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RESEARCH ARTICLE

Drug safety awareness and rational use of medicines among university students in greater Bandung: A cross-sectional survey

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Abstract

Background: In Indonesia, compliance to the rational use of medicines (RUM) was 47.08% in community healthcare centers, and so might the university students. **Objectives:** The study aims to evaluate students' knowledge and attitude toward the RUM and identify the correlation between these parameters and drug safety awareness. **Method:** A cross-sectional study used the online questionnaire among university students in Greater Bandung Area from March-April 2022. Spearman's rank was carried out in correlation analysis between the parameters. **Result:** In 342 subjects, 54.1% of students have moderate knowledge of RUM and drug safety awareness (56.7%). However, 80.1% of students have a high attitude towards RUM. Attitude toward RUM formed a significant, weak, and unidirectional correlation with knowledge (r = 0.292) and so did with safety awareness (r = 0.345). **Conclusion:** Students have a positive attitude towards RUM while having moderate knowledge of RUM and drug safety awareness.

Introduction

According to the World Health Organization (WHO), rational use of medicines (RUM) means that patients receive medications appropriate to their clinical needs, in doses that meet their requirements, for an adequate period, and at the lowest cost to them and their community. Globally, over 50% of medications are prescribed, delivered, or sold inappropriately, and 50% of patients fail to take their medications as directed (World Health Organization, 2002). In Indonesia, compliance with the rational use of medicines was 47.08% in community healthcare centres (Ministry of Health, 2020).

Potential adverse effects of drug therapy were associated with the irrational use of medicines, which also contributes to the waste of funds allocated (Religioni & Pakulska, 2020). Knowledge about diagnostic and treatments by healthcare providers will minimise adverse drug reactions (ADRs) incidence. Patients' misinformation about drug safety might harm their treatment. With the knowledge of their medicines, patients are becoming more aware of the possible side effects of drug therapies (AlHusaini & al Mubarak, 2018). Most people (61%) in Indonesia practice self-medication (Statistic Indonesia, 2014). A high burden of drug use will lead to irrational use of medicines and adverse effects. University students may face the risk factors for adverse effects during the treatment as part of communities. This study aims to evaluate students' knowledge and attitude toward the rational use of medicines and identify the correlation between these parameters with drug safety awareness.

Methods

Study setting

A cross-sectional study was conducted using an online questionnaire (google form platform) among university students in Greater Bandung Area (Bandung City,

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Bandung Regency, and West Bandung Regency), Bandung, West Java, Indonesia, from March-April 2022. Undergraduate and postgraduate students who studied in universities around Greater Bandung Area were eligible to participate in the study.

Sample size

The sample size was calculated using Raosoft online calculator. Using a 95% confidence interval, 5% margin of error, and 50% response distribution, the sample was estimated to be 381.

Data collection and data quality assurance

The questionnaire was developed based on similar studies' objectives and literature reviews. The tool was designed and distributed to students in Bahasa Indonesia. The questionnaire consists of socio-demographic data (eight items), disease history (two items), knowledge and attitude about the rational use of medicines (17 items), and drug safety awareness (five items). The data was collected using a self-administered questionnaire on the Google form platform. The questionnaire was distributed to 30 students for validity and reliability test. A good Cronbach's alpha score (0.67) was achieved. All the questions were valid and reliable.

Students' knowledge about the rational use of medicines was assessed using eight questions with a four-point Likert scale (strongly disagree, disagree, agree, and strongly agree). The expected maximum score was 32 and the minimum was eight. Likewise, students' attitude was assessed by putting nine statements on a four-point Likert scale. The expected maximum score was 36 and the minimum was seven. Five statements with a 4-point Likert scale were applied to evaluate the awareness of drug safety. Students' knowledge, attitude, and awareness were categorised as good, moderate, and poor using the original Bloom's cut-off point (Good, 80-100%; Moderate, 60-80%; Poor, <60%).

Data management and analysis plan

The data collected through Google Forms were recorded, retrieved in .xlsx format, and entered using the IBM SPSS v.26. Spearman's rho test was applied to test the correlation between knowledge and attitude towards the rational use of medicines, and drug safety awareness.

Ethical approval

Approval for the study was obtained from Institutional Review Board, Politeknik Kesehatan Kemenkes Bandung, Bandung, No. 13/KEPK/EC/III/2022 on March 4, 2022. Each respondent was informed about the study on the first page of the forms and continued to fill in the questