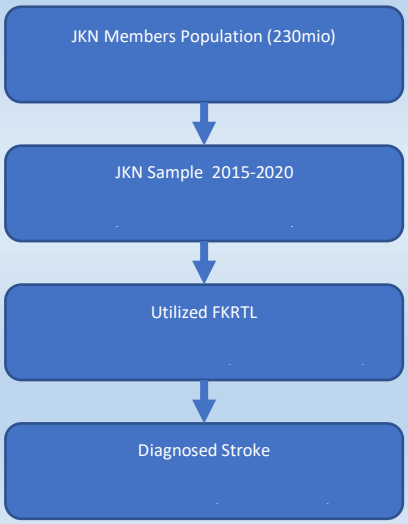

Figure 1. Source of data by using sampling published from BPJS Kesehatan 2015-2020

Methods

The research method is a quantitative cross sectional study design and statistical data analysis of Chi Square bivariate. The data sample taken from 2015-2020 BPJS Kesehatan database. While contextual sample data for stroke is information on sample data that has been diagnosed with stroke based on the International Classification of Diseases (ICD)10 when accessing advanced referral health facilities (FKRTL), with a diagnosis of ICD 10 code, namely G45, I60, I61, I62, I63 and I64 and classified into 3 types of strokes, Transient Ischemic Attack (TIA), Hemorrhagic Stroke, and Ischemic Stroke.

Table 1. Number of visited/treated stroke based on ICD 10 code

ICD 10 Identified for Stroke	Classified	# Treated	% Proportion
G45 Transient cerebral ischaemic attacks and related syndromes	Transient Ischemic Attack (TIA)	816	2,1%
I60 Subarachnoid haemorrhage	Hemorrhagic Stroke	248	0,6%
I61 Intracerebral haemorrhage	Hemorrhagic Stroke	1.369	3,5%
I62 Other nontraumatic intracranial hae	Hemorrhagic Stroke	88	0,2%
I63 Cerebral infarction	Ischemic Stroke	13.158	34,0%
I64 Stroke, not specified as haemorrhag	Ischemic Stroke	23.045	59,5%

Total Stroke	38.724	100,0%

1. Results and Discussion

Currently, the National Health Insurance Program (JKN) has reached 230 million participants, of which JKN was started in 2014. Meanwhile, stroke is a non-communicable disease that needs attention because it causes disabilities, mortality, and lost productivity in the community. In this study, sample data for the 2015-2020 BPJS Health were taken with the number of JKN participants being 2,200,960 participants. Based on sample data, the prevalence of stroke in JKN participants is 3.2‰, which is lower than the prevalence of stroke based on Riskesdas 2018 where the prevalence is 10.9‰. Based on stroke diagnosis type that Ischemic Stroke occurs in 93.5% stroke patients, while Hemorrhagic Stroke occurs in 4.4% patients, and the rest is TIA (Transient Ischemic Attack).

Sex

Men have a significant incidence of stroke compared to women, where men have a 56% proportion of suffering from stroke. Meanwhile, based on the ICD 10 diagnosis shows that ischemic stroke has an incidence rate in men far above women. The prevalence of stroke in men is 3.4‰, while in women it is 3.0‰. But women have a tendency to be diagnosed more in cases of subarachnoid hemorrhagic with ICD 10 code: I60 Subarachnoid haemorrhage.

Age Group

Based on age group that 84.6% patients are older than 50 years old and male has higher risk to get stroke. Event thought with current situation it seems that there is indication that the younger age already get stroke. It is quite concerning that for a young age (<= 30 years) the incidence of hemorrhagic stroke is quite high among this age group. On average, based on the frequency of visits, older people are more likely to control or get services because of a stroke diagnosis.

Table 2. Stroke patients based on age group and sex.

Age Group	Male	Female	Total	% Proportion
<=30 years old	65	35	100	1,41%
31-40 years old	104	96	200	2,81%
41-50 years old	437	361	798	11,22%
51-60 years old	1.163	992	2.155	30,31%
61-70 years old	1.294	1.035	2.329	32,76%
>70 years old	816	712	1.528	21,49%
Total	**3.879**	**3.231**	**7.110**	**100,00%**
Sample Size	1.125.524	1.075.436	2.200.960	
Prevalence	3.4‰	3.0‰	3.2‰	

Class of Patients

Prevalence of stroke for 1st class patients significantly higher than 2nd and 3st class, which prevalence for 1st class is 4.8‰, 2nd class is 3.0‰, and 3rd class is 2.8‰. Patients in 3rd class has significant occurs of hemorrhagic stroke with diagnose I61 Intracerebral haemorrhage rather than 1st and 2nd class.

While for 1st class and 2nd class patients dominated by occurs ischemic stroke.

Segmentation

Segmentation patients based on membership type was divided by not a worker, subsidized members (PBI APBN/national government budget), subsidized members (PBI APBD/local government budget), non-wage worker and wage worker. The data shown that non-wage worker has identified significantly higher than other segment of membership (41.8%). While for not a worker has significant higher prevalence compares with other (13.8‰), then follow with non-wage worker (5.7‰). The prevalence for other segments is PBI APBN (1.8‰), PBI APBD (2.6‰) and wage worker (2.2‰). It seems that non formal worker suffers from stroke.

Length of Stay (LOS)

Length of treatment for stroke patients was dominated by having outpatient treatment, it contributes by 90.4%. While for longer stay in hospital/FKRTL dominated by ischemic stroke.

Table 3. Characteristics stroke patients by ICD 10 diagnose

		ICD10						Total	% Share	Chi-Square Tests		
		G45	I60	I61	I62	I63	I64			Pearson Chi-Square	df	Asymptotic Significance (2-sided)
Sex	Male	421	58	711	57	7.743	12.868	21.858	56,4%			
	Female	395	190	658	31	5.415	10.177	16.866	43,6%			
Total		816	248	1.369	88	13.158	23.045	38.724	100,0%	166.169[a]	5	0,000
Age	<= 30 years old	24	14	56	9	88	82	273	0,7%			
	31-40 years old	46	5	79	3	384	537	1.054	2,7%			
	41-50 years old	133	16	217	9	1.329	2.261	3.965	10,2%			
	61-70 years old	201	33	312	45	4.597	8.265	13.453	34,7%			
	>70 years old	146	32	220	10	2.405	3.935	6.748	17,4%			
Total		816	248	1.369	88	13.158	23.045	38.724	100,0%	893.104[a]	25	0,000
Class of Patients	1st Class	290	17	318	17	3.706	7.364	11.712	30,2%			
	2nd Class	205	148	311	46	3.484	5.357	9.551	24,7%			

	3rd Class	321	83	740	25	5.968	10.324	17.461	45,1%			
Total		816	248	1.369	88	13.158	23.045	38.724	100,0%	352.142[a]	10	0,000
Segmentation	Not a worker	74	7	140	10	1.700	3.911	5.842	15,1%			
	PBI - APBN	53	18	181	7	1.630	2.923	4.812	12,4%			
	PBI - APBD	24	19	215	5	871	1.674	2.808	7,3%			
	Non-wage workers	321	189	561	48	5.992	9.058	16.169	41,8%			
	Wage workers	344	15	272	18	2.965	5.479	9.093	23,5%			
Total		816	248	1.369	88	13.158	23.045	38.724	100,0%	677.625[a]	20	0,000
Length of Stay	Outpatient treatment	727	231	1.143	73	11.901	20.923	34.998	90,4%			
	1-5 days	77	9	129	9	901	1.476	2.601	6,7%			
	6-10 days	11	4	68	3	295	519	900	2,3%			
	>10 days	1	4	29	3	61	127	225	0,6%			
Total		816	248	1.369	88	13.158	23.045	38.724	100,0%	166.386[a]	15	0,000

Geographical

The highest prevalence of stroke based on geographical were provinces in Java island, West Sumatera, Bangka Belitung Islands, Bali, South Kalimantan and East Kalimantan. Possibility the higher prevalence come from provinces that has sufficient infrastructures and human resources to identify the stroke. It seems that infrastructures and human resources is not evenly distributed.

Table 4. Prevalence stroke based on provinces

Provinces	Patients Stroke	Sample	Prevalence
Aceh	135	51.667	0,26%
North Sumatera	299	137.492	0,22%
West Sumatera	**198**	**47.201**	**0,42%**
Riau	158	58.468	0,27%
Jambi	59	37.365	0,16%
South Sumatera	175	80.169	0,22%
Bengkulu	60	32.095	0,19%
Lampung	153	65.968	0,23%
Bangka Belitung Islands	**44**	**13.784**	**0,32%**
Riau Islands	49	20.992	0,23%
DKI Jakarta	**215**	**64.451**	**0,33%**
West Java	**998**	**283.168**	**0,35%**
Central Java	**1321**	**271.923**	**0,49%**
Yogyakarta	**263**	**31.383**	**0,84%**
East Java	**1320**	**238.105**	**0,55%**
Banten	175	61.691	0,28%

Bali	**263**	**47.813**	**0,55%**
West Nusa Tenggara	84	31.663	0,27%
East Nusa Tenggara	126	67.488	0,19%
West Kalimantan	74	41.346	0,18%
Central Kalimantan	86	32.797	0,26%
South Kalimantan	**159**	**46.037**	**0,35%**
East Kalimantan	**146**	**40.243**	**0,36%**
North Kalimantan	18	9.428	0,19%
North Sulawesi	79	37.346	0,21%
Central Sulawesi	68	33.634	0,20%
South Sulawesi	249	91.421	0,27%
South East Sulawesi	71	46.773	0,15%
Gorontalo	32	12.893	0,25%
West Sulawesi	25	16.713	0,15%
Maluku	19	31.126	0,06%
North Maluku	25	24.649	0,10%
West Papua	34	25.687	0,13%
Papua	27	66.891	0,04%
INDONESIA	**7110**	**2.200.960**	**0,32%**

Conclusions

Stroke is a non-communicable disease that often occurs in JKN participants with a prevalence of 3.2‰ lower than Basic Health Research (Riskesdas) data (10.9‰), prompt and appropriate prevention and treatment measures will reduce the occurrence of disability or mortality. Indonesia stroke patient profile which participates in JKN programs has dominated with diagnosed ischemic stroke which contributes 93.5% and hemorrhagic stroke is 4.4% and transient ischemic attack (TIA) is 2.1%. There is indication that younger age has started to suffer with stroke, and most of it with hemorrhagic stroke. Based on segment, it seems that non formal worker has higher indication on stroke rather than formal and subsidized participants. Most of stroke treated as outpatients' treatment. Provinces in Java Island, West Sumatera, Bangka Belitung Islands, Bali, South Kalimantan and East Kalimantan indicated to has higher prevalence compares with others.

Recommendation: need to strengthen prevention program for stroke disease and health promotion on stroke detection FAST (Facial drooping, Arm weakness, Speech difficulties and Time) program or MOH program on promotion Se Ge Ra Ke R S (**Se**nyum tidak simetris; **Ge**rakan separuh anggota tubuh melemah tiba-tiba; bi**Ca**ra pelo; **Ke**bas atau baal; **R**abun, pandangan satu mata kabur; Sakit kepala hebat muncul tiba-tiba dan tidak pernah merasakan sebelumnya).

Declaration of Interest Statement

I hereby declare that there is no financial interest and conflict of interest in the preparation of this paper.

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2. Several Factors Associated with Hyperglycemia among Integrated Non-Communicable Disease Post (Posbindu) Members in Indonesia

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Abstract

Background: Hyperglycemia is a sign of diabetes mellitus (DM) which can be measured by blood glucose examination. The examination could be performed in Posbindu, an integrated Non-Communicable Disease Post, in Indonesia. There are several factors influencing hyperglycemia. The study aimed at knowing several factors associated with proportion of hyperglycemia among Posbindu members in Indonesia. **Materials and methods:** This was a cross sectional study with descriptive and bivariate analysis. Secondary data was collected from Directorate of Non-Communicable Disease Prevention and Control, Ministry of Health. Data of hyperglycemia and several variables were taken from examination in Posbindu in 2016 with 39.479 examination from 134 district in 27 provinces. Descriptive analysis was performed to know distribution of hyperglycemia and other related variables. Correlation analysis was performed to know association between selected factors to hyperglycemia using Spearman Correlation test. **Results**: Median of the proportion of hyperglycemia was 11.0% per district, smoking proportion was10.6%, overweight and obese proportion was 60.3%, hypercholesterolemia was 45.1%, lack of physical activity was 28,9%, central obesity was 61.2%, lack of fruit and vegetable consumption was 30.3%, and hypertension was 35.5%. Factors that significantly associated/correlated with proportion of hyperglycemia were smoking proportion (p 0,002; r -0.270), overweight (p 0,015; r -0.210), hypercholesterolemia (p 0,002; r 0.262), lack of physical activity (p 0,031; r -0.186), lack of fruit and vegetable consumption (p 0,038; r -0.179), and hypertension (p 0,000; r 0.302). Meanwhile, central obesity was not associated hyperglycemia. **Conclusions:** Smoking, overweight, hypercholesterolemia, lack of physical activity, lack of fruit and vegetable consumption were negatively associated with proportion of hyperglycemia. Meanwhile, hypertension was correlated positively with hyperglycemia

Acknowledgements: Thanks to Director of Non-Communicable Disease Prevention and Control, Ministry of Health who gave permission to use data of Posbindu.

Keywords: hyperglycemia, Posbindu, diabetes mellitus, Indonesia

Introduction

Diabetes Mellitus (DM) becomes a serious health problem in Indonesia. In 2017 DM became the 3rd highest cause of death in Indonesia from the previous number 9 in 1990, with an increase of 162% (IHME, 2018). Hyperglycemia is a sign of diabetes mellitus (DM) which can be measured by blood glucose examination (WHO, 2001). The result of the examination with value ≥ 200 mg/dL and classical symptom become one of diagnosis criteria of diabetes mellitus. (Perkeni, 2019).

The examination of blood glucose could be performed in Posbindu, an integrated Non-Communicable Disease Post, in Indonesia. Activities of Posbindu, including blood glucose examination, were massively conducted since 2015. Up to 2019, there was 40.999 village or 50.6% out of 80,983 villages in Indonesia run the activities of Posbindu (Kemenkes RI, 2020a). Through Posbindu, early detection of blood glucose can be carried out periodically which is followed by counseling and blood glucose monitoring so that DM can be controlled. This becomes a way to increase early detection of NCD risk factors. Early detection of NCD risk factors, including blood sugar, is a target in the Ministry of Health's Strategic Plan 2020-2024 with a target of 80% of the population ≥15 years old (Kemenkes RI, 2020b).

There are several factors influencing hyperglycemia. According to WHO (2001) (WHO, 2001). The risk factors of DM include smoking, nutrition, lack of physical activity, obesity, hypertension, raised in blood glucose, and increase of cholesterol. There was a significant relationship between the incidence of type 2 DM and fruit and vegetable consumption, physical activity (Kistianita et al., 2018). Risk factors for DM include unhealthy diet, lack of physical activity, smoking, hypertension, and obesity (Peters et al., 2018). Overweight, obesity, high triglyceride, and hypertension are risk factors for DM in men and women, Kadar high LDL, and physical activity is a risk factor in women (Zhang et al., 2019)

Activities in Posbindu has been conducted quite a lot but the use of data is still limited. Information using Posbindu data on factors related to hyperglycemia is still not widely done. In fact, with routine data from Posbindu, prevention and control interventions can be carried out more precisely. Thus, we conducted the study aimed at knowing several factors associated with proportion of hyperglycemia among Posbindu members in Indonesia.

Materials and Methods

This was a cross sectional study with descriptive and bivariate analysis. Secondary data was collected from Directorate of Non-Communicable Disease Prevention and Control, Ministry of Health. Data of hyperglycemia and several variables were taken from examination in Posbindu in 2016 with 39.479 examination from 134 district in 27 provinces with complete data. Variables included in the study was dependent variable which was proportion of hyperglycemia using blood glucose examination ≥ 200 mg/dL and independent variables which consisted of smoking, overweight and obese (body mass index ≥ 23), hypercholesterolemia (≥ 200 mg/dL), lack of physical activity, central obesity, lack of fruit and vegetable consumption, and hypertension.

Descriptive analysis was performed to know distribution of hyperglycemia and other related variables. Correlation analysis was performed to know association between selected factors to hyperglycemia. The normality test of hyperglycemia using Kolmogorov-Smirnov test showed that the p value was 0.000, which meant that data distribution was not normal. Therefore, Spearman Correlation test was performed to know the correlation.

Results

Median of the proportion of hyperglycemia was 11.0% per district, smoking proportion was 10.6%, overweight and obese proportion was 60.3%, hypercholesterolemia was 45.1%, lack of physical activity was 28,9%, central obesity was 61.2%, lack of fruit and vegetable consumption was 30.3%, and hypertension was 35.5% (Table 1)

Table 1. Distribution of Hyperglycemia and Selected Factors

No.	Variable	Median	Min	Max	SD	Range
1.	% Hyperglycemia	11.00	2.00	63.90	10.35	61.90
2.	% Smoking	10.60	1.50	69.20	10.09	67.70
3.	% Overweight and obese	60.30	32.90	84.20	10.56	51.30
4.	% Hypercholesterolemia	45.15	5.40	86.80	20.64	81.40
5.	% Lack of physical activity	28,95	1.40	93.80	20.67	92.40
6.	% Central obesity	61.20	20.00	90.30	12.30	70.30
7.	% Lack of fruit and vegetable consumption	30.35	1.10	95.90	23.13	94.90
8	% Hypertension	35.55	17.70	75.00	10.13	57.30

Factors that significantly associated/correlated with proportion of hyperglycemia were smoking proportion (p 0,002; r -0.270), overweight (p 0,015; r -0.210), hypercholesterolemia (p 0,002; r 0.262), lack of physical activity (p 0,031; r -0.186), lack of fruit and vegetable consumption (p 0,038; r -0.179), and hypertension (p 0,000; r 0.302). Meanwhile, central obesity was not associated hyperglycemia. There are only variables were positively correlated with hyperglycemia, namely hypercholesterolemia and hypertension (Table 2)

Table 2. Correlation between selected factors to Hyperglycemia

No.	Variable	P value	r	Conclusion
1.	% Smoking	0.002	-0.270	Significant, negative correlation
2.	% Overweight and obese	0.015	-0.210	Significant, negative correlation
3.	**% Hypercholesterolemia**	**0.002**	**0.262**	**Significant, positive correlation**
4.	% Lack of physical activity	0.031	-0.186	Significant, negative correlation
5.	% Central obesity	0.938	-0.007	Not significant
6.	% Lack of fruit and vegetable consumption	0.038	-0.179	Significant, negative correlation
7.	**% Hypertension**	**0.000**	**0.302**	**Significant, positive correlation**

Discussion

The findings of this study include average of hyperglycemia and several NCD risk factors and variables correlated with hyperglycemia. The median of hyperglycemia (11%) was higher than the prevalence of diabetes mellitus from national survey in Indonesia. The prevalence of DM in Indonesia increased from 5.7% in 2007 to 6.9% in 2013 and 8.5% in 2018

(Kemenkes, 2008, 2013b, 2019). Smoking proportion in this study was 10.6%. This much lower than prevalence in 2013 for 36.3% and in 2018 for 33.8. The proportion of overweight and obese proportion was 60.3%. The prevalence of overweight (body mass index/BMI ≥25) and obesity (BMI ≥27) in Indonesia increased from 19.1% in 2007, to 26.3% in 2013, and 35.4% in 2018 (Kemenkes, 2008, 2013b, 2019).

Proportion of hypercholesterolemia was 45.1%, which is much higher than national prevalence for 7.6%. Meanwhile, the proportion of ack of physical activity was 28,9%. It was similar with prevalence in 2007 (48,2%) and in 2013 (26,1%) and 2018 (33,5%). Moreover, the proportion of central obesity was 61.2% which is higher than national prevalence in 2008 for 18,8% , 2013 for 26,6%, and 2018 for 31%. In term of lack of fruit and vegetable consumption, the proportion was 30.3%, much lower than national prevalence for 93,6%, 93,5%, and 95,5% in 2008, 2013, and 2018. Then, the proportion of hypertension was 35.5%, almost same with national prevalence for 31,7%, 25,8% dan 34,1% in 2008, 2013, and 2018 (Kemenkes, 2008, 2013b, 2019).

The factual measurement of the risk of NCDs including blood glucose was carried out at Posbindu. Posbindu is a form of community participation in early detection, monitoring, and early follow-up of NCD risk factors independently, and continuously. (Kemenkes, 2014) . Posbindu is carried out with the aim of preventing and controlling NCD risk factors based on community participation in an integrated, routine, and periodic manner. Measurements in Posbindu need to be standardized and the competence of officers needs to be strengthened to maintain data quality. Posbindu members are residents aged 15 years and over, but older member which have symptoms of risk factors tend to come. This is probably the reason why there was a high proportion of hyperglycemia and other risks of NCDs.

The result of this study also revealed that hypercholesterolemia and hypertension were positively associated with hyperglycemia. Raised blood cholesterol and hypertension were among factors that influence diabetes mellitus (WHO, 2001). Hypertension was one of the risk factors of diabetes mellitus (Peters et al., 2018). High triglyceride and hypertension are risk factors of DM among males and females while high LDL was risk factors among females (Zhang et al., 2019). Similarly, hypertension was a risk factor of diabetes mellitus among several risk factors (Kemenkes RI, 2016; Perkeni, 2019). Dyslipidemia and overweight/obesity was risk factors of diabetes mellitus (Olesen et al., 2020). A study in Indonesia also proved that hypertension and cholesterol level were associated tih diabetes mellitus (Trisnawati & Setyorogo, 2013).

Diabetes mellitus (DM) is a group of metabolic diseases with characteristics of hyperglycemia that occur due to abnormalities in insulin secretion, insulin action or both. Diabetes Mellitus is a chronic degenerative disease and often causes complications in all organs of the body, such as heart and blood vessel disease, kidney failure, visual impairment, impotence, gangrene, and others. (Perkeni, 2019)

Efforts to prevent and control diabetes are carried out through primary, secondary, and tertiary efforts. Primary prevention efforts through education, lifestyle changes related to diet, physical activity, and not smoking. Secondary efforts through blood sugar screening and monitoring. Meanwhile, tertiary efforts with comprehensive treatment (Perkeni, 2019). Research by Zhang, et al (2019) shows that an attempt that has been shown to be convincing to lower the risk of DM in adults is by intervening active physical activity and maintaining body mass index (Steyn et al., 2004).

Meanwhile, quasi-experimental research by Pamungkas, *et al* (2015) showed that there was a significant relationship between dietary behavior and physical activity with fasting blood sugar levels (Pamungkas et al., 2015).

Programs to prevent and control DM that are already underway in Indonesia need to be improved. The campaign of the healthy living community movement needs to be expanded and improved. The implementation of sugar, salt, fat regulations in MoH Decree No 30/2013 juncto MoH Decree No 63/2015 (Kemenkes, 2013a, 2015) also needs to be done. Efforts to early detect and monitor risk factors through the Posbindu and Integrated Services (Pandu) of NCDs, as well as the Chronic Disease Service (Prolanis) program (Kemenkes RI, 2016) need to be strengthened. Minimum service standards related to health screening and health services for DM patients (Kemenkes RI, 2019) also need to be improved in order to achieve the target.

Evaluation of the implementation of Posbindu also needs to be carried out continuously. The results of the research by Wahidin, *et al* (2019) showed that the Ministry of Health needed research to evaluate the implementation of the PTM Posbindu and its effect on the incidence of NCDs(Wahidin et al., 2019). Increased efforts to promote and monitor blood glucose are carried out to change people's behavior to be vigilant in the prevention and control of DM. Such behavior can change for the better if it strengthen predisposing factors (knowledge, attitudes), and enabling (health services) (Green et al., 1980). The use of Posbindu data also needs to continue to be improved considering that its use is still limited. New use at the internal evaluation stage and has not been widely done for study and improvement of the program (Rahajeng & Wahidin, 2020)

This research has limitations, namely analysis unit in district level that can cause ecological bias. The data sample from each district has not been able to represent the district. In addition, the quality of the data depends on the Posbindu officers in measurement and filling in the data where the officer's accuracy varies.

Conclusion

Hypercholesterolemia and hypertension were correlated positively with hyperglycemia. Meanwhile, smoking, overweight, lack of physical activity, lack of fruit and vegetable consumption were negatively associated.

Acknowledgements

Thanks to Director of Non-Communicable Disease Prevention and Control, Ministry of Health who gave permission to use data of Posbindu.

Declaration of Interest Statement

The authors declared that there is no conflict of interest.

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3. Barriers to cervical cancer screening in Riau Islands Province

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Abstract

Background: Cervical cancer is the most common reproductive health cancer in Riau Islands. In most cases, women report to health when diseases in its advanced stage. In this study, the service provider's perceptions about barriers for women to access cervical cancer screening in Riau Islands Province was investigated. **Materials and methods:** This was a qualitative study using in-depth interviews with 7 districts coordinators and 45 service providers of cervical cancer screening in public health centers in 7 districts in Riau Islands Province. The study was conducted in June – July 2021. Program data, monthly and annual report from the Provincial Cancer Control Program were analyzed to identify the health facilities which were providing cervical cancer screening. **Results:** Almost all respondents reported that the delivery and uptake of cervical cancer screening was compromised because of factors such as gross shortage of staff and the lack of supportive supervision. In addition, the lack of awareness of the disease, feeling embarrassment and anxiety about the procedure of the screening among community members. **Conclusions:** A number of factors that are barriers to cervical cancer screening. There is a need to continue creating awareness among community members and also addressing barriers such as shortage of staff. The service providers must be aware cultural barriers and should reach out community resources to alleviate these barriers. Culturally responsive communication, making faith-based groups a community resource target, social support and networking can improve screening rates.

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Keywords: barriers, Riau Islands, VIA, cervical cancer

Introduction

Cervical cancer is probably the most thoroughly studied and preventable human cancer (Portero, S and Cebrino,J, 2022). However, it remains the fourth most common cancer and the fourth leading cause cancer mortality in women, with estimated 604.000 new cases and 342.000 deaths globally in 2020. In 2020, low and middle-income countries accounted for over 90% of new cases and death worldwide (Sung *et al*, 2020).

Women's cancer, including cervical cancer, lead to hundreds of thousands of premature deaths among women. Cervical cancer is the second most common cancer in women worldwide. Yet, because of poor access to screening and treatment services, the vast majority of deaths occur in women living in low- and middle-income countries. Effective methods for early detection of precancerous lesions using cytology (Pap smear) exist and have been shown to be successful in high income countries. However, competing health care priorities, insufficient financial resources, weak health systems, and limited number of trained providers have made high coverage for cervical cancer screening in most low- and middle-income countries difficult to achieve.

The World Health organization strategy for cervical cancer elimination suggests that each country should meet 90-70-90 targets by 2030 (coverage of 90% of girls vaccinated, 70% women screened, ant treatment of 90% of women identified with cervical disease (Pham et al, 2022). At the national level, a comprehensive approach to cervical cancer prevention and control benefits from multi-disciplinary. As approach is made up of several key component ranging from community education, social mobilization, and screening, it important to involve representatives from various disciplines and other health programs such as reproductive health, cancer control and adolescent health. In developed countries, regular screening with a Papanicolaou spear has been shown to effectively lower the risk for developing invasive cervical cancer by detecting precancerous changes. However, in developing countries, only approximately 5% of eligible women undergo cytology-based screening in five year period, secondary to constraints in technical expertise and health care infrastructure inherent to cytology-based screens. Visual Inspection with Acetic Acid (VIA) is an alternative method that has been shown to overcame the limitations and further, provide opportunity for simultaneous screening and treatment using cryotherapy. This "see and treat" approach provides health care delivery through the primary health system and ensure adherence to treatment soon after diagnosis, and has demonstrated reduction in the incidence of pre-cancerous lesions.

Despite, its demonstrated efficacy in trial settings, there has been no demonstrable reduction in cervical cancer incidence, raising questions regarding adequacy of screening and treatment provisions to at risk population (4). Screening services may be provides both as organized or opportunistic (i.e taking advantage of woman's visit to health facility for another purpose) services or a combination of both. It is generally accepted that organized screening is more cost-effective than opportunistic screening, making better use of available resources and ensuring that the greatest number of women will benefit. Visual inspections of the cervix with acetic acid (VIA) is an effective, inexpensive screening test that can be combined with simple treatment procedures for early cervical lesions, provided by trained health workers. A seven years experience in early detection or cervical cancer and pre-cancers using VIA test is a community based in Riau Island Province, where there are some districts are no existing organized cervical screening programs. VIA by trained health workers is a safe, acceptable, and effective test that can save lives from cervical cancer even in remote areas with few resources.

Cervical cancer is the most common reproductive health cancer in Riau Islands. Cervical cancer is one of the most preventable malignancies among the relevant human cancers. In most cases, women report to health when diseases in its advanced stage. Over the past seven years there has been a cancer prevention and control programs aimed to increase cervical cancer screening rate. The Ministry of Health of Indonesia recommends that women between ages 30 and 50 obtain a VIA test every 3 years. There have been a number of attempts to expand cervical cancer screening, early treatment, and prevention at all levels of health care. Cervical cancer screening and early treatment program was embarked in 2014 but the program experienced deterioration because of lack of financial resources and trained professionals.

The strategic intervention implemented through this program was the single visit approach as recommended by the World Health Organization (WHO). In this "see and treat" approach the uterine cervix is examined through visual inspection after application of acetic acid (VIA) followed by treatment of pre-cancerous lesions with cryotherapy. All these are accomplished at one visit to health facility. The use of VIA and cryotherapy for controlling cervical cancer was endorsed in Riau Islands Province in 2014.

The Ministry of Health of Indonesia and other stakeholder are implementing cervical cancer prevention and interventions. Cervical cancer screening is the systematic application of a test to identify cervical abnormalities in an asymptomatic population. Women targeted for screening may actually feel perfectly healthy and see no reason to visit health facilities. As of the end of June 2021, 58 of 92 public health centers in Riau Islands Province were providing cervical cancer screening and since the program started 58.876 women had been screened and 0,58% were found VIA+. This generally reveals that the cervical cancer screening and early treatment program has expanded over the years.

This paper evaluates, through a qualitative study, the status of the cervical cancer prevention program and the barrier being experienced by service providers to deliver these services. The paper further looks at the acceptability of the cervical cancer screening to recipients of the service from the health providers' perspective. In term of access, geographical variation in access and uptake of cervical cancer screening, with rural women less likely to be screened for cervical cancer compared to suburban women.

Although cervical cancer related mortality can be reduced through screening and early treatment programs, ensuring high levels of coverage or these services continues to be a serious challenge in resource-constrained setting. A survey over 2000 women in the USA identified cancer risk perceptions to be an indirect factor in reluctance to come for screening (Rob *et al*, 2010). An Increase in education around risk factors for cervical cancer at the school and community level is advocated to improve screening services. Additionally, trained community health worker can be effective to identify cultural and other barriers that limit utilization of screening services (Christie de, J & Reilly, 2021).

A local need assessment examining technical and infrastructural capacities and information needs enable the management team to identify what inputs are required to achieve the objectives of a cervical cancer prevention program. The assessment is best

conducted through a participatory process involving a multidisciplinary team of stake holders and obtaining the perspectives of the people involved in providing and those receiving prevention services. Based on the findings of the need of assessment and cost-effectiveness considerations, the management team can elaborate a program plan that describes a step-by-step process for reaching the program's goal of achieving high screening coverage, offering a high-quality and effective screening test and ensuring that women with positive screening test result receive treatment. The management team's role is to map out local strategies that cover all programmatic areas, including defining local programmatic targets, developing local service delivery strategies, and determining the equipment, training, and resources needed at each sites.

The main goal of service delivery is to enable women to have maximum access to quality cervical cancer screening and treatment services. Women in many countries particularly in rural states have limited access to health services.

Services need to be accessible, acceptable, affordable, and reliable. For example, programs that reduce the number of clinic visits required for screening, treatment, and follow- up make it easier for women to receive the care they need, improve follow-up rates, and reduce program costs. Programs can Implement a health facility-based (static) approach, a mobile (outreach) approach, or combine the two approaches. Trained community health workers/volunteers can be engaged to build and maintain link with the community- to encourage women to utility the service and to track women who need to be treated and followed up. Lastly, to ensure availability and reliability of services, an efficient supply distribution and logistics chain should be place (WHO, 2004).

Community information and education

These activities are necessary to inform and educate woman and men in communities about cervical cancer services both encourage and support women to participate in screening services and to ensure the program reaches its coverage goals. These activities should be implemented in communities, health facilities, and through various media. Linkages must be established between the community and health facilities.

Engaging Stakeholder

The first step in developing a program involves engaging stakeholdes to participate in the planning and management on the program. Stakeholder's involvement and sense of ownership are critical for the successful implementation of the cervical programs. To make certain that programs address women's need and concern, special effort should be made to involve women in developing, implementing, and evaluating program interventions and informational messages.

Community perspectives

It is important to consider the perspectives of women and men in the community,

their knowledge about cervical cancer, and their service needs in order to develop services that will meet their needs. Furthermore, these perspectives are important for developing promotional campaigns that address their knowledge gaps and concerns. Potential clients and their husbands (or partners) can be surveyed by community health workers or other health outreach staff who normally interact with community members. Aspects to be considered include understanding of the concept of preventing disease, knowledge of cervical cancer, awareness of cervical cancer prevention services, feelings about screening, possible barriers to utilizing screening services, and attitudes toward the health care system.

Materials and Methods

Riau Island Province is divided into 7 districts. This study was conducted in 7 districts namely Batam, Tanjungpinang, Bintan, Karimun, Lingga, Anambas Islands and Natuna. Each district has a coordinator for the cancer prevention and control program. The study was conducted in June – July 2021. Program data, monthly and annual report from the Provincial Cancer Prevention and Control Programs were analyzed to identify the health facilities which were providing cervical cancer screening. Our point of contact in each district was the district coordinators for the services who was asked to provide the data of health facilities which were providing cervical cancer screening services.

In each district, all health facilities providing cervical cancer screening were supposed to be interviewed. In some cases there was only one such provider. A total of 7 coordinators and 45 service providers were interviewed. These interviews focused on whether cervical cancer was a problem in their respective districts, the cancer prevention efforts they were involved in, the challenges they were experiencing in the delivery of these services. While district coordinators dan service providers were asked questions on their experiences of providing cervical cancer screening they were also asked about the barrier that their clients experienced in uptaking services.

All the interviews were written. All these interviews were read and reread in order to determine the major issues that were emerging. Content analysis was used to analyze this data. The data analysis for this was focused on health workers' perspective about the barriers to accessing cervical cancer screening among women.

Results and Discussion

Cervical cancer as a public health problem

Almost all the coordinators and providers of cervical cancer considered cervical cancer screening delivery and uptake is challenging because of the low rates of cervical cancer screening in their districts. Frequently repeated cervical screening either organized or opportunistic have led to a large decline in cervical cancer incidence and mortality. In contrast, cervical cancer remains largely uncontrolled in high risk developing countries because of ineffective or no screening. Secondary data from The Cancer Prevention and

Control Program of Riau Islands Province revealed that the cervical cancer screening rates using VIA in Riau Islands Province are low. In the mid of 2021, cervical screening rate using VIA in Riau Islands is 5% of 407.726 population target which is means 95% of target population have not been screened. About 58 in 1.000 (0,58%, n=338) of the women who have been screened are identified with VIA positive or have precancerous lesions.

Cervical cancer prevention effort at district level

Coordinators and providers of cervical screening and early treatment services mentioned a wide range of cervical cancer prevention effort being implemented in their districts. The services included health education, screening through VIA and treatment of those VIA positive with cryotherapy. The respondents from Batam, Tanjungpinang, and Bintan in this study said that the health education on cervical cancer was being conducted in the communities, and integrated with family planning and sexually transmitted infections. All districts are available for cryotherapy. There are six health facilities have cryoteraphy in Batam and and Tanjungpinang and Karimun have 2 cryotherapies. The other district Lingga, Natuna, and Anambas Island each has 1cryotherapies.

In District Tanjungpinang, Batam, and Karimun cervical cancer screening are available both organized and opportunistic services. In order to increase uptaking of cervical cancer screening the districs offer a mobile (outreach) services. While in the other districts, are available for opportunistic service only.

Barriers to cervical cancer screening

Tabel. 1 Potential barriers to cervical cancer screening

No	Potential barriers	n = 45 (%)
1	Long distance to health facilities	13,3
2	Innovative approaches to screening	26,7
3	Local need assesment	53,3
4	Lack awarenness among stake-holder	57,8
5	Lack of funds	57,8
6	Cultural approach	62,2
7	Supportive supervision	62,2
8	Lack of knowledge about cervical cancer	65,2
9	Feeling embarrasment	66,7
10	Fear of finding cancer	71,1
11	Lack of staffs	86,7
12	Anxiety about procedure	93,3

Table .1 show the percentage of respondents who strongly agreed with the items presented as potential barriers receiving a VIA test. A majority of respondents identified the

barrier from clients factors. The respondents identified anxiety about procedures (93%) among the women as first barrier. Fear of finding cancer was a barrier to VIA test (71,7 %) and feelings of embarrassment was the third of the barrier (66,7%) and lack knowledge about cervical cancer screening (62,2%).

Lack of Trained staffs

Lack of staffs was the first barriers to cervical cancer screening (86,7%) from the service providers aspects. Most informants said that one of the major weakness is that there are a few members of staff who are involved in the delivery of cervical cancer screening. In some facilities only one provider provided these services and she was also required to provide ante natal and family planning services among others; hence they were overloaded with work. During the pandemic of Covid-19 all informants have been overworked, these all affect to delivery of cervical cancer screening.

The average number of provider available in Riau Island Province was 27,5 the majority of providers seen were midwifes (86%) and 14% were medical doctors. Over the years a number cervical cancer training have been trained by various organization including Indonesian Cancer Foundation and some professional organizations. In almost all the district informants mentioned that there were more providers who were trained but others were not providing cervical cancer screening because they were not interested or had been assigned to other duties. The shortage of staff therefore, affects service delivery.

Lack of knowledge about cervical cancer

Most respondents said that provision of cervical cancer screening was a good approach. Their major concern was that wany of their clients reported when the cervical cancer was already in advanced stages. These respondents attributed this to lack awareness about cervical cancer among the general population. These also exist misperception about VIA which make some women not go for the service.

The other challenge in accessing cervical cancer screening, according to some respondents, is that services are offered to women who are generally healthy and hence the do not need any health interventions. Several studies have also investigated barriers to cervical cancer screening specifically. The. Most common barrier to routine screening highlighted in these. Studies include lack of knowledge about cervical cancer or screening, fear of abnormal result, cost and lack of adequate medical infrastructure and personnel (Mwaka *et al*, 2013).

