Jurnal Farmasi dan Ilmu Kefarmasian Indonesia
Pharmacy and Pharmaceutical Sciences Journal
Published by Faculty of Pharmacy Universitas Airlangga
OPEN ACCESS
E-ISSN 2580-8303
P-ISSN 2406-9388

Jurnal Farmasi dan Ilmu Kefarmasian Indonesia Vol. 11 No. 1 April 2024, 34-41
DOI: 10.20473/jfiki.v11i12024.34-41
Available online at https://e-journal.unair.ac.id/JFIKI/

Pharmacy Students' Readiness for Offline Learning in The New Normal Transmission of COVID-19: A Cross-Sectional Study

Budi Suprapti[1,2]*, Dinda Monika Nusantara Ratri[1,2], Mareta Rindang Andarsari[1,2], Fany Devita Ritonga[3], R.R. Endang Lukitaningsih[4], Enda Mora[5], Enok Nurliawati[6]

[1]Department of Pharmacy Practice, Faculty of Pharmacy, Universitas Airlangga, Surabaya, Indonesia
[2]Department of Pharmaceutical Sciences, Universitas Airlangga Hospital, Surabaya, Indonesia
[3]Master Program of Clinical Pharmacy, Faculty of Pharmacy, Universitas Airlangga, Surabaya, Indonesia
[4]Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia
[5]Sekolah Tinggi Ilmu Farmasi Riau, Riau, Indonesia
[6]Sekolah Tinggi Ilmu Kesehatan Bakti Tunas Husada, Tasikmalaya, Indonesia

*Corresponding author: budi-s@ff.unair.ac.id

Submitted: 16 October 2023
Revised: 16 January 2024
Accepted: 29 January 2024

Abstract

***Background**: Pharmacy students consist of undergraduate and professional pharmacy students. They are candidates for future pharmacist health workers who require practical experience. Offline learning with hands-on practice methods in health facilities supports their professional skills. **Objective**: This study aimed to determine pharmacy students' knowledge and attitude toward implementing offline learning methods during the new normal era. **Methods**: This study involved pharmacy students from Indonesia who were asked to participate in an e-questionnaire about the vaccination program, COVID-19 health protocols, pharmacist competence, and attitude toward implementing offline learning. The students' scores were based on their knowledge and attitude. Statistical analysis was performed to compare the scores between the two groups, and a correlation test was conducted to assess the relationship between the students' knowledge and attitudes. **Results**: A total of 652 pharmacy students were divided into two groups, undergraduate and professional pharmacy students, in a 3:1 ratio. About 74.6% of undergraduate students and 78.5% of professional pharmacy students had good and moderate knowledge. The level of knowledge was not different between the two groups ($p=0.602$; $p>\alpha$). Professional pharmacy students were more ready to engage in offline learning compared to undergraduate students ($p=0.001$; $p<\alpha$). However, there was a relatively low correlation between knowledge and attitudes, with $r = 0.079$ ($p=0.043$; $p<\alpha$). **Conclusion**: Professional pharmacy students are more ready for offline learning methods than undergraduate students, particularly in hands-on field practice.*

***Keywords**: COVID-19, learning, offline, pharmacy students, practice*

How to cite this article:
Suprapti, B., Ratri, D. M. N., Andarsari, M. R., Ritonga, F. D., Lukitaningsih, R. R. E., Mora, E., & Nurliawati, E. (2024). Pharmacy Students' Readiness for Offline Learning in The New Normal Transmission of COVID-19: A Cross-Sectional Study. *Jurnal Farmasi dan Ilmu Kefarmasian Indonesia*, 11(1), 34-41. http://doi.org/10.20473/jfiki.v11i12024.34-41

P-ISSN: 2406-9388
E-ISSN: 2580-8303

INTRODUCTION

The coronavirus (COVID-19) pandemic swept across the globe, including Indonesia, disrupting all activity sectors, including education. Even though the majority of schools have reopened, the educational system is still recuperating and reviewing the lessons. The pandemic affected over 1.5 billion students, including vulnerable young learners. Indonesia had to close schools for a total of 77 weeks, which is a relatively high number in the total duration of school closures compared to other Southeast Asian countries (e.g. Malaysia 61 weeks, Thailand 52 weeks, Vietnam 31 weeks, Cambodia 64 weeks, etc.) (UNESCO, 2022).

