Knowledge and attitudes about COVID-19 are associated with student compliance with health protocols

Lian Adhalia[*]🔘**, Retno Sintowati**

Department of Medicine, Universitas Muhammadiyah Surakarta, Campus IV, Jl.A.Yani Tromol Pos I, Pabelan, Kartasura Surakarta 57169, Indonesia

✉ lianadhalia27@gmail.com

Abstract

COVID-19 is a virus that spreads through droplet splashes that can remain active for several hours in the air. The main strategy to overcome the transmission of the covid-19 virus is to implement the COVID-19 protocol as a preventive effort. This study uses a cross-sectional research design with 134 respondents, with a sampling technique using simple random sampling. Data collection using Google form distributed via WhatsApp group. Data were processed using univariate, bivariate, and multivariate analysis. The chi-square test analysis showed a relationship between knowledge and attitudes about COVID-19 with compliance with the COVID-19 protocol with p 0.000 <0.05. In contrast, the logistic regression test results showed a relationship between knowledge and attitudes about COVID-19 with compliance with the COVID-19 protocol with an R-Square value of 0.543. The conclusion that can be drawn from this study is that there is a relationship between knowledge and attitudes about COVID-19 with student health protocol compliance with OR values of 9.19 and 9.28, respectively, with an R-square value of 0.543. The contribution of the research is that students are expected to be able to apply health protocols correctly and consistently during covid-19.

Keywords: compliance; covid-19 knowledge; health protocols; student attitudes

1. Introduction

Coronavirus disease 2019 (COVID-19) is a respiratory infectious disease first identified in Wuhan, a city in Hubei province, China, on December 31, 2019 (Al-Hanawi et al., 2020). In Indonesia, WHO reported that from January 3, 2020, to August 23, 2021, there were 3,989,060 confirmed cases of COVID-19, with 127,214 deaths (WHO, 2021). On 1 June 2020, the World Health Organization (WHO) reported that the virus had infected 216 countries, with 5,939,234 confirmed cases of COVID-19 and 367,225 deaths (WHO, 2020).

Based on this data, the condition of covid-19 is a serious and emergency situation. Until now, no standardized treatment has been used to treat COVID-19 virus infection, although the current drugs can alleviate the symptoms of COVID-19 infection (Cohen & Corey, 2020). Therefore, preventive measures by implementing COVID-19 health protocols are the main strategy to overcome the transmission of the COVID-19 virus (Guner et al., 2020). During the COVID-19 pandemic, it is very important for all elements of society, including students, to know about COVID-19 and how to prevent it (Lerik & Damayanti, 2020). Students' knowledge about COVID-19 transmission is an insight that impacts a change in attitude toward implementing the COVID-19 protocol as a prevention effort (Sukesiha et al., 2020). Based on this data, as far as the researcher understands, this research is a new study that has not previously been conducted on students to determine the relationship between the two variables of knowledge and a student's attitudes regarding compliance with the COVID-19 protocol. This is viewed from the role of self-application and socialization to the community regarding the application of health

protocols in preventing COVID-19. The implication of good knowledge about COVID-19 will give birth to a positive attitude toward applying the COVID-19 protocol.

Based on the above background, the authors are interested in conducting scientific research on the relationship between knowledge and attitudes about COVID-19 with health protocol compliance. This research is considered important, so it must be carried out on students because students are important assets of the country that play a role in controlling COVID-19 (Pulungan, 2020). This study aims to determine the relationship between knowledge and attitudes towards COVID-19 with health protocol compliance among Informatics Engineering students at Universitas Muhammadiyah Surakarta UMS.

