Priority Efforts to Increase Body's Immune and The Risk of Covid-19 Clinical Symptoms

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Abstract

People who have been negatively affected by Covid-19 need information on priority efforts to increase their immune system in order to survive in this pandemic era. This cross-sectional survey research aims to find priority efforts among various efforts to prevent the onset of clinical symptoms of Covid-19. We involved 1785 respondents aged 19 years and older by asking them to respond to self-reported online questionnaires distributed throughout Indonesia at March to June 2020. There are 2 data focused on this research, namely efforts to increase body's immune and clinical symptoms of Covid-19 experienced by respondents in the last 14 days. The ordinal-cumulative logit, logistic regression analysis with the assumption of proportional odds, a significance level of 0.05 was used to analyze the data obtained.

The results showed that 63% of the people increased their body's immune in the moderate category and 67.6% of the people experienced clinical symptoms of Covid-19 in the mild category. Rest is the priority effort among several efforts to increase body's immune. Never rest had a significant effect on clinical symptoms of severe Covid-19 (β=-1.014, 95% CI=-1.480 to -0.547, p = 0.000) and gave 2.756 times the risk compared to those who often rest. Sometimes rest had a significant effect on clinical symptoms of Covid-19 in the moderate category (β= -0.464, 95% CI=-0.685 to -0.243, p=0.000) and gave 1.261 times the risk compared to those who often rest.

This study concluded that rest is a priority effort that can be made by the community, especially those affected by the Covid-19 pandemic, among the various recommended efforts. The public is still required to implement health protocols and comply with all government policies in order to reduce the number of breakthrough cases and deaths of Covid-19.

Keywords: Rest, body's immune, clinical symptoms of Covid-19

BACKGROUND

At the end of 2019 Corona virus (Covid-19) was found in Wuhan, Hubei, China. The virus spread very quickly to various countries in the world and soon after it was declared as a pandemic [1]. Various countries continue to make efforts to protect their people, including prevention of transmission through strict implementation of health protocols, mass vaccinations and health campaigns to encourage the public to increase their immunity. However, until the end of September 2021, the data on Covid-19 cases in the world was still high, at 229,298,157[2]. America is listed as the country with the most cases in the world, namely 41,853,362, while Indonesia is ranked 13th with 61,743 cases. The addition of new cases per day in Indonesia is 2,234 cases. This data is much higher than neighboring countries, namely Singapore with only 450 cases [2].

Until now, there has been no effective drug to prevent or treat and one of the most important weapons is to increase the immune system [3]. In general, the recommended practices to strengthen immune system is eating vegetables and fruit, drinking water, exercising, resting, not smoking, sunbathing, and taking vitamins. As a recommendation, the community can do according to their respective conditions [4]. On the other hand, the country's economic activities have been affected by the Covid-19 pandemic which has lasted almost 2 years. It is predicted that the Indonesia government will lose 2.9 percent of Gross Domestic Product during 2020[5]. The impact on the level of social welfare of the community is increasingly felt, even the level of poverty has increased. Data for March 2021 showed that one in 10 people in Indonesia live below the poverty line [6]. This situation is a potential problem because, on the one hand people have to increase their immune system so they don't get infected with the Covid-19 virus, but on the other hand they are helpless because they are affected by the Covid-19 Pandemic. One solution to this potential problem is the need for information about efforts to increase their immune system, the priority among a series of efforts to increase the body's immune required. However, until now there is a few research related to this. In addition, the existing research has used more subjects with Covid-19, while research that uses healthy individual subjects or those who have experienced clinical symptoms of Covid-19 are still limited. This research is needed to complement the existing research. This experience related to the clinical symptoms of Covid-19 is important considering that most people who are infected with Covid-19 will experience symptoms, even though they are mild to moderate[2]. In addition, if the public understands that there are clinical symptoms of Covid-19, they can take early precautions.

This study aims to obtain information on efforts to increase body's immune, which is a priority among the various efforts that need to be made by the community during Pandemic and the risks if this effort is not carried out.

MATERIALS AND METHODS

Design

An online survey was carried out to determine the effect of efforts to increase body's immune on clinical symptoms of Covid-19 and the magnitude of the risk if these efforts are not carried out.

Respondents and data collected

Respondents were Indonesian residents aged 19 years and older, who responded voluntarily totaling 1785 people who were estimated to have experienced Covid-19 symptoms. There are 2 data focused on this research, namely efforts to increase body's immune and clinical symptoms of Covid-19 experienced by respondents in the last 14 days. The research was conducted from March to June 2020 by the Research Team of the Health Polytechnic of the Ministry of Health, Yogyakarta, Indonesia.