Barriers and facilitators to cervical cancer screening are complex and multifactorial ranging from cognitive factors such as lack awareness to emotional, practical, cultural, and religious factors (Marlow, *et al*, 2015 & Rob *et al*, 2021). Interventions aimed at improving uptake at a population level seem to work less well than targetted interventions (Marlow *et al*, 2017). Cultural tailoring can be effective method of addressing screening barriers and can assist in developing targeted interventions to promote screening (Krauter *et al,* 2005).

Culture is often regarded as a barriers health behaviour, but it can also be used in

interventions as positive health resources (Bond. C *et al*, 2004). Faith based health promotion consistent with principles underpinning one's faith, alongside other factors that improve uptake screening, can offer a culturally acceptable method of addressing barriers to screening (Prat *et al*, 2017 & Padela, 2018). Faith based messages can help tackle known barriers to screening to allow informed decision making about screening (Prat *et al*, 2020).

Long distance to health facilities

Some providers in Natuna, Anambas Islands, and Lingga, mentioned that the long distance access to health facilities also tend to deter most women accessing cervical cancer screening. This is, especially, the community targets are in different remote islands. Distance is therefore a major barrier to accessing cervical cancer screening in Riau Island Province.

Lack of involvement of husbands

Men have a critical role to play in reducing cervical cancer burden. Yet, there is little information of male involvement in the cervical cancer screening and treatment process in Indonesia. A study showed that male partners have little or no knowledge about cervical cancer. Some men, provide various forms of suppor-financial, social, material and emotional-to their partners during the screening and treatment stage of disease. Some men, however abandoned their partners during the screening and treatment stages of disease (Charity B, 2019).

Cervical cancer education program is needed to target husbands. The education should focus on the causes of the disease, screening and treatment methods of the disease, and ultimately spousal support during the screening and treatment process. Patriarchal practice is embedded in Indonesian culture, and patriarchal culture and social culture may influence use of gynecological services including cervical cancer screening. Thus, involving me in cervical cancer prevention activities is essential. Although cervical cancer is exclusively a female disease, men can play a key role in cervical cancer prevention and treatment if they have knowledge of cervical cancer risk factors and prevention strategies (WHO, 2006).

In populations with cervical cancer disparities, empirical evidence supports positive effect associated with male involvement in cervical cancer screening practices. A. study among Mexican immigrants in the U.S indicated that men have a role in effective screening programs for cervical cancer . When the men understood the risk factors related to cervical cancer and the benefits of cervical cancer screening, they were motifated to be supportive of screening for theif female partners (Thiel, B *et al*, 2008).

While the aim of offering cervical cancer screening is to test, some women opt to go home first before getting the treatment and consult their husbands. It is easy, as mentioned by informants, for those who visit the health facilities with their husbands to be tested and treated. It is difficult, however, for women to adhere because in most cases their husbands do not go with their wives for counselling. Wood *et al* (2016) also found that nurses reported that women in general are afraid of exposing their private parts.

As far as informants were concerned, the test and treat approach to cervical cancer control is acceptable to women even though in some cases women would still want to get permission from their husbands before undergoing cryotherapy; hence the delay in seeking care. Men generally have an important role in decision making in the family and if knowledgeable about cervical cancer they can actually motivate their partners. However, studies have shown that men do not have knowledge about

cervical cancer. Promoting partner participation in cervical cancer screening and early treatment service would increase the uptake of these services.

Lack of supportive supervision

Supervision of health workers is a necessary monitoring and evaluation tool for the health system. Providers of cervical cancer screening and early treatment services were asked if they were satisfied with supervision and guidance that they received in their work. In general, most providers were not satisfied with the level of supervision because their superiors did not visit them for supervision.

Supervisors are supposed to visit the facilities providing the services in order to identify if there are any problems affecting service delivery and advise providers accordingly. Most of provider claimed that either they have never been supervised since they have finished their training and started providing services or they have only been supervised once. Supervision of providers of cervical cancer screening and early treatment is generally weak.

Conclusion

Some significant progress has been made in the delivery of cervical cancer screening. The number of health facilities has increased the services as a mobile (outreach) services for the screening. This has been accompanied by a corresponding increase in the number of providers who have been trained. The quality of services being delivered. However, been compromised by the general lack of supervision of provider and coordinators at a district level, the general shortage of human resources to effectively deliver cervical cancer screening. There is a need to continue creating awareness among community members, including husbands about cervical cancer available services. The results of the current study revealed population categories with low screening adherence that may be appropriate target groups for intervention to encourage screening behaviours for detecting cervical cancer in these countries.

On the other hand, health providers must be aware of the sectors of the population at high risk of non-participation and urge screening among these women. Moreover, communication skills, as well as the ability to gather information, are required to raise women's awareness of the etiology of cervical cancer, HPV infection, preventative strategies, and early detection.

A number of factors that are barriers to cervical cancer screening. There is a need to continue creating awareness among community members and also addressing barriers such as shortage of staff. The service providers must be aware cultural barriers and should reach out community resources to alleviate these barriers. Culturally responsive communication, making faith-based groups a community resource target, social support and networking can improve screening rates.

Limitations

This study has several limitations. First, the survey was provided only to service provider's perspectives. The perceptions of barriers difficult to measure the validity of these responses.

Discussion

In order to attain a highly successful cervical cancer screening program, there is a need for having a high coverage of women at risk of getting this condition. In order to achieve this, people should be aware this disease and the availability of early detection and treatment services at health facilities. Poor knowledge about cervical cancer screening, feel anxiety about the procedures, feelings of embarrassment are a major barriers to uptake the cervical screening cancer in Riau Island Province.

Since most women are uninformed about interventions such as cervical cancer screening there is no demand for such services by these women. Women, therefore, present themselves to professionals only for curative rather than preventive health care and only presence illness justifies access to health care.

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Declaration of Interest Statement

The author declare that no conflict of interests in this work.

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TRACK 3: ONE HEALTH FOR ZOONOSIS DISEASE

1. Longitudinal Study Of Community Knowledge, Attitude, And Behavior On Dengue Prevention In Gilimanuk Port Buffer Area During The Covid-19 Pandemic

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Abstract

Background: Eradication of *Aedes aegypti* breeding site can reduce the number of dengue cases during the COVID-19 pandemic. Dengue infrction continues being public health problem in endemic countries during the COVID-19 pandemic and resulting in a double burden of diseases. **Materials and methods**: This was a longitudinal study with cross-sectional design, which was initiated in December 2020 and completed in March 2022. This study aimed to identify knowledge, attitude, and behavior on dengue prevention during the COVID-19 pandemic. Samples were collected from 190 household heads in residential of Gilimanuk port buffer area, Bali, Indonesia. The final structured questionnaire was in Bahasa Indonesia. Respondents interviewed for three years (2020,2021, and 2022) used the same instrument. Data was analyzed with One-Way Analysis of Variance (ANOVA). **Results**: This study found that there was a positive trend to knowledge, attitude, and behavior on dengue prevention during COVID-19 Pandemic. Respondents in 2022 had the highest mean of knowledge, attitude, and behavior compared with 2020 and 2021. Statistical analysis showed that there was a significant difference in community knowledge, attitude, and behavior on dengue prevention during the COVID-19 pandemic (P-value = 0.001). This study indicated the effectiveness of dengue prevention education provided by *Jumantik* (trained local community in larva monitoring) and public health officers during the COVID-19 pandemic. **Conclusions**: The continuity of education about dengue prevention is highly recommended to improve knowledge, attitude, and behavior on dengue prevention during COVID-19 pandemic.

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Keywords: Knowledge, attitude, behavior, dengue prevention, Port, COVID-19 Pandemic

Introduction

Vector borne diseases occur due to the environment or human behavior changes in the long term. *Aedes aegypti* is a vector of several diseases in tropical and sub-tropical regions, including dengue, yellow fever, zika, and chikungunya, (Ridha *et al*., 2017). During the COVID-19 pandemic, dengue infection continues being public health problem in endemic countries, such as southeast Asia, resulting in a double burden of disease, (Harapan *et al*., 2021). Dengue is a major public health problem in Indonesia. Health ministry of Indonesia reported the Incidence Rate (IR) of Dengue in 2020 was 40 per 100.000 population and Case Fatality Rate (CFR) of Dengue was 0,7%. Bali was the highest IR of dengue (273,1) than other provinces in Indonesia. The dengue cases were reported in 460 districts in Indonesia of which 439 of them have also reported cases of Covid-19 in 2020, (Health Ministry of Indonesia, 2020).

Dengue cases is increasing among international travelers. Prevention of dengue at the entry point of a country is important to prevent disease transmission in and out of a country. International Health Regulations stated that the port perimeter area has to be free from *Ae. aegypti* larvae, while the port buffer area is based on the entomological index of the house index has to be < 1%, (WHO, 2005). Gilimanuk port is located in Bali province, Indonesia. This port is a crossing port between the islands of Bali and Java. During the COVID-19 pandemic, as many as 6000 passengers per day pass through this port. In early 2020, 9 cases of dengue were found in Gilimanuk village. The results of larval monitoring by the Denpasar quarantine office showed that the house index in the Gilimnauk port buffer area from January to June 2020 was > 1%. Based on house index, health quarantine officers of Denpasar and *Jumantik* (trained local community in dengue prevention) educated the community in residental area of Gilimanuk port to prevent the dengue cases increase during the COVID-19 pandemic. This longitudinal study was designed to evaluate the community knowledge, attitude, and behavior on dengue prevention after educated by health officers and *Jumantik*. This study provides important information relevant to strengthening dengue control in residential area.

Materials And Methods

Study design

This study was a longitudinal study with cross-sectional design, initiated in December 2020 and completed in March 2022. Gilimanuk port is located in Jembrana regency, Bali province, Indonesia. This study was conducted in buffer area of Gilimanuk port. Buffer area is an area with a radius of 400 meters from the port to monitor the entomological index of *Ae. aegypti* as a vector of yellow fever and dengue, (WHO, 2016). Buffer area was residential area with estimated population about 255 households. Respondents of this study were household heads in residential of Gilimanuk port buffer area. The household heads were chosen because they influence health practices to the family and may contribute to added knowledge on

dengue prevention during the pandemic or other infectious diseases such as COVID-19. (Mashudi *et al*., 2022).

Sampling and sample size

Sample size was calculated by using the formula: $n = \frac{N}{1+N\,(e)^2}$,(Madow, 1968). Where n is the sample size, N is the population size (255), furthermore, e is the level of precision (5%) at 95% confidence level. The minimum sample size was 156 and after adding 20% to compensate for persons were unable to contact, respondents were collected from 190 households. Sample of the household heads were mothers, fathers or relatives of the families (aged $\geq$ 18 years) who had lived more than 6 months in Gilimanuk port buffer area and who were willing to participate in this study. This study randomly selected 2 clusters from buffer area of Gilimanuk Port. From each cluster, 95 respondents were randomly recruited

Study instrument

Sample was collected with the same size for every year (from 2020 to 2022) by using same instrument. The final structured questionnaire was in bahasa Indonesia. The content validity of the questionnaire was reviewed by public health specialists in Health Quarantine Office Denpasar. The questionnaire consisted of four part: Part A (sociodemographic data), Part B (knowledge on dengue prevention), Part C (attitude on dengue prevention), and Part D (behavior on dengue prevention). Eight questions were for knowledge (True/False) with combination of favorable and unfavorable question, six for attitude (5-point likert scale-based questions: Strongly agree, agree, neutral, disagree and strongly disagree), and six for the behavior on dengue prevention (Yes/No). Validity of the questionnaire was analyzed by using product moment validity test on 20 household heads at another location in the Melaya Sub-district about 30 km from the buffer area of Gilimanuk Port. Validity test was analyzed for with p (value) < 0,05, interpreted all items were valid. Cronbach's alpha was analyzed as an accepted reliable value of 0.69, 0.79, and 0.73 for knowledge,attitude, and behavior, respectively

Data analysis

Data collection was carefully monitored and double-checked ihen transferred to Microsoft excel format for further analysis. Data was analyzed by using One-Way Analysis of Variance Test (ANOVA) to evaluate differences between the means of 2020, 2021, and 2021 regards to knowledge, attitude, and behavior on dengue prevention during the COVID-19 Pandemic

Result

This study was conducted during the COVID-19 pandemic (2020-2022). The total sample was 190 respondents for each year. Respondents sociodemographic showed in Tabel 1. Based on this study during three years data collection, the majority of respondents were female (54,2%). Age was categorized based on the mean of age (35) which was ≤ mean and > mean. Age > 35 was a bit higher when compared with age ≤ 35, and the majority of respondents were in education level of senior high school (75,3%). During the COVID-19 pandemic (2020-2022), the percentage of unemployed respondents increased from 9,5% in 2020 to 22,1% in 2022. Otherwise, the percentage of respondents occupation in private (worker) decreased from 2020 to 2022. The same trend was showed on respondent income. The percentage of respondents with income/month of > 3 million IDR decreased from 68,4% in 2020 to 60,5% in 2022.

Table 1. Respondent sociodemographic

Respondent characteristics	Year 2020 (n = 190)		Year 2021 (n = 190)		Year 2022 (n = 190)	
	F	%	f	%	f	%
A. Gender						
Male	87	45.8	87	45.8	87	45.8
Female	103	54.2	103	54.2	103	54.2
B. Age						
≤ 35	77	40.5	79	41.6	83	43.7
>35	113	59.5	111	58.4	107	56.3
C. Education						
Senior High School	143	75.3	143	75.3	143	75.3
College and Higer	47	24.7	47	24.7	46	24.7
D. Occupation						
Unemployed	18	9.5	40	21.1	42	22.1
Agriculture	32	16.8	32	16.8	32	16.8
Government	30	15.8	30	15.8	30	15.8
Private (owner)	22	11.6	20	10.5	20	10.5
Private (worker)	88	46.3	68	35.8	66	34.7
E. Income/month*						
< 1	18	9.5	40	21.1	42	22.1
1-3	42	22.1	28	14.7	33	17.4
>3	130	68.4	122	64.2	115	60.5

* 1 Million IDR = 66.8 USD

Community knowledge is important factor to prevent *Ae. aegypti* potential breeding sites in residential area. In Indonesia, *Jumantik* has a role to mobilize the community to eradicate of *Ae. aegypti* breeding site. *Jumantik* is a trained local community member who recruit by the community or goverment to conduct periodic and continuous larval monitoring.(Health Ministry of Indonesia, 2016). In buffer area of Gilimanuk port, *Jumantik*

recruited and trained by Health Quarantine Office Denpasar to visit houses for larval monitoring once a month. *Jumantik* also has the role to educate husehold about dengue prevention during the COVID-19 Pandemic. Table 2 summarizes the community knowledge on dengue prevention who answered the item correctly.

The percentage of correct response for knowledge questions increased from 2020 to 2022. In 2020, only 21,6% respondents were answered correctly for knowledge question "only *Jumantik* and public health officers that are responsible on dengue prevention during the COVID-19 pandemic (False)", the correct responses increased to be 29,5% and 94,2% in 2021 and 2022 respectively. Approximately, 34,7% respondents were answered correctly for knowledge question "the most effective way to prevent dengue fever during the COVID-19 pandemic is fogging (false)", the correct responses increased to be 40.0% and 85.3% in 2021 and 2022 respectively. In 2020, only 34,7% respondents were answered correctly for knowledge question "stored water container/tanks without being covered should be cleaned every 7 month (false)", the correct responses increased to be 38.4% and 95,8% in 2021 and 2022 respectively.

Table 2. Knowledge of respondents on dengue prevention during the COVID-19 pandemic

Items	Year 2020		Year 2021		Year 2022	
	n	%	n	%	n	%
The principal mosquito vector for dengue fever is female *Ae. aegypti* (true)	88	46.3	104	54.7	163	85.8
Only Dengue virus infects adults during the COVID-19 Pandemic (false)	135	71.1	150	78.9	156	82.1
The mosquito lays its eggs in clean water (true)	116	61.1	132	69.5	145	76.3
Mosquitoes transmitting dengue infection bite only during day time (true)	130	68.4	140	73.7	157	82.6
The most effective way to prevent dengue fever during the COVID-19 pandemic is fogging (false)	54	28.4	76	40.0	162	85.3
Larvicides prevent breeding of mosquito larvae (true)	123	64.7	131	68.9	172	90.5
Stored water container/tanks without being covered should be cleaned every 7 month (false)	66	34.7	73	38.4	182	95.8
Only *Jumantik* and public health officers that are responsible on dengue prevention during the COVID-19 pandemic (False)	41	21.6	56	29.5	179	94.2

Note: The percentage shown respondents who answered the item correctly

Tabel 3 summarizes attitude of respondents on dengue prevention during the COVID-19 pandemic. In 2020, Most respondents were strongly agreed (43.2%) or agreed (31,1%) that *Jumantik* applies health protocols while monitoring *Ae. aegypti* larvae in every house during the COVID-19 pandemic, the agreed responses increased to be 52,6% and 64,7% in 2021 and 2022 respectively. Approximately 13,7% of the respondents were strongly disagreed that

family members have a important role to prevent spread of dengue during the COVID-19 Pandemic, otherwise the percentage of strongly disagreed response were decreased significanly in 2021 (11,6%) dan 2022 (1,1%). Approximately 41,6% of the respondents were disagreed that healthy person who work from home can be infected by dengue fever during the COVID-19 Pandemic, the percentage of strongly disagreed response were decreased significanly in 2021 (20,0%) and 2022 (2,1%).