2. Research Methods

This study used an observational quantitative analytic research design (non-experimental) with a cross-sectional study approach. This method determines the relationship between knowledge and attitudes about COVID-19 with health protocol compliance in Informatics Engineering students at Universitas Muhammadiyah Surakarta with Ethical Clearance number No. 3852/B.1/KEPK-FKUMS/XI/2021. The sample in this study amounted to 134 samples collected using a questionnaire via Google form from September 2021 to November 2021. The sampling technique used in this study was probability sampling with simple random sampling. The following research flow is presented in Figure 1:
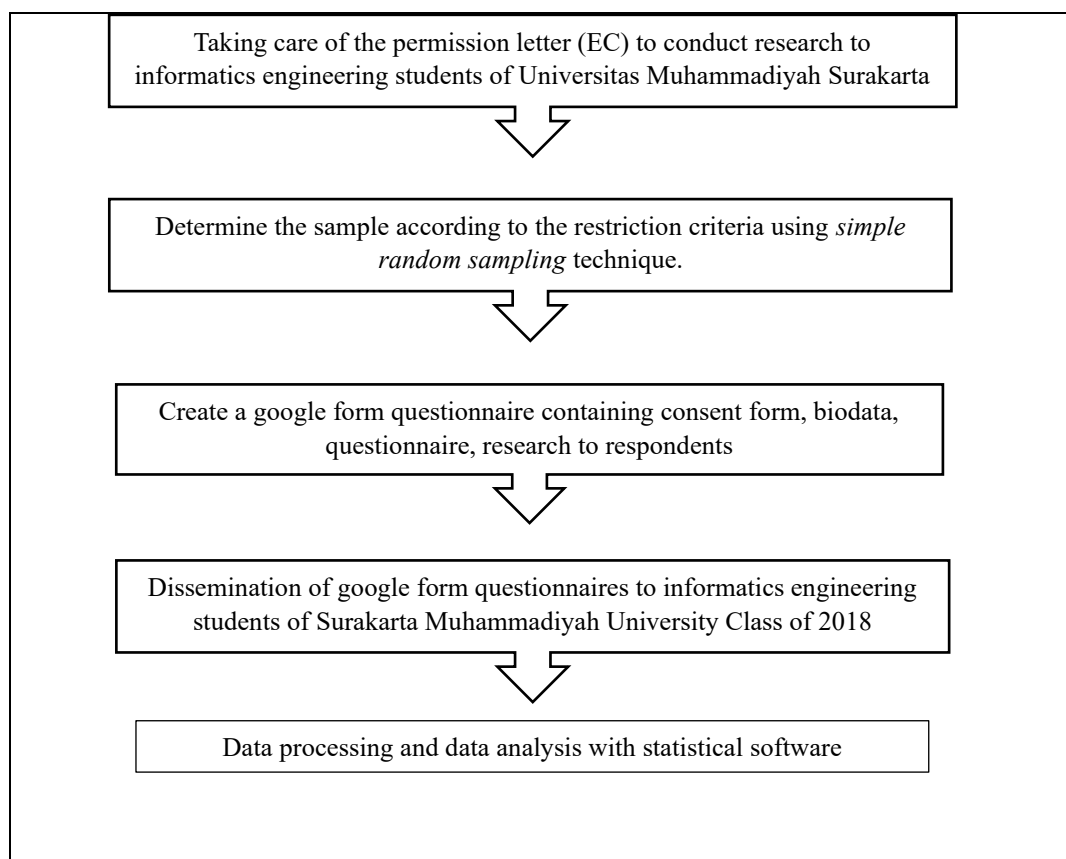

Figure 1. Research flow

The research data were processed using the SPSS (statistical product and service solution) version 25.0 software program. Univariate analysis was used to see the percentage of knowledge, attitudes, and compliance with health protocols regarding COVID-19 in UMS Informatics Engineering Students class of 2018. Bivariate analysis using the Chi-Square test which serves to analyze the relationship between

the independent variable and the dependent variable. Multivariate analysis using the logistic regression test to connect two independent variables and one dependent variable.

3. Results and Discussion
3.1. Results
3.1.1. Univariate Analysis

Table 1. Distribution of respondent characteristics based on knowledge, attitudes, and compliance regarding COVID-19

Variables	Frequency (N)	Percentage (%)
Knowledge		
Good	101	75.4
Bad	33	24.6
Attitude		
Positive	93	69.4
Negative	41	30.6
Compliance		
Compliant	99	73.9
Non-compliant	35	26.1

(Primary data, 2021)

Table 1 shows the respective number of respondents from all research variables. Respondent variables based on knowledge obtained as many as 101 (75.4%) respondents have good knowledge, and 33 (24.6%) respondents have poor knowledge. Then for the attitude variable, 93 (69.4%) respondents had a positive attitude, and 41 (30.6%) respondents had a negative attitude. As for the compliance variable, 99 (73.9%) respondents had obedient behavior, and 35 (26.1%) had non-compliant behavior.

