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ASSOCIATION OF KNOWLEDGE AND ATTITUDE WITH HEALTH PROTOCOLS' COMPLIANCE DURING THE COVID-19 PANDEMIC

HUBUNGAN PENGETAHUAN DAN SIKAP TERHADAP KEPATUHAN PADA PROTOKOL KESEHATAN DI MASA PANDEMI COVID-19

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ABSTRAK
Pendahuluan: *Pandemi COVID-19 berdampak negatif bagi masyarakat. Pemerintah Indonesia telah menerapkan protokol kesehatan untuk mengendalikan transmisi COVID-19. Pengetahuan dan sikap turut memengaruhi kepatuhan warga yang akan berdampak terhadap keberhasilan implementasi protokol kesehatan. Penelitian ini bertujuan untuk menilai pengetahuan, sikap, dan kepatuhan terhadap protokol kesehatan terkait COVID-19 di Indonesia, serta faktor-faktor yang memengaruhinya. Hasil penelitian berguna untuk merumuskan strategi pengontrolan penularan COVID-19 maupun penyakit menular lainnya di Indonesia.*
Metode: *Studi potong-lintang dengan teknik* purposive snowball sampling *dilakukan dengan mendistribusikan kuesioner Google formulir melalui media sosial dari Juni hingga Agustus 2021. Populasi target dalam penelitian ini adalah semua orang Indonesia dewasa berusia 17 tahun ke atas yang sedang berada di Indonesia selama pandemi dan dapat mengakses kuesioner. Kuesioner yang tidak terisi dengan lengkap akan dieksklusi. Data responden kemudian dianalisis secara deskriptif dan uji statistik dilakukan menggunakan* Chi-square *atau* Fisher's exact test*.*
Hasil: *Dari 713 responden yang memenuhi kriteria penelitian, 95% memiliki pengetahuan yang memadai, 87% memiliki sikap yang positif terhadap protokol pengendalian COVID-19, dan 79,7% mematuhi protokol kesehatan dengan baik. Sikap dipengaruhi secara signifikan oleh pengetahuan (p<0,001). Selain itu, pengetahuan yang baik (p<0,001; OR 9.19, 95% CI 4.47-18.88) dan sikap yang positif (p<0,001; OR 19.18; 95% CI 11.44-32.16) memengaruhi kepatuhan terhadap protokol kesehatan secara signifikan. Usia (p<0,001), tingkat pendidikan (p<0,001), pengalaman (p=0,018), dan durasi penggunaan media sosial (p=0,004) merupakan faktor-faktor yang berhubungan dengan pengetahuan.*
Simpulan: *Masyarakat Indonesia secara umum telah memiliki pengetahuan yang memadai dan sikap yang positif terhadap COVID-19. Hal tersebut dapat meningkatkan kepatuhan terhadap protokol kesehatan secara signifikan.*
Kata kunci: *Indonesia, kuesioner online, penggunaan media sosial, protokol kesehatan, studi potong-lintang*

ABSTRACT
Introduction: The COVID-19 pandemic negatively impacted the community. The Indonesian government has implemented health protocols to control COVID-19 transmission. Knowledge and attitude affect the compliance level, which plays an important role in the success of health protocol implementation. This study aims to evaluate the knowledge, attitude, and compliance towards COVID-19 control protocols in Indonesia, as well as factors that influence the knowledge. The findings can be used in formulating a strategy to reduce COVID-19 transmission or other infectious diseases in Indonesia.
Methods: A cross-sectional study utilizing a purposive snowball sampling method was performed by distributing a Google form questionnaire through social media from June to August 2021. The target population was all Indonesians aged ≥17 years old who were present in Indonesia during the pandemic and had access to the questionnaire. Incomplete questionnaires were excluded. The data were analyzed descriptively and statistically using the Chi-square or Fisher's exact test.
Results: Out of 713 respondents who met the study criteria, 95% had adequate knowledge, 87% exhibited a positive attitude, and 79.7% adhered to health protocols with high compliance. Knowledge significantly influenced attitude to COVID-19 (p<0.001). Additionally, sufficient knowledge (p<0,001; OR 9.19, 95% CI 4.47-

