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The knowledge of COVID-19 treatments, behaviors, and attitudes of providing the information on COVID-19 treatments: Perspectives of pharmacy students

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Abstract:

BACKGROUND: Increasing community awareness about the transmission and treatment of COVID-19 will stop the spread of the virus. Pharmacy students are the potential facilitator to give community education about COVID-19 treatment. The objective of this study is to evaluate the pharmacy students' knowledge of COVID-19 treatment, behavior, and attitude of providing the information about COVID-19 treatment.

MATERIALS AND METHODS: We conducted cross-sectional study, recruiting 429 pharmacy students from three schools of pharmacy in Indonesia. The questionnaire about the knowledge of COVID-19 treatment, behavior, and attitude of providing the information on COVID-19 treatment met the validity and reliability criteria. We defined the proportion of knowledge, behavior, and attitude of the students using SPSS® version 22.

RESULTS: Most of the students are in the earlier years (46.63%), female (84.15%), find the information about COVID-19 from many sources of media (85.08%) including scientific articles and know information about COVID-19 transmission around their life area (76.46%). The students' knowledge about antiviral and plasma convalescent is good (>70%), the positive behaviors are related to the COVID-19 treatment information regarding to the antiviral and the provision of Vitamin C (>50%), and the positive attitude are related to giving information about the use of avigan®, plasma convalescent, chloroquine, hydroxychloroquine, and immunomodulator (>50%).

CONCLUSIONS: As a future pharmacist, the knowledge of pharmacy students about COVID-19 treatment needs to be improved since earlier years. Furthermore, using the good knowledge about COVID-19 treatment, the positive behavior and attitude of providing information of the students, the community behavior and attitude will be improved. The high year students have a tendency for the good knowledge and positive behavior and attitude of providing the information.

Keywords:

Attitude, behavior, COVID-19 treatment, knowledge, pharmacy

Introduction

Until now, the coronavirus cases reach more than 174.790.312 around the world, with 3.764.076 number of deaths in June 2021. Around 99% of the cases are in mild condition, and the rests are in serious or critical condition.[1] Increasing community awareness related to the transmission and treatment of coronavirus disease

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2019 (COVID-19) during the pandemic situation will stop the spread of the virus.[2] Pharmacy students are the potential facilitator to give community education about COVID-19 treatment. Thus, the knowledge of pharmacy students about the COVID-19 treatment must be increased.[3] As the facilitator in providing the information, the behavior and attitude of pharmacy students also must be well trained.[4] The previous study presented that the pharmacy students still have to change their behavior and attitude during the pandemic, even though they have the good knowledge about COVID-19.[5] The other study recommended that the knowledge and awareness of pharmacy students must be improved by implementing strategies and educational course. The valid information sources must be accessed by the students.[6] The other study involving pharmacy, medical, physiotherapy, dental, and nursing students presented the partial knowledge about the symptoms of severe cases. However, the perception of herbal medicine, antibiotics, and vaccine is still need to be improved.[3]

Out of the pharmacy and health students, some studies about the community and other major students' awareness regarding the COVID-19 showed the unsatisfactory preventive practices, but their knowledge is good.[7] The other study from China presented that the undergraduate Chinese students have good knowledge about basic information of COVID-19, positive attitude, and practice during this outbreak. These results showed the effectiveness of public health campaigns in this country.[8] To date of our knowledge, the students' knowledge, behavior, and attitude about COVID-19 treatment and providing the information about COVID-19 treatment has not been explored yet in Indonesia. Therefore, the objective of this study is to evaluate the pharmacy students' knowledge about COVID-19 treatments, behaviors, and attitudes of providing the information about COVID-19 treatment.

Materials and Methods

Study design

Our study design was cross-sectional recruited the pharmacy students from three schools of pharmacy in Indonesia, as the respondents.

Participants

The inclusion criteria of the respondents were active students in schools of pharmacy and willing to participate in the study. The students who did not have good internet connection were excluded because the questionnaire was given online.

The questionnaire

The questionnaire of knowledge about COVID-19 treatment and behavior and attitude of providing information about COVID-19 treatment was developed based on the information from the National Institute of Health about the treatment of COVID-19[9] The questionnaire was validated to sixty respondents using *Pearson Correlation* and reliability tested using *Cronbach alpha*. All the questionnaire items met the criteria of validity, which was counted; correlation values were bigger than table correlation values. The *Cronbach alpha* value was 0.6, which also met the criteria of reliability.