Tabel 3. Attitude of respondents on dengue prevention during the COVID-19 pandemic

Items	Responses	Year 2020 n (%)	Year 2021 n (%)	Year 2022 n (%)
Dengue can be prevent during the COVID-19 Pandemic	Strongly agree	28 (14.7)	33 (17.4)	71 (37.4)
	Agree	36 (18.9)	76 (40.0)	105 (55.3)
	Neutral	83 (43.7)	57 (30.0)	8 (4.2)
	Disagree	23 (12.1)	21 (11.1)	4 (2.1)
	Strongly disagree	20 (10.5)	3 (1.6)	2 (1.1)
Eradicate of *Ae. aegypti* breeding site can reduce the number of dengue cases	Strongly agree	47 (24.7)	30 (15.8)	44 (23.2)
	Agree	32 (16.8)	48 (25.3)	128 (67.4)
	Neutral	72 (37.9)	82 (43.2)	13 (6.8)
	Disagree	37 (19.5)	29 (15.3)	5 (2.6)
	Strongly disagree	2 (1.1)	1 (0.5)	0 (0.0)
Family members have a important role to prevent spread of dengue during the COVID-19 Pandemic	Strongly agree	27 (14.2)	49 (25.8)	97 (51.1)
	Agree	32 (16.8)	44 (21.1)	85 (44.7)
	Neutral	28 (14.7)	58 (30.5)	4 (2.1)
	Disagree	77 (40.5)	21 (11.1)	2 (1.1)
	Strongly disagree	26 (13.7)	22 (11.6)	2 (1.1)
Healthy person who work from home can be infected by dengue fever during the COVID-19 Pandemic	Strongly agree	45 (23.7)	55 (28.9)	75 (39.5)
	Agree	30 (15.8)	44 (23.2)	105 (55.3)
	Neutral	30 (15.8)	48 (25.3)	4 (2.1)
	Disagree	79 (41.6)	38 (20.0)	4 (2.1)
	Strongly disagree	6 (3.2)	5 (2.6)	3 (1.6)
Jumantik continues to monitor *Ae. aegypti* larvae during the COVID-19 pandemic	Strongly agree	16 (8.4)	34 (17.9)	22 (11.6)
	Agree	74 (38.9)	64 (33.7)	128 (67.4)
	Neutral	39 (20.5)	59 (31.1)	18 (9.5)
	Disagree	31 (16.3)	24 (12.6)	13 (6.8)
	Strongly disagree	30 (15.8)	9 (4.7)	9 (4.7)
Jumantik applies health protocols while monitoring *Ae. aegypti* larvae in every house during the COVID-19 pandemic	Strongly agree	82 (43.2)	59 (31.1)	59 (31.1)
	Agree	59 (31.1)	100 (52.6)	123 (64.7)
	Neutral	39 (20.5)	21 (11.1)	7 (37.7)
	Disagree	6 (3.2)	7 (3.7)	1 (0.5)
	Strongly disagree	4 (2.1)	3 (1.6)	0 (0.0)

Tabel 4 summarizes percentage the good behavior of respondents on dengue prevention during the COVID-19 pandemic. In 2021, approximately 12,1% respondents were

cleaned the water container once a week, the percentage of good behavior increased to be 31,1% and 75,3% in 2021 and 2022 respectively. In terms of behavior on cover all water used for storing on or outside the house, showed the percentage of 26,3% (2020), 50,5% (2021), and 78,4%(2022). In terms of behavior on examine for mosquito larvae in water containers once a week, showed percentage of 21,6% (2020), 33,2% (2021), and 88,4%(2022). In terms of behavior on proper disposal of items that can collect rainwater, showed percentage of 7,9% (2020), 22,6% (2021), and 95,3%(2022). Furthermore, approximately 34,2% (2021) respondents were prevented mosquito bites (by using a mosquito coil, electric mosquito mat, mosquito spray, or mosquito repellent), increased to be 51,6% (2021) and 82,1 (2022).

Tabel 4. Behavior of respondents on dengue prevention during the COVID-19 pandemic

Items	Year 2020		Year 2021		Year 2022	
	n	%	n	%	n	%
Clean the water container once a week	23	12.1	59	31.1	143	75.3
Cover all water used for storing on or outside the house	50	26.3	96	50.5	149	78.4
Put larvicide in water container	19	10.0	104	54.7	134	70.5
Examine for mosquito larvae in water containers once a week	41	21.6	63	33.2	168	88.4
Proper disposal of items that can collect rainwater	15	7.9	43	22.6	181	95.3
Prevent mosquito bites (by using a mosquito coil, electric mosquito mat, mosquito spray, or mosquito repellent)	65	34.2	98	51.6	156	82.1

Note : The percentage shown respondents who answered "yes" for the item

Data was analyzed by using analysis of variance (ANOVA) to evaluate differences between the means of 2020, 2021, and 2022 with regards to knowledge, attitude and behavior on dengue prevention. Based on table 5 showed that the respondents in 2022 had the precise knowledge on dengue prevention ($\bar{x}$ = 6,92) compared with 2020 ($\bar{x}$ = 4,31) and 2021 ($\bar{x}$ = 4,15). There was a significant difference in community knowledge on dengue prevention during the COVID-19 pandemic (P-value = 0.001). Respondents in 2022 had the highest recommended attitude on dengue prevention ($\bar{x}$ = 25,07) compared with 2020 ($\bar{x}$ = 19,74) and 2021 ($\bar{x}$ = 21,36). There was a significant difference in community attitude on dengue prevention during the COVID-19 pandemic (P-value = 0.001). Respondents in 2022 had the highest recommended behavior on dengue prevention ($\bar{x}$ = 4.90) compared with 2020 ($\bar{x}$ = 1,10) and 2021 ($\bar{x}$ = 2,43). There was a significant difference in community behavior on dengue prevention during the COVID-19 pandemic (P-value = 0.001).

Table 5. Comparison between knowledge, attitude and behavior on dengue prevention in 2020–2022

Variables	Means	S.D.	F	P -value
Knowledge				
Year 2020 (n = 190)	4.31	3.06		
Year 2021 (n = 190)	4.15	3.12	56.376	0.001
Year 2022 (n = 190)	6.92	2.29		
Attitude				
Year 2020 (n = 190)	19.74	6.66		
Year 2021 (n = 190)	21.36	6.09	44.572	0.001
Year 2022 (n = 190)	25.07	3.86		
Behavior				
Year 2020 (n = 190)	1.10	1.86		
Year 2021 (n = 190)	2.43	22.51	155.880	0.001
Year 2022 (n = 190)	4.90	1.93		

Discussion

The COVID-19 pandemic began in 2020. Various policies were issued by the Indonesian government to prevent the transmission and elevation of COVID-19 cases, such as implementing health protocols, self-isolation, and working from home. Indonesia is endemic country for dengue, including Bali province, to prevent the possibility of a double burden of diseases, community participation is needed to prevent dengue during the COVID-19 pandemic. At the beginning of the COVID-19 pandemic in 2020, only 21.6% of respondents in the Gilimanuk port buffer area thought that dengue prevention was not the responsibility of the *Jumantik* and health workers. Meanwhile, the role of community participation on dengue prevention is important. During COVID-19 Pandemic, *Jumantik* was difficult to visit houses for larval monitoring due to many people were self-isolating and refused *Jumantik*'s visit to implement social distancing at home. Education to the community in the Gilimanuk Port buffer area was carried out by *Jumantik* and health workers using leaflet media about dengue prevention by visiting door to door method. Education was carried out three times from 2020 to 2022. This longitudinal study was conducted during the COVID-19 pandemic period (2020 to 2022) and evaluated the dengue prevention education provided to the community by *Jumantik* and health workers.

This study found that there was a positive trend to knowledge on dengue prevention during COVID-19 Pandemic. The correct responses increased about preventing dengue was not only the responsibility of the *Jumantik* and health workers but also family members, with percentage 29,5% and 94,2% in 2021 and 2022 respectively. This finding was in line with many studies that have been performed in general population, such as those in Laos, Pakistan, Thailand, Malaysia and Maldives, (Sayavong et al., 2015). Statistical analysis showed that there was a significant difference in community knowledge on dengue prevention during the

COVID-19 pandemic (P-value = 0.001). Previous studies have revealed the similiar result that the contribution of media in educating about dengue was increasing the knowledge of Thai people significantly from 2013 to 2015, (Boonchutima et al., 2017).

This study found that in year 2020, most respondents were strongly agreed (43.2%) that *Jumantik* applies health protocols while monitoring *Ae. aegypti* larvae in every house during the COVID-19 pandemic. *Jumantik* has an important role in monitoring *Ae. agypti* larvae. During the COVID-19 pandemic, *Jumantik* should mobilize the community to prevent dengue fever. The community in the Gilimanuk Port buffer area agreed to *Jumantik* apply health protocols while on duty. Along with the longer the pandemic, the community attitude towards *Jumantik* to apply health protocols was increasing to be 52,6% and 64,7% in 2021 and 2022 respectively. *Ae. aegypti* larvae survey method by *Jumantik* or health workers need to consider the development of COVID-19 cases. Health workers need to design larva monitoring methods by considering health protocols. During with the COVID-19 pandemic, respondents showed a trend of positive attitudes that even though working from home a person is still at risk of being infected with dengue infection, during the COVID-19 pandemic, dengue prevention must be done by involving community participation. Statistical analysis showed that there was a significant difference in community attitude on dengue prevention during the COVID-19 pandemic (P-value = 0.001). The Srategies to improve community partisipation is health education through mass media, implementation of the programmes through door-to-door visits from village volunteers (*Jumantik*) and inter-sectoral coordination, (Sulistyawati et al., 2019).

Community behavior on dengue prevention is important to implement during the COVID-19 pandemic to prevent the double burden of diseases. At the beginning of the COVID-19 pandemic in 2020, people spent most of their time at home. The results showed that even though they were at home, people had less behavior in preventing dengue fever. Approximately 12,1% respondents were cleaned the water container once a week. A previous study also showed in Malaysia reported that even people stay at home during the lockdown due to the COVID-19 pandemic, the level of dengue prevention is still low, (Mashudi *et al*., 2022). This study found that there was a positive trend in behavior on dengue prevention during COVID-19 Pandemic from 2020 to 2022. Statistical analysis showed that there was a significant difference in community behavior on dengue prevention during the COVID-19 pandemic (P-value = 0.001). This study indicated the effectiveness of dengue prevention education provided by *Jumantik* (trained local community in larva monitoring) and public health officers during the COVID-19 pandemic. During the COVID-19 Pandemic when people were stay at home, community participation in mosquito control activities should be strengthened. Dengue transmission in and around homes is considered a key factor for dengue outbreaks. Residents should be reminded of the mosquito life cycle, including the aquatic phase of 6–10 days, and encouraged to work together in and around their homes to remove stagnant water, reduce solid waste and plastics that fill with rain, and ensure proper covering of all water storage containers (Wilder-Smith *et al*., 2020).

Conclusion

This study found that there was a positive trend to knowledge, attitude, and behavior on dengue prevention during COVID-19 Pandemic. This study indicated the effectiveness of dengue prevention education provided by *Jumantik* (trained local community in larva monitoring) and public health officers during the COVID-19 pandemic. The continuity of education about dengue prevention is highly recommended to prevent dengue cases during COVID-19 pandemic. The government should create method for monitoring *Ae. aegypti* larvae by *Jumantik* during the COVID-19 pandemic with a health protocol approach

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Competing Interests

None declared.

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TRACK 4: HEALTH SYSTEM AND HEALTH POLICY IN ENDEMIC, EPIDEMIC, AND PANDEMIC

1. Determinants of Exclusive Breastfeeding Intention among Pregnant Woman in a Private Hospital in Padang, West Sumatera

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Abstract

Background: Exclusive breast feeding is an important factor for preparation of children development. There are several factors contributing to exclusive feeding. The study aimed to know determinants of exclusive breastfeeding intention among pregnant woman in a private hospital in Padang, West Sumatera.

Materials and methods: Design of this study is cross sectional study which using primary data from Reproductive Clinic of Restu Ibu Mother and Child Hospital, Padang, West Sumatera. A set of data collected in July 2022 incorporated 283 pregnant women. Variables involved in the study were breast feeding intention, age, age of pregnancy, parity, education, work, and family support. Descriptive and bivariate analysis (Chi Square test) were performed in this study. **Results**: Intention of breast feeding was found in 65% respondent, 94% of which aged ≥ 25 years, 64% in pregnancy ≥ 28 weeks, 75.6% has >2 parity, 28% has university education background, 31.6% were government employee or state-owned enterprise employee, and 80.8% had support from husband. Bivariate analysis showed that works status and support from family were associated with intention of exclusive breast feeding. Meanwhile, age, age of pregnancy, parity, and education were not associated with breastfeeding intention. **Conclusions:** Intention of breast feeding was quite high. Works status and support from family were associated with intention of exclusive breast feeding

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Keywords : breast feeding, exclusive breast feeding,

Introduction

The Infant Mortality Rate (IMR) is one of the important indicators to determine the degree of health of a country. One of the targets of the Sustainable Development Goals (SDGs) by 2030 is to end the preventable deaths of new born babies and toddlers, so all countries should reduce the infant mortality rate. [1]. The global strategy in preventing infants' distress is with exclusive breastfeeding for 6 months and the introduction of safe and nutritious complementary foods along with breastfeeding up to the age of 2 years or more [2]. Exclusive breastfeeding up to the age of 24 months contributes to the intake of important nutrients in infants [3].

In 2021, the prevalence of exclusive breastfeeding worldwide was 44% and was still below the World Health Organization's global target [4]. In Indonesia, the prevalence of exclusive breastfeeding was 37.3% [5]. The low practice of exclusive breastfeeding in some parts of Indonesia is still a problem. The lack of information about exclusive breastfeeding from health workers and the mother's perception about breast milk are the triggers for the low practice of exclusive breastfeeding [6].

Antenatal Care (ANC) is a visit by pregnant women to a midwife or doctor as early as possible to get antenatal care. One of the most crucial ANC services is the provision of counselling [7] for mother and child health including exclusive breastfeeding

Many factors influence the success of exclusive breastfeeding, including sociodemographic factors in the form of age, occupation, socioeconomic education and residence, psychosocial factors (husband support, family support, beliefs, desires, perceptions), pre/ post-natal factors (parity, type of childbirth, difficulties) and intentions. The intention of pregnant women for exclusive breastfeeding starts from pregnancy. Intention is the intention of pregnant women to breastfeed their babies from birth until the baby is 6 months old. Intention refers to the degree to which the mother is motivated to try to perform a behavior, or how much of their efforts to direct the attempted appearance of planned behavior [8].

According to the Ministry of Health's Strategic Plan for 2015-2019, the ANC coverage target is 80% and the exclusive breastfeeding coverage target is 77.6%. Based on ANC coverage data in Padang City, ANC coverage has reached the target, but exclusive breastfeeding rates is still low [9]. It needs to know the intension for breastfeeding in the city why it is still low. Thus, we conducted this study aimed to know determinants of exclusive breastfeeding intension among pregnant woman in a private hospital in Padang, West Sumatera

Methods and Materials

Design of this study is cross sectional study which using primary data for intension of breastfeeding and secondary data for other variables from medical record from Reproductive Clinic

of Restu Ibu Mother and Child Hospital, Padang, West Sumatera. Population of the study was pregnant women who attend the examination in Reproductive Clinic of the hospital in July 2022. Sample was total population consisted of 283 pregnant women based on medical record.

Variables involved in the study were dependent variable (breast feeding intension) and, age, age of pregnancy, parity, education, work, and family support. Intension was asked by the midwives before the pregnant women are being examined. Descriptive analysis was performed to describe the variables of the study. Meanwhile, bivariate analysis was performed to know association of independent variables to dependent variables using Chi Square test with significant point 0.05.

Results

Intension of breast feeding was found in 65% respondent, 94% of which aged ≥ 25 years, 64% in pregnancy ≥ 28 weeks, 75.6% has >2 parity, 28% has university (bachelor) education background, 31.6% were government employee or state-owned enterprise employee, and 80.8% had support from husband.

Table 1. Characteristics of study participants

Variable	N	%
Intension of exclusive breast feeding		
No	99	35.0
Yes	184	65.0
Age		
< 25 years	17	6.0
≥ 25 years	266	94.0
Age of pregnancy		
< 28 weeks	102	36.0
≥ 25 weeks	181	64.0
Parity		
< 2	214	75.6
≥ 2	69	24.4
Education		
Senior High School	90	31.8
DIII	85	30.0
S1	108	38.2
Occupation		
Government/ Stated Owned Enterprise Employee	89	31.4
Private	68	24.0
Entrepreneur	75	26.5
Housewife/Not working	50	17.7
Missing	1	0.4
Support		
Husband	227	80.2
Mother	5	1.8
Brother/sister	492	17.3
Missing	2	0.7

Result of bivariate analysis showed that work status and support from family were associated with intension of exclusive breastfeeding. Meanwhile, age, age of pregnancy, parity, and education were not associated with it (Table 2)

Table 2. Association between independent variables with Intension of Exclusive Breastfeeding

Variable	Intension of Exclusive Breastfeeding					PR (95% Confidence Interval)	*P*
	No		Yes		Total		
	N	%	N	%	N		
Age						1.009 (0.520 – 1.961)	1.000
< 25 years	6	35.3	11	64.7	17		
≥ 25 years	93	35.0	173	65.0	266		
Age of pregnancy						1.105 (0.799 – 1.529)	0.637
< 28 weeks	38	37.3	64	62.7	102		
≥ 25 weeks	61	33.7	120	66.3	181		
Parity						1.358 (0.892 – 2.067)	0.178
< 2	80	37.4	134	62.6	214		
≥ 2	19	27.5	50	72.5	69		
Education						-	0.281
Senior Hight School	33	36.7	57	63.3	90		
DIII	24	28.2	61	71.8	85		
S1	42	38.9	66	61.1	108		
Occupation						-	0.031
Government/ Stated Owned Enterprise Employee	40	44.9	49	55.1	89		
Private	24	35.3	44	64.7	68		
Entrepreneur	17	22.7	58	77.3	75		
Housewife/Not working	18	36.0	32	64.0	50		
Support						-	0.031
Husband	71	31.3	156	68.7	227		
Mother	2	40.0	3	60.0	5		
Brother/sister	25	51.0	24	49.0	49		

Discussion

Breastfeeding intentions were found in 65% of respondents, 94% of whom were 25 years old, 64% at 28 weeks pregnant, 75.6% had parity >2, 28% had a university educational background, 31.6% were government employees or state-owned enterprises. employees of

self-owned companies, and 80.8% have the support of their husbands. Bivariate analysis showed that employment status and family support were associated with exclusive breastfeeding intentions. Meanwhile, age, gestational age, parity, and education are not related to breastfeeding intentions.

Breastfeeding intension in thy study was quite high, but need to be scale up to achieve target of exclusive breastfeeding, particularly in Padang City. Effort to increase breast feeding should include participation of pregnant women. Health providers should discuss the importance and management of breastfeeding with pregnant women and their families, support mothers to initiate and maintain breastfeeding, encourages mothers not to provide breastfed newborns any food or fluids other than breast milk, and encourage mothers and their infants to remain together and practice rooming-in 24 hours a day.

Breast milk is an ideal nutrient for babies that contains nutrients that are most in line with the needs of the baby and contain z at protection to prevent the occurrence of diseases. The first two years of a child's life are very important, since optimal nutrition during this period decreases morbidity and mortality, reduces the risk of chronic diseases, and promotes overall better development [12]. Therefore, optimal breastfeeding, namely when the child is 0-23 months old, is very important because it can save the lives of more than 820,000 children under the age of 5 years every year [13].

Education will make a person compelled to be curious, to seek experience and to organize experience so that the information received will become knowledge [14]. The knowledge possessed will form a belief in carrying out certain behaviors [15]. Education affects exclusive breastfeeding highly educated mothers will be more receptive to a new idea than mothers who are poorly educated. So that promotions and information about exclusive breastfeeding can easily be accepted and implemented. Research on factors affecting breastfeeding within 6 months of giving birth shows that mothers with high school education or higher are more likely to give exclusive breastfeeding than mothers who have a lower level of education. Likewise with the research conducted by Yvoonne et all, (2016) one of the factors driving the high success rate of breast milk in developed countries is the majority of mothers who have higher education so that they easily filter and receive new information, especially regarding the importance of exclusive breastfeeding [16].

Other findings included a bivariate analysis shown that maternal age was not significantly associated with the practice of exclusive breastfeeding. These findings were confirmed in previous studies [17] while other results showed different findings that age was significantly associated with exclusive breastfeeding [18]. Parity is not significantly related to the practice of exclusive breastfeeding. These findings were confirmed in previous studies [19] while some studies stated parity was significantly related to exclusive breastfeeding practices [20]. Exclusive breastfeeding is significantly related to maternity places pat and maternal education [21].

Working mothers are one of the causes of failure to breastfeed [22]. Basic Health Research data in 2013 showed that 89.6% of working mothers in Indonesia provide prelacteal food to their babies [23]. A study conducted in Ethiopia among 178 health workers (doctors, nurses, and midwives) showed that only 35.9% of respondents practiced exclusive breastfeeding [24]. whereas an equivalent study in Nigeria among 626 working mothers showed that only 11% practiced exclusive breastfeeding. Failure to breastfeed exclusively for women often occurs after three months of leave and start working. Many experiences a decrease in breast milk production because mothers feel tired at work, causing their husbands and families to worry about the adequacy of breast milk [25].