18.88) and positive attitudes (p<0,001; OR 19.18; 95% CI 11.44-32.16) showed significant correlation with compliance. Age (p<0.001), education level (p<0.001), experience (p=0.018), and duration of social media usage (p=0.004) were significantly associated with knowledge.
Conclusion: The Indonesian community generally has adequate knowledge and a positive attitude toward COVID-19. This could significantly improve compliance with health protocols.
Key Words: cross-sectional study, health protocols, Indonesia, online questionnaire, social media usage

INTRODUCTION

The acute respiratory syndrome caused by SARS-CoV-2 has spread all over the world. This virus, the causal agent of COVID-19, was initially detected in Wuhan, China. The virus spread rapidly across the border to other countries that on March 11, 2020, WHO declared COVID-19 as a global pandemic.[1] More than 200 countries in the world have been affected by this disease. As of January 2023, it was reported that more than 665 million cases had been diagnosed worldwide, and 6.7 million people have died due to COVID-19.[2] In Indonesia, COVID-19 was first confirmed on March 2, 2020. During the first three years of COVID-19 pandemic, the spread of this disease in Indonesia has not been completely controlled. Indonesia itself was ranked the 20th of countries/territories with the highest incidence of COVID-19 cases, with more than 6.7 million cumulative cases and a total of 160 thousand deaths. Java Island accounted for more than 60% of cases, with DKI Jakarta as the province with the most COVID-19 cases, followed by West Java and Central Java.[3]

The high number of COVID-19 cases was inseparable from the low public compliance with health protocols. The COVID-19 health protocol is a series of guidelines issued by the government to regulate activities during the pandemic. The health protocols that had been set by the government include Large-Scale Social Restrictions (*Pembatasan Sosial Berskala Besar/PSBB*) and Implementing Restrictions on Community Activities (*Pemberlakuan Pembatasan Kegiatan Masyarakat/PPKM*).[4] There were also health protocols that could be executed independently, namely 6M. The 6M health protocol consists of washing hands (*mencuci tangan*), wearing masks (*menggunakan masker*), physical distancing (*menjaga jarak*), avoiding crowds (*menghindari kerumunan*), reducing mobilization (*mengurangi mobilitas*), and avoiding eating together (*menghindari makan bersama*).[5]

Based on the 16-25 February 2022 report by the Central Bureau of Statistics (*Badan Pusat Statistik*), there were still many people who did not implement health protocols properly. The lowest compliance was in reducing mobilization (70.8%), maintaining distance (71.1%), and avoiding crowds (73.5%). In addition, around 30% of the respondents believed that the people in their surroundings generally did not adhere to health protocols as expected. These issues need to be solved because public compliance with health protocols was crucial in COVID-19 transmission prevention and control. To have a maximum result, support and participation from the community were needed in compliance with existing health protocol, as stated in a previous study.[6] The lesson learned from this study

could be useful for future implementation of widespread infection control.

According to Lawrence Green's theory, knowledge and attitudes are part of the predisposing factors in determining one's behavior or practice. Predisposing factors are those that facilitate, underlie, or motivate individuals to engage in certain behaviors. Those factors are personal considerations of individuals that might either inhibit or support the expression of a behavior.[7] In terms of preventing COVID-19, one of the behaviors that everyone needs to have is compliance with the mandatory health protocols. Thus, the knowledge and attitudes possessed by an individual will determine their compliance with health protocols. During the initial phase of COVID-19, the Indonesian populace displayed good knowledge, with around 78.2 and 98% demonstrating a solid knowledge of the virus following the first confirmed case in Indonesia in 2020. The majority of Indonesians also showed a positive attitude to prevent the transmission of COVID-19, with 96% expressing support for these measures.[8,9] Despite this, the follow-up study on the public's knowledge, attitude, and practice during the peak of the second wave of COVID-19 cases has yet to be measured. Therefore, the objectives of this study were to identify the factors that might potentially influence knowledge of COVID-19 and evaluate the association between knowledge, attitudes, and community compliance with COVID-19 prevention controls during another COVID-19 wave in 2021. While education and age have been widely known to influence knowledge, we also analyzed other factors, such as the surrounding environment, experience, and the role of social media, that might influence a person's knowledge. The results gained from this nationwide study could be used to control another COVID-19 infectious disease outbreak that may occur in the future.