In March 2020, the Indonesian Ministry of Higher Education issued a distance learning or e-learning policy due to the COVID-19 pandemic. Based on the Joint Decree (SKB) of the Four Ministers (the Minister of Education, Culture, Research, and Technology, the Minister of Religious Affairs, the Minister of Health, and the Minister of Home Affairs of the Republic of Indonesia), blended learning was implemented for the academic year 2020/2021. Face-to-face learning was only allowed in schools, colleges, and universities located in the yellow and green zones (SKB, 2020). In the Odd Semester of 2022/2023, learning is encouraged to be carried out face-to-face while implementing health protocols for COVID-19 (e.g. always wearing a mask, washing hands with soap or sanitiser, avoiding shaking hands or direct contact, and keeping a distance and avoid crowds) (Kemendikbud RI, 2022).

In Indonesia, pharmacy higher education is divided into two levels: the undergraduate pharmacy with a length of study of 4 years, graduates with a Bachelor of Pharmacy degree, and the professional education program with a length of study of 1 year, graduates with a pharmacist degree. The undergraduate program provides knowledge-based education, while the pharmacy professional program is focused on developing skills and experiential learning. After completing the pharmacy professional program, students are required to pass a national examination in order to obtain a license to practice as pharmacists. This national exam consists of two types: computer-based test (CBT) and Objective Structured Clinical Examination (OSCE). The CBT evaluates students' knowledge, while OSCE assesses their skills and attitudes (Mohamed *et al*., 2020).

During the pandemic, several adjustments have been made, with the hope that all programs will run smoothly and achieve their goals. According to the Global Competency Framework (GbCF), graduates of pharmacy education should possess four competency clusters, which are (1) pharmaceutical public health, (2) pharmaceutical care, (3) professional character, and (4) organization and management (FIP, 2020). These clusters require four elements, namely knowledge, attitudes, skills, and behaviour (Engle *et al*., 2020). While distance learning (online learning) can be used to acquire knowledge during the pandemic, it may not be as effective as face-to-face learning (offline learning). On the other side, developing attitudes, skills, and behaviour requires offline activities. In a US hospital, the pharmacy residency program was modified during the pandemic to ensure that pharmacy residents' learning experience was not disrupted and the rotation target was met. The program was carried out in three scenarios, for illustrates: (1) hybrid learning that combined remote and on-site drug dispensing practice, (2) remote learning for ward rounds with the team, and (3) on-site learning for emergency services. Nevertheless, to implement such programs, besides the availability of human resources, adequate supporting facilities are also required (Danelich *et al*., 2021).

Many people have concerns about implementing offline learning activities due to the risk of COVID-19 transmission. Students, parents, lecturers, educational institutions, and clinical sites are all worried about achieving learning targets while keeping everyone safe. Although 55% of lecturers had a positive attitude toward remote education (online learning), they were unsure whether the attainment of learning outcomes would improve or worsen (Safwan *et al*., 2022). The majority of medical students believe that online learning is beneficial, but the pandemic has limited their opportunities to become specialists. Moreover, they fear being infected with SARS-CoV-2 (Turana *et al*., 2022). Online learning is less effective in developing skills, knowledge, and interaction levels (AlQhtani *et al*., 2021).

Offline learning activities are essential, but they require strict adherence to health protocols to ensure the safety of all personnel involved in teaching and learning (PBM) and their families. This study was conducted to determine the level of knowledge of Indonesian pharmacy students on vaccination, COVID-19 health protocols, pharmacist competence, attitudes toward COVID-19 prevention and protocols, and the readiness of pharmacy students to resume offline learning in the new normal era.