3.1.2. Bivariate Analysis

The following is a bivariate analysis using the *chi-square* test:

Table 2. Results of bivariate analysis of knowledge with compliance

	Compliant		Non-compliant		p-value	OR Value
	N	%	N	%		
Knowledge						
Good	90	67.2	11	8.2	**0.000**	6.678
Bad	9	6.7	24	17.9		

(Primary Data, 2021)

Based on bivariate data analysis in table 2, it was found that students with good knowledge and obedient behavior were 90 respondents (67.2%), and students with good knowledge and non-obedient behavior were 11 respondents (8.2%). In comparison, nine respondents had poor knowledge and obedient behavior (6.7%), and students who had poor knowledge and non-obedient behavior 24 respondents (17.9%).

The bivariate analysis results on the variable of knowledge about COVID-19 on compliance obtained a p-value of 0.000 (<0.05). This means that Ha is accepted, so knowledge has a significant relationship with student compliance.

The bivariate analysis results on the variable of knowledge about COVID-19 on compliance obtained an OR value of 6.678. This means that if someone has poor knowledge about COVID-19, there will be a risk of 6.678 times protocol non-compliance.

Table 3. Results of bivariate analysis of attitude with compliance

	Compliant		Non-compliant		*p-value*	OR Value
	N	%	N	%		
Attitude						
Positive	85	63.4	8	6.0	**0.000**	7.655
Negative	14	10.4	27	20.1		

(Primary Data, 2021)

Based on data analysis in table 3 using the chi-square test, it was found that students who had a positive attitude and obedient behavior were 85 respondents (63.4%), and students who had a positive attitude and disobedient behavior were eight respondents (6.0%). In contrast, students who had a negative attitude and had obedient behavior were 14 respondents (10.4and %), and students who had a negative attitude and disobedient behavior were 27 respondents (20.1%).

The bivariate analysis results on the attitude variable about COVID-19 with compliance obtained a p-value of 0.000 (<0.05). This means that Ha is accepted, so attitudes have a significant relationship with student compliance.

The bivariate analysis results on the variable attitude about COVID-19 with compliance obtained an OR value of 7.655. This means that if someone has a negative attitude, there will be a risk of 7.655 times to non-compliance with health protocols.

3.1.3. Multivariate Analysis

Table 4. Logistic regression multivariate test

Variables	B	OR (ExpB)	95% IK		*p-value*	R-square
			Min	Max		
Knowledge	2.20	**9.19**	2.987	27.767	0.000	
Attitude	2.22	**9.28**	3.147	27.377	0.000	**0.543**
Constant	-1.67	**1.86**			0.01	

(Primary Data, 2021)

Based on data analysis in table 4 using logistic regression analysis, the R-square value by Nagelkerke is 0.543 (0.543 x 100% = 54.3%), which means that the variables of knowledge and attitude have an influence of 54.3% on student compliance and 45.7% are influenced by other factors outside the variables studied.

The logistic regression hypothesis test for the knowledge variable obtained an OR (ExpB) value of 9.19 with a p-value of 0.000 (P <0.05), so it means partially that knowledge has a significant relationship, then if someone has poor knowledge, there will be a risk of 9.19 for non-compliance. While the attitude variable obtained a p-value obtained an OR (ExpB) value of 9.28 with a p-value of 0.000 (P <0.05), so it means partially that attitude has a significant relationship. If someone has a negative attitude, it will be a risk of 9.28 to non-compliance.

3.2. Discussion

Based on the research hypothesis that the author has determined earlier, the research discussion describes the answer to the hypothesis as follows:

3.2.1. Relationship between Knowledge of COVID-19 and Health Protocol Compliance

The results of bivariate analysis of students' knowledge about COVID-19 with compliance obtained a p-value of 0.000 (<0.05) and OR 6.678. This means that knowledge in students has a significant and risky relationship with non-compliance as much as 6.678 times to respondents who have poor knowledge. This is to the results of research conducted by Al-Hanawi (2020), which says that