METHODS

This cross-sectional study was conducted from June to August 2021. The inclusion criteria for this study were adult Indonesian citizens aged 17 years and above who resided in Indonesia during the COVID-19 pandemic and had access to complete the online questionnaire. Meanwhile, incomplete questionnaires were excluded from the analysis. Respondents who were active in social media were recruited using a purposive snowball sampling technique via an online Google Forms survey. The online questionnaire was distributed through social media platforms such as WhatsApp, Line, Facebook, Instagram, etc. Prior to the data collection, respondents were requested to voluntarily give statement of aged above 17 years old and their consent for the study. Following the informed consent, the participants were obliged to complete the research questions, which consisted of respondents' characteristics, knowledge regarding COVID-19, attitude towards COVID-19, and compliance with health protocols (Supplementary Data 1). The questionnaire was arranged by the research team utilizing numerous sources and has been assessed for its validity and reliability using Pearson's correlation and Cronbach's alpha,

respectively (Supplementary Data 2 & 3).[5,10,11] In the questionnaire, a total of 40 questions were structured with the following sections: the knowledge section consisted of 24 items using the Guttman scale, the attitude section contained 10 items utilizing a Likert scale, and the adherence to health protocols section contained six items using a Likert scale. All respondents were permitted to fill in the form just once with their specific emails to avoid the repetition. Based on the Slovin formula, a minimum of 400 respondents were required for this study. After the data collection period concluded, the online questionnaire was closed, preventing any other parties from accessing it.

Data collected from the online survey was converted into Microsoft Excel for assessment. The data was subsequently imported to SPSS version 25.0 (IBM Corp., Armonk, N.Y., USA). Before statistical analysis, a number of variables were grouped or recategorized into different variables. Participants' ages were re-arranged into young adults (17-25 years old) and late adults (>25 years old). Their latest education levels were grouped as low (middle school or lower), medium (high school), and high (university) according to the Law of the Republic of Indonesia No. 20 year 2003 regarding the National Education System (*Undang-Undang Republik Indonesia Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional*). Domicile of each respondent was recategorized into the Java-Bali group and outside Java-Bali group. Duration of social media consumption was coded as low (<1 hour/day), moderate (1-3 hours/day), and high (>3 hours/day). For knowledge and compliance to COVID-19 protocols, the categories were divided into adequate (>75%) and insufficient/poor (≤75%).[10,12] Meanwhile, categories for attitude were split into positive (>75%) and negative (≤75%).[11] The descriptive analysis was conducted on the characteristics of the respondents and their level of knowledge, attitude, and adherence. Meanwhile, the analysis between knowledge and attitude toward community's adherence to the health protocols was performed using Chi-square test, with $p<0.05$ signified significant association. Fisher's exact test would be used as an alternative if the data did not meet Chi-square criteria. The risk for several parameters was calculated using odds ratio (OR). This study was approved by the Ethical Clearance Committee of the School of Medicine and Health Sciences (SMHS), Atma Jaya Catholic University of Indonesia (AJCUI), under reference No. 13/06/KEP-FKIKUAJ/2021.

RESULTS

Prior to the data acquisition and analysis, the online questionnaire underwent validation and reliability analysis. All the items in attitude and compliance practice were considered valid, with r value ranged between 0.475-0.796 and 0.506-0.756, respectively. In the knowledge section, 17 out of 24 questions were determined as valid (r value = 0.361-0.723). Despite the invalid result in several items, the questions were still included in this study, as those are important to analyze the basic understanding of COVID-19 (Supple-

mentary Data 2). The reliability test (α = 0.778) also showed the capability of questionnaire as the measuring instrument for this study (Supplementary Data 3).

