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Correlation between Knowledge and Attitude with The Practice of Using PPE among Professional Dental Students at Jember University Dental Hospital, Indonesia: A Cross-Sectional Study

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Abstract

Background: Hundreds of millions of nosocomial infection cases are estimated yearly worldwide. Nosocomial infections significantly lead to death and financial losses in the healthcare system. There is a need for infection mitigation, one of them is using Personal Protective Equipment (PPE). The importance of using PPE is still not supported by its compliance. **Aim and Objective:** This study aims to determine the relationship between knowledge and attitude toward PPE use among professional dental students at RSGM Universitas Jember. **Materials and Method:** The research method uses quantitative observational analytics cross-sectionally with questionnaires given through google forms and checklists filled out by researchers during observation. Variable involvement consists of knowledge, attitude, and practice in using PPE. It took 132 professional dental students as the respondents whose selection was done by stratified random sampling. Data analysis was performed univariate and bivariate using Microsoft Excel and the chi-square test on SPSS. **Results:** 81.8% of respondents had a good level of knowledge of PPE use, 81.1% of respondents had a positive attitude towards using PPE, and there were 22% of respondents who were not compliant using PPE. Respondents who did not comply with PPE came from dental treatment-producing aerosols. There was a relationship between knowledge and PPE use (p-value 0.002), but no relationship was found between attitude and PPE use (p-value 0.792). **Conclusion:** There was a relationship between knowledge and PPE use but no relationship between attitude and PPE use.

Keywords: Dental Students, PPE, Health Behavior.

INTRODUCTION

It is estimated that hundreds of millions of patients worldwide are infected with HAIs (Healthcare-Associated Infections) each year. These infections can cause significant harm in terms of lost lives and financial strain on the healthcare system ^[1]. HAIs, also known as nosocomial infections, are acquired by patients while in the hospital ^[2]. In the United States, nosocomial infections are the sixth leading cause of death, with 98,000 cases reported. Shockingly, 20% of patients infected with Severe Acute Respiratory Syndrome (SARS) from 2002 to 2003 were healthcare workers, with 10% of them passing away. From 2013 to 2015, there were 1,049 cases of Ebola Virus Disease (EVD) infection among healthcare workers in West Africa, with 535 fatalities ^[3]. In Indonesia's latest COVID-19 outbreak, data shows 2,087 healthcare workers have died, with the highest number of cases in East Java Province ^[4].

Healthcare workers can be exposed to nosocomial infections through various transmission routes depending on the type of pathogen causing it ^[5]. In dental care, transmission of infection can occur through direct contact with salivary glands, blood, droplets, or airborne that containing pathogens. Indirect transmission is also possible through contaminated objects during dental procedures, such as filling cavities and root canal treatment ^[5]. Consequently, a nosocomial infection control program is necessary to prevent the spread of infections. It is essential to implement this program since the threat of infection transmission can occur anytime ^[6].

Efforts to mitigate infection can be made by fulfilling standard precautions based on the Centers for Disease Control and Prevention (CDC), including using Personal Protective Equipment (PPE). PPE is a set of clothing worn by healthcare workers to protect against blood or other body fluids contamination from patients. PPE also helps prevent patients from getting infected by healthcare workers ^[7]. A recent study shows a link

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between the use of PPE and the occurrence of hospital-acquired infections in patients at Alimuddin Umar Liwa Hospital in West Lampung Regency in 2020 [8].

The importance of using PPE for healthcare workers is still not supported by its compliance. As many as 53.2% of healthcare workers in Egypt did not comply using PPE in the first wave of the COVID-19 pandemic [9]. Another study found that only 49.4% of healthcare workers complied with wearing mask and 54.9% complied with using PPE consistently when working and in contact with patients at the Suranenggala Health Center, Cirebon [10]. Additionally, the Infection Prevention and Control (IPC) team at Jember University Dental Hospital stated that professional dental students were not using PPE optimally.