someone with good knowledge about the causes and transmission of COVID-19 will have awareness about the spread of the infectious disease, so they will take precautions and comply with the COVID-19 health protocol (Al-Hanawi et al., 2020). The results of this study are reinforced by research conducted by Yanti (2020), which states that individuals who know COVID-19 will be better able to make decisions and determine behavior in dealing with pandemic situations (Yanti et al., 2020). Yanti's research (2020) also said that the transmission of infectious diseases that had just occurred would put motivational pressure to find out about the disease so that it could change a person's level of behavior. Another study conducted by Sari and Atiqoh (2020) also gave similar results to this study, that there was a significant relationship (p-value = 0.004) between the relationship between knowledge and health protocol compliance (Sari and 'Atiqoh, 2020). However, research conducted by Syafel and Fatimah (2020) with research subjects of housewives gave different results from the results of this study. The study showed an OR of 0.399 with a CI range of 0.190 to 0.838, which means that knowledge is not at risk and is not related to compliance with COVID-19 prevention (Syafel & Fatimah, 2020).

Students, as respondents in this study, most have good knowledge. Psychologically, a person's knowledge is influenced by his environment, which tends to require a person to learn quickly based on the conditions. So that when students are in a supportive environment, it will increase the knowledge of individuals who have the opportunity to carry out compliance with existing protocols. Based on the analysis in terms of age, students have an average age of 19-23 years. This is a productive age that will tend to respond more and follow the development of science so that they have the opportunity to have good knowledge. This study' with Ekadipta's research (2021), states that a person's knowledge obtained from education will increase insight into a disease. In addition, education can also increase a person's capacity to absorb information objectively (Ekadipta et al., 2021).

3.2.2. The Relationship between Attitudes About COVID-19 and Health Protocol Compliance

The bivariate analysis results of attitudes about COVID-19 with compliance obtained a *p-value of* 0.000 (<0.05) and OR 7.655. This means that attitude has a significant relationship and will risk non-compliance 7.655 times for people with a negative attitude. This is in line with research conducted by Al-Hanawi (2020) that someone with a positive attitude and high confidence that COVID-19 can be controlled has a response in carrying out control and prevention efforts by complying with health protocols against COVID-19 (Al-Hanawi *et al.*, 2020). There are similar results in research conducted by Syafel and Fatimah (2020) with research subjects of housewives, giving a p-value of 0.002 (<0.05) with the conclusion that there is a significant relationship between attitude and health protocol compliance (Syafel & Fatimah, 2020).

The attitude variable had lower results than knowledge and compliance. Based on the results of the analysis in terms of age, the research sample was young adults, who at that age have more negative emotions and fear of infection. Young adults believe they have better immunity than older people and are more future-oriented. Young adults are more likely to underestimate the long-term effects of the pandemic and believe it will end in the near future. This study's results align with theory and empirical evidence in the field of aging. The aging theory explains that young adults lack efficient emotional regulation strategies, allowing them to focus on negative emotions (Ceccato et al., 2021). This study is in line with research conducted by Ceccato (2021), which states that older people have a more optimistic attitude than young adults. This study reported that older people had fewer negative emotions and fear of COVID-19. Then old age also considers more experience and wisdom based on their life experiences, so they have a more realistic attitude about the development of the situation as it is today (Ceccato et al., 2021).

3.2.3. The Relationship between Knowledge and Attitudes about COVID-19 with Health Protocol Compliance

Based on the analysis of the results of this study, students already have a high level of compliance with the implementation of health protocols recommended by health authorities. The increase in compliance can occur because there have been many platforms voiced by health professionals so that public knowledge becomes good and more moved to apply what is conveyed. Then when the public already has good knowledge, it will form an attitude embedded in one's perception to believe something that has implications for one's compliance with health protocols. according to Beca (2021), when people know information directly from expert professionals, it has twice the chance to comply with health protocols compared to the information obtained from electronic media and social media (Beca-Martínez et al., 2021).

The results of this study with students as respondents also support one of the theories, which states that a person's education level affects knowledge, motivating a person to comply with established regulations (Setyawati & Ningrum, 2021). In addition, good compliance can also be triggered by the existence of established government authorities. So that if you violate this will get social sanctions. According to Kleitman (2021), the knowledge information that the community can accept and apply in complying with health protocols depends on government authority (Kleitman et al., 2021). According to research conducted by Roma (2020), a high level of compliance is also influenced by important authorities in controlling the COVID-19 virus. Such as the existence of a mass information campaign program and the provision of legal sanctions to non-compliant people (Roma et al., 2020).