A total of 713 qualified respondents completed the online questionnaire. Most of them were female (65.1%), aged between 17-25 years old (87.1%), and had a secondary level of education (high school graduates/ equivalent) (78.8%). Based on the data, 83.6% of respondents lived in the Java-Bali area during the COVID-19 pandemic; predominantly within the Jakarta-Bogor-Depok-Tangerang-Bekasi (Jabodetabek) areas. The other 16.4% of them were resided in Sumatra (6.6%), Sulawesi (3.6%), Kalimantan (3.4%), East Nusa Tenggara/West Nusa Tenggara (1.5%), and Maluku/Papua (1.3%). The majority of the respondents indicated having a supportive environment to implement health protocols, including positive responses from family, friends, and relatives, along with the accessibility of resources such as masks, handwashing facilities, and others. Additionally, 67.9% of the respondents had a history with COVID-19 infection in themselves or their relatives. During the pandemic, around 54.7% of the respondents also used social media with high frequency. The overall characteristics of respondents were detailed in Table 1.

Table 1. Respondent Characteristics

Characteristics	N	%
Gender		
Male	249	34.9
Female	464	65.1
Age group		
Young adult (17-25 y.o)	621	87.1
Late adult (>25 y.o)	92	12.9
Education level		
Low	101	14.2
Medium	562	78.8
High	50	7.0
Domicile during the COVID-19 pandemic		
Java-Bali	596	83.6
Outside of Java-Bali	117	16.4
Surrounding		
Supportive	667	93.5
Not supportive	46	6.5
Experience with COVID-19		
Yes	484	67.9
No	229	32.1
Duration of Social Media Usage		
High	390	54.7
Medium	261	36.6
Low	62	8.7
Total	**713**	**100**

Table 2. Level of Knowledge, Attitude, and Compliance

Parameters	N	%
Knowledge		
Adequate	677	95.0
Poor	36	5.0
Attitude		
Positive	620	87.0
Negative	93	13.0
Compliance		
High	568	79.7
Low	145	20.3

Table 3. Factors Influencing Knowledge Level

Variable	Knowledge				*P*-value OR (95% CI)[#]
	Adequate		Poor		
	n	%	N	%	
Age group					
Young Adult (17-25 years old)	600	84.2	21	2.9	<0.001*
Late Adult (>25 years old)	77	10.8	15	2.1	5.57 (2.75-11.25)
Education level					
Low	84	11.8	17	2.4	
Medium	545	76.4	17	2.4	<0.001*
High	48	6.7	2	0.3	
Surrounding[†]					
Supportive	635	89.0	32	4.5	0.281
Not supportive	42	5.9	4	0.6	1.89 (0.64-5.60)
Experience with COVID-19					
No	211	29.6	18	2.5	0.018*
Yes	466	65.4	18	2.5	2.21 (1.13-4.33)
Duration of Social Media Usage					
High	380	53.3	10	1.4	
Medium	240	33.7	21	2.9	0.004*
Low	57	8.0	5	0.7	

*Statistically significant
[#]Odd-ratio (OR) values are only available for 2x2 data
[†]Fisher exact test

Table 4. Association of Knowledge and Respondent's Attitudes towards COVID-19

Knowledge	Attitude				*P*-value OR (95% CI)
	Positive		Negative		
	n	%	N	%	
Adequate	600	84.2	77	10.8	<0.001*
Poor	20	2.8	16	2.2	6.23 (3.10-12.54)

*Statistically significant

In this study, the respondents mainly had substantial knowledge and a positive attitude towards COVID-19, along with a high level of adherence to health protocols during the COVID-19 pandemic, as described in Table 2. Table 3 showed the statistical analysis of the characteristics of the respondents and their knowledge level regarding COVID-19. Except for the "surrounding" parameter, the other four

factors—age, education level, experience with COVID-19, and social media consumption—exhibited a statistically significant association with the level of knowledge about COVID-19. This study also revealed a significant association between good knowledge and positive attitudes toward COVID-19, with $p<0.001$ (OR = 6.23; 95% CI = 3.10-12.54) (Table 4). The respondents' adherence to health protocols was found to be associated with both their level of knowledge and attitude. The results implied that participants with adequate knowledge (OR = 9.19; 95% CI = 4.47-18.88) and positive attitudes (OR = 19.18; 95% CI = 11.44-32.16) tended to comply with the health protocols (Table 5).