P-ISSN: 2406-9388
E-ISSN: 2580-8303

MATERIALS AND METHODS

Study design

The design of this study is a cross-sectional study. Primary data were collected from the pharmacy students' answers through non-probability sampling.

Setting

This study was conducted in October 2021 and received approval by the ethics committee board of the Faculty of Pharmacy, Universitas Airlangga (number 43/LB/2021). Primary data were collected by completing answers to questionnaires. The questionnaires were distributed online via Google Forms. Participants provided informed consent before taking the questionnaires.

Participants

The respondents met the criteria: (1) Indonesian undergraduate or professional pharmacy student, (2) currently active for learning in a pharmacy study program (not on leave/semester off), (3) who voluntarily completed a survey. Participants who did not complete the survey were excluded.

Study instrument

The questionnaires consist of respondents' identity, i.e., name, age, gender, address, current level of education (undergraduate or professional pharmacy student), and origin of an educational institution. In addition, the questionnaires have 15 questions each for knowledge (using the Guttman scale) (Appendix 1) and attitudes (using the Likert scale) (Appendix 2) related to vaccination, the COVID-19 health protocol, pharmacist competency, and the readiness of the students and their families for offline learning.

Data analysis

Each correct question for knowledge is one point, and the score range is 0-15. All of the questions are two choices: true or false. In addition, the score range for attitude is 5-75, with the possible score for each question being 1, 2, 3, 4, and 5. Furthermore, the mean score for knowledge and attitudes is categorized into three categories: good (76-100%), moderate (56-75%), and poor (<56%).

Respondents who are in the good and moderate categories are considered knowledgeable. The characteristics of the data were analyzed using univariate data analysis. The Mann-Whitney Test was used to compare differences in gender, age, and different scores of knowledge and attitudes between two groups. In addition, the Spearman Test was used to determine the correlation between the knowledge and attitudes of the respondents.

RESULTS AND DISCUSSION

Participants

A total of 660 participants accessed the questionnaire, and 652 participants were willing to be respondents and filled out the entire questionnaire. Eight participants declined to take part in the study. The distribution of respondents can be seen in Table 1. The respondents were primarily undergraduate pharmacy students. The majority were female, with 414 (84.7%) people in the undergraduate students and 140 (85.9%) people in the professional pharmacy students. However, there was no difference between the gender and the educational level of the two groups ($p>0.05$). Most of the respondents were in the age range of 17-22 years old, and there is a difference between ages and respondents' educational levels ($p<0.05$).

Knowledge of participants

The knowledge level of the respondents can be seen in Table 2 and Appendix 1. The respondents have moderate-good knowledge about the benefits of vaccination, COVID-19 vaccination, and COVID-19 health protocols, except in understanding the type of immunization and type of COVID-19 vaccines (questionnaires no 1 & 3) in poor categories. In addition, the study found that pharmacist competency knowledge is poor and requires further improvement. Overall, the knowledge levels of vaccines, pharmacist competency, and health protocols for undergraduate and professional pharmacy students were moderate to good, accounting for 74.6% and 78.5%, respectively, and no difference in knowledge level between both groups ($p>0.05$).

Table 1. Respondents characteristics

Characteristics	Level of Education		p-value
	Undergraduate (n= 489)	Professional program (n= 163)	
Gender			
Male	75 (15.3)	23 (14.1)	0.704
Female	414 (84.7)	140 (85.9)	
Age			
17-22	448 (91.6)	51 (31.3)	0.001
23-28	41 (8.4)	112 (68.7)	

P-ISSN: 2406-9388
E-ISSN: 2580-8303

Table 2. Pharmacy students' knowledge about vaccination, COVID-19 health protocols, and pharmacist competency