The clinical symptoms of Covid-19 include 8 symptoms, namely fever, sneezing, coughing, runny nose, headache, sore throat, lethargy, and shortness of breath, on a categorical scale. The score was given to the answers of experienced more than usual (score 1), occasionally (score 2), and never experienced (score 3). Based on the minimum and maximum scores obtained, the clinical symptoms of Covid-19 are grouped into 3 categories, namely severe (score 8-12) code 1, moderate (score 13-17) code 2 and mild (18-24) code 3. Clinical symptoms of severe Covid-19 are equivalent to experiencing 6-8 symptoms more than usual; the moderate category is equivalent to experiencing 4-6 more symptoms than usual, the mild category is equivalent to experiencing 2-4 more symptoms than usual.

Efforts to increase body's immune are activities carried out by individuals in the last 14 days. There are 7 types of efforts measured, including eating vegetables and fruit, drinking water, exercising, resting, not smoking, sunbathing, and taking vitamins. Scoring is done on the answers of never do (score 1), sometimes do (score 2), and often do (score 3). Based on the minimum and maximum scores obtained, efforts to increase their body's immune were grouped into 3 categories, namely week (score 7-11), moderate (score 12-16), and good (score 17-21).

Especially for often rest was equivalent to >8 hours a day, sometimes rest was equivalent to 6-8 hours a day and never do rest was equivalent to <6 hours a day.

Instrument

The data collection tool used was an online questionnaire (Google Form) sent via WhatsApp containing 9 questions about personal data without name field (to maintain confidentiality and give respondents freedom to fill in), where 8 questions were about the clinical symptoms of Covid-19 the respondents experienced, and 7 questions about their efforts to increase their body's immune carried out in the last 14 days or before the respondent filled out the questionnaire.

Data analysis

The ordinal-cumulative logit logistic regression analysis with the assumption of proportional odds was carried out to obtain priority efforts among the various efforts suggested by the government (X_{1-7}) for the clinical symptoms of Covid-19 (Y_{1-3}) and the magnitude of the risk of the occurrence of Covid-19 clinical symptoms. There are 5 important steps in this analysis, namely: (1) selecting prospective predictors of X using the Chi-Square correlation test, (2) determining the dominant predictor by looking at the parameter estimation output from the Ordinal Logistics Regression test carried out 2 times, (3) forming a regression model with a change in the sign of the estimate value, and (4) calculating the magnitude of the risk of a predictor (X) against Y using the Odds Test. Odds test carried out to measure the magnitude of the risk. This value is obtained by calculating the exponential regression coefficient of the significant predictor.

Declaration of the Research Ethic Commission

This research had been approved by the Ethics Commission of the Health Polytechnic of the Ministry of Health of Yogyakarta, No. e-KEPK/POLKESYO/0324/III/2020, March24, 2020

RESULT

Respondents Domicile

The respondents came from all provinces in Indonesia. The province that contributed the most was the province of West Nusa Tenggara with 218 people (12.5%). The 34 provinces are spread over 8 islands in Indonesia, namely Sumatra, Java, Kalimantan, Sulawesi, Bali, Nusa Tenggara, Maluku Islands, and Papua. Java Island contributed the most with 749 people (41.96%) (Table 1 attached).

Respondents Characteristics

Most of the respondents were women (72.1%), aged 20-29 years (45.8%), held Master's degree (34.1%) and were students (31.8%). There were 3 characteristics of respondents who did not show significant differences, namely gender, age group, and education (p value > 0.05) but job characteristics showed significant differences in the Covid-19 clinical symptoms (Table 2 attached).

Covid-19 Clinical Symptoms

The results showed that most of the respondents (1206 people or 67.6%) experienced the Covid-19 clinical symptoms in the mild category (Table 3).