Based on the results of multivariate analysis using logistic regression analysis, the magnitude of the influence of knowledge and attitudes on health protocol compliance has a relationship and affects a person's compliance behavior by 54.3%. Then for logistic regression analysis, poor knowledge provides a risk factor of 9.19 times for non-compliance. Meanwhile, logistic regression analysis of negative attitudes provides a risk factor of 9.28 times for non-compliance. Research conducted by Zhong (2020) states that a person's compliance with health protocols is influenced by several factors, including good knowledge about the high infectivity of the COVID-19 virus and having an optimistic attitude. (Zhong et al., 2020). Research conducted by Yanti (2020) states that some people's prevention and compliance behavior is still not in line with their knowledge and positive attitudes. Sometimes someone with good knowledge and a positive attitude is not reflected in their compliance (Yanti et al., 2020). The results of research by Zhong (2020) and Yanti et al. (2020), the results of the Zhong (2020) and Yanti et al. (2020) studies are in line with this study, which shows that even though respondents have good knowledge and attitudes, there are still respondents who behave non-compliant with health protocols. This is because knowledge and attitudes are not yet an action or activity. So based on the results of this study, it can be concluded that someone with good knowledge and attitudes is not necessarily able to implement compliance. This is reinforced by research conducted by Moudy (2020), which provides significant results (p-value = 0.001) between knowledge and attitudes toward COVID-19 prevention behavior (Moudy & Syakurah, 2020).

The results of this study state that most students already have good compliance. The results of this study support one of the theories, which states that a person's level of education affects knowledge, so it motivates a person to comply with established regulations (Setyawati and Ningrum, 2021). In addition, good compliance can also be triggered by the existence of established government authorities. According to Kleitman (2021), knowledge information that the community can accept and apply in complying with health protocols depends on government authority (Kleitman et al., 2021). According to research conducted by Roma (2020), a high level of compliance is also influenced by important authorities in controlling the COVID-19 virus. Such as the existence of a mass information campaign program and the provision of legal sanctions to non-compliant people (Roma et al., 2020).

4. Conclusion

Based on the results of research and discussion about the relationship between knowledge and attitudes about COVID-19 with compliance with health protocols in students, the following conclusions were obtained: There is a significant relationship between knowledge about COVID-19 and compliance with student health protocols, with an OR value of 9.19 and in the attitude variable, the results show that there is a significant relationship between attitudes towards COVID-19 and compliance with student health protocols, with an OR value of 9.28 so it is concluded that there is a significant relationship between knowledge and attitudes about COVID-19 in complying with student health protocols, with an R-square value of 0.543.

Acknowledgments

Acknowledgments contain appreciation given by the author to those who have played a role in the research, both in the form of permits, consultants, and assisting in data collection so that this research runs smoothly.

Limitations

The author's limitations in conducting this research were influenced by many factors that caused the length of time it took the author to collect respondent data. The most influential thing about this research is that this research was conducted during a pandemic, so the author could not collect data directly. Data collection was carried out through distributing questionnaires distributed by the head of the class of informatics engineering students. This caused the author not to be able to supervise the filling out of the questionnaire directly.

References

Al-Hanawi, M. K., Angawi, K., Alsharee, N., Qattan, A. M. N., Helmy, H. Z., Abudawood, Y., Alquarashi, M., Kattan, W. M., Kadash, N. A., Chirwa, G. C., Alsharqi, O., 2020. Knowledge, Attitude and Practice Toward COVID-19 Among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study. *Frontiers in Public Health*. 8:1–10

Beca-Martínez, M. T., Rodriguez-Blazque, C., Romay-Barja, M., Benito0Liane, Agustin., Falcon-Romero, M., 2021. Compliance with the main preventive measures of COVID-19 in Spain: The role of knowledge, attitudes, practices, and risk perception', *Transboundary and Emerging Diseases*, (June). doi: 10.1111:1–12.