Level of Education	Knowledge Category			p-value
	Good	Moderate	Poor	
Undergraduate (n=489)				
Frequency	68	297	124	
Percentage (%)	13.9	60.7	25.4	0.602
Professional program (n=163)				
Frequency	16	112	35	
Percentage (%)	9.8	68.7	21.5	

Table 3. Pharmacy students' attitudes toward vaccination, COVID-19 health protocols, and their readiness for offline learning

Level of Education	Attitude Category			p-value
	Good	Moderate	Poor	
Undergraduate (n=489)				
Frequency	341	147	1	
Percentage	69.7	30.1	0.2	0.001
Professional program (n=163)				
Frequency	134	29	0	
Percentage	82.2	17.8	0	

Attitude of participants

Table 3 shows the distribution of the respondents based on their level of attitude. Undergraduate and professional pharmacy students' attitudes were mainly in the good attitude category, with 341 (69.7%) undergraduate students and 134 (82.2%) professional students. Only one person (0.2%) in the undergraduate students had a poor attitude category. There was a difference between the attitudes of undergraduate and professional pharmacy students ($p < 0.05$).

Correlation of knowledge and attitude participants

A Spearman test was performed to establish the correlation between the knowledge and attitudes of the respondents. The results showed a p-value of 0.043 ($p<0.05$), indicating a significant correlation. However, the correlation coefficient (z) was only 0.079, indicating a very weak correlation between knowledge and attitude. Despite this, the respondents' knowledge still had an impact on their attitudes.

Discussion

This study was conducted to determine the level of Indonesian pharmacy students' knowledge about vaccination, COVID-19 prevention and protocols, pharmacist competency, attitudes towards, and the readiness of pharmacy students for offline learning in the new normal era. Offline learning is face-to-face learning carried out by pharmacy students after a period of distance learning due to large-scale social restrictions (Indonesian: pembatasan sosial berskala besar (PSBB)). There are still barriers to implementing offline learning, while offline learning is necessary for competency achievement (Turana *et al*., 2022). Information related to student knowledge for prevention, health protocols for COVID-19, and attitudes toward offline learning is needed.

From this study, female respondents dominate both undergraduate and professional pharmacy students. This aligns with the statement that 70% of health workers worldwide are women (WHO, 2019). Of health workers in Indonesia, especially general practitioners, pharmacists, and nursing professionals, more than 60% are female (Efendi & Kurniati, 2020). Meanwhile, the age difference in this study is due to differences in educational levels, where professional pharmacy students will be older than undergraduate students.

Students of pharmacy are prepared to become change agents by acquiring the necessary knowledge, skills, attitudes, and values to meet complex demands, including human, technology, and data literacies (Mohamed *et a*l., 2020).

The knowledge levels regarding vaccinations, health protocols, and pharmaceutical competencies for undergraduate and professional pharmacy students are moderate to good, 74.6% and 78.5%, respectively (Table 2). Undergraduate and professional pharmacy students also have good attitudes categories for being willing to COVID-19 and, understand the importance of vaccination and health protocol, but they are more prominent in professional pharmacy students (82.2%) compared to undergraduate students (69.7%) (Table 3). There was no significant difference in knowledge between the two groups ($p=0.602$), while attitudes had a significant difference ($p=0.001$). The Spearman test results show that there is a significant relationship

P-ISSN: 2406-9388
E-ISSN: 2580-8303

between knowledge and attitude (p=0.043). However, the correlation coefficient (z) is only 0.079, indicating a very weak correlation between knowledge and attitudes. The attitudes towards preventing the spread of COVID-19 and following health protocols are very positive. Both undergraduate and professional pharmacy students are willing to be vaccinated, understand the importance of vaccination, and have been implementing health protocols such as wearing masks and washing hands. They are also aware of how to behave in crowded environments to minimize the risk of infection. A large percentage of undergraduate students (83%) and professional pharmacy students (93.3%) expressed the need for offline learning. However, a positive attitude toward readiness for offline learning is more pronounced in the group of professional pharmacy students (84,7%) compared to undergraduate students (67,9%) (questionnaires no.7 and 8 in Appendix 2). Therefore, strengthening education and motivation for offline learning needs to be carried out, especially for professional pharmacy students. Professional students need face-to-face learning, especially skill development and direct practice in the field to support national exam preparation (CBT & OSCE). One of the learning outputs of professional pharmacy students is required to pass the national exam to obtain a license or legal permit to practice as a pharmacist (Mohamed *et a*l., 2020).