Ethics statement

Our study is approved by the Ethics Committee of Universitas Ahmad Dahlan No 012006024. All the respondents gave their consent before the study.

Statistical analysis

The characteristic data were descriptively analyzed to understand the percentage of sex, age, years, source of information, and the transmission of COVID-19 in their life area. The association between students' characteristics and their knowledge about COVID-19 treatment and the behavior-attitude of providing the information about COVID-19 treatment were defined using Chi-square test and Pearson correlation. We used SPSS® version 22.0. Armonk, NY : IBM Corp for the statistical analysis.

Results

We recruited 429 participants from pharmacy study program of three institutions [Table 1]. Most of the students are in the earlier years (46.63%), female (84.15%), find the information about COVID-19 from many kinds

Table 1: Students characteristics in pharmacy study program

Characteristics	*n* (%)
Years	
1	200 (46.62)
2	100 (23.31)
3	35 (8.16)
4	84 (19.58)
>4	10 (2.33)
Sex	
Male	68 (15.85)
Female	361 (84.15)
Source of information	
Colleagues (lecturer, family, friend)	247 (57.58)
Media (social, news, printed)	365 (85.08)
Scientific media	
COVID-19 patients infection students' life area	
Not available	165 (38.46)
Available	163 (38.00)
Do not know	101 (23.54)
Age (years-old) (X±SD)	20.44±2.92

SD=Standard deviation

of media (85.08%) including scientific articles and know information about COVID-19 patients around their life area (76.46%). The average of age of the students is 20.44 (standard deviation: 2.92). Most of the students can answer the questions about antivirals plasma convalescent and immunomodulator (>70%), but they still do not have enough information about the name of the antiviral (6.29%) [Table 2].

When providing the information to their colleagues, the students show the positive behavior related to the COVID-19 treatment information regarding the antiviral (>50%) and the provision of Vitamin C (>50% for the agree and strongly agree). Students are partially behavior on some questions related to the use of azithromycin, plasma convalescent, hydroxychloroquin, immunomodulator, and antihypertension in COVID-19 patients (around 30%) [Table 3].

Most of the students with a positive attitude are never giving information about avigan®, plasma convalescent, chloroquine, hydroxychloroquine, and immunomodulator (>50%). The most frequent right information that they gave is about vaccination and acetaminophen (around 20%) [Table 4].

The students' characteristics that have a significant association with their knowledge, behavior, and attitude are described in Tables 5-7, respectively. The significant associations in knowledge domain are seen between years of study and item questions about oseltamivir and duration of azithromycin used. The late-year students have better knowledge about oseltamivir and duration use of azithromycin 1.33 and 1.79 times than early years of students, respectively (95 confidence interval: 1.03–1.74; 1.19–2.73, respectively). The significant associations in the behavior domain can be seen between students' sex and questions about antivirals, antipyretics, and kina consumption.

The significant association in the attitude domain is defined between the years of students and questions about vaccination, oseltamivir, acetaminophen, and chloroquine in adults and pediatric patients and the use of immunomodulators.

Table 2: Students' knowledge about COVID-19 treatment

Questions related to the knowledge	Right answer	Percentage
All antivirals are appropriate for COVID-19 treatment	351	81.8
Avigan® (Favipiravir) has been already pass the clinical trial Phase I for covid-19	339	79.02
Oseltamivir is an antiviral for COVID-19	27	6.29
Azitromisin is the treatment for COVID-19 patients	92	21.45
The duration use of azithromycin for severe COVID-19 patients is 14 days	114	26.57
The combination of penicillin and aminoglycoside can be used to treat COVID-19 patients	244	56.88
Ciprofloxacin can be the alternative for azithromycin in COVID-19 patients	200	46.62
The high dose of Vitamin C must be given to COVID-19 patients with mild symptoms	154	35.90
Ibuprofen is safe as antipyretic for COVID-19 patients	167	38.93
Plasma convalescent can be used to treat COVID-19 patients	267	62.24
Chloroquine has severe nausea and vomiting as side effect in COVID-19 patients	89	20.75
Hydroxychloroquin is the main treatment for COVID-19 patients	211	49.18
The combination of azythromycin and phosphate chloroquine cause prolong of QT interval in COVID-19 patients	292	68.07
Imunomodulator is the treatment for COVID-19 patients	383	89.28

Table 3: Students' behavior about providing information related to the treatment of COVID-19 (%)