Ceccato, I., Palumbo, R., Crosta, A. D., Malva, P. L., Marchetti, D., Maiella, R., Verrocchio, M. C., Marin, A., Mammarella, N., Palumbo, R., Domenico, A. D.,2021. Age-Related Differences In The Perception Of COVID-19 Emergency During The Italian Outbreak. *ging & Mental Health*. 25: 1305–1313

Cohen, M. S. and Corey, L., 2020. Combination Prevention For COVID-19. *Science*. 368:551

Ekadipta., Hidayat, F., Komarrudin, D., Artaji P., Isngunaenah., Sukamdiyah, M., 2021. Pengaruh Antara Pendidikan, Pekerjaan, dan Pengetahuan mengenai COVID-19 Terhadap Kepatuhan Penerapan PSBB dengan Menggunakan Metode Path Analysis di Wilayah JaBoDeTaBek', *Jurnal Kesehatan Masyarakat*.8:26–33

Güner, R., Hasanoğlu, İ. and Aktaş, F., 2020. Covid-19: Prevention and Control Measures In Community. *Turkish Journal of Medical Sciences*. 50:571–577

Kleitman, S*.,* Dayna, J., Fullerton., Lisa, M., Matthew, D., Blanchard., Lee, J., Stankov, L., Thompson, V., 2021. To comply or not comply? A latent profile analysis of behaviours and attitudes during

---

the COVID-19 pandemic. *PLoS ONE*. 16:1–22

Lerik, M. D. C. and Damayanti, Y., 2020. Mitos Covid-19 di Kalangan Masyarakat Kota Kupang : Survei Cross-Sectional Online. 2:130–137

Moudy, J. and Syakurah, R. A., 2020. Pengetahuan Terkait Usaha Pencegahan Coronavirus Disease (COVID-19) di Indonesia. *Higeia Journal of Public Health Research and Development*. 4:333–346

Pulungan, M. S., 2020. Jurnal at-taghyir. *Jurnal At-Taghyir*. 2:291–308

Roma, P*.,* Monaro, M., Muzi, L., Colasanti, M., Ricci, E., Biondi, S., Napoli, C., Ferracuti, S., Mazza, C., 2020. How To Improve Compliance With Protective Health Measures During The Covid-19 Outbreak: Testing A Moderated Mediation Model And Machine Learning Algorithms. *International Journal of Environmental Research and Public Health*. 17:1–17.

Sari, D. P. and 'Atiqoh, N. S., 2020. Hubungan Antara Pengetahuan Masyarakat Dengan Kepatuhan Penggunaan Masker Sebagai Upaya Pencegahan Penyakit Covid-19 Di Ngronggah. *Infokes: Jurnal Ilmiah Rekam Medis dan Informatika Kesehatan*, 10:52–55

Setyawati, D. and Ningrum, M. Y. (2021) 'Community Knowledge and Compliance in Doing Prevention of COVID-19', *South East Asia Nursing Research*, 3(1), p. 16. doi: 10.26714/seanr.3.1.2021.16-22.

Sukesiha*.,* Usman., Budi, S., Adkhan, N., 2020. Pengetahuan dan Sikap Mahasiswa Kesehatan Tentang Pencegahan COVID-19 di Indonesia.11:258–264.

Syafel, A. B. and Fatimah, A., 2020. Hubungan Pengetahuan, Sikap Dan Perilaku Dengan Kepatuhan Ibu Rumah Tangga Dalam Pencegahan Covid-19 Di Rt 02 Rw 05 Kabandungan I Desa Sirnagalih Bogor. 4:112.

WHO., 2020. Coronavirus Disease 2019 (COVID-19): *Situation Report*.*105:*18.

WHO., 2021. Coronavirus Disease 2019 (COVID-19): *Situation Report*.*105:*18.

Yanti, B., Wahyudi, E., Wahiduddin., Novika, R., Arina, Y., Martani, N., Nawan., 2020. Community Knowledge, Attitudes, and Behavior Towards Social Distancing Policy As Prevention Transmission of Covid-19 in Indonesia. *Jurnal Administrasi Kesehatan Indonesia*. 8:4-14

Zhong, B. L*.,* Zhong, B.L., Luo, W., Li, H.M., Zhang, Q.Q., Liu, X.G., Li, W.T., Li, Y .,2020. Knowledge, Attitudes, and Practices Towards COVID-19 Among Chinese Residents During The Rapid Rise Period Of The COVID-19 Outbreak: A Quick Online Cross-Sectional Survey. *International Journal of Biological Sciences*.16:1745–1752