Table 3. Symptoms of Covid-19 experienced by respondents in the last 14 days

Sub Var	Category	f	%
1. Fever			
	Never	1420	79.6
	Sometimes	365	20.4
	More than usual	0	0
	Total	1785	100
2. Sneeze			
	Never	649	36.4
	Sometimes	1136	63.6
	More than usual	0	0
	Total	1785	100
3. Coughs			
	Never	1068	59.8
	Sometimes	697	39
	More than usual	20	1.1
	Total	1785	100,0
4. Have a cold			
	Never	1097	61.5
	Sometimes	668	37.4
	More than usual	20	1.1
	Total	1785	100.0
5. Headache			
	Never	1018	57
	Sometimes	752	42.1
	More than usual	15	0.8
	Total	1785	100.0
6. Sore throat			
	Never	1314	73.6
	Sometimes	462	25.9
	More than usual	9	0,5
	Total	1785	100.0
7. Sluggish			
	Never	1167	65.4
	Sometimes	618	34.6
	More than usual	0	0
	Total	1785	100.0
8. Out of breath			
	Never	1643	92.0
	Sometimes	142	8.0
	More than usual	0	0
	Total	1785	100.0
9. Category Experience getting symptoms of Covid-19			
	Severe (8-12) code 1	2	0.1
	Moderate (13-17) code 2	577	32.3
	Mild (18-24) code 3	1206	67.6
	Total	1785	100.0

Covid-19 clinical symptoms experienced by respondents which were more than usual namely cough, runny nose, and headache with a percentage of 1.1%, 1.1% and 0.1% respectively, while the other 5 types of symptoms had a

percentage of 0%. There were 3 types of symptoms that most respondents answered never experienced namely shortness of breath, fever, and sore throat. Sequentially the percentages were 92%, 79.6%; and 73.6% (Table 3).

Efforts to Increase Body's Immune

Efforts made by the respondents to increase body's immune are grouped into 3 categories, namely less, moderate, and good. The results showed that most of the respondents (1,123 people or 63%) made these efforts in the moderate category (Graph 1).
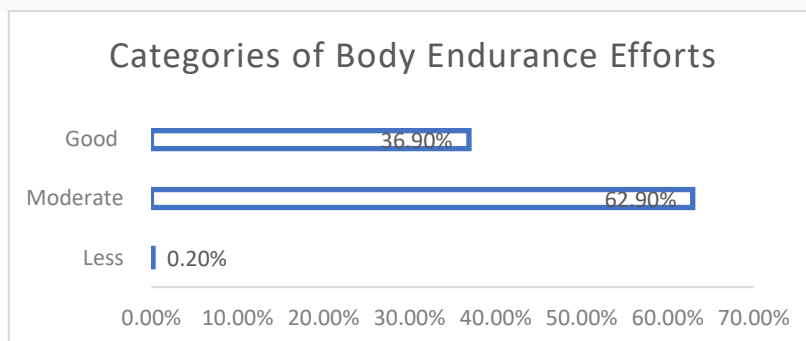
Graph 1: Categories of Body'2 immune e Efforts made by Respondents

The types of efforts to increase body's immune that are often carried out by respondents were drinking water consumption (94.7%); consuming vegetables and fruit (72.7%); and resting (68.7%) while the type of effort that had never been done was smoking (93.7%) (Table 4).

Table 4. Efforts to Increase Body Endurance by respondents

Effort type	Category	f	%
1. Consume vegetable and fruit			
	Never	6	0.3
	Sometimes	481	26.9
	Often	1298	72.7
	Total	1785	100.0
2. Consume plain water):			
	Never	2	0.1
	Sometimes	92	5.2
	Often	1691	94.7
	Total	1785	100.0
3. Physical exercise:			
	Never	196	11.1
	Sometimes	1205	67.5
	Often	384	21.5
	Total	1785	100.0
4. Rest)			
	Never	76	4.3
	Sometimes	482	27.0
	Often	1227	68.7
	Total	1785	100
5. Smoking			
	Often	50	2.8
	Sometimes	62	3.5
	Never	1673	93.7
	Total	1785	100.0
6. Sunbath			
	Never	98	5.5
	Sometimes	1032	57.8
	Often	655	36.7
	Total	1785	100.0
7. Consume vitamins):			

	Never	264	14.8
	Sometimes	950	53.2
	Often	571	32.0
	Total	1785	100.0
8.	Categories of Body's Immune Efforts		
	Weak (8-12) code 1	3	0.2
	Moderate (13-18) code 2	1123	62.9
	Good (19-24) code 3	659	36.9
	Total	1785	100.0

a. Chi-Square test; * 0.05 level if significant

Ordinal-cumulative logit logistic regression analysis with the assumption of proportional odds

Selection of prospective predictors from 7 predictors was carried out using Chi-Square correlation. The results of the analysis showed, consuming vegetables and fruit (r=0.086, p=0.010) and resting (r=0.135, p=0.000) were prospective predictors. The two efforts were included in the Ordinal Logistics Regression analysis while the other efforts were excluded because of p>0.05 (Table 5).