Questions related to the behavior	Strongly agree	Agree	Undecided	Strongly disagree	Disagree
If I meet my colleague experiencing body temperature 37.7°C in 3 days, I suggest ibuprofen as antipyretic	6.53	34.97	26.81	5.36	26.34
I suggest that all antivirals are appropriate for COVID-19 treatment	2.33	10.26	14.45	17.72	55.24
I suggest that azithromycin is the treatment for COVID-19 patients	3.03	30.07	35.20	4.66	27.04
I suggest that Vitamin C must be given to all COVID-19 patients	20.51	43.36	23.78	1.40	10.96
I suggest that all antipyretics can be given to COVID-19 patients	1.63	23.31	26.11	5.36	43.59
I suggest that patients with mild symptoms of COVID-19 should consume kina	2.56	23.08	33.33	4.66	36.36
I inform to the physician that plasma convalescent is used for severe COVID-19 patients	5.59	36.13	34.27	2.33	21.68
I suggest that covid-19 patients with mild symptoms can be treated with immunomodulator	4.66	33.80	36.83	1.86	22.84
I suggest that covid-19 patients without symptoms with hypertension has to stop the use of ACE-inhibitor and/or angiotensin receptor blocker	5.36	34.50	30.54	2.80	26.81

ACE=Angiotensin converting enzyme

Table 4: Students' attitude about providing information related to the treatment of covid-19

Questions related to the attitude	Frequently	Occasionally	Rarely	Never
I suggest vaccination for preventing the COVID-19 transmission	21.45	34.73	22.38	21.45
I suggest oseltamivir for COVID-19 patients	4.43	15.85	20.75	58.97
I suggest avigan® for COVID-19 pregnant patients	3.26	10.02	13.05	73.66
I suggest the use of antibiotics for COVID-19 patients	10.49	20.28	19.58	49.65
I suggest to consume high dose of Vitamin C for the treatment of COVID-19	20.75	26.34	21.91	31.00
I suggest the use of acetaminophen for the treatment of COVID-19 patients	22.14	28.90	17.72	31.24
I suggest the use of plasma convalescent for COVID-19 patients	6.99	19.58	17.48	55.94
I suggest the use of chloroquine for COVID-19 adult patients	8.62	19.58	20.28	51.52
I suggest the use of chloroquine in COVID-19 pediatric patients	3.96	11.42	15.62	69.00
I suggest the use of immunomodulator for COVID-19 patients	4.90	16.32	18.18	60.61

Table 5: Association between students' characteristics and their knowledge

Students characteristics (years)	Knowledge (question item, OR [95% CI])
Late	Oseltamivir is an antiviral for COVID-19: 1.33 (1.03-1.74)
Early	The duration use of azithromycin for severe COVID-19 patients is 14 days: 1.79 (1.19-2.73)

OR=Odds ratio, CI=Confidence interval

Table 6: Association between students' characteristics and their behavior in providing information related to the COVID-19 treatment

Students characteristics	Behavior (question item, *P*)
Sex	I suggest that all antivirals are appropriate for COVID-19 treatment (*p*: 0.034)
	I suggest that all antipyretics can be given to COVID-19 patients (*p*: 0.001)
	I suggest that patients with mild symptoms of COVID-19, should consume kina (*p*: 0.019)

Table 7: Association between students' characteristics and their attitude in providing information related to the COVID-19 treatment

Students characteristics	Behavior (question item, *P*)
Years	I suggest vaccination for preventing the COVID-19 transmission (*p*: 0.003)
	I suggest oseltamivir for COVID-19 patients (*p*: 0.001)
	I suggest the use of acetaminophen for the treatment of COVID-19 patients (*p*: 0.001)
	I suggest the use of chloroquine for COVID-19 adult patients (*p*: 0.003)
	I suggest the use of chloroquine for COVID-19 pediatric patients (*p*: 0.001)
	I suggest the use of immunomodulator for COVID-19 patients (*p*: 0.001)

Discussion

Our study was designed to assess the pharmacy students' knowledge about COVID-19 treatment and the behavior-attitude of providing information related to the COVID-19 treatment. In general, our study found that the knowledge of pharmacy students related to the treatment of COVID-19 is good in particular topic, also in their behavior and attitude. They also have positive attitude about the COVID-19 treatment information regarding to the antiviral and the provision of Vitamin C. Most of the students with positive attitude are not giving wrong information about avigan®, plasma convalescent, chloroquine, hydroxychloroquine, and immunomodulator. The knowledge about COVID-19 treatment needs to be improved, since earlier years. These findings can be used to plan the education program for the community. The previous studies presented that the community knowledge and attitude are still poor about the COVID-19.[10,11] Most of the students obtained the information from the media, both social media and scientific sources. This finding is supported by a previous study in India, which is stated that most of the student's health program study and health workers got the information from social media and news media.[5,12,13] The study from Jordan also stated that most of the university students are retrieved the information about COVID-19 from the social media.[14] This could be caused by the situation that the students have to stay at home during the pandemic, therefore most of students are easily to get information from the social media.