Mothers need support to achieve successful breastfeeding. Family support will influence the mother's decision to give exclusive breastfeeding. Mothers need the support of the husband because the husband can also be helpful in finding information about breastfeeding, providing encouragement and motivation, and being involved in decision-making, practical support, and emotional support for breastfeeding. The husband's attitude towards breastfeeding, both positive and negative, can affect the mother's breastfeeding practice [26].

The intention of exclusive breastfeeding is the intention of the mother to breastfeed her baby from birth until the baby is 6 months old. Intention refers to the degree to which the mother is motivated to try to carry out a behavior, or how much of their efforts are to direct the attempted appearance of the behavior that has been planned [9]. The intention to give exclusive breastfeeding will be higher if the mother has good attitudes, subjective norms, perceptions of behavioral control as well. The stronger the mother has the intention to give exclusive breastfeeding, the stronger the possibility of giving exclusive breastfeeding [17]. Research conducted in Malawi showed that mothers who had a strong intention to give exclusive breastfeeding were 5 times more likely to give exclusive breastfeeding than mothers who had lower intentions [9.26].

This study has limitation due to data collection from medical records. We could not control data entry of the medical records officers. Data analysis was only from available data in the records. We do not include all related variables to intension of breastfeeding.

Conclusion

Intension of exclusive breastfeeding was quite high (65%). Work status and support from family were associated with intension of exclusive breastfeeding.

Acknowledgement

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Conflict of interest statement

There are no competing interest declared by the authors

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2. The Indonesian Hajj Surveillance System: Development and Use

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Abstract

Backround: The paper describes the development of the Indonesian Hajj surveillance system from 1950 to 2011 and highlights its potential use in hajj health research. It evolved from a basic registry of hajj pilgrims and number of Hajj-associated deaths (1950 to 1998) to an incident reporting system which collected demographic data with morbidity (pre-existing diseases) and mortality information which uses 21 International Classification of Disease (ICD) broad based groupings. It further evolved into a web-based system with an additional android service which used the SMS gateway for data transmission and a manual back up system. **Material and methods:** Historical development of the Indonesian Hajj surveillance system is reviewed from a public health perspective. Comparison of existing systems in other countries relevant to the Hajj surveillance system. It will also explanation how the surveillance system works in tandem with the current health provisions made by the Indonesian Government. A narrative discussion the current and potential use of the data extracted from the Hajj surveillance system by presenting examples. **Results:** From 1989 to 1996, the formal manual collection of basic mortality information started. However, interruptions in data collection occurred on the years of 1997 and 1999 to 2003. Only in 2004, mortality information resumed until now. In 2008, the first mobile Java based SMS (short messaging service) surveillance system was implemented and used by mobile medical teams assigned to Indonesian Hajj groups. In 2010, the new updated system included pre-existing disease data on individual hajj pilgrims were collected in addition to mortality surveillance data. The recent improvements to the surveillance system have allowed for its use in: tracking imported/exported infectious diseases; promoting health via educating Hajj pilgrims; and identifying high risk pilgrims to reduce mortality and morbidity. From 2004 to 2011, data for mortality in Indonesian pilgrims could be used to evaluate verbal autopsies [1] during the Hajj, and even describe long term mortality patterns in Indonesian Hajj pilgrims [2]. Future challenges include how raw data is processed and merged with the legacy system; ICD updates; cause of death determination by medical personnel; interruptions/updates to current mobile technologies; changes to surveillance software and hardware; and possibly the use of algorithms to assist medical teams.

Keywords: Health related issues in Hajj, Surveillance system, public health

Introduction

Since the 1950s, commercial aviation and the now affordable costs had made it convenient for international travellers, as well as infectious diseases, to move across countries and the number of travellers are growing to more than 1 billion in 2015. [3]. More hajj pilgrims are now undertaking the pilgrimage due to the convenience of commercial aviation and contributing to related non-communicable disease (NCDs) health effects from mass overcrowding, and infectious diseases transmission in the course of their journey.[4]

According to official Indonesian Hajj statistics, more than 200,000 visas to Indonesian hajj pilgrims have been issued each year on average from 2003 from the initial recorded number of 9,892 in 1950. To mitigate any potential cross border issues associated with the Hajj pilgrimage, especially infectious diseases (e.g. influenza, Mycobacterium tuberculosis (MTB), meningococcal disease etc.), the Indonesian government initiated a change from a registry system of live and mortality rates in pilgrims to a full Hajj screening and surveillance system which adheres to the health requirements set by the authority of the Kingdom of Saudi Arabia (KSA).

This paper describes the evolution of the Indonesian Hajj surveillance system from a simple registry of total pilgrims and mortality data to a sophisticated health surveillance system which monitors the health of the pilgrims during the Hajj beginning with the initial pre-Hajj screening process to the end of their journey. This surveillance system is now capable of tracking the place of death, the routes taken as well as the demographics with the addition of non-communicable disease (NCD) history. In addition it will also discuss the uses in public health and the potential development of the surveillance system to encapsulate disease development and spread in travellers.

The methodology is purely narrative in nature and will make a comparison of the available surveillance methodologies which are used. Most research studies on global disease risk use volumes of passengers, known factors in relation to infectious diseases and air travel as a starting simulation point. However the Hajj surveillance system allows us to capture certain unique characteristics about the pilgrims which are not readily available to modellers.

Material and Methods

Multinational or Cross country/border surveillance systems are surveillance systems which may focus on particular communicable diseases , chronic non-communicable diseases or mortality outcomes specifically in domestic, regional and international travellers (as well as migrants). [5,6] An established multinational surveillance system, like GeoSentinel surveillance,[6] are based on tracking affected individuals who present to one of the 63 sentinel sites in 29 countries across the 6 continents. [7]Two regional cross border surveillance system are EuroTravNet Travel and Tropical Medicine Network and CanTravNet which is part of the GeoSentinel surveillance system.[5,8] EuroTravNet have core sites and members situated around the European Union.[5] These two established travel surveillance systems collect

information on travel related illnesses and morbidity (in EuroTravNet) in travellers. While these systems depend on presentation of affected individuals to the clinic where demographic and medical data (e.g. presenting symptoms and clinical diagnosis) are entered into the system, none of them have previously screened the affected individuals prior to travel.

The main weakness with GeoSentinel and the related systems in Europe as well as Canada is that the travellers have to present to one of the sentinel sites/clinics in order to be included in their surveillance reports.[5,8,9] Furthermore travellers with mild illness with varying incubation periods could have sought care in different settings other than the sentinel clinics.[8] The data does not estimate the incidence rates or destination-specific risks for certain diseases. Some sites may show an over-representation. For example, Montreal site contributed 48% of the cases because of travel variation between provinces. [8] Most studies done on pre and post travel medical data of affected individuals are cross sectional studies with samples derived to study a particular disease of interest.[10]

Currently, there are no other known publications on other civilian surveillance programs, unlike military focused studies [11] which focus on pre and post travel screening of travellers in a tracked cohort over a specific period of time within a particular country over years, aside from the Indonesian Hajj surveillance system which tracks all Hajj pilgrims . [12]

Historical development of the Indonesian Hajj surveillance system is reviewed from a public health perspective. Comparison of existing systems in other countries relevant to the Hajj surveillance system. It will also explanation how the surveillance system works in tandem with the current health provisions made by the Indonesian Government. A narrative discussion the current and potential use of the data extracted from the Hajj surveillance system by presenting examples. Types of Data Evolution The current system allows for the demographic data , as well as geographical and time data to be captured for research analysis. Research is performed with the main aim of reducing mortality in pilgrims who are mostly aged above 50 and have NCD. Other uses can be directed at future[13]

Results and Discussion

The Indonesian Hajj surveillance system evolved from a basic registry of hajj pilgrims and number of Hajj-associated deaths (1950 to 1988) to an incident reporting system which collected demographic data with morbidity (pre-existing diseases) and mortality information which uses 21 International Classification of Disease (ICD) broad based groupings. It further evolved into a web based system with an additional android service which used the SMS gateway for data transmission and a manual back up system. From 1989 to 1996, the formal manual collection of basic mortality information started. However interruptions in data collection occurred on the years of 1997 and 1999 to 2003. Only in 2004, mortality information resumed until now. In 2008, the first mobile Java based SMS (short messaging service) surveillance system was implemented and used by mobile medical teams assigned to

Indonesian Hajj groups. In 2010, the new updated system included pre-existing disease data on individual hajj pilgrims were collected in addition to mortality surveillance data.

The current Hajj surveillance system derives its data from different sources; health services based in Indonesia and KSA; mobile health teams deployed to KSA; and mortality/morbidity records of any hospitalised pilgrims in KSA. Since 1950, medical services have been provided by the Government of Indonesia to their Hajj pilgrims.

The current pre-screening process consist of two compulsory health screenings prior to the start of the Hajj pilgrimage.The duration of the Indonesian government- sponsored travel for pilgrims to the Kingdom of Saudi Arabia is 40 days, of which 22 days are spent in Mecca, 5 to 6 days in Arafat-Mina, 8 to 9 days in Medina and one to two days in Jeddah (for transit). The two screenings Six months and three months before the 40 days travel, the pilgrims in Indonesia have to undergo a set series of health screenings performed by their general practitioner or any clinics. For all pilgrims above 40 years old, tuberculosis (TB) screening is done additionally by any registered medical doctor or general practitioner prior to departure from Indonesia. This is because Indonesia has a high burden of TB.[1] Meningococcal vaccination will take place during either one of the screenings. Before they depart for their journey, the pilgrims are assigned to pilgrim dormitories for 48 hours prior to departure for the port health authorities to do a final check that all compulsory screenings have been performed; that they have satisfied all criteria listed in KSA travel conditions; that all meningococcal vaccinations have been given; and that they are fit for travel. With the exception of 2009, the influenza vaccine was made compulsory in 2009. Demographic variables (e.g. name, age, sex, home address, employment, flight group, travels route, date of arrival into Saudi Arabia) is then recorded with the Hajj Health authority of Indonesia. The surveillance begins from the moment the pilgrim leaves their residence to embark on their journey until they return home, or they pass away.

There are two routes available to pilgrims who may travel from twelve other airports within Indonesia (Figure 1). Route 2 is more physically demanding as pilgrims proceed to Mecca directly after a long flight (approximately 10 hours or more) and then to Arafat- Mina. Route 1 is less demanding as pilgrims can stopover in Jeddah/Medina for a period of time post-flight prior to the two hours journey to Mecca. The route is recorded, as well as four main sites (Jeddah/Mecca/Mina/Arafah) if any of the pilgrims suffer mortality or morbidity within those sites. For morbidity, the type of facility it occurred in. There is a more detailed category which include “during journey (perjalanan)”. All morbidity and mortality is coded according to 21 broad International Classification of Diseases (currently ICD-10) categories due to the limited capacity in KSA to perform a full autopsy. Reports of hospitalizations and deaths are recorded either by hospital death certificate (issued by KSA), general cause of death (and since 2008, verbal autopsy results). The data obtained from Hajj medical service records also include hospital death certificates or flight doctor’s records depending on the location of death (i.e. hospital, en route or private lodgings). Reports of hospitalizations and deaths are recorded either by hospital death certificate (issued by KSA), general cause of

death (and since 2008, verbal autopsy results). Demographic variables collected include name, age, sex, home address, employment, flight group, travels route, date of arrival into Saudi Arabia and cause of death (if any), according to the medical record in hospital or flight doctor death certificate. All these reports are notified daily to a central Indonesian public health team based in KSA during the Hajj. There is a 14 day follow up of pilgrims who are issued with a healthcare card on return to Indonesia if an infectious disease is detected in either KSA or Indonesian healthcare facilities.

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TRACK 5: OCCUPATIONAL HEALTH AND SAFETY, ENVIRONMENTAL HEALTH; PRIMARY, SECONDARY AND TERTIARY PREVENTION

1. The Effect Of Exposure Of Lead (Pb) In Blood Pressure On General Fueling Station Officers In The West Aceh Region

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Abstract

Background: Air pollution due to vehicle fumes becomes an emission emitter containing harmful substances toxic heavy metals are lead (lead). Lead can enter through the mouth, nose, eyes and skin can accumulate in the blood. Exposure to lead in the blood can increase high blood pressure. Causes of high blood pressure due to impaired dilation of blood vessels and narrowing of blood vessels. The purpose of the study was to see the effect of lead in the blood on high blood pressure in officers of the Public Refueling Station in the West Aceh Region. **Materials and methods:** The research method used is quantitative with a cross-sectional design. Research population of all Public Refueling Station Officers in West Aceh Region. The research sample of all General Refueling Station Officers was 60 respondents. **Results**: Results obtained from exposure to lead in the blood of General Refueling Station Officers at the age of > 20 years, service life >2 years and length of work >8 hours, with the acquisition of lead levels in the blood >10 µg / dL. There is an influence of lead exposure in the blood with high blood pressure on the officers of the General Refueling Station, obtained from the variables of age >20 years (p.Value=0.002 and PR=4.371), service life >2 years (p.value=0.001 and PR 4.908), and length of work >8 hours (p.value=0.002 and PR 4.375), with a systolic of 110-190 mmHg an average of >150 mmHg and a diastolic of 60-100 mmHg an average of >80 mmHg. It was concluded there was an influence of lead exposure in the blood with high blood pressure on the Officers of the General Refueling Station. Advice needs to be made to prevent the distribution of supplementation to officers exposed to lead.

Keywords: Lead, Age, Service Life, Length of Service. High Blood Pressure

Introduction

Currently, air pollution is getting worse due to the smoke of motor vehicles and cars, the percentage reaches 70% while 30% comes from industry, forest fires, and households. Air pollution that occurs continuously will have a harmful impact on human health. World Health Organization (WHO) data in 2022 It is estimated that as many as 99% of humans globally in low-income countries and the middle of the world has breathed dirty air due to emissions of motor vehicles and cars and others Exhaust emissions from exhaust fumes are the result of incomplete combustion and contain lead (Pb). Lead (Pb) released by motor vehicles and cars in the form of fuel combustion comes from tetramethyl-Pb compounds and tetraethyl-Pb which serves as an anti-tap on the vehicle's engine. (Regional Environmetal Management Agency Jakarta, 2015)

The presence of lead (lead) is around 62% due to an imperfect combustion process so that the lead in the air is produced from the smoke of motor vehicles and cars higher. Indonesia itself has data on the population using motorized vehicles and cars ranging from 136 137 451 units which indicated by the Central Statistics Agency (BPS) in 2018-2020. (Central Bureau Of Statistics, 2022).

The high number of vehicle use is certainly a direct cause of air pollution. Vulnerable groups exposed to the smoke of motor vehicles and cars such as parking workers, street vendors, traffic police, officers from the transportation department, public refueling officers (gas stations) and others. Officers of public refueling stations (gas stations) have a high risk of exposure to harmful chemicals, especially lead from gasoline and gas emissions of motor vehicles that are waiting in line for fuel fillers, or vehicles that depart after refueling. The location of the gas station on the side of the highway makes it easier for officers to be exposed to lead pollutants (leads) from the smoke of vehicles driving on the highway as well as vehicles queuing to carry out the refueling process. (Marianti et al, 2013) According to the results of a study conducted by Klopfleisch B et al in 2017, there were levels of lead (Pb) in the blood. officers of public refueling stations (gas stations) ranged from 62,174 µg/L (Klopfleisch B, 2017).

World Health Organization (WHO) data states that two-thirds or 25% of deaths in the world have been linked to environmental risk factors which dominates the rise of non-communicable diseases such as stroke, cancer, heart, high blood pressure and others (NCDs) .(World Health Organization, 2021).

Lead (Pb) can enter the blood through various means such as breathing, gastrointestinal tract and dermal contact but the main pathway that often occurs through breathing. The effect of lead (lead) is chronic, the longer it is exposed, there will be a compulsive increase Lead poisoning (Pb) for a long time will cause without unclear symptoms such as disturbances in the nervous system, reproductive system, kidneys, gastrointestinal tract and increased blood pressure The cause of elevated high blood pressure has been linked to exposure to lead (lead) in the blood. This is because lead levels in the blood have an important role in the mechanism which is disturbed in renin angiotensin, reactive oxgen species (ROS), increased levels of endothelin production, nitrate oxidation (NO) resulting in

dilation disorders on the diameter of blood vessels (vasodilation) and narrowing of blood vessels (vasocontriction) (Vaziri ND,Khan M, 2007).

Lead levels in the blood >10 mg/dL as a predetermined standard can increase blood pressure.(National Health And Medical Research Council, 2016) Furthermore, the standard normal blood pressure systolic 120 mmhg and diastolic <80 mmhg, prehypertension is seen in systolic blood pressure 120-139 mmHg and diastolic 80-89 and high systolic blood pressure ≥140 and diastolic ≥90.(Centers For Disease Control And Prevention, 2015). The results of a study by Muslimah N.et.al 2017 showed that lead levels in the blood had a meaningful relationship with high blood pressure p-value = 0.001. (Muslimah N, 2017)

World Health Organization (WHO) data in 2015 showed that around 1.13 billion people in the world were diagnosed with an increase in high blood pressure The number of sufferers continues to increase every year, it is estimated that by 2025 there will be 1.5 Billion and it is estimated that every year 9.4 million people die from high blood pressure and its complications (WHO, 2015).

Riskesdas Survey (2018) high blood pressure ranked first in Indonesia as a non-communicable disease by 34.11% Its prevalence has increased from 2013, which was 31.7% of the population aged 18 years and over.(Ministry of Health RI.2019). Based on the results of observations made at West Aceh gas stations, gas station officers in West Aceh have never checked lead levels (Pb) their bodies and many gas station workers experience headaches, dizziness, firefly eyes, and fatigue Then a blood pressure examination was carried out by west Aceh gas station officers as many as 10 respondents showed that high systolic blood pressure ranged from 110-190 mmHg with an average of 150 mmHg and diastolic blood pressure of 60-100 mmHg which is included in high blood pressure.

Materials and Methods

This type of research is quantitative analytical survey research with a Cross Sectional design. The population of this study is all gas station officers located in the West Aceh region who have certain criteria to be used as research samples The sample in this study was taken from the total population of 60 gas station officers in West Aceh. The instrument that will be used in this study is a questionnaire, atomic absorbtion spectophotometer (ASS) to analyze the level of lead in the blood of gas station officers in West Aceh and the Sphygmomanometer measures the blood pressure of gas station officers in West Aceh Questionnaires are used to measure individual characteristic variables, namely age, length of service, and length of service. Data analysis is used univariate to explain or describe the characteristics of research variables, bivariate analysis is used to see the influence of independent variables lead levels in the blood with dependent variables of high blood pressure and a confidence interval of 95% with $\alpha = 0.05$.