During the COVID-19 pandemic, pharmacists, pharmacy technicians, residents, and intern students played a crucial role in providing essential patient services and contributing to public well-being in various settings such as hospitals, clinics, and community pharmacies in high- and low-middle-income countries (Goff *et al*., 2020). It is essential to adopt technology to ensure the safety of patients and health workers. Using virtual presence during limited ward rounds can reduce the transmission of the virus while still allowing for ongoing service responsibility. Accordingly, offline learning can be safely implemented by following the appropriate protocols (Goff *et al*., 2020; Mohamed Ibrahim *et al*., 2021).

From this study, pharmacy students received good support from their families to carry out offline learning. However, support for offline learning is also more significant from the families of professional pharmacy students (82,8%) than undergraduate students (66,9%) (questionnaire no.9 in Appendix 2). Some parents still prefer online learning, so it is essential to educate and communicate with them about COVID-19 prevention, learning protocols during pandemics, and the importance of offline learning to fulfil pharmacy competencies. Similar results regarding the willingness of parents in Indonesia to support the implementation of offline learning for their children in early education were reported by Sutini et al (2022). It was found that parents with elementary school children in Indonesia have good knowledge, beliefs, and attitudes to supporting their children to take part in offline learning during the COVID-19 pandemic (Sutini *et al*., 2022).

CONCLUSION

The level of knowledge regarding vaccination, COVID-19 prevention and protocols, and pharmacist competency was not different between undergraduate and professional students. However, there are differences in their attitudes, with professional pharmacy students being more ready for offline learning methods than undergraduate students.

ACKNOWLEDGMENT

The authors would like to thank all of the respondents for their willingness to participate in this study.

AUTHOR CONTRIBUTIONS

Conceptualization, B.S., D.M.; Methodology, B.S., D.M., M.R.; Software, D.M., M.R., F.D.; Validation, B.S., D.M., M.R.; Formal Analysis, D.M., M.R., F.D.; Investigation, B.S., D.M., M.R., E.M., E.L., E.N.; Resources, B.S., D.M., M.R., E.M., E.L., E.N.; Data Curation, D.M., M.R., F.D.; Writing - Original Draft, B.S., D.M., F.D.; Writing - Review & Editing, B.S., D.M., F.D.; Visualization, F.D.; Supervision, B.S.; Project Administration, D.M.; Funding Acquisition, B.S.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

REFFERENCES

AlQhtani, A., AlSwedan, N., Almulhim, A., Aladwan, R., Alessa, Y., AlQhtani, K., Albogami, M., Altwairqi, K., Alotaibi, F., AlHadlaq, A., & Aldhafian, O. (2021). Online Versus Classroom Teaching for Medical Students During COVID-19: Measuring Effectiveness and Satisfaction. *BMC Medical Education*; *21*; 1-7. doi: 10.1186/s12909-021-02888-1.

Danelich, I. M., Thomson, L., Alberto, J., Bonanni, S., Buckler, R., Foley, J., Phillips, S., Rall, B., Thoma, B., Merli, G., & Wordell, C. (2021). Adaptation of Clinical Pharmacy Services to Meet Patient Care Needs During the COVID-19

P-ISSN: 2406-9388
E-ISSN: 2580-8303

Pandemic. *Journal of the American College of Clinical Pharmacy*; *4*; 364–371. doi: 10.1002/jac5.1392.

