Relationship between Clean, Healthy Living Behaviour, and COVID-19 Infection at the Parigi Public Health Center, West Java, Indonesia

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Abstract

Background: Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). One form of prevention is implementing Clean and Healthy Living Behaviour (*Perilaku Hidup Bersih dan Sehat*, PHBS) at the household level. This study aimed to analyze the association between PHBS at the household level and COVID-19 cases at the Parigi Public Health Center, West Java, Indonesia.

Methods: This was an unmatched case control study carried out in September–October 2021 with respondents from Parigi Public Health Center, Pangandaran Regency, West Java, Indonesia, involving 63 people for each case and control group. Sampling was conducted by the non-probability method. Data were collected using a checklist to measure the implementation of PHBS at the household level. Data were analyzed by statistical analysis, using the Chi-square or Fisher Exact test and Odds Ratio.

Results: There was no statistically significant difference between the implementation of PHBS at the household level and the incidence of COVID-19 (p=0.668).

Conclusion: The implementation of PHBS at the household level is not related to the incidence of COVID-19. Further studies are needed with larger population, looking for causal relationship, and controlling for confounding variables.

Keywords: Clean and healthy living behaviour, coronavirus disease 2019, Parigi Public Health Center

Introduction

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[1] The total number of confirmed COVID-19 cases in Indonesia ranked 17th in the world as of February 11, 2022, with a total of 4,677,554 cases.[2] One of the increases in the total number of COVID-19 occurred in Pangandaran Regency, West Java, Indonesia, with a total case of 1,464 on April 1, 2021, and increased to 6,535 cases on August 26, 2021.[3] Pangandaran Regency is a National Tourism Strategic Area (*Kawasan Strategis Pariwisata Nasional*, KSPN) that becomes the main tourists destination that allows increased transmission.

An increase in COVID-19 cases can cause a Public Health Emergency (K*edaruratan Kesehatan Masyarakat,* KKM), which causes losses in various sectors. Therefore, it is necessary to control it through guidelines for the prevention and control of COVID-19 according to the regulation Minister of Health (*Keputusan Menteri Kesehatan*, Kepmenkes) number HK.01.07/Menkes/413/2020. One form of prevention is Clean and Healthy Living Behavior (*Perilaku Hidup Bersih dan Sehat*, PHBS). There are six PHBS indicators related to COVID-19 based on Kepmenkes Number HK.01.07/Menkes/413/2020, namely behavior of using clean water, washing hands with clean water and soap, healthy latrines, consuming fruits and vegetables every day, daily physical activity, and do not smoking at home.[1]

Several studies using descriptive analysis methods explain theories regarding PHBS indicators at the household level with the risk of being infected with SARS-CoV-2.[4–11] Research in the United Kingdom (UK) explains that there is no association between subjectively reported physical activity and COVID-19 infection.[12] Besides, there is study explaining that there is an association between

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hand washing and a reduced risk of seasonal coronavirus infection, which is believed to have the same transmission mechanism as SARS-CoV-2.[13] A study conducted in Israel explained that there is an association between smoking and the incidence of COVID-19 infection.[14] Another study employing the scoping review method concluded that smoking has a protective effect against COVID-19 but can cause severe clinical symptoms in individuals with COVID-19 disease.[15] In the Pangandaran Regency, there has been no research on the association between the implementation of PHBS and COVID-19 infection. Therefore, the purpose of this study was to analyze the association between the implementation of PHBS at the household level and the incidence of COVID-19 infection in the working area of Puskesmas Parigi in Pangandaran Regency, West Java, Indonesia.

Methods

This study employed a quantitative method with an unmatched case-control design conducted in September–November 2021 in public health center (*Pusat Kesehatan Masyarakat*, Puskesmas) Parigi, Pangandaran Regency's work area, which includes Cibenda, Ciliang, Karangbenda, Karangjaladri, and Parigi villages. The research sample for this study was residents recorded in the daily report of COVID-19 or seeking treatment at the Puskesmas Parigi from June–September 2021.

The inclusion criteria for the case group were residents who had confirmed COVID-19 through PCR examination and were recorded by the COVID-19 surveillance team at the Puskesmas Parigi from June 2021 to September 2021, willing to be interviewed, aged ≥18 years, and willing to fill out the checklist. The exclusion criteria for the case group were residents who died during primary data collection. The inclusion criteria for the control group were residents who sought treatment at the Puskesmas Parigi and had never been diagnosed with COVID-19 from June–September 2021, could be contacted by the researcher by phone, aged ≥18 years, and were willing to fill out a checklist. The exclusion criteria consisted of residents who died during primary data collection, lived in the same house as a person confirmed positive for COVID-19 through polymerase chain reaction (PCR) examination.