Table 5. Association of Knowledge and Attitudes with Compliance with Health Protocols

Parameters	Health Protocols Compliance				*P*-value OR (95% CI)
	High		Low		
	n	%	n	%	
Knowledge					
Adequate	556	78.0	121	17.0	<0.001*
Poor	12	1.7	24	3.3	9.19 (4.47-18.88)
Attitude					
Positive	543	76.2	77	10.8	<0.001*
Negative	25	3.5	68	9.5	19.18 (11.44-32.16)

*Statistically significant

DISCUSSION

This study managed to obtain the knowledge, attitudes, and compliance profiles of the Indonesian people during the COVID-19 pandemic in mid-2021, with respondents coming from various parts of Indonesia. In this period, the Delta variant emerged as the dominant variant of COVID-19 worldwide, following the Alpha and Beta variants.[13] In response to the rapid escalation of cases and fatalities attributed to the Delta variant in Indonesia, the government intensified the PPKM program. Based on this investigation, over 85% of respondents had adequate knowledge and attitude about COVID-19. Most also displayed a high level of compliance to health protocol for COVID-19 transmission management. These data display similar results to other studies. A previous study during the first wave of the COVID-19 pandemic in Indonesia revealed that the public from various parts of Indonesia had attained good knowledge regarding COVID-19, possessed favorable attitudes towards health protocols, and demonstrated good practices in maintaining the protocols.[14] Another provincial-based studies on a similar timeline revealed that citizens in East Nusa Tenggara showed good knowledge (79.8%), attitude (72.7%), and practice (94.6%) toward COVID-19[15], while respondents from East Kalimantan community indicated high level of COVID-19 knowledge (83.3%) and commendable COVID-19 prevention practices (97.2%), with slightly higher percentage of positive attitude (57.4%).[16] The community of healthcare personnels from West Sumatra also exhibited good knowledge, attitude, and practice,

ranging from 53.5% to 87.7%.[17] These data highlighted the preparedness of Indonesian citizens in facing the COVID-19 pandemic during this period.

This study evaluated the association between respondents' characteristics and their degree of COVID-19 knowledge. According to the analysis, four factors have a significant association with the level of knowledge. Age is one of the factors that affect a person's level of knowledge, with late adults being associated with more adequate knowledge (OR = 5.57; 95% CI = 2.75-11.25). This finding is in line with a study by Defar *et al*., which indicated that the older age group has better knowledge about the transmission and prevention of COVID-19 infection compared to the younger age group.[18] Another study also reported the significant association between age and knowledge (p<0.01), with older people are more likely to gather useful knowledge for their own health.[19] As a person's age increases, their comprehension and mindset also grow, enabling them to obtain more comprehensive knowledge.[20] These results underscore the role of age as a factor influencing individuals' understanding to COVID-19.

The level of knowledge is also influenced by the formal education level. Individuals with higher education levels presented higher knowledge about COVID-19 compared to those with lower education levels. This result is similar to a study conducted in East Nusa Tenggara (p<0.001). The study revealed that higher-educated individuals had 3.38 times and 10.67 times better knowledge than those from secondary and primary education backgrounds, respectively.[15] According to a cross-sectional study from China in 2021, education level affects the level of knowledge about COVID-19, as people with a higher education level had the advantage in understanding complex or novel information better than those with a lower education level.[21] This result conveyed the importance of formal education in shaping individuals' information processing and critical thinking skills.

Another factor that statistically has a significant association with the level of knowledge is the experience related to COVID-19. This study found that the participants with COVID-19 experiences, either directly or indirectly, had more knowledge about the virus compared to the inexperienced ones (p=0.018; OR = 2.21; 95% CI = 1.13-4.33). Experience is a source of knowledge, as previous exposure could deepen the knowledge about health-related information and behavior.[22] Individuals tended to seek further information on COVID-19 when they are infected with COVID-19 or had a close encounter with someone who was infected with the virus. The acquired knowledge can be recalled and set as the basis for humans' attitude and behavior related to COVID-19.

The duration of social media usage also influenced the level of COVID-19 knowledge among participants in this study. This result is in line with previous research in 2020, revealing a significant relationship between the frequency of information exposure through

social media and the Indonesian adult population's knowledge regarding the pandemic (p<0.001).[23] The important role of social media as a platform to circulate any news and progress regarding COVID-19 was also highlighted in wider area.[24] As the COVID-19 management policies were in effect, people were mostly required to work from home. This resulted in people having quite a free time. Consequently, the internet usage, especially social media, increased significantly. Despite its chance of misinformation and hoax, social media was still an effective and swift medium for spreading information about COVID-19.[25] Therefore, social media can be used as a strategy to elevate the rightful and up-to-date knowledge and awareness of COVID-19 to the community if used correctly.