The use of PPE is a form of health behavior consisting of three domains which are knowledge, attitude, and practice [11]. Recent studies have established a correlation between knowledge and attitude toward the use of PPE among nurses at Pandan Hospital in Central Tapanuli Regency and professional dental students at Baiturrahmah Dental Hospital [12,13].

The IPC team of Jember University Dental Hospital declared there had been no further research on knowledge and attitude in the use of PPE as closely related to the use of PPE. To improve compliance with PPE use, the author researched knowledge, attitude, and practice of using PPE and how knowledge and attitudes impacted the practice of using PPE among professional dental students at Jember University Dental Hospital.

MATERIALS AND METHODS

Study design and participants

The type of research was an analytical observational quantitative study with a cross-sectional design. The research location carried out at Jember University Dental Hospital in March 2023. The research population was all active professional dental students in integration classes I, II, and III at Jember University Dental Hospital in the even semester 2022/2023 academic year. The research required 132 professional dental students as respondents selected through stratified random sampling techniques. Two measuring tools used in this study were questionnaires filled out by respondents through google forms and checklists filled out by researchers during observation. The variables involved in this study were knowledge and attitude as independent variables and action as dependent variables. Data analysis was conducted univariately and bivariately using Microsoft Excel and SPSS. A statistical analysis of chi-square was applied in bivariate analysis used to see the relationship between independent and dependent variables. This research has received permission from the Dentistry Faculty of Jember University Ethics Commission with number 1668/UN25.8/KEPK/DL/2022.

Measures

Knowledge of PPE Usage- The questionnaire consists of 10 multiple-choice questions, each worth 10 points if answered correctly and no points if answered incorrectly or not. The maximum score that respondents can get is 100 points. The measuring instrument used is in the form of a questionnaire. The assessment results were converted into percentage form and further categorized into three levels, which are Good (>85-100%), Fair (50-85%), dan Poor (<50%) [14].

Attitude of PPE Usage- The questionnaire consists of 10 questions with five answer choices using the Likert scale, which are Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD). Each point in a positive statement option is SA=5, A=4, N=3, D=2, and SD=1. In a negative statement, each point in option SA=1, A=2, N=3, D=4, and SD=5. The measuring instrument used is a questionnaire. The assessment results converted into percentage form and further

categorized into three levels, which are Positive (>85-100%), Neutral (50-85%), dan Negative (<50%) [14].

Practice of PPE Usage- The assessment of PPE items usage based on the risk of treatment carried out directly to the patient according to the latest Jember University Dental Hospital rules. In aerosol-generating measure, PPE items must include medical mask, gloves, face shield, head cap, and gown. Actions that produce aerosols in dental care use an aerator, ultrasonic scaler, or micromotor during treatment [15]. In non-aerosol actions, PPE items are medical mask and gloves. The measuring instrument used is a checklist filled directly by research when direct observation of respondents. The results of the observations categorized into two groups: (1) Compliant, if using all PPE items required according to the type of action and (2) Not compliant, if not using one or more PPE items according to the type of action.

RESULTS

The total respondents involved were 132 professional dental students at Jember University Dental Hospital who were studying in integration classes I, II, and III in the even semester 2022/2023 academic year. In this study, the number of female respondents was more than male. The breakdown of respondents by gender was 40 (30.3%) male and 92 (69.7%) female. Based on the integration class taken, most respondents are currently taking integration class II. Distribution of the 132 respondents involved, there were 27 (20.4%) students of integration class I, 95 (72.0%) students of integration class II, and 10 (7.6%) students of integration class III (table 1).

Each questionnaire question to measure knowledge of PPE usage posed to respondents had more correct answers than incorrect answers. Questions 1 to 9 had more than 80% of respondents answered correctly and only question 10 respondents answered correctly 57.6% (table 2).

Generally, the questionnaire used to measure respondents' PPE usage attitude contains two types, positive and negative statements. Questionnaires with positive statements were found in numbers 1 through 8 and negative statements in numbers 9 and 10. The positive statement at number 1, received the most Strongly Agree answers from respondents (89.4%). Meanwhile, negative statement number 10 received the most Strongly Disagree answers from respondents (64.4%) (table 3).