Table 5. Correlation between Efforts to Increase Body's Immune and Clinical Symptoms of Covid-19 Experienced by Respondents

Efforts to Increase Body Endurance	Clinical Symptoms	
	Coef Correlation	P value [a]
Consume vegetable and fruit	0.086	0.010*
Consume plain water	0.042	0.533
Physical exercise	0.045	0.455
Rest	0.135	0.000*
Smoking	0.061	0.156
Sunbath	0.050	0.348
Consume vitamins	0.053	0.282

a. Chi-Square test; * 0.05 level of significant

The data that analyzed was 1,785 and there was no missing data (processing of summary table in the supplementary file 1).

1st Round:

The 1st round of the Ordinal Logistics Regression Analysis was carried out by involving 2 predictors (X_1 and X_2) that were correlated with the clinical symptoms of Covid-19 (Y) (Table 5). The output of the 1st round of Ordinal Logistics Regression analysis showed that the predictor of eating vegetables and fruit (X_1) had no significant effect (β= 1.042, 95% CI=-1.128 to 3.212, p value= 0.347 or >0.05) while the predictor of rest (X_2) had a significant effect (β= -0.937, 95% CI=-1.412 to -0.462, p value 0.000) or <0.05 (Table 6). Thus, the predictor of eating vegetables and fruit (X_1) was not included in the second round of analysis because the p value was more than 0.05.

Table 6. Parameter Estimate Predictor (X) Against Clinical Symptoms of Covid-19 (Y)

		Estimate	Wald value	p value	95% Confidence Interval	
					Lower Bound	Upper Bound
Threshold	Clinical Symptoms (Y $_{1=severe}$)	-7.061	99.086	0.000	-8.452	-5.671
	Clinical Symptoms (Y $_{2=moderate}$)	-0,966	201.309	0,000	-1,099	-0.833
Location	X_1 Consume vegetables and fruit (1=never)	1.042	0.886	0.347	-1.128	3.212
	Consume vegetables and fruit (2=sometimes)	-0.257	4.945	0.026*	-0.484	-0.030
	X_2 Rest $_{(1=never\ do)}$	-0.937	14.963	0.000*	-1.412	-0.462
	Rest $_{(2=sometimes)}$	-0.417	13.076	0.000*	-0.643	-0.191

Note: Clinical Symptom of COVID-19 (Y $_{3=mild}$) as a reference; *is a sign indicating a significant value

2nd Round:

        The second round of Ordinal Logistics Regression Analysis was carried out by involving only 1 predictor (X), namely Rest. The output of the 2nd round of Ordinal Logistics Regression Analysis showed that the predictor of never rest had a significant effect on clinical symptoms of Covid-19 in the severe category (β=-1.014, 95% CI=-1.480 to -0.547, p=0.000) and the predictor of sometimes rest had a significant effect on clinical symptoms of Covid-19 in the moderate category (β= -0.464, 95% CI=-0.685 to -0.243, p= 0.000) (Table 7).

Table 7. Parameter Estimate Predictor (X) Against Clinical Symptoms of Covid-19 (Y)

	Predictor	Estimate	Wald value	p value	95% Confidence Interval	
					Lower Bound	Upper Bound
Threshold	Clinical Symptoms (Y$_{1=severe}$)	-7.004	97.560	0.000	-8.393	-5.614
	Clinical Symptoms (Y$_{2 =moderate}$)	-0.914	209.269	0.000	-1.037	-0.790
Location	X Rest $_{(1=never\,do)}$	-1.014	18.149	0.000*	-1.480	-0.547
	Rest $_{(2=sometimes)}$	-0.464	16.950	0.000*	-0.685	-0.243

Note: Clinical symptoms of Covid-19 (Y$_{3=mild}$) as a reference; * is a sign indicating a significant value at the level of significant 0.05

        The number of regression line models that can be formed was 3-1=2. Clinical symptoms of Covid-19 (Y) consist of 3 categories based on stages namely severe, moderate, and mild. The general line model was Y= α+ βX. The model can be formed using the data in Table 7. To give meaning to the analysis model of Ordinal cumulative logit logistic regression analysis with the assumption of proportional odds, a change in the direction of the sign was made to the estimated value. If the estimate value was positive (+) then it was changed to a negative sign (-). Conversely, if the estimate value was negative (-), then it was changed to a positive sign (+). After changing the sign on the estimated value, the two models became as follows.