The minimum size of subjects in this study was 124 people for each case and control group. The total number of research subjects who filled out the checklist was 154 people. However, there were 13 people from the case and control groups who did not meet the inclusion criteria. At last, this study involved 126 respondents consisting of 63 respondents for each case and control group.

Data were collected in two periods, the initial period and the extra period. In the initial period, the data were collected from research subjects from June to July 2021 by sending a link of the checklist form through text messages and interviews. Respondents who participated were 62 people. Due to this number did not meet the minimum number of the research subjects, the researcher decided to increase the number of research subjects from the case and control groups by collecting data from August to September 2021 and changing the method of collecting primary data on the implementation of PHBS from May 2021 in an extra period.

Changes to data collection were carried out by creating WhatsApp groups and distributing the links of checklist form to research subjects from June to September 2021. Interviews were carried out in the control group with a ratio of 1:1 to the case group in collecting the data. The number of respondents increased to 126 respondents consisting of 63 respondents for each case and control group.

The variables in this study were respondents' characteristics including age which was categorized into 18–29 years, 30–49 years, and ≥50 years, gender; addresses came from the villages of Cibenda, Ciliang, Karangbenda, Karangjaladri, and Parigi; educational background categorized into low (elementary school, junior high school, and senior high school), and high (college/university); occupation; income categorized into ≤ Pangandaran Regency Minimum Wage (*Upah Minimum Kabupaten*, UMK) and > Pangandaran Regency Minimum Wage; PHBS indicators in household level were the behavior of using clean water, washing hands with clean water and soap, using healthy latrines, consuming fruits and vegetables every day, daily physical activity, and not smoking inside the house. The implementation of PHBS was categorized into implementing and not implementing. The implementing category of PHBS was designated as respondent who applied the six PHBS indicators, and not implementing of PHBS means that the respondents did not fully apply the PHBS indicators in their daily life; COVID-19 infections were categorized into COVID-19 and non-COVID-19. The instrument

Table 1 Frequency Distribution of Respondents Characteristics of Case and Control Group

Characteristics	COVID-19 (n=63)		Non-COVID-19 (n=63)		p-value
	n	%	n	%	
Age (years)					
18–29	26	41	27	43	0.422
30–49	26	41	20	32	
≥ 50	11	17	16	25	
Gender					
Male	21	33	21	33	1.000
Female	42	67	42	67	
Address (village)					
Cibenda	5	8	15	24	0.199
Ciliang	8	13	7	11	
Karangjaladri	14	22	12	19	
Karangbenda	13	21	11	17	
Parigi	23	37	18	29	
Education					
Low (Elementary, Junior and Senior High School)	4	6	16	25	0.004
High (college/university)	22	35	25	40	
Occupation					
Not working	14	22	27	43	0.005
Working	49	78	36	57	
Income					
≤ UMK* Pangandaran (≤1.860.591)	35	56	40	63	0.719
> UMK* Pangandaran (>1.860.591)	28	44	23	37	

Notes: *Regency minimum wage (*Upah Minimun Kabupaten*, UMK)

used was a modified Health Promotion-based PHBS implementation checklist with an additional implementation period from May 2021.

This study has obtained permission from two institutions, namely National Unity and Politics (*Badan Kesatuan Bangsa dan Politik*, Kesbangpol) and the Puskesmas Parigi. Meanwhile, an ethics permit has been obtained from the Research Ethics Committee of Universitas Padjajaran Number 675/UN6. KEP/EC/2021. Statistical analyses used in this study were Chi-square and Odds Ratio (OR).

Results

In this study, there were 126 respondents consisting of 63 respondents for each case and control group. There were several characteristics of the respondents between the case and control groups which were statistically significant, namely the educational background (p=0.007) and occupation (p=0.005) (Table 1). Characteristics of the respondents that were not statistically significant were age (p=1.000), address (p=0.199), and income (p=0.719). Differences in the characteristics of the respondents were tested using the Chi-square test.

The results showed that there was no association between PHBS indicators and the incidence of COVID-19 infection at the Puskesmas Parigi, Pangandaran Regency (Table 2). The majority of respondents in this study did not practice PHBS. According to the Chi-square test results, there was no association between the implementation of PHBS in the household level and the incidence of COVID-19 infection at the Puskesmas Parigi in Pangandaran Regency (p-value=0.668) (Table 3).