Efendi, F. & Kurniati, A. (2020). Human Resources for Health Country Profiles of Indonesia. Jakarta: Kementerian Kesehatan Republik Indonesia.

Engle, J. P., Burke, J. M., Ashjian, E. J., Avery, L., Borchert, J. S., Faro, S. J. E., Harris, C. S., Herink, M. C., Jain, B., MacLaughlin, E. J., Martello, J. L., Moore, K., Rogers, E., Smith, W. J., & Stranges, P. M. (2020). ACCP Clinical Pharmacist Competencies: Advocating Alignment Between Student, Resident, and Practitioner Competencies. *Journal of the American College of Clinical Pharmacy*; *3*; 124–132. doi: 10.1002/jac5.1200.

FIP. (2020). FIP Global Competency Framework: Supporting the Development of Foundation and Early Career Pharmacist. Hague: International Pharmaceutical Federation.

Goff, D. A., Ashiru-Oredope, D., Cairns, K. A., Eljaaly, K., Gauthier, T. P., Langford, B. J., Mahmoud, S. F., Messina, A. P., Michael, U. C., Saad, T., & Schellack, N. (2020). Global Contributions of Pharmacists During the COVID-19 Pandemic. *Journal of the American College of Clinical Pharmacy*; 3; 1480–1492. doi: 10.1002/jac5.1329.

Kemendikbud RI. (2022). Surat Edaran No.3 Tahun 2022 Tentang Penyelenggaraan Pembelajaran di Perguruan Tinggi di Masa Pandemi CORONAVIRUS DISEASE 2019 (COVID-19) Tahun Akademik 2022/2023. Jakarta: Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi.

Mohamed Ibrahim, O., Ibrahim, R. M., Abdel-Qader, D. H., Al Meslamani, A. Z., & Al Mazrouei, N. (2021). Evaluation of Telepharmacy Services in Light of COVID-19. *Telemedicine and E-Health*; *27*; 649–656. doi: 10.1089/tmj.2020.0283.

Mohamed, M. H. N., Mak, V., Sumalatha, G., Nugroho, A. E., Hertiani, T., Zulkefeli, M., Dorjbali, E., Dashbaljir, S., Faller, E. M., Benosa, C. A. C., & Zaini, S. (2020). Pharmacy Education During and Beyond COVID-19 in Six Asia-Pacific Countries: Changes, Challenges, and Experiences. *Pharmacy Education*; *20*; 183–195. doi: 10.46542/pe.2020.202.183195.

Safwan, J., Cherfan, M., Dabbous, M., Hammoudi, D., Akiki, Z., Saade, F., Akel, M., Younes, S., Rahal, M., Raad, E. B., & Sakr, F. (2022). Faculty Perceptions on Online Education in a School of Pharmacy During the COVID-19 Pandemic. *Pharmacy Education*; *22*; 450–457. doi: 10.46542/pe.2022.221.450457.

SKB. (2020). Surat Keputusan Bersama Menteri Pendidikan dan Kebudayaan, Menteri Agama, Menteri Kesehatan, dan Menteri Dalam Negeri Republik Indonesia No.03/KB/2020, No.612 Tahun 2020, No.HK.01.08/Menkes/502/2020, No.119/4536/SJ Tentang Perubahan Atas Keputusan Bersama Menteri Pendidikan dan Kebudayaan, Menteri Agama, Menteri Kesehatan, dan Menteri Dalam Negeri No.01/KB/2020, No.516 Tahun 2020, No.HK.03.01/Menkes/363/2020, No.440-882 Tahun 2020 Tentang Panduan Penyelenggaraan Pembelajaran pada Tahun Ajaran 2020/2021 dan Tahun Akademik 2020/2021 di Masa Pandemi CORONAVIRUS DISEASE-19 (COVID-19). Jakarta: Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, Kementerian Agama, Kementerian Kesehatan, dan Kementerian Dalam Negeri Republik Indonesia.