Model logit of proportional Odds (1): $Y_{(1=severe)} = +7.004-1.014^*X_{(1=never\,do)}$

Model logit of proportional Odds (2): $Y_{2\,(moderate)} = +0.914-0.464^*X_{(2=sometimes\,do)}$

Information:

$Y_{(1=severe)}$= Clinical symptoms of Covid-19 in severe category; $X_{(1=never\,do)}$= never do resting

$Y_{(2=moderate)}$ = Clinical symptoms of Covid-19 in moderate category, $X_{(2=sometimes)}$= sometimes resting

A positive sign (+) in the estimate means that severe COVID-19 clinical symptoms ($Y_{1=severe}$) or moderate category ($Y_{2=moderate}$) were more likely to occur than mild Covid-19 clinical symptoms ($Y_{3=mild}$). Mild clinical symptoms ($Y_{3=mild}$) were used as the reference by the application automatically.

        Odds test was carried out to measure the magnitude of the risk. This value was obtained by calculating the exponential regression coefficient of a significant predictor. Referring to the regression line equation model (1) was $Y_{(1=severe)}$ =+7.004-1.014*X $_{(1=never\,do\,rest)}$, it was known that the regression coefficient of the predictor $X_{(1=never\,do\,rest)}$ marked *. The Odds Value was 2.756. The meaning of the regression line equation model (1) was that the clinical symptoms of Covid-19 in the severe category were more likely to occur (compared to the mild category) in the group of individuals who never do rest, which has a risk of 2.756 times compared to those who are often resting.

        Referring to the regression line equation model (2) was $Y_{(2=moderate)}$ = +0.914-0.464*X $_{(2=sometimes\,do\,rest)}$, it was known that the regression coefficient of the predictor $X_{(2=sometimes\,do\,rest)}$ is marked *. The Odds value was 1.261. The meaning of the regression line equation model (2) was that the clinical symptoms of Covid-19 in the moderate category were more likely to occur (compared to the mild category) in the group of individuals who sometimes do rest, with 1.261 times at risk compared to those who are often resting.

        After going through several stages of testing, it was known that among the 7 efforts to increase body's immune, resting was a priority predictor that affects the clinical symptoms of Covid-19 and was at risk if the priority predictor was not carried out. There were 2 regression line equation models that can be used to predict groups of individuals who were never rested. The regression line equation model (1) can be used to predict groups of individuals who were never do rest. They were most likely to have severe COVID-19 symptoms (compared to mild symptoms) and had 2,756 times risk than those who were often resting. The regression line equation model (2) can be used to predict the group of individuals who rest in the sometimes do rest. They are more likely to have moderate COVID-19 symptoms (compared to mild symptoms) and had 1.261 times the risk than those who were often resting.

DISCUSSION

Most of the respondents who responded to the survey on Covid-19 (72.1%) were women. The same characteristic was identified in respondents to a survey conducted in 552 hospitals and from 31 provinces in China at the end of 2019 [7]. Both conditions occur by chance because both have p = 0.611 and 0.967 or greater than 0.05. Job variation shows a significant association with clinical symptoms of Covid-19. This condition was also experienced by health workers at one of the Covid-19 handling hospitals in Japan. Nurses had more physical health symptoms than doctors and other technicians [8]. There were 3 clinical symptoms of Covid-19 experienced by respondents "more than usual". One of them was a cough symptom. Coughing was one of the common symptoms of Covid-19. This symptom was also experienced by most of the respondents (67.7%) in the study at the end of December 2019 in Wuhan, China [7]. Although it was a common symptom, unusual cough symptoms should be watched out for because acute cough and fever are one of the clinical criteria for suspected cases of Covid-19 [9].

This study has proven that rest is the priority effort to increase body's immune. Rest means taking a break from the routine or activity. Rest periods are usually used for eating breaks [23] [24] or sleeping breaks. Sleep is a delay in part or all of the functions of the body and mind, which is characterized by the characteristics of the body that is not moving or relaxed and less sensitive unless there are external stimuli [10] [11]. Sleep has an important role for the body and its mechanism in maintaining homeostatic balance that can affect a person's health [25]. Sleep aids in the production of T cells and white blood cells, which play an important role in the immune system's response to viruses. T cells are a type of white blood cells and are the basis of the immune system. It is in the bloodstream and ready to attack viruses and other pathogens that invade the body. Even during a phase of deep rest, the body is able to release them, growth hormone, and return epinephrine to the circulation to fight pathogens when needed [20].