The distribution of PPE usage based on PPE items used by respondents during observations was medical mask and gloves, which was as many as 132 (100%) respondents used. Meanwhile, the PPE item that respondents used least frequently was face shield, which only 10 (7.58%) respondents used (table 4).

There were 24 (18.2%) respondents who had fair knowledge and 108 (81.8%) respondents had good knowledge. The assessments result of the attitude level toward PPE usage among respondents showed 25 (18.9%) respondents had neutral attitude and 107 (81.1%) had positive attitude. The respondents' practice showed 29 (22%) were non-compliant and 103 (78%) compliant used PPE items according rules at Jember University Dental Hospital. In the use of non-aerosol PPE, 100 (100%) respondents were compliant, while the PPE usage in aerosol measures only 3 (9.4%) respondents were compliant and 29 (90.6%) respondents were non-compliant (table 5).

A total of 108 respondents had good knowledge of PPE usage, but 18 (16.7%) were still not compliant in their actions. The output of the chi-square analysis obtained a p-value of 0.002 ($p < 0.05$), which means there was a relationship between knowledge and the use of PPE. The 107 respondents who had positive attitude toward PPE usage, 24 (22.4%) still did not comply with the rules for using PPE items. The table output has a p-value between attitude and practice valued at 0.792 ($p > 0.05$),

which means that there was no relationship between attitude and PPE use (table 6).

Table 1: Respondents of professional dental students distribution

Characteristics	Frequency (F)	Percentage (%)
Gender		
Male	40	30,3%
Female	92	69,7%
Integration Class		
Integration I	27	20,4%
Integration II	95	72,0%
Integration III	10	7,6%

Table 2: Distribution of Knowledge Questionnaire Answers Toward PPE Use

Questions	True	False
What is the purpose of using PPE?	121 (91,7%)	11 (8,3%)
When is PPE required to be used?	131 (99,2%)	1 (0,8%)
What are the risks that can occur if PPE is not used correctly or is not used at all?	130 (98,5%)	2 (1,5%)
When should we wear medical mask?	131 (99,2)	1 (0,8%)
What dangers might occur if do not use a medical mask when treating patients?	122 (92,4%)	10 (7,6%)
What is the function of using gloves in the treatment procedure?	132 (100%)	0 (0%)
What are the risks of not using gloves in the treatment procedure?	131 (99,2%)	1 (0,8%)
When is it needed to wear a gown?	118 (89,4%)	14 (10,6%)
What is the primary purpose of using face shield in healthcare workers?	126 (95,5%)	6 (4,5%)
What is the function of using head cap?	76 (57,6%)	56 (42,4%)

Table 3: Distribution of Attitude Questionnaire Answers Toward PPE Use

Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I believe using PPE is very important to protect myself and my patients from the risk of spreading infection.	0 (0%)	0 (0%)	1 (0,8%)	13 (9,8%)	118 (89,4%)
I always use PPE according to the Standard Operating Procedure (SOP) at Jember University Dental Hospital.	0 (0%)	0 (0%)	5 (3,8%)	53 (40,2%)	74 (56,1%)
I feel it is essential to wear a mask when interacting with patients.	0 (0%)	0 (0%)	4 (3,0%)	14 (10,6%)	114 (86,4%)
I feel safer and more protected when I wear a mask while treating patients.	0 (0%)	0 (0%)	1 (0,8%)	17 (12,9%)	114 (86,4%)
I still use gloves even though the Jember University Dental Hospital does not provide them.	0 (0%)	1 (0,8%)	1 (0,8%)	22 (16,7%)	108 (81,8%)
I realized that not wearing gloves could endanger patients and myself.	0 (0%)	1 (0,8)	3 (2,3%)	12 (9,1%)	116 (87,9%)
I consider using gown an essential step in the fight against nosocomial infections.	0 (0%)	1 (0,8%)	2 (1,5%)	49 (37,1%)	81 (60,6%)
I believe using head cap can reduce the risk of spreading infection.	0 (0%)	6 (4,5%)	5 (3,8%)	52 (39,4%)	70 (52,3%)
I feel that face shield can interfere with my vision or movement when performing treatment actions on patients.	25 (18,9%)	31 (23,5%)	43 (32,6%)	25 (18,9%)	8 (6,1%)
I use appropriate PPE only when supervised by a lecturer or the IPC of Jember University Dental Hospital team.	85 (64,4%)	30 (22,7%)	7 (5,3%)	6 (4,5%)	4 (3,0%)