Discussion

The number of checklist forms filled in this study was 154 out of 387 checklist forms distributed. The majority of case group respondents who filled out the checklist were from July 2021 period. This was due to the high number of COVID-19 cases in the

Table 2 Association of the Application of PHBS Indicators at the Household Level with the Incidence of COVID-19 Infection in the Working Area of the Puskesmas Parigi, Pangandaran Regency

Clean and Healthy Lifestyle Behavior	COVID-19 (n=63)				Non-COVID-19 (n=63)				p-value	OR(95% CI)
	Yes		No		Yes		No			
	n	%	n	%	n	%	n	%		
The behavior of used clean water	63	100	0	0	63	100	0	0	N/A	N/A
Washed hands with soap	63	100	0	0	63	100	0	0	N/A	N/A
Used the proper toilet	61	97	2	3	60	95	3	5	**1.000	1.52(0.24–9.45)
Consumed fruits and vegetables every day	30	48	33	52	35	56	28	44	*0.373	0.72(0.36–1.46)
Do physical activity every day	53	84	10	16	51	81	12	19	*0.639	1.24(0.49–3.13)
Non-smoking behavior at home	32	51	31	49	32	51	31	49	*1.000	1.00(0.49–2.01)

Notes: *Chi-square test; **Fisher exact test; N/A= not applicable

Table 3 Association of Clean and Healthy Lifestyle at the Household Level and the COVID-19 Infection in the Working Area of the Puskesmas Parigi, Pangandaran Regency

Implementation of Clean and Healthy Lifestyle Behaviour	Incidence of COVID-19 Infection				p-value	OR (95% CI)
	COVID-19		Non-COVID-19			
	n	%	n	%		
Apply	15	24	13	21	0.668	1.20(0.51–2.78)
Not Apply	48	76	50	79		

working area of the Puskesmas Parigi, which reached 200 cases. Most of the respondents in the control group who filled out the checklist questionnaire came from the June 2021 period due to the large distribution and the largest number of checklist questionnaire distributed in that period.

Most of the respondents were 18–29 years old. There was no statistical difference in gender characteristics between the case and control groups because the distribution between women and men was the same. The characteristics of respondents by address did not describe the incidence of COVID-19 in each village in the Puskesmas Parigi working area. The majority of the case groups had a high level of education, and most of the respondents had jobs with a percentage of 78%. Most of the case groups worked as civil servants, nurses, and midwives. This allows risk factors for COVID-19 to occur, namely a history of travel to areas with high transmission of COVID-19 or direct contact with individuals positively infected with SARS-CoV-2.[16]

The PHBS indicators concerning the behavior of using clean water and washing hands with soap cannot be analyzed, however, several studies have indicated that there is an association between washing hands 6–10 times a day with a reduced risk of seasonal coronavirus infection, whose transmission mechanism is believed to be the same as SARS-CoV-2.[13] Another study shows that washing hands with clean water and soap or alcohol-based liquids can reduce the risk of COVID-19 because alcohol has the ability to dissolve the fatty components contained in the viral envelope, making it effective for eradicating SARS-CoV-2.[4,17]

The use of healthy latrines with the incidence of COVID-19 infection was not statistically significant, but the use of healthy latrines was a risk factor for the incidence of COVID-19 infection. This supports the theory that transmission through fecal-oral route is still possible and further research is needed.[7,8,18]

Consuming vegetables and fruit is a factor

in preventing COVID-19 infection. This supports the theory that intake of vegetables and fruit functions as antioxidants to fight free radicals, vitamins to maintain body functions, and minerals to maintain body and organ performance.[6] If an individual is malnourished or has an unhealthy diet, he or she will be susceptible to infection by COVID-19.[5,6]

In this study, there was no association between physical activity and the incidence of COVID-19 infection. This finding supports a study which explains that there is no association between subjectively reported physical activity and the incidence of COVID-19 infection.[12] This happened because the measurement of physical activity was not carried out objectively and was only based on self-reports. The COVID-19 pandemic has led to a decrease in physical activity.[19] However, the results in this study do not support the theory that decreased physical activity or excessive physical activity can make individuals more susceptible to SARS-CoV-2 infection.[9,10,20]

The results of this study cannot support the theory that smoking has a protective effect on the incidence of COVID-19.[15] This theory is not supported by other studies which argue that smoking has a protective effect on COVID-19 infection.[21] There are other theories explaining that smokers are more susceptible to COVID-19 infection because of the increased expression of the ACE-2 receptor.[11,15] Another study explains that there is an association between smoking behavior and the incidence of COVID-19 infection which cannot be supported by the results of this study.[14] People who smoke and are infected with SARS-CoV-2 have worse negative progression than people who do not smoke.[15,22,23]

Some of the shortcomings in this study include the number of respondents who did not meet the minimum number of research subjects, unable to conclude causality, did not directly observe the implementation of PHBS due to limited face-to-face meeting during the COVID-19 pandemic, and bias in remembering the implementation of PHBS since Mei 2021 for the case and control groups which might affect the results of the study. Further studies with larger population, using statistical analysis that can conclude a causal correlation, and considering controlling for confounding variables, namely educational background and occupation are needed.

In conclusion, there is no association between the implementation of PHBS at the household level and the incidence of COVID-19.

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