Sutini, T., Apriliawati, A., Astuti, M. A., Wulandari, I. T., & Santi, R. T. (2022). Offline Learning Readiness During COVID-19 Pandemic: Indonesian' Parent Knowledge, Belief, and Attitude. *Open Access Macedonian Journal of Medical Sciences*; *10*; 254–258. doi: 10.3889/oamjms.2022.8284.

Turana, Y., Primatanti, P. A., Sukarya, W. S., Wiyanto, M., Duarsa, A. B. S., Wratsangka, R., Adriani, D., Sasmita, P. K., Budiyanti, E., A., … Kurniawan, F. (2022). Impact on Medical Education and the Medical Student's Attitude, Practice, Mental Health, After One Year of the COVID-19 Pandemic in Indonesia. *Frontiers in Education*; *7;* 1-11. doi: 10.3389/feduc.2022.843998.

UNESCO. (2022). Education: From Disruption to Recovery. https://webarchive.unesco.org/web/20220629024039/https://en.unesco.org/covid19/educationresponse/. Accessed: 22 December 2022

WHO. (2019). Female Health Workers Drive Global Health. https://www.who.int/news-room/commentaries/detail/female-health-workers-drive-global-health. Accessed:25 December 2022.

P-ISSN: 2406-9388
E-ISSN: 2580-8303

Appendix 1. Frequency and percentage of the correct answers related to pharmacy students' knowledge

No	Questions	Level of Education	
		Undergraduate pharmacy (n=489)	**Professional pharmacy (n=163)**
1	Vaccination is a process for getting passive immunity.	147 (30.1)	39 (23.9)
2	Convalescent plasma therapy is a process to get ready-to-use antibodies.	427 (87.3)	140 (85.9)
3	The Sinovac COVID-19 vaccine is the whole virus vaccine category that weakened.	107 (21.9)	38 (23.3)
4	The Astra Zeneca's COVID-19 vaccine is a category viral vector vaccine.	424 (86.7)	147 (90.2)
5	The efficacy of the Sinovac vaccine in Indonesia is reported to be 65%, which means there will be a 65% reduction in cases in the vaccinated population compared to the placebo group	373 (76.3)	110 (67.5)
6	The characteristics of the subjects and placebo influence the vaccine efficacy value.	425 (86.9)	152 (93.3)
7	Storage of Astra Zeneca vaccine at -20^{o}C.	282 (57.7)	114 (69.9)
8	Vaccination is needed to obtain immunity, preventing the spread of infectious diseases.	451 (92.2)	145 (89.0)
9	Dispensing pharmacy is included in pharmaceutical supplies management.	431 (88.1)	123 (75.5)
10	Aseptic dispensing is included in the pharmaceutical supplies management	78 (16.0)	44 (27.0)
11	Being able to develop practices that are beneficial to society and gain national and international recognition are two of the competencies that new graduate pharmacists must have.	49 (10.0)	14 (8.6)
12	The highest transmission of COVID-19 is caused by the 20-34-year-old group.	367 (75.1)	124 (76.1)
13	Prevention COVID-19 disease can minimized by using two layers of masks, namely surgical masks and cloth masks.	442 (90.4)	159 (97.5)
14	Washing hands after removing a mask does not reduce the risk of preventing infection the COVID-19.	371 (75.9)	122 (74.8)
15	Maintaining a distance of around 50cm is one of the strategies for preventing COVID-19 disease.	314 (64.2)	106 (65.0)