Based on this study, external factors around respondents did not seem to have a significant influence on their knowledge about COVID-19. This analysis opposed another study that indicated the influence of mutual interactions among individuals on the process of knowledge acquirement.[26] Surrounding aspects could be regarded as an important factor in shaping one's knowledge. Nonetheless, various factors also determine people's knowledge. In this study, respondents' personal opinions regarding their access to COVID-19 information and health-related facilities around were asked. Since COVID-19 had been a condition that affected all society and aspects, we assumed that most of the respondents' surroundings were providing sufficient information about the virus and showing supportiveness for the implementation of COVID-19 health protocols. This was further suggested by the small percentage of the respondents with unsupportive surrounding (6.5%). Additionally, the influence of other factors, such as information from other resources and individual beliefs, may also play part in the nonsignificant relation between respondents' surroundings and their knowledge about COVID-19.

Knowledge is an aspect that influences a person's attitude and behavior toward certain materials. The investigation in this study showed a significant association between knowledge and attitude. The result of this analysis was comparable to those of a previous study conducted in the early stage of the pandemic.[8] Furthermore, respondents with competent knowledge were found to generate good adherence to COVID-19 health protocols. These findings align with previous research conducted in Yogyakarta and Semarang, which suggested the tendency of respondents with decent knowledge to showcased excellent COVID-19 prevention practices.[27,28] Attitude was also found to be substantially related to public adherence to health protocols. Another study among university students in Jakarta displayed a similar statistical result between attitudes and precautions against COVID-19.[29] In general, attitude can be defined as the influence, rejection, assessment, or preference towards an object that impacts decision-making. This corresponds to Lawrence Green's theory, which stated that attitude is a predispositional

factor affecting one's behavior.[7] In accordance to these results, respondents with a good level of knowledge generally possessed a positive attitude toward COVID-19. In turn, positive attitudes reflected their awareness concerning the COVID-19 emergency and an understanding of the importance of adhering to health protocols in order to mitigate COVID-19 transmission. Knowledge facilitates the development of beliefs and attitudes. With adequate knowledge, a positive attitude and behavior could be fostered.[30] These findings implied the interdependence and dynamism of knowledge, attitude, and behavior.

This research successfully attained crucial data related to the factors that influence Indonesian people's knowledge of COVID-19 and the interrelation between knowledge, attitudes, and behavior related to COVID-19 during Delta variant wave. Yet, the limitation of this study is that the study was only assessed at a single time point during the COVID-19 pandemic, as individual adherence to health protocols might change over time and impact the future results. Another limitation of the study is that the majority of the respondents were from Java and Bali as the most populous regions in Indonesia. Most of the respondents also belong to the younger age group that might have different access of information compared to older population. As of now, the COVID-19 pandemic appears to be under control and citizens have demonstrated relatively superb awareness toward COVID-19 from the early wave of pandemic to the Delta wave. Nevertheless, the result of this study provided valuable insights into the public's understanding, views, and compliance with the COVID-19 health regulations during the height of the COVID-19 cases by the Delta variant. This data might serve as a reference for the Indonesian government and other policymakers in formulating proper regulations in the event of another COVID-19 or infectious disease outbreak in the future.

CONCLUSION

In general, the Indonesian respondents exhibited a satisfactory level of knowledge and attitude regarding COVID-19, as well as good compliance to COVID-19 health protocol regulations. The level of knowledge is affected by age, formal education level, experience with COVID-19, and duration of social media usage. Knowledge of COVID-19 was significantly associated with respondents' attitudes to the pandemic. Moreover, both knowledge and attitudes were significantly related to compliance with health protocols. Good knowledge and a positive attitude can significantly increase community adherence with health protocols. Therefore, the development of strategies and approaches to improve community knowledge about COVID-19 is important to increase the public's attitude and adherence to health protocols. The results of this study also provided new details to clinicians and healthcare personnel in Indonesia.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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