Table 4: PPE Item Usage Distribution

PPE Items	PPE usage	
	Yes	No
Medical mask	132 (100%)	0 (0%)
Gloves	132 (100%)	0 (0%)
Head cap	58 (43,94%)	74 (56,06%)
Face shield	10 (7,58%)	122 (92,42%)
Gown	59 (44,7%)	73 (55,3%)

Table 5: Classification of Assessment of Each Research Variables

Variables	F	%
Knowledge		
Poor (<50%)	0	0%
Fair (50%-85%)	24	18,2%
Good (>85%-100%)	108	81,8%
Attitude		
Negative (<50%)	0	0%
Neutral (50%-85%)	25	18,9%
Positive (>85%-100%)	107	81,1%
Practice		
Not compliant	29	22%
Aerosol	29	100%
Non-aerosol	0	0%
Compliant	103	78%
Aerosol	0	0%
Non-aerosol	103	100%

Table 6: The Relationship of Knowledge and Attitudes with the Practice Using PPE in Professional Dental Students at Jember University Dental Hospital

Variables		Practice of PPE Usage				Total		p-value
		Not compliant		Compliant		F	%	
		F	%	F	%			
Knowledge	Poor	0	0%	0	0%	0	0%	0,002
	Fair	11	45,8%	13	54,2%	24	100%	
	Good	18	16,7%	90	83,3%	108	100%	
Attitude	Negative	0	0%	0	0%	0	0%	0,792
	Neutral	5	20%	20	80%	25	100%	
	Positive	24	22,4%	83	77,6%	107	100%	

DISCUSSION

Knowledge of PPE usage was 24 (18.2%) respondents had fair knowledge and 108 (81.8%) respondents with good knowledge. The majority knowledge level of PPE usage has been good in this study is likely because all respondents have participated in orientation education at the beginning of the clinic, one of which is related to the use of PPE. Education is one of the internal factors that influence knowledge. Education aims to provide and increase knowledge about a material. A person who attends education is considered to have gained knowledge [16].

The attitude assessment result toward PPE usage showed that 25 (18.9%) respondents had neutral attitude and 107 (81.1%) respondents had positive attitude. This result was likely motivated by respondents' good awareness and assessment of the benefits of using PPE. This is based on most respondents answering Strongly Agree to the PPE use attitude questionnaire at numbers 1, 3, 4, 6, 7, and 8. The questionnaires contain statements regarding the importance of using PPE to prevent potential infection transmission when treating patients. Previous research conducted through experimental trial also said that respondents showed positive attitude toward using PPE because it was considered crucial and helpful in restricting virus transmission during the COVID-19 pandemic [17].

The PPE usage compliance among respondents involved in this study still needed to be improved. It was noted that 22% of respondents did not use PPE items according to applicable regulations. Observations of PPE usage conducted on staff at Qolbu Insan Mulia Hospital also found that 29.41% of respondents were not compliant with using PPE [18]. The face shield used in this study was recorded to be the least used by respondents compared to other PPE items. The reason may be that respondents feel that face shield interferes with vision or movement when treating patients. Non-compliance with PPE usage is caused by its

use which makes it uncomfortable [19]. The disadvantages of using face shield, among others, can cause glare and impaired vision [20].

The classification of practice using PPE is based on the type of PPE that must be used, divided PPE for treatment produce aerosols and treatments that do not. Aerosols result from a dental treatment action when pressurized air and water are emitted from an aerator, a unit for scaling, or a micromotor [15]. The PPE usage among respondents in non-aerosol measures has a more significant percentage of compliance than in aerosol measures. These results may be influenced by the role of supervision in using PPE [21]. This statement is supported by the results of interviews in previous studies that conveyed that respondents use PPE mostly because of supervision [22].