P-ISSN: 2406-9388
E-ISSN: 2580-8303

Appendix 2. Frequency and percentage related to pharmacy students' attitudes

No	Statements	Level of Education									
		Undergraduate pharmacy (n=489)					Professional pharmacy (n=163)				
		Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree	Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
1	To reduce the risk of COVID-19 infection, I am willing to vaccinate.	382 (78.1)	85 (17.4)	22 (4.5)	0 (0.0)	0 (0.0)	143 (87.7)	18 (11.0)	2 (1.2)	0 (0.0)	0 (0.0)
2	I am ready to communicate the importance of vaccination in preventing the spread of COVID-19.	280 (57.3)	167 (34.2)	34 (7.0)	6 (1.2)	2 (0.4)	99 (60.7)	59 (36.2)	5 (3.1)	0 (0.0)	0 (0.0)
3	I recommend vaccination to my family members.	319 (65.2)	133 (27.2)	33 (6.7)	4 (0.8)	0 (0.0)	132 (81.0)	25 (15.3)	5 (3.1)	1 (0.6)	0 (0.0)
4	In my family, there are family members who are not willing to be vaccinated.	34 (7.0)	56 (11.5)	109 (22.3)	87 (17.8)	203 (41.5)	6 (3.7)	16 (9.8)	23 (14.1)	28 (17.2)	90 (55.2)
5	I prevent the transmission of COVID-19 by always implementing the COVID-19 protocols.	371 (75.9)	104 (21.3)	11 (2.2)	2 (0.4)	1 (0.2)	129 (79.1)	27 (16.6)	6 (3.7)	1 (0.6)	0 (0.0)
6	I implement health protocols in the main family.	264 (54.0)	154 (31.5)	51 (10.4)	13 (2.7)	7 (1.4)	87 (53.4)	50 (30.7)	21 (12.9)	3 (1.8)	2 (1.2)
7	To achieve pharmacist competency, I need offline learning.	258 (52.8)	148 (30.3)	66 (13.5)	9 (1.8)	8 (1.6)	111 (68.1)	41 (25.2)	10 (6.1)	0 (0.0)	1 (0.6)
8	I am ready to do offline learning.	158 (32.3)	174 (35.6)	118 (24.1)	27 (5.5)	12 (2.5)	93 (57.1)	45 (27.6)	21 (12.9)	3 (1.8)	1 (0.6)
9	Currently, my parents (family) allow me to do offline learning.	157 (32.1)	170 (34.8)	108 (22.1)	39 (8.0)	15 (3.1)	82 (50.3)	53 (32.5)	23 (14.1)	3 (1.8)	2 (1.2)
10	I feel safe not to wash my hands after removing the mask.	27 (5.5)	17 (3.5)	54 (11.0)	124 (25.4)	267 (54.6)	6 (3.7)	8 (4.9)	17 (10.4)	41 (25.2)	91 (55.8)
11	I have to do six steps of washing my hands to make sure they are clean.	331 (67.7)	125 (25.6)	31 (6.3)	2 (0.4)	0 (0.0)	116 (71.2)	39 (23.9)	8 (4.9)	0 (0.0)	0 (0.0)
12	I feel that coming to a dinner gathering with friends or family will be safe as long as the air ventilation is open.	57 (11.7)	128 (26.2)	195 (39.9)	75 (15.3)	34 (7.0)	19 (11.7)	42 (25.8)	58 (35.6)	36 (22.1)	8 (4.9)
13	Online learning can improve all my skills as a future pharmacist.	87 (17.8)	108 (22.1)	163 (33.3)	79 (16.2)	52 (10.6)	37 (22.7)	20 (12.3)	40 (24.5)	40 (24.5)	26 (16.0)
14	I feel safe around healthy-looking people.	134 (27.4)	135 (27.6)	131 (26.8)	51 (10.4)	38 (7.8)	43 (26.4)	27 (16.6)	51 (31.3)	28 (17.2)	14 (8.6)
15	I feel that to minimize crowds with other people, I don't need to exercise.	19 (3.9)	37 (7.6)	128 (26.2)	155 (31.7)	150 (30.7)	5 (0.8)	6 (3.7)	56 (34.4)	51 (31.3)	45 (27.6)

P-ISSN: 2406-9388
E-ISSN: 2580-8303