The pharmacy students have a good knowledge in recognizing the antiviral, plasma convalescent, and immunomodulator in the treatment of COVID-19. Currently, the effective treatments for COVID-19 are still under clinical investigation. However, the use of antiviral, plasma convalescent, and immunomodulator is established for the treatment of COVID-19.[15] The students need to learn more about the antiviral,

antibiotics, and the side effect of chloroquine during the COVID-19 treatment due to the percentages of the right answer in these questions are low. This situation may be due to the early years of students who are still have less knowledge about the medications. The findings is supported by the previous study in Jordan, presented that the medical students lack with the awareness of vaccine and the treatment.[13] Another study in Uganda also presented that the higher level of students have better knowledge about COVID-19.[16] The previous study in Iraq presented that the students had good knowledge, appropriate practice, and positive attitude about COVID-19 infection. This situation can be used to protect the community from the infection using the programs involving the students participation.[17]

The pharmacy students' skill in finding the evidence-based information and providing the drug information is important in the professionals' practice.[18] In the pandemic situation, the pharmacy students got many questions regarding to the COVID-19 treatment. Pharmacy lecturers and students are the potential stakeholders in giving education to the community.[19] The positive behavior during providing the information to the students' colleagues is related to the use of antiviral and Vitamin C. This finding is consistent with the knowledge of the students in our study. However, again, due to the early years of students, they have the average behavior on some questions related to azithromycin, plasma convalescent, kina, immunomodulator, and antihypertension utilization. Furthermore, because the students did not have much information or knowledge about COVID-19 treatment, they did not have enough self-confidence to give information about the COVID-19 treatment. Increasing the knowledge about the COVID-19 treatment in students hopefully will increase their confidence in giving the correct information for society.

Regarding the attitude of the pharmacy students in giving the information, the most frequent information given to their colleagues are about vaccination and acetaminophen. Moreover, the less frequent information given to their colleagues is about avigan®, plasma convalescent, chloroquine, hydroxychloroquine, and immunomodulator. Again, this situation because the pharmacy students are in the early years and still do not recognize the medication's name. These findings are supported by the less knowledge and negative behavior. The students with good knowledge will establish positive behavior and attitude.[5]

The significant association between the years of study and the students' knowledge is shown in the item questions about oseltamivir and the duration of use of azithromycin. The higher student's level has good knowledge than the early years of students. These findings are supported by the previous study stated the senior pharmacy students have good knowledge which will promote the positive behavior and attitude.[5]

Regarding to the behavior, the significant association can be seen between sex and the question items related to the use of antiviral, antipyretic, and kina. The previous study also stated that sex can influence the attitude and behavior. The female students have more positive tendency in giving the information related to the use of antiviral, antipyretic, and kina. Our study findings are in line with the previous study, which mentioned that the female students have positive behavior regarding the awareness and knowledge of COVID-19.[5] Some of the positive attitude regarding the providing information about vaccine, oseltamivir, immunomodulator, and chloroquine in adult and pediatric patients are shown by the late years of students. The late-year students have more information about the treatment of COVID-19. These findings are contradictive with the previous study mentioned that the level of students did not influence their behavior and practice about COVID-19.[16]

In this study, we acknowledge that this study still have some limitations, such as limited discussion for comparing our results with the previous study results. It can be the new topic during the pandemic. Moreover, most of the participants in this study were students in the early years; thus the limited knowledge about the medication became the potential bias for this study. To the best of our knowledge, this is the first study investigating the pharmacy students' knowledge, behaviors, and attitudes related to the treatment of COVID-19.

Conclusions

The pharmacy students have good knowledge about antivirals, plasma convalescent, and immunomodulator. Furthermore, using the good knowledge about COVID-19 treatment, the positive behavior and attitude of providing information of the students, the community behavior and attitude will be improved. The high year students have tendency for the good knowledge and positive behavior and attitude of providing the information. Since pharmacy students will be the frontlines to give the education to the community about the treatment of COVID-19, we recommend to increase pharmacy students' knowledge about the treatment of COVID-19 by the lecturer, started from early years.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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