The bivariate analysis showed that this study found a relationship between knowledge and the practice of PPE (p-value 0.002). This research aligns with research conducted on professional dental students at UNSOED Dental Hospital, emergency room nurses at Dr. Zubir Mahmud Hospital, and nurses at Pandan Hospital, Central Tapanuli, which showed a relationship between knowledge and the practice of PPE usage [12,21,23].

Knowledge is the initial stimulus that causes a response in the form of action, therefore knowledge is closely correlated with practice [24]. In line with this, the level of practice formation also begins with perception, namely the introduction of objects related to the action to be taken [25]. This recognition is manifested in the form of knowledge. Recognition can be achieved through the five senses of sight, touch, taste, smell, and hearing. When people act based on what they know, they have been at the level of application of knowledge. Application in this case can be interpreted as applying laws, formulas, methods, principles, and other similar concepts in different cases or scenarios. The application uses something learned in actual conditions or situations [11].

Based on the bivariate analysis results, there was no relationship between attitude and practice using PPE in this study [p-value 0.792]. This study is in line with research conducted on healthcare workers in Padang Public Health Centers' and workers at PG Poerwodadie that there is no relationship between attitude and compliance with the practice of PPE usage [26,27]. Factors that affect the use of PPE are not only attitude, but also factors of the work environment and the comfort of officers using PPE [26]. In addition, positive attitude is not always manifested in the form of concrete actions. Some of the reasons that play a role in influencing it include the environment or situation at a specific time, the experiences of individuals and others, and the values believed in society [27]. However, in other research results, the attitude was related to compliance with PPE use [12,21,23].

Regular supervision and training are needed at Jember University Dental Hospital to improve compliance with PPE usage among prospective dentists. This is essential to prepare them to face the risk of infection that can occur during treatment. Additionally, further research is necessary to identify other factors that may influence professional dental students' compliance with PPE usage at Jember University Dental Hospital.

CONCLUSION

There is a correlation between knowledge and the practice of PPE usage among professional dental students at Jember University Dental Hospital. However, there is no relationship between attitude and practice of PPE usage among professional dental students at Jember University Dental Hospital.

Conflict of Interest

The authors have no conflicts of interest to declare.

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REFERENCES

- Rahmawati SA, Dhamanti I. Infections prevention and control (IPC) programs in Hospitals. *Journal of Health Science and Prevention*. 2021;5(1):23–32.
- Raofi S, Kan FP, Rafiei S, Hosseinipalangi Z, Mejareh Z, Khani S, et al. Global prevalence of nosocomial infection: A systematic review and meta-analysis. *PLOS ONE*. 2023;18(1):e0274248.
- Verbeek J, Rajamaki B, Ijaz S, Sauni R, Toomey E, Blackwood B, et al. Personal protective equipment for preventing highly infectious diseases due to exposure to contaminated body fluids in healthcare staff. *The Cochrane database of systematic reviews*. 2020;5(5):CD011621.
- Pandemic data: mortality statistics of Indonesian healthcare workers [Internet]. *LaporCOVID19.org*. [updated 2023 Jun 9; cited 2023 Jun 9]. Available from: <https://nakes.laporCOVID19.org/statistik>
- Rao B, Chauhan A, Hegde A, Chakravarthy K, Satyam SM. Knowledge, Awareness and Compliance of Personal Protective Equipment and Measures among Undergraduate Dental Students of South India. *Journal of International Dental and Medical Research*. 2020;13(3):1109–1116.
- Khan H, Baig FZ, Mehboob R. Nosocomial infections: Epidemiology, prevention, control and surveillance. *Asian Pacific Journal of Tropical Biomedicine*. 2017;7(5):478–482.
- Brown LJ, Munro J, Rogers SK. Use of personal protective equipment in nursing practice. *Nursing Standard*. 2019;34(5):59–66.
- Andoko A, Zainaro MA, Nasim I. [The relationship between the use of PPE on the incidence of nosocomial infections in inpatients at Alimuddin Umar Liwa Hospital, West Lampung Regency]. *Manuju*. 2021;3(3):353–364.
- El-Sokkary RH, Khater WS, El-Kholy A, El-Din STK, Gad DM, Bahgat SM, et al. Compliance of healthcare workers to the proper use of personal