The Covid-19 pandemic can trigger sleep disturbances [12][13], anxiety, stress, depression [13] and impair immune function [12]. There have been no effective efforts, both prevention and treatment of the transmission of the Covid-19 virus, except for increasing the body's immunity [3]. This study succeeded in identifying rest as the priority effort in increasing immunity. Lack of rest provides 2.756 times the risk compared to those who are often do rest (> 8 hours / day) to suffer from severe clinical symptoms of Covid-19. The sometimes rest gave 1,261 times the risk compared to those who often do rest (> 8 hours / day) to suffer from clinical symptoms of Covid-19 in the moderate category. This can happen because at rest or sleep there is a process of rejuvenation and recovery, as well as relaxation of tense muscles [22] [11] maintaining energy and a healthy mental state [11]. When resting or sleeping the body will produce more immune substances (antibodies) [12] [19] so as to prevent infection [20] from various diseases that have an inflammatory component such as diabetes [21] and produce hormones that the body needs. At rest, the muscles relax. Relaxed muscles can reduce anxiety and improve sleep quality in Covid-19 patients [14] and can reduce the risk of the severity of Covid-19 infection [15].

The results of this study strengthen previous findings, namely that poor sleep quality is associated with increased susceptibility to viral infections [16] [17], while the risk rate for individuals who lack sleep is slightly higher than the results of previous studies, which is 2.60 times the chance of Covid-19 [18]. With the findings of this study, people, especially those who have been negatively affected by Covid-19, can increase their immunity by prioritizing efforts that do not cost money, namely resting or sleeping. These efforts have been selected among the various recommended efforts. If they experience symptoms of Covid-19 due to lack of rest, they can seek help early before getting a more serious condition.

This research indicates that there are conditions that influence each other between rest/sleep and Covid-19. Various studies have shown that Covid-19 triggers sleep disturbances, both in health workers and in Covid-19 patients. However, this study shows that good rest/sleep prevents the occurrence of severe Covid-19 clinical symptoms. It is a preliminary finding.

During its development, it was identified that there was an increase in Covid-19 cases in children. The Covid-19 virus in addition to infecting adults also infects infants and children [26]. This is also an opportunity for researchers who are interested in continuing this research with different subjects.

The strengths of this research are (1) finding 1 priority effort out of 7 efforts that are generally recommended for increasing body's immune, so that the community will be more efficient in carrying it out, especially for people who are negatively affected by Covid-19; (2) placing the clinical symptoms of COVID-19 as criterion (Y), not patients or suspected Covid-19 patients so that the community can take precautions as early as possible; (3) the measurement of the main variables (Immune body efforts and experience of Covid-19 clinical symptoms) is divided into 3 sizes (ordinal scale) so that information obtained is more accurate; (4) research subjects represent 34 provinces in Indonesia so as to minimize the effect of ethnic variability on the data obtained.

The limitation of this study is the grouping of clinical symptoms of Covid-19 which is determined not based on practical grouping in the field [9], but based on the number of scores obtained from the respondents' answers. In its implementation, the score equalization for each category has been carried out. The assumption developed is that all clinical symptoms of Covid-19 have the same prognosis with each other. Clinical symptoms of COVID-19 in the severe category are equivalent to experiencing 6-8 symptoms with more than usual

conditions, moderate clinical symptoms are equivalent to 4-6 symptoms with more than usual conditions, and mild clinical symptoms are equivalent to 2-4 symptoms with more than usual conditions. Another limitation is the grouping of rest into never do, sometimes, and often do rather than a number indicating the length of rest/sleep. In its application, conversion has been carried out. Never do rest is equivalent to <6 hours a day, sometimes do rest is equivalent to 6-8 hours a day, and often rest is equivalent to >8 hours a day.
Conflict of Interest: authors state, no conflict of interest.

CONCLUSION

Most of respondents (63%) had increased their body's immune in the moderate category and most of them (67.6%) experienced clinical symptoms of Covid-19 in the mild category at the beginning of the Covid-19 pandemic. Rest is a priority effort that can be done by people who are negatively affected by Covid-19. The public is advised to rest/sleep well (equivalent to >8 hours a day) so that they avoid a 2.756 times risk of experiencing severe COVID-19 clinical symptoms and 1.261 times the risk of experiencing moderate COVID-19 clinical symptoms. The public is still required to implement health protocols and comply with all government policies in order to reduce the number of breakthrough and deaths due to Covid-19.

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