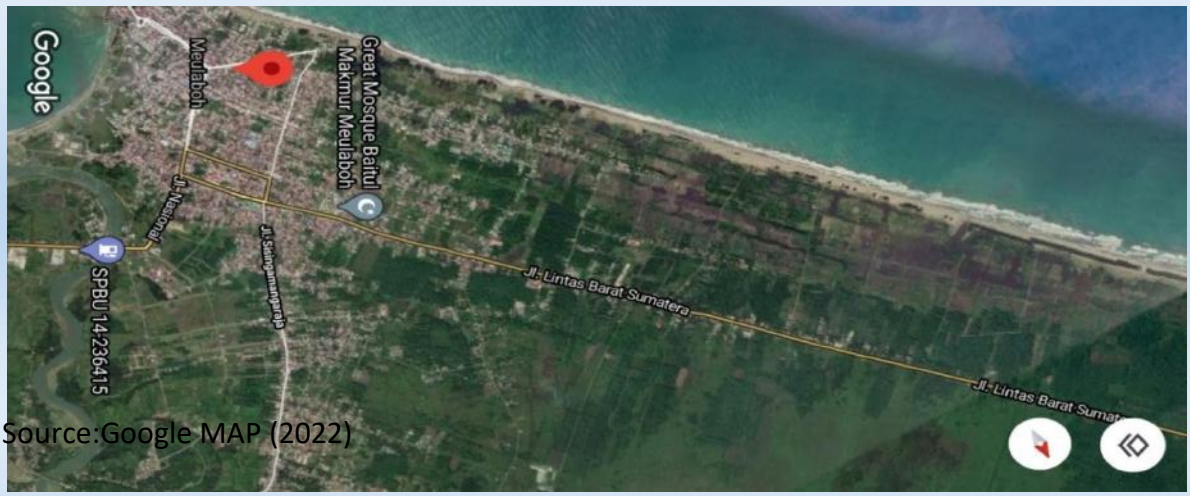
Results

West Aceh Regency has a land area of 2,927.95 km2, an ocean area of 12 miles covering an area of 957.38 km2 and a coastline of 54.84 km. Administratively, West Aceh Regency is divided into 12 sub-districts, 36 settlements, and 322 gampong. A total of 192 villages of which are on the plains and 83 villages are located in the valley Only 47 villages are located on the slopes. Meulaboh is the capital of West Aceh Regency.Geographically, West Aceh Regency located between 04o06' - 04o47' North Latitude and 95o52' - 96o30' East Longitude (West Aceh.2020).

West Aceh Regency has regional boundaries to the north are Aceh Jaya Regency, Pidie Regency and Central Aceh Regency; and Central Aceh Regency; to the south are the Indian Ocean and Nagan Raya District; to the east, namely Central Aceh Regency and Nagan Raya Regency; as well as the bordering the west, namely the Indian Ocean and Aceh Jaya Regency (West Aceh.2020).

West Aceh has 4 Public Refueling Stations (SPBU) based on their coordinates and type. From the coordinates, a map of the distribution of gas stations will be generated, while the two will determine one gas station with another From the coordinates, a map of the distribution of gas stations will be generated, while the two will determine one gas station with another. So that the pattern of distribution of gas stations can be known based on the type determined by Pertamina. Regarding the distribution map can be seen in The figure. 1 follows:

West Aceh Gas Station Distribution Map



Source:Google MAP (2022)

Table 1. Age Frequency Distribution of Respondents of Gas Station Officers in West Aceh

Age	Frekuensi	Persen
19	1	3.2
20	3	3.2
21	4	6.5
22	3	3.2
23	3	3.2
24	5	9.7
25	5	9.7
27	5	9.7
28	3	3.2
29	3	3.2
32	5	9.7
33	2	3.2
35	2	3,2
38	4	6.5
41	5	9,7
45	6	9.8
49	2	3.2
Total	60	100.0

Source : Primary Data (2022)

Based on table 1. above, it is known that the most respondents are respondents who have the age of 24, 25, 27, 32, 38, 41 and 45 years. While the fewest were respondents who had the age of 19, 20, 22, 23, 28, 29, 33, 35, and 49 years (3.2%). In table 1, it can be seen that the number of respondents whose length of work <8 hours was 53 respondents (77.4%) and those whose length of work >8 hours were 7 respondents (22.6%). In the table above, it can be seen that the most length of work is <8 hours.

Distribution of Respondents by Age

Table 2 Distribution of Respondents By Age at Gas Station Officers in West Aceh

Age	Sum	Persen
>20 Year	59	96.8%
<20 Year	1	3.2%
Total	60	100%

Source : Primary Data (2022)

In table 2. It can be seen that, from the 60 respondents studied, respondents in the age group > 20 years, namely 59 people (96.8%) and the age group < 20 years, namely 1 person (3.2%). In the table above, it can be seen that the age of the most respondents is >20 years.

Distribution of Respondents by length of work

Table 3 Distribution of Respondents According to length of service at gas station officers in West Aceh in 2022

Length of Work	Sum	Persen
>8 hour	7	22.6
<8 hour	53	77.4
Total	60	100%

Source : Primary Data (2022)

In table 3. it was seen that the number of respondents whose length of work was <8 hours was 53 respondents (77.4%) and those whose length of work >8 hours were 7 respondents (22.6%). In the table above, it can be seen that the most length of work is <8 hours.

Distribution of Respondents by length of service

Table 4 Distribution of Respondents By Length of Service at Gas Station Officers in West Aceh

service life	Sum	Persen
>2 Year	56	87.1
<2 Year	4	12.9
Total	60	100%

Source : Primary Data (2022)

In table 4. it can be seen that out of 60 respondents, respondents who had a working period of >2 years were 56 people (87.1%) while respondents whose service period was <2 years as many as 4 people (12.9). In the table above, it can be seen that the most service periods are >2 years

Distribution of Respondents By Lead Level (Lead)

Table 5 Distribution of Respondents According to Lead Levels at gas station officers in West Aceh

Lead levels in the blood	Sum	Persen
Tall	54	80.6
Low	6	19.4
Total	60	100%

Source : Primary Data (2022)

From table 5, it shows that of the 60 respondents who were studied for lead levels in their blood, the number of respondents who had the highest lead levels was 54 people (80.6%) and those who had the lowest lead levels were 6 people (19.4%). In the table above, it can be seen that the most lead levels are in the high lead content group.

E. Distribution of Respondents according to Blood Pressure of Gas Station Officers

Table 6. Distribution of Respondents According to Lead Levels in Officers Gas Stations in West Aceh

blood pressure	Sum	F	Persen
Systolic	>120	6	19.4
	<120	54	80.6
Diastolic	>90	11	35.5
	<89	49	64.5
MAP	>100	12	38.7
	70-99	48	61.3

Source : Primary Data (2022)

From table 6. showed that gas station officers who had systolic blood pressure >120 mmHg were 6 people (19.4%) while gas station officers whose systolic blood pressure was <120 mmHg were 54 people (80.6%). Gas station officers who had diastolic blood pressure >90 mmHg were 11 people (35.5%) while gas station officers who had diastolic blood pressure <89 mmHg were 49 people (64.5%). gas station officers who have a MAP >100 mmHg as many as 12 people (38.7%) while gas station officers who have MAP 70-99 as many as 48 people (61.3%)

F. Age Based on Blood Pressure

Table 7 Age Based on Blood Pressure in Gas Station Officers in West Aceh Year 2022

Age	high blood pressure				Total		P Value	RP 95%CL
	Risk		Not at risk					
	n	%	n	%	N	%		
>20 Year	47	94.7	12	100	59	96.8		
<20 Year	1	5.3	0	0	1	3.2	0.002	4371
Sum	48	100	12	100	60	100		

Source : Primary Data (2022)

The relationship of age with high blood pressure can be seen in the table. 7 The results of the study found that 59 respondents (96.8%) who had a >20 years of age, there were 12 respondents (100%) who had high blood pressure, while of the 1 respondents (3.2%) who had a <20 years of age, there were no respondents (0%) of high blood pressure. Based on the chi-square test, the value of Pvalue = 0.002 was obtained and this was smaller than the value of α = 0.05 (Pvalue = .000 > α = 0.05) so it was described that there was a relationship between the age variable and high blood pressure in gas station officers in West Aceh. Based on the results of RP 0.002 can be concludedthat the age variable is at risk of 4371 times with high blood pressure which means that the age variable <1 means that age is a protective factor in the occurrence of high blood pressure at gas station officers in West Aceh.

G. Service Life Based on High Blood Pressure

Table 8 Working Period Based on High Blood Pressure at Gas Station Officers in West Aceh

service life	high blood pressure				Total		P Value	RP 95%CL
	Risk		Not At Risk					
	n	%	n	%	N	%		
>2 Year	17	89.5	10	83.3	27	87.1		
<2 Year	26	10.5	7	16.7	33	12.9	0.001	4,908
Sum	43	100	17	100	60	100		

Source : Primary Data (2022)

The relationship between working period and the incidence of hypertension can be seen in table 8 The results of the study found that 27 respondents (87.1%) who had a working period of >2 years, there were 10 respondents (83.3%) who were at risk of increasing high blood pressure, while of the 33 respondents (12.9%) who had a working period of <2 years, there were 7 respondents (16.7%) who have high blood pressure. Based on the chi-square test, the value of Pvalue = 0.001 and this is smaller than the value of α = 0.05 (Pvalue = 0.000 > α = 0.05) so it is explained that there is a relationship between the variable length of service and high blood pressure in gas station officers in West Aceh. Based on the results of RP 4,908

it can be concluded that the variable of working period is at risk of 4,908 times with high blood pressure which means that the variable length of service = 1 means as a risk factor in increasing high blood pressure in gas station officers in West Aceh.

H. Length of Work Based on High Blood Pressure

Table 9 Length of Work Based on High Blood Pressure at Gas Station Officers in West Aceh

length of work	high blood pressure				Total		P Value	RP 95%CL
	Risk		Not At Risk					
	n	%	n	%	N	%		
>8 hour	2	10.5	5	41.7	7	22.6		
<8 hour	38	89.5	15	58.3	53	77.4	0.002	4,375
Sum	40	100	20	100	60	100		

Source : Primary Data (2022)

The long-standing relationship with high blood pressure can be seen in table 9. The results of the study found that 7 respondents (22.6%) who had a working period of >8 hours, there were 5 respondents (41.7%) who had high blood pressure while of the 53 respondents (77.4%) who had a length of work <8 hours, there were 7 respondents (58.3%) who were at risk have high blood pressure. Based on the chi-square test, the value of Pvalue = 0.002 and this is smaller than the value of α = 0.05 (Pvalue = 0.000 > α = 0.05) so it is explained that there is a relationship between the variable length of work and high blood pressure in gas station officers in West Aceh. Based on the results of RP 4,375, it can be concluded that the variable length of work is not at risk by 4,375 times with high blood pressure which means that the variable length of work >1 means that length of work is a risk factor to increase the high blood pressure of gas station officers in West Aceh.

I. Lead Levels In The Blood With High Blood Pressure

Table 10 Lead Levels in the Blood and High Blood Pressure Gas station officers in West Aceh

Lead Grade	High Blood Pressure				Total		P Value	RP 95%CL
	Risk		Not At Risk					
	n	%	n	%	N	%		
Tall	44	78.9	10	83.3	54	80.6		
Law	4	21.1	2	16.7	6	19.4	0.000	1.200
Sum	48	100	12	100	60	100		

Source : Primary Data (2022)

The relationship of lead levels (leads) to high blood pressure can be seen in table 10. The results of the study found that 54 respondents (80.6%) who had high levels of lead in the blood, there were 10 respondents (83.3%) who were at risk of experiencing high blood

pressure, while of the 6 respondents (19.4%) who had low levels of lead (lead) in the blood, there were 2 respondents (16.7%) who had high blood pressure. Based on the chi-square test, the value of Pvalue = 0.000 was obtained and this was smaller than the value of α = 0.05 (Pvalue = 0.000 > α = 0.05) so it was explained that there was a relationship between variable lead levels and high blood pressure in gas station officers in West Aceh. Berdasarkan hasil RP 1.200 dapat disimpulkan bahwa variabel kadar timbal berisiko sebesar 1.200 kali dengan tekanan darah tinggi yang berarti variabel kadar timbal (lead) =1 artinya kadar timbal (lead) sebagai faktor risiko dalam tekanan darah tinggi pada petugas SPBU di Aceh Barat.

Discussion

1. Lead Levels in the Blood of West Aceh Gas Station Officers

Based on the results of measuring lead levels in the blood of gas station officers in West Aceh, it was shown that there were respondents who had abnormal lead levels or exceeded normal standards as many as 54 respondents and as many as 6 respondents did not have lead levels or were called normal. Increasing age and decreasing health status, there will be a decrease in the function of various organs of the body including heart function. The decrease in lung function makes it easier for lead that enters through the respiratory system to be able to enter the lung tissue and then enter the blood vessels and be channeled throughout the tissues of the human body. (Noviyanti, 2012).

This condition occurs as a result of public refueling activities and traffic flow around gas stations, so exposure to lead from inhaled gasoline vapors and other public fuel vapors and residual exhaust of motor vehicles is certainly high. If this state lasts a long time and continuously it will trigger the increase in lead levels in the air and can be inhaled directly by humans continuously and for a long time results in high levels of lead in the blood of gas station officers in West Aceh who carry out daily activities.

The results of a study conducted by Klopfleisch (2017) stated that the level of lead in the blood of officers at gas stations. Monjali, Jalan Magelang gas station and Jalan Adjisucipto gas station have exceeded the normal limit with an average level of lead in the blood of gas station officers of 62,174 µg / L and an average MDA level in the blood of 5.86 µmol / LA.

2. Relationship of Age With High Blood Pressure

From table 7, it can be seen that age has a significant relationship with blood pressure in gas station officers in West Aceh, it can be seen that the age of 0.002 > 0.05. The risk of experiencing an increase in lead levels in the blood increases with age. This situation occurs because lead is accumulative. In line with the results of Mairita's research in 2018 obtained age-related results as a characteristic of epidemiological studies being quite an important variable because a number of diseases found with varying frequency are caused by age. (Mairita et al, 2018)

Qoriah (2015) explained that age is a determining factor in the condition of a person's body the older a person gets older, the more physiologically it will experience a physiological decline in all functions of the body organs. In addition with reduced endurance of the body due to increased lifespan, maka racun yang masuk ke dalam tubuh baik melalui pernafasan maupun melalui makanan tidak dapat di netralisir dengan baik. Dengan demikian faktor umur memberikan pengaruh terhadap peningkatan kadar timbal dalam darah (Qoriah, 2015)

3. Relationship of Working Period with High Blood Pressure

The period of service in question is the work period of west Aceh gas station officers starting from the first work until the implementation of blood sampling or this research. The results of a study conducted by Farinding GF et al (2016) stated that workers who had a working period of > 2 years had lead levels of >25 µg / dl in the blood while for officers who work < 2 years have a level of lead in the blood of about 10-25 µg / dl, the length of this service period makes the lead accumulate in the body due to the property of lead that is easily absorbed in body tissues. (Farinding GF, 2013).

The length of service has a significant relationship with the increase in systolic and diastolic blood pressure in gas station officers in West Aceh, it can be seen that the pvalue of service life is 0.001> 0.05. Increasingly long systolic blood has the potential to increase lead levels in the blood. This is because lead has accumulative properties so that if a person is in a state of air polluted by lead, his blood will contain inhaled lead as a respiratory activity. The longer the work period of the gas station officer, the higher the risk of an increase in lead levels in the blood, lead which is sent to the bloodstream and then distributed by plasma throughout soft tissues and bones. (Noviyanti, 2012).

4. Long-Standing Relationship With High Blood Pressure

The length of work in question is the length of work of west Aceh gas station officers in a matter of hours. It is known that the length of work has a significant relationship with the increase in systolic and diastolic blood pressure in gas station operators in West Aceh, it can be seen that the pvalue of length of work is 0.002 < 0.05. Based on the results of RP 4,375, it can be concluded that the variable length of work is at risk of 4,375 times with high blood pressure which means that the variable of length of work >1 means that the length of work is a risk factor in the occurrence of high blood pressure in gas station officers in West Aceh.

Based on research conducted by Noviarsih et al (2017) where high lead levels were found in gas station officers with a working time of >8 hours and low lead levels were found at <8 hours of work per day. This shows that the length of time a person works can affect a person's lead levels due to lead levels with high blood pressure is found in each grouping of length of work per day. The results of a study conducted by Muslimah et al (2017) support this study by stating that length of work is associated with increased high blood pressure in gas station officers.

5. Relationship of Lead Levels in the Blood of Gas Station Attendants with High Blood Pressure

The results of the Chi-Square test conducted on lead levels with high blood pressure obtained P value of 0.000 > 0.05 = meaning that there is a significant relationship between lead levels in the blood of gas station staff and high blood pressure. The results of the research that has been carried out, blood pressure in gas station officers in West Aceh is on average in the high group, meaning that there is a relationship between lead levels in the blood of gas station officers in West Aceh with high blood pressure. The results of this study are in line with Eka H and Mukono J in 2017 obtained the results of testing lead levels in the blood of 83.33% of respondents had lead levels exceeding normal limits in car painting workers in the city of Surabaya with the acquisition of p-value = r = 0.618 meaning that there is a strong relationship between lead levels in the blood >10µg / l with high blood pressure. (Eka H and Mukono J, 2017)

Conclusion

Based on the results of research on the effect of lead levels (Pb) in the blood with high blood pressure on gas station officers in West Aceh in 2022, it can be concluded that:
The level of lead (Pb) in the blood of gas station staff in West Aceh >10µg/dL. There is a significant relationship between age and high blood pressure in gas station staff in West Aceh. There is a significant relationship between service life and high blood pressure in gas station attendants in West Aceh. There is a significant relationship between length of work and high blood pressure in gas station staff in West Aceh. There is a significant relationship between lead (Pb) levels in the blood and high blood pressure at gas station staff in West Aceh.

Declaration of Interest Statement

To the director of the gas station to pay attention to the health of the workers, especially those who work in the public refueling department. To the gas station workers to carry out independent therapy such as consuming nutritious food and exercising diligently to reduce the risk that occurs due to high levels of lead (Pb) in the body.

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2. Factors Related to Covid-19 Prevention Behavior at CV. SST Bandung in 2022

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Abstract

Background: Corona Viruses (CoV) have become a topic of conversation from all circles in the world from December 2019 to April 2021, which are still the topic of problems. Novel coronavirus (2019-nCoV) is a new type of coronavirus that has never been previously identified in humans that can cause illness ranging from the common cold to serious illnesses such as Middle East Respiratory Syndrome (MERS) and *Severe Acute Respiratory Syndrome* (SARS). COVID-19 spreads from person to person especially when an infected person comes in contact with other people. The purpose of this study was to determine factors related to COVID-19 prevention behavior in workers at CV. SST Bandung. **Materials and methods**: The type of research is observational analytic using a cross sectional design. Stratified random sampling technique with 63 respondents. The research instrument used a questionnaire with validity and reliability test. Data analysis using Chi-Square and prevalens ratio. **Results**: There is prevalens ratio between the behavior of preventing the spread of COVID-19 with the level of education (PR=11.8; 95%CI 1.703-81.812), knowledge (PR=3.96; 95%CI 1.678-9.345), social support (PR= 1.87; 95% CI 1.180-2.953), K3 communication (PR=2.7; 95%CI 1.396-5.244) and supervision (PR=2.88; 95%CI 1.222-6.787). There is no relationship between the behavior of preventing the spread of COVID-19 with age, length of work and attitude. **Conclusion**: There are a relationship between education, knowledge, social support, K3 communication and supervision and there is no relationship between age, gender, tenure and attitude with COVID-19 prevention behavior. CV. SST should increasing workers's awareness of COVID-19 with any interesting education media and supervision in several times of year.

Acknowledgement: Thanks to CV. SST for allowing and supporting the research. We could never have finished this without your great guidance.

Keywords: COVID-19, COVID-19 prevention behavior, factory, occupational health

Introduction

The World Health Organization (WHO) has designated COVID-19 as a Public Health Emergency of International Concern (PHEIC) on January 30, 2020 (Ministry of Health RI, 2021). Sources of data from the Ministry of Health reported that until March 8, 2022 were recorded globally showing 452 million cases with 6.02 million deaths in 225 affected countries. In Indonesia, there were 5.83 million confirmed cases with 151,304 deaths and data in West Java with 1,063,228 confirmed cases with 15,314 deaths. Meanwhile, in the city of Bandung, there were 78,352 confirmed cases of COVID-19 with 1,454 deaths (Ministry of Health RI, 2022).

Transmission of COVID-19 between humans is influenced by social interactions, one of which is interaction at work (Prem et al., 2020). The business world and the working community have a major contribution in breaking the chain of transmission due to the large number of working population and the large mobility and interaction of the population generally due to work activities. The workplace as a locus of interaction and gathering of people is a risk factor that needs to be anticipated for transmission. To reduce the number of COVID-19 transmissions in the workplace, the government implemented the COVID-19 health protocol by establishing the regulations contained in the Minister of Health Decree number HK.01.07/MENKES/328/2020 on May 20, 2020 regarding guidelines for preventing and controlling COVID-19 in the workplace. office and industrial work. The goal is to increase workplace efforts, especially offices and industry in preventing the transmission of COVID-19 for workers during the pandemic (Ministry of Health RI, 2020). In accordance with this regulation, office and industrial workplaces are required to make policy changes to the work environment so that they can adapt to this pandemic situation to support business continuity (Decree of the Indonesian Minister of Health, 2020).

The city of Bandung has many textile manufacturing factories, one of which is CV. SST. CV. SST is engaged in the manufacture of textiles with a total of 180 workers in the production division. Manpower is an important component in a project or factory, therefore to run a safe job or business, the application of Occupational Safety and Health (K3) must be carried out consistently, especially during the COVID-19 pandemic (Wowor et al., 2013). The purpose of this study was to determine factors related to COVID-19 prevention behavior in workers at CV. SST Bandung, Indonesia.

Materials and Methods

This research using cross sectional design with stratified random sampling. Population was 180 workers in CV. SST production area with 63 sample. Independent variable was knowledge, attitude, social support, OHS communication, and supervision. Dependent variable was prevention behavior. The research instrument uses a questionnaire that has been tested for validity and reliability. Questionnaires were distributed to workers as respondents and then collected, processed and presented by researchers. Data were analyzed by editing, coding, processing, cleaning, and tabulating stages, using Chi-Square test and linear regression.

Results and Discussion

Respondent Characteristic

Most of the respondents were >35 years old with a percentage of 55.69%, female with a percentage of 63.59%, high school education with a percentage of 65% and having a working period of 5 years with a percentage of 61.9% (Table 1).

Table 1. Respondent Characteristic

		Frequency	Presentase
Age	≤35 years old	28	44.4%
	35 years old	35	55,6%
Sex	Male	23	36,5%
	Female	40	63,5%
Education	High school	41	65%
	Universities	22	35%
Working period	<5 years	24	38,1%
	≥5 years	39	61,9%

Table 2. Analysis of Variables

Variable		Behavior		*p-value*	PR	95%CI
		In appropriate	appropriate			
Knowledge	Less	18	12	0.000	8.4	2.531-27.878
	Good	5	28			
Attitude	Unfavorable	8	15	0.525	0.889	0.305-2.593
	Favorable	15	25			
Social support	Less	7	28	0.003	0.188	0.061-0.573
	Good	16	12			
OHS communication	Less	14	9	0.003	5.358	1.750-16.404
	Good	9	31			
Supervision	Less	18	17	0.006	4.871	1.508-15.732
	Good	5	23			

Knowledge

Knowledge is what someone knows about something that is obtained formally or informally. According to Lawrence Green's theory, knowledge is the initial factor of an expected behavior and is generally positively correlated with behavior. Based on the level of knowing, understanding, applying, analyzing, synthesizing, and evaluating which will

later affect the health behavior carried out. So that the level of knowledge includes what should be done and what should not be done as an effort to prevent COVID-19. Those who have a low level of knowledge will be more susceptible to COVID-19 because they do not understand what things are related and can prevent the transmission of COVID-19. The better the level of knowledge, the smaller the chance for COVID-19 to occur. Every increasing in knowledge score of 0.36, will increase the prevention of COVID-19 (Table 3).

The results of this study are in line with the research of Purnamasari et al (2020) which states that there is a relationship between knowledge and behavior about COVID-19 in the Wonosobo community. This is evidenced by 144 respondents, 96.9% (126 people) with a good level of knowledge have good preventive behavior as well (Purnamasari & Raharyani 2020). This supports the adaptation theory which states that a good level of knowledge will encourage the individual to take good actions as well (Moudy & Syakurah 2020). This research is also in line with research conducted by Santoso et al, 2020 which also said that there was a relationship between the level of knowledge and COVID-19 prevention measures. The results of Santoso's research showed that respondents who had good knowledge took good preventive measures as well (Santoso & Setyowati 2020). In addition, the results of Purnamasari's research (2020) show that there is a significant relationship between knowledge and COVID-19 prevention behavior.

However, from the results of this study it was found that there were 9.3% of respondents who had good knowledge but still behaved not in accordance with the rules of health protocols in the workplace. This is because there are several factors that underlie workers not behaving in accordance with health protocols, one of which is comfort in working and lack of supervision by the COVID-19 task force so that workers forget to comply with health protocol rules.

Attitude

Attitude is an action or activity, but it is still a predisposition to the action of a behavior. A person's attitude will affect health behavior, a person's positive attitude will produce positive health behavior as well. While a negative attitude will produce negative health behavior as well. A positive attitude is an attitude that is in accordance with applicable health values, while a negative attitude is an attitude that is not in accordance with applicable health values (Notoatmodjo, 2014).

This study found that a positive attitude of respondents in COVID-19 prevention behavior does not guarantee positive COVID-19 prevention behavior. This can be caused because the attitude is still a closed response, so that the positive attitude is also expressed in the form of positive behavior. In addition, it is known that the negative attitudes of respondents also tend to show good COVID-19 prevention behavior. The possibility that can explain this is the respondent's personal experience regarding prevention of COVID 19 obtained from the mass media and news from other communication media. This is due to the many appeals regarding the prevention of COVID 19 in mass media and other

communication media such as social media.

However, attitudes and behavior do not always go hand in hand, because it is very possible that the behavior shown is not based on awareness or appropriate attitudes but rather pressure or rules that require someone to behave according to expectations. This is in accordance with the results of research in the field that the behavior of workers is one of them because there are regulations made in the workplace. In addition, there is a COVID-19 task force that supervises all workers so that they behave in accordance with health protocol regulations.

Social Support

Based on research by Suryani et al., 2021, it was found that there was a significant relationship between social support and COVID-19 prevention behavior (p-value = 0.000). In addition, Hutahaean & Wahyu's research, 2020 obtained results (p value = 0.003) which means that there is a relationship between social support and COVID-19 prevention behavior in pregnant women. This research is also in accordance with the research of Kundari, 2020 which states that the social environment such as family support and friend support has a positive influence on individuals to carry out positive behavior. They can help to recognize the importance of positive behavior, encourage them to take more responsibility for their own health behaviors, and promote the benefits of adopting healthy behaviors.

However, from the results of the study, it was found that there were 2.8% of respondents who had good social support but still behaved not in accordance with health protocols in the workplace. This is due to the lack of supervision from the COVID-19 task force in the workplace so that workers sometimes override COVID-19 prevention behavior in the workplace.

Occupational Health and Safety (OHS) Communication

OHS communication are applied in the drying and processing section using machines and using various media, both oral and written. OHS communication is used to encourage behavior so that workers are motivated to work safely. (Suryani et al., 2021).

The results of research in the field found that OHS communication had been fulfilled both through health promotion media and the message content of the media. Good OHS communication encourages workers to prevent COVID-19 in the work environment. Besides that, coupled with good supervision, it will also encourage workers to take preventive measures against COVID-19 according to the rules that apply in the workplace.

This study is in accordance with research conducted by Aeni and Fermania, 2015 on factors related to occupational health and safety behavior, where the results obtained are that there is a relationship between OHS communication and OHS behavior. Communication is one of the important factors in the success of health promotion because it is very important in changing one's behavior, such as providing understanding or motivation to encourage changes in one's behavior. In addition, the results of Dewi,

Soeratinoyo, et al., 2021 research showed that there was a significant relationship between OHS communication and COVID-19 prevention measures.

Supervision

Supervision is the process of observing the implementation of all organizational activities to ensure that all work being carried out goes according to a predetermined plan. In principle, occupational health and safety services are closely related to supervision in the workplace (Sucipto, 2014).

These results are in line with the research conducted by Novianus&Setyawan (2019) regarding supervision and unsafe acts, the results show that there is a relationship between supervision and actions taken by respondents who state good supervision. According to Siagian (2010) supervision is the process of observing an implementation of all organizational activities to ensure that all tasks being carried out are in accordance with the plan. Similar results are also shown by research conducted by Suryanto and Widajati (2017) research was carried out on loading and unloading workers and the results showed that there was a relationship between supervision and actions taken by workers.

There have been many supervisory efforts that have been carried out by company parties such as carrying out supervision while at work so that they can behave in accordance with health protocols.

Table 3. Linear Regression Analysis

Variable	R square	Sig.	B	Std. Eror
Knowledge			.363	0.124
OHS communication	30.10%	0.000	0.094	0.136
Supervision			0.250	0.113

Togetherness, knowledge, OHS communication, and supervision can explain the variation of behavior prevention by 30.1%, with the regression model:

Prevention behavior = 0.567 +0.363 knowledge + 0.094 OHS communication + 0.250 supervision

Conclusion

Knowledge, OHS communication, and supervision are the stronger variables that can influence prevention behavior so that these three variables become fit models in this study. For production workers at CV. SST is expected to continue to improve COVID-19 prevention behavior in the workplace. In addition, it is hoped that workers will be more active in implementing programs made by the company, especially in terms of preventing COVID-19 in the workplace. CV. SST is expected to be more creative in COVID-19 Health promotion education and routine supervision in several times of year.

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Declaration of Interest Statement

The authors declare that they have no conflict of interests.

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3. Risk Factors of Leptospirosis Confirmed Case in Cilegon City, Banten Province 2021

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Abstract

Background: Leptospirosis is a zoonotic disease which is mainly transmitted by rats that release bacteria through urine into the environment. Humans are infected through injured skin or mucous membranes. The objectives are to ensure, to detect the source of transmission and find out the risk factors for transmission of Leptospirosis in Cilegon City. **Materials and methods:** The method used were risk factors observation, interview by questionnaire, finding suspect cases and sampling of patient and suspect case's blood serum, open well water sample and 2 samples of rat kidney. Samples were tested by RDT and PCR method and continued by MAT method for blood serum sample of patient and rat kidney samples. **Results**: Based on clinical symptoms of the patient were fever, headache, malaise, jaundice, nausea and vomiting, thrombocytopenia, leukocytosis, and an increase in bilirubin as well as the result of the RDT Leptospirosis showed positive IgM Leptospira, followed by the result of MAT method which is showed positive of Leptospira sp with the Bataviae serovar, so the patient was meeting the operational definition of a confirmed case of Leptospirosis. It was found 1 suspect case of Leptospirosis with symptoms were 2 day of fever, headache and nausea. The results of RDT and PCR method of blood serum's suspect case showed negative of Leptospira sp, so is the result of PCR method of the well water sample. However, the results of rat kidney samples of Rattus tiomanicus species by PCR method showed positive of Leptospira sp. These results suggest that the rats has the potential risk factor for transmission of Leptospirosis. There has been 1 confirmed case of Leptospirosis in Cilegon City by RDT & MAT method with result of positive Leptospira sp with the Bataviae serovar. This corresponds to the results of kidney rats sample by PCR method showed positive of Leptospira sp. There were risk factors for the transmission of Leptospirosis case in Cilegon City.

Keywords: Risk factors, Confirmed case, Leptospirosis, Cilegon City

Introduction

Leptospirosis is an acute zoonotic disease caused by Leptospira bacteria with a broad spectrum of disease and may cause dead. Leptospirosis in Indonesia is mainly transmitted by rats which contaminated environment with urines that contain bacteria. Humans are infected through injured skin or mucous membranes. Mild leptospirosis is estimated to account for 90% of all cases of leptospirosis in the community with symptoms of fever, headache, and myalgia. Meanwhile, severe leptospirosis is followed by symptoms of kidney failure, jaundice, and bleeding. (MoH of Indonesia, 2017). In the early stage of infection, the disease shows minor symptoms such as cold, fever, headache, and jaundice; later on, it causes Weil's illness, an acute type of leptospirosis causing liver and lung failure, resulting in death. (Gayathri, 2022). The incubation period for leptospirosis is between 2-30 days, usually an average of 7-10 days. (MoH of Indonesia, 2017).

Leptospirosis bacteria are infecting humans through animal urine, or water and soil contaminated with animal urine, coming into contact with the eyes, mouth, nose or wounds on the skin. In developing countries, the disease occurs most commonly in farmers and low-income people who live in areas with poor sanitation. (Raymond, 2022).

Leptospirosis in humans should be diagnosed based on a combination of epidemiological and clinical evidence, with mandatory laboratory testing to validate the diagnosis. (Pal, 2021). The most common test for Leptospira is a blood sample. In the first 5 to 10 days after infection, molecular methods can be used to diagnose leptospirosis. It's only good for two weeks' worth of symptoms. Leptospires in the blood are gone after 10-15 days. Leptospira is typically transmitted from a carrier to a human through infected animals' urine. For early detection of leptospires, blood samples from an affected person should be collected within one week of the onset of symptoms; however, after ten days of illness, leptospires in blood samples may disappear before producing any antibody and they may persist in other organs. (Gayathri, 2022).

Environmental factors that are risk factors for Leptospirosis transmission such as flood-prone areas, slums, poor environmental sanitation, unmaintained sewers, lots of puddles, high rat population. An important risk factor for leptospirosis is the presence of rats in the house and its surroundings. (MoH of Indonesia, 2017).

Based on information from the Banten Provincial Health Office on November 22, 2021 that there was 1 probable case of Leptospirosis who was hospitalized at the Cilegon Regional Public Hospital. The case resides in Ketileng Village, Cilegon District, Cilegon City. Therefore, the Jakarta BBTKLPP Team conducted an epidemiological investigation and sampling of risk factors. The objectives are to ensure, to detect the source of transmission and find out the risk factors for transmission of Leptospirosis in Cilegon City.

Materials and Methods

The method used were risk factors observation, interview by questionnaire, finding additional suspect cases and sampling of risk factor samples. Samples to be taken are bloods of patient's and suspect case's, water from open well, serum and rat kidneys samples. To get rodent samples, rat traps were installed for 3 x 24 hours inside and outside the patient's house and its surroundings at potential risk places to have rats. On-site rat surgery was performed to take samples of serum and rat kidneys.

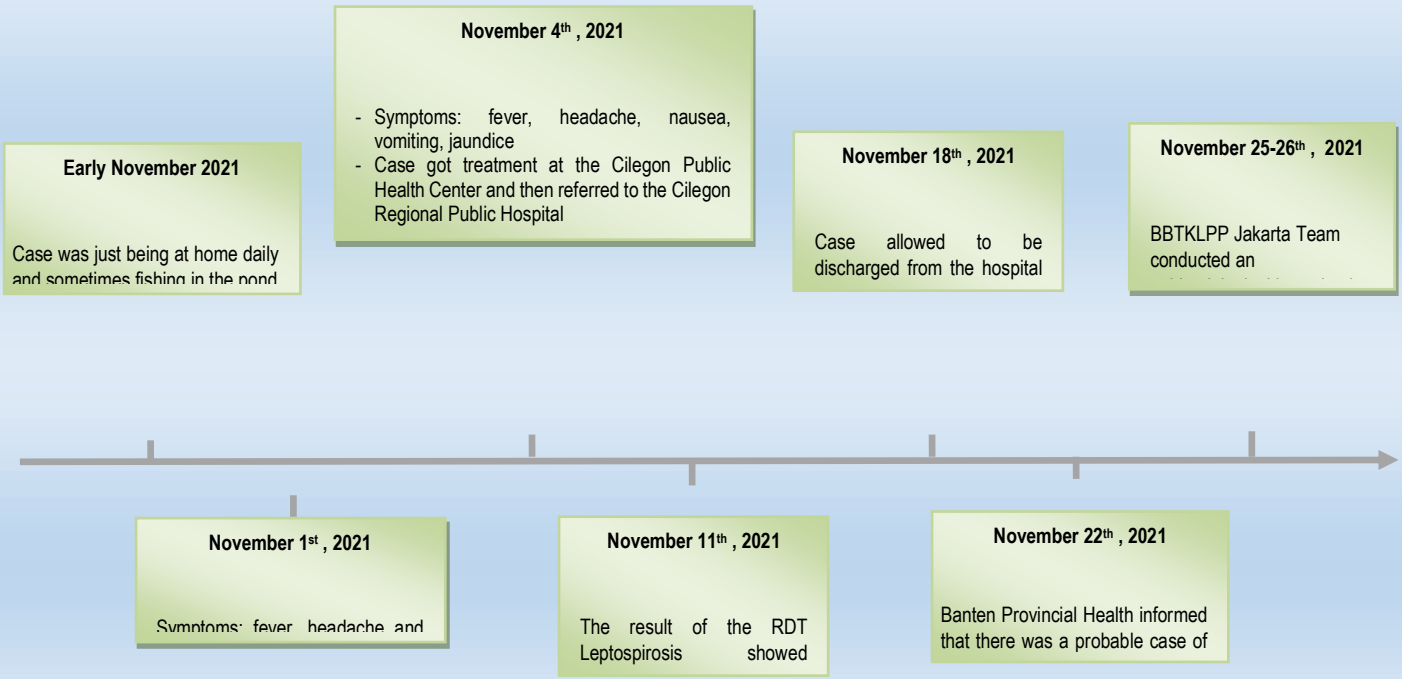
Furthermore, samples were tested at BBTKLPP Jakarta laboratory by RDT and PCR method for blood serum specimens, and PCR method for water sample and rat kidney samples. Then, blood serum sample of patient and rat serum samples were tested by Microscopic Aglutination Test (MAT) which was conducted at the Research Center for Veterinary Science, Bogor. Microscopic Agglutination Test (MAT) is used to detect Leptospira serovar specific antibodies.

Results and Discussion

Case Report

In November 2021, a 21st-years-old male presented to the Hospital with complaints of a 4-days history of fever, headache, malaise, jaundice, nausea and vomiting. He had sought care at Cilegon Public Health Center first before referred to Cilegon Regional Public Hospital. On the first day of hospitalization, laboratory results demonstrated anemia, thrombocytopenia, leukocytosis, hepatic damage and renal failure. Repeat laboratory values on the third day of hospitalization still demonstrated anemia, thrombocytopenia and leukocytosis. On the fifth day of hospitalization laboratory values demonstrated anemia, leukocytosis, hyperbilirubinemia, renal failure and improving thrombocytopenia. The serum sample was referred to a private clinic for RDT Leptospirosis examination an on the 8th day of the hospitalization the result of the RDT Leptospirosis showed positive IgM Leptospira. On the 10th day of hospitalization laboratory values still demonstrated leukocytosis, hyperbilirubinemia, hepatic damage and renal failure. He was discharged home on day 15th of hospitalization with a diagnosis of Leptospirosis.

Figure 1 : Case History Timeline



The following is the summary of laboratory test results during the case being hospitalized :

Table 1 : Summary of Laboratory Results At The Hospital

Parameter	Date				Reference Value	Key Findings
	Nov 4 '21	Nov 6 '21	Nov 8 '21	Nov 13 '21		
Hemoglobin	9.1 g/dL	7.0 g/dL	8.4 g/dL	10.6 g/dL	13,0-17.0 g/dL	Anemia
Hematocrit	24.2 %	18.8 %	21.7%	28.1%	40.0-48.0%	
Erythrocytes	2.94x10^6/µl	2.30x10^6/µl	2.73x10^6/µl	3.53x10^6/µl	4.50-5.50 x10^6/µl	
Platelets	16x10^3/µl	48x10^3/µl	126x10^3/µl	200x10^3/µl	150-450 x 10^3/µL	Thrombocytopenia
Leucocytes	14.67x10^3/µl	12.72x10^3/µl	24.6x10^3/µl	20.86x10^3/µl	5 – 10 x 10^3/µL	Leukocytosis
Total Bilirubin	-	-	49.18 mg/dL	50.66 mg/dL	<1.2 mg/dL	Hyperbilirubinemia

Bilirubin Direct	-	-	36.64 mg/L	35.86 mg/dL	<0.30 mg/dL	
Bilirubin Indirect	-	-	12.54 mg/dL	14.80 mg/dL	0.30-0.90 mg/dL	
AST	282 U/L	-	-	47 U/L	<37 U/L	Liver disfunction
ALT	70 U/L	-	-	60 U/L	10-50 U/L	
Ureum	148 mg/dL		322 mg/dL	334 mg/dL	10-50 mg/dL	Renal failure
Creatinine	7.51 mg/dL		9.08 mg/dL	4.94 mg/dL	0.70-1.30 mg/dL	
HCV Rapid	Non-reactive					
HBsAg Rapid	Non-reactive					

Data source : Cilegon Regional Public Hospital, 2021

Epidemiological Investigation

Epidemiological investigation was conducted by BBTKLPP Jakarta Team with Banten Provincial Health, Cilegon City Health Official and Cilegon Public Health Centre on November 25th-26th, 2021. Result of tracing suspected case was found one suspected case that is patient's father with symptoms were 2-day of fever, headache and nausea.

The types of samples taken by BBTKLPP Jakarta Team were :

- Sampling of 2 blood serum specimens of patient's and suspect case's.
- Sampling of 1 open well water that is consumed daily by the patient's family
- Two rats were trapped in traps inside and outside the case's house with species of *Rattus tiomanicus*. On-site rat surgery was performed to take samples of serum and kidneys in rats.

Results of the environmental risk factors observation of the case's house and its surroundings were as follows :

- Patient sometimes fishing in ponds that allow contact with water, mud, soil or grass contaminated with Leptospira-infected rat urine
- The patient's residence is a dense settlement and there were gaps in the house as a way in and out of rats, and so the humid environment of patient's house
- The food storage in the house is not closed so that sometimes food is contaminated by rats and is not heated first before consumption
- The presence of open trash cans in the house and piles of dirty cutlery so that it can be a risk factor for the presence of rats in the house
- In front of the patient's house there is a chicken coop that is not maintained and there are many piles of unused goods

- The ditch around the patient's house where the water doesn't flow
- There were evidence of the presence of rats in the form of rat tracks and droppings in the patient's house and its surroundings

Laboratory Results

Here are the laboratory results of the samples taken by BBTKLPP Jakarta Team. Samples testing by RDT and PCR methods was conducted at the BBTKLPP Jakarta laboratory, while testing by MAT method was conducted at the Research Center for Veterinary Science (BBalitvet), Bogor.

Table 2 : Laboratory Results At The BBTKLPP Jakarta and BBalitvet Bogor

Type of samples	**Method**		
	RDT	**PCR**	**MAT**
Blood serum of probable case	Negative	Negative	**Positive (*Bataviae serovar* with a titer of 1/1.1600)**
Blood serum of suspect case	Negative	Negative	-
Open well water sample	-	Negative	-
Rat serums	-	-	Negative
Rat kidneys	-	**Positive *Leptospira sp***	-

Data source : BBTKLPP Jakarta, 2021

Results of blood serum specimens of patient's and suspect case by RDT and PCR method showed negative, while by MAT method showed positive of *Leptospira sp* (*Bataviae* serovar with a titer of 1/1.600). Result test of open well water sample by PCR method showed negative. Result tests of rat kidney samples by PCR method showed positive of *Leptospira sp*, while result tests of rat serums sample by MAT method showed negative.

Discussion

Suspect case of Leptospirosis is acute fever with or without headache with muscle ache, malaise with or without conjunctival suffusion and there is a history of exposure to a contaminated environment in the previous 2 weeks. Probable case of Leptospirosis is a suspected case with at least 2 clinical symptoms as follows are calf pain, jaundice, oliguria/anuria, bleeding manifestations, shortness of breath, cardiac arrhythmias, cough with or without hemoptysis, skin rash; suspected case with positive of RDT IgM Leptospira; or suspected case with 3 of the laboratory results are thrombocytopenia <100.000 cells/mm,

leukocytosis with neutropilia >80%, increase in total bilirubin >2g%, examination of urine for proteinuria and/or hematuria.

Confirmed case of Leptospirosis is a suspected case or a probable case with one of the followings are isolation of Leptospira bacteria from clinical specimens; positive PCR; sero MAT conversion from negative to positive or a 4x increase in titer from the initial examination; or titer MAT 320 (400) or more on one sample.(MoH of Indonesia, 2017, p.25-28).

Based on clinical symptoms of the patient were fever, headache, malaise, jaundice, nausea and vomiting, result of the RDT Leptospirosis showed positive of IgM Leptospira, followed by the result of MAT method which is showed positive of *Leptospira sp* with the Bataviae serovar, so the patient was meeting the operational definition of a confirmed case of Leptospirosis. The patient's series laboratory results at the hospital showed anemia, thrombocytopenia, leukocytosis, hyperbilirubinemia, liver disfunction and renal failure. This indicates that patient had severe Leptospirosis, also known as Weills' disease which can lead to death due to organ failure. Microscopic agglutination titers of the patient high against serogroup Bataviae (serovar Bataviae) that is 1/1.600, this also demonstrate that Leptospira infection with serovar Bataviae can result in severe illness.

The patient sometimes do fishing in ponds which is one of the risk factors for Leptospirosis transmission. The water polluted with urine from the hosts' reservoir enhances the probability of disease transmission, and fishing communities are another high-risk community for the spread of leptospirosis. (Masunga, 2022).

Based on results of risk factor observation, there were environmental risk factors related to the incidence of Leptospirosis in Cilegon City such as humid house, the open trash cans, the ditches aren't flowing, piles of unused goods and the evidence of the rats presence in and around the house. The results of rat kidney samples of *Rattus tiomanicus* species by PCR method showed positive of *Leptospira sp*. These results suggest that the rats has the potential risk factor for transmission of Leptospirosis. Rats as the main reservoir of leptospirosis can transmit leptospirosis bacteria directly to humans through rat droppings, or through rat tracks in trash cans, sewerages, puddles, and vegetation. (Notobroto, et al, 2021, p.4)

Conclusion

There has been 1 confirmed case of Leptospirosis in Cilegon City by RDT & MAT method with result of positive *Leptospira sp* with the Bataviae serovar with a titer of 1/1.600. This corresponds to the results of kidney rat samples tested by PCR method showed positive of *Leptospira sp*. Considering this finding, we must assume that there are more unidentified pathogenic rodents in the community especially in Cilegon City. And regarding the results of this epidemiological investigation, it was found that there were risk factors for the incidence of Leptospirosis in Cilegon City, so the appropriate Leptospirosis prevention and control

strategy is needed. It is recommended for raising early awareness of Leptospirosis including the causes and transmission mechanisms of Leptospirosis and its epidemiology among healthcare workers and the general population, environmental sanitation improvement and hygienic personal practices.

Declaration of Interest Statement

The authors declare no conflict of interests.

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4. Behavioral Analysis of Refill Drinking Water Depot Handlers on Microbiological Quality of Refill Drinking Water in Palembang City

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Abstrak

Background: Along with current technological advances and accompanied by increasingly busy human activities, people tend to choose a more practical way with relatively low cost in meeting drinking water needs, namely by using refilled drinking water, especially in the city of Palembang. In order for the refill drinking water consumed by the people in the city of Palembang to be safe for consumption, it is necessary to test the quality of whether the content in the refill drinking water has met the requirements of the Minister of Health Regulation number. 492/MENKES/PER/IV/2010 concerning requirements for drinking water quality. **Materials and methods:** This study aims to determine the behavior of refill drinking water depot management officers on the quality of refill drinking water in the city of Palembang in 2021. The behavior observed was the knowledge and attitude of the handlers of refill drinking water depots in the city of Palembang as many as 30 respondents and Water samples taken at DAMIU were 30 samples and bacteriological tests were carried out to determine the content of E Coli in water which was carried out at the Palembang Environmental Health Engineering Center Laboratory. **Results:** The results showed that from 30 respondents there were 6 respondents whose knowledge was good and 24 respondents whose knowledge was not good, and there were 26 respondents whose attitudes were good and 4 respondents whose attitudes in serving consumers were still classified as not good. Of the 30 refilled waters whose water quality was checked bacteriologically, there were 5 refilled drinking waters containing *E Coli* bacteria. **Conclusions:** The conclusions in this study indicate that there is no significant relationship between the knowledge of DAMIU handlers and the bacteriological quality of refill drinking water in the city of Palembang and there is no significant relationship between the attitude of the DAMIU handlers and the microbiological quality of refill drinking water in the city of Palembang.

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Keywords: Behavior, Refill Drinking Water Depot, Microbiological Quality

Introduction

Water is an important material in life. All living things need water. For humans, the need for water is absolute because 70% of the substances that make up the human body consist of water. The need for water for daily needs is different for every place and every level of life. Usually, the higher the standard of living, the higher the amount of water needed (Apriliana E., M.R. Ramadhian, M. Gapila, 2014). One of the most important uses of water is the need for drinking, including for cooking (Tombeng R.B., B. Polii, S. Sinolungan, 2013).

Water is one of the most important human needs, in order to stay healthy drinking water must meet the biological requirements according to Regulation of the Minister of Health of the Republic of Indonesia number 492/MENKES/PER/IV/2010. To meet the drinking water needs of the community, the selection of refill drinking water is an alternative because the price is cheap. Depot as a provider of drinking water, must meet hygiene and sanitation standards and drinking water must be free from bacteria. Based on a field survey, it is known that most of the drinking water depots in Palembang City are not registered with the Health Office, so it is likely that bacterial contamination such as E. Coli can occur due to lack of supervision from related parties (Ainurrizal, I. P., & Windusari, 2021).

The existence of refill drinking water depot continues to increase in line with the dynamics of the community's need for quality and safe drinking water, although not all refill drinking water depot products are guaranteed safe. This happens because of the weak supervision of the relevant agencies. The lack of supervision of refill drinking water depot resulted in the production process being not properly supervised (Putra IDGNKP, K.A. Nocianitri, P.A. Sandhi, 2012). This study aims to determine the behavior of Refill Drinking Water Depot Management Officers on the Microbiological Quality of Refill Drinking Water in Palembang City in 2021.

Population and Research Sample

The population used in this study were the handlers of the refill drinking water depot and refill drinking water in the city of Palembang. while the sample of this study were some of the handlers of the refill drinking water Depot as many as 30 touchers and the refill drinking water of 30 samples of refilled drinking water

Processing and data analysis

The data that has been collected is then processed using SPSS, then analyzed by univariate and bivariate, then presented in the form of frequency tables, distributions, and short narratives.

Result

Frequency Distribution of Knowledge of Refill Drinking Water Depot Handlers

Table 1: Distribution of Knowledge Frequency of Refill Drinking Water Handlers in Palembang City in 2021

No	Description	Amount
1	Good	6
2	Not Good	24
	Amount	30

From the table above, the results obtained from 30 handlers there are 6 respondents who have good knowledge and 24 respondents whose knowledge is not good. The results of this study are in line with the research of Ismiati, I (2020) which shows that the knowledge of refill drinking water Depot handlers is categorized as lacking as many as 24 respondents (52.2)

Frequency Distribution of Attitudes of Respondents/Handlers of DAMIU

Table 2: Frequency Distribution of Attitudes of DAMIU Handlers in Palembang City in 2021

No	Description	Amount
1	Good	26
2	Not Good	4
	Amount	30

From the table above, the results obtained from 30 handlers/respondents there are 26 respondents whose attitude is good and 4 respondents whose attitude in serving consumers is still not good.

Results of Examination of Bacteriological Parameters of Refill Drinking Water

Table 3: Results of Examination of DAMIU Bacteriological Parameters in Palembang City in 2021

Number	Description	Amount
1	Qualified	25
2	Unqualified	5
	Amount	30

From the table above, the results obtained from 30 refill drinking water that were checked for microbiological parameters, there were 5 refill drinking water containing E Coli

The Relationship between Knowledge of DAMIU Handlers and Bacteriological Parameters of Refill Drinking Water

Table 4: The Relationship between Knowledge of refill drinking water Depot Handlers and Bacteriological

Handler Knowledge	Bacteriological Parameter				Total		P Value
	Qualified		Unqualified				
	n	%	n	%	n	%	0,053
Good	6	31,6	5	45,5	11	100	
Not Good	13	68,4	6	54,5	19	100	
Total	19	63,3	11	36,7	30	100	

Parameters of Refill Drinking Water

Based on the table above shows that as many as 11 drinking water depots that do not meet microbiological requirements (36.7%) with good knowledge of refill drinking water handlers, 5 refill drinking water do not meet the requirements of bacteriological parameters and 6 refill drinking water do not meet the requirements of bacteriological parameters with poor knowledge. . From the results of statistical tests using the chi square test, it shows a P value of 0.053, P value > 0.05, it can be concluded that Ho is accepted, which means that there is no statistically significant relationship between the knowledge of refill drinking water handlers and the microbiological quality of refill drinking water in Palembang City in 2021

Table 5: The Relationship between Attitudes of refill drinking water Handlers and Bacteriological Parameters in Palembang City

Handler Attitude	Bacteriological Parameter				Total		P Value
	Qualified		Unqualified				
	n	%	n	%	n	%	0,073
Good	14	66,7	4	44,4	18	100	
Not Good	7	33,3	5	55,6	12	100	
Total	21	70	9	30	30	100	

Based on the table above, it shows that as many as 9 drinking water depots that do not meet microbiological requirements (30%) with good attitude of refill drinking water handlers are 4 refill drinking water do not meet the requirements of bacteriological parameters and there are 5 refill drinking water do not meet the requirements of bacteriological parameters with bad attitudes. From the results of statistical tests using the chi square test, it shows a P

value of 0.073, P value is > 0.05, it can be concluded that Ho is accepted, which means that there is no statistically significant relationship between the attitude of the refill drinking water handlers and the microbiological quality of refill drinking water

Discussion

Knowledge and Attitude of Refill Drinking Water Depot Handlers

The results of this study found that the knowledge of the handlers at the refill drinking water depot was not good as many as 24 people (80%). From the research, it was found that the knowledge of bad handlers was more than good, while the attitude of the handlers at the refill drinking water depot was good as many as 26 people (87%). From the research, it was found that the attitude of the handlers in the good category was more than the bad one, this was because the handlers at refill drinking water depot had not attended training on Sanitary Hygiene for Refill Drinking Water Depots. The knowledge of refill drinking water handlers is still low because the handlers at DAMIU have not attended training on Sanitary Hygiene for Refill Drinking Water Depots. According to Regulation of the Minister of Health of the Republic of Indonesia number 43 of 2014 concerning Sanitary Hygiene for Drinking Water Depots, it is stated that the Sanitation Hygiene Requirements in drinking water management cover at least the following aspects: place; equipment; and Handlers and every refill drinking water handler must have a Sanitation Hygiene Eligibility Certificate issued by the Palembang City Health Office. The high knowledge of refill drinking water depot handlers who are not yet good is possible because there is still not maximum guidance from the Puskesmas and the Palembang City Service, it can be seen that most of the refill drinking water depot do not have a Sanitation Hygiene Eligibility Certificate,

Content of *E Coli* in Refillable Drinking Water

The results of the quality inspection of refill drinking water at refill drinking water depots in Palembang City that do not meet health requirements were 5 depots (17%). These data indicate that the water at the refill drinking water depot does not meet the health requirements in accordance with the Regulation of the Minister of Health of the Republic of Indonesia No. 492 / MENKES / Per / IV /2010 which states that drinking water must be free from E coli bacteria, with a contamination level of 0 (Zero) colonies/100 ml for the presence of E coli bacteria. The presence of *E Coli* bacteria contamination indicates the poor quality of refill drinking water depots.

The Relationship Between The Behavior Of The Handler And The Amount Of E Coli In DAMIU Drinking Water

Based on the results of the study showed that as many as 11 drinking water depots (36.7%) with good knowledge of refill drinking water depot handlers, 6 refill drinking water depot met the requirements of bacteriological parameters with good knowledge and 5 refill drinking water do not meet the requirements of bacteriological parameters and there were 6 refill drinking water do not meet the requirements. From the results of statistical tests using the chi square test, it shows a P value of 0.053, P value is > 0.05, it can be concluded that Ho is accepted, which means that there is no statistically significant relationship between the knowledge of the refill drinking water depot handlers and the refill drinking water depot in the City. Palembang and as many as 11 drinking water depots (36.7%) with good knowledge of refill drinking water depot handlers, 6 refill drinking water met the requirements for bacteriological parameters with good knowledge and 5 refill drinking water do not meet the requirements for bacteriological parameters and there were 6 refill drinking water depots that did not meet the requirements. From the results of statistical tests using the chi square test, it shows P value of 0.073 where the P value is > 0.05, it can be concluded that Ho is accepted, which means that there is no statistically significant relationship between the attitude of the refill drinking water depot handlers and the refill drinking water depot in the City. Palembang.

In this study, it can be explained that the behavior of the handler of refill drinking water depot has no effect on the contamination of refill drinking water by E Coli bacteria so that the quality and quality of refill drinking water is suitable for consumption. Meanwhile, there are some refill drinking water do not meet the requirements of the Regulation of the Minister of Health of the Republic of Indonesia No.492/MENKES/Per/IV/2010 it is possible due to the lack of functioning of ultraviolet radiation in refill drinking water depot. This research is in line with research by Ummah, M, et al (2019) as much as 9.1% (2 of 22) DAM, drinking water production is contaminated with E.Coli

Conclusion

Based on the results of the study, it can be concluded that the knowledge of the handlers of the Refill Drinking Water Depot is not good about the management of the Refill Drinking Water Depot. Meanwhile, the attitude of the handlers of the Refill Drinking Water Depot is classified as good in serving consumers. There is no relationship between knowledge and attitude of refill drinking water depot handlers on the microbiological quality of refill drinking water

Suggestion

It is recommended that the Palembang City Health Office organize training or debriefing starting from the production process to the distribution process of refill drinking water so that

the hygiene of refill drinking water products is well maintained and it is necessary to increase supervision at the refill drinking water depot.

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