- protective equipment during the first wave of COVID-19 pandemic. *Journal of Infection and Public Health*. 2021;14(10):1404–1410.
- Herawati NC, Latifah NG, Kristanti NI, Supriatin N, Indragiri NS, Wahyuni NNT. Compliance with using Personal Protective Equipment (PPE) and the incident of COVID 19 in health workers. *World Journal of Advanced Research and Reviews*. 2022;16(1):685–689.
- Notoatmodjo S. [Health behavioral science]. 2nd ed. Jakarta: PT. Rineka Cipta; 2014.
- Purba R. [Knowledge and attitude of nurses towards the use of personal protective equipment (PPE)]. Bandung: Penerbit Media Sains Indonesia; 2019.
- Salsabila N, Bakar AYA, Amran R, Ningrum V. Relationships between levels of knowledge and attitude towards behavior of using personal protective equipment among professional students at rsgm baiturrahmah during Covid-19 pandemic. *e-Gigi: Jurnal Ilmiah Kedokteran Gigi*. 2022;10(2):248.
- Abu-Grain SH, Alsaad SS, Kheir DYME. Factors affecting primary health-care physicians' emergency-related practice; Eastern Province, KSA. *Journal of Family Medicine and Primary Care*. 2018;7(4):739.
- Freeman JF. Risk of aerosol contamination around the dental chair. *Dental Nursing*. 2013;9(1):12–15.
- Husamah, Restian A, Widodo R. [Introduction to education]. Malang: UMMPress; 2019.
- Simpson R, Sandrin R. The use of personal protective equipment (PPE) by police during a public health crisis: An experimental test of public perception. *Journal of Experimental Criminology*. 2021;18(2):297–319.
- Nurbeti M, Prabowo ED, Faris M, Ismoyowati R. [The relationship between the level of knowledge and compliance of hospital staff in the rational use of personal protective equipment during the Covid-19 pandemic]. *The Journal of Hospital Accreditation*. 2021;3(2):96–100.
- Shwe S, Sharma A, Lee PA. Personal Protective Equipment: attitudes and behaviors among nurses at a single university medical center. *Cureus*. 2021;13(12):e20265.
- Singh P, Pal K, Chakravarty A, Ikram S. Execution and viable applications of face shield "a safeguard" against viral infections of cross-protection studies: A comprehensive review. *Journal of Molecular Structure*. 2021;1238:130443.
- Nahrishah P, Ardilla A. [Factors affecting compliance with the use of nurses' Personal Protective Equipment (PPE) during the Covid-19 pandemic in the emergency department of dr. Zubir Mahmud regional general hospital]. *Prepotif*. 2021;5(2):1243–1253
- Utami TN, Sillehu S. Compliance of the use of personal protective equipment for workers. *Advances in Health Sciences Research*. 2020;24:128–131.
- Dewi IM, Adawiyah WR, Rujito L. [Analysis of the level of compliance with the use of personal protective equipment of dental professional students at UNSOED Dental Hospital]. *JEBA (Purwokerto)*. 2020;21(4).
- Sunaryo. [Psychology for nursing]. 2nd ed. Jakarta, Indonesia: Penerbit EGC; 2013.
- Rahmawati. [Public health sciences]. Pekalongan, Indonesia: PT. Nasya Expanding Management.; 2021.
- Za AFS, Syafrawati S, Fizikriy LT. [Analysis of the use of Covid-19 personal protective equipment (PPE) on puskesmas officers in Padang City]. *Prepotif*. 2021;5(1):271–281.
- Widyawati C, Paskarini I. Correlation Between Age, Work Period, Knowledge, and Attitude's Workers With Behavior on The Use of PPE. *Jurnal Berkala Kesehatan*. 2021;7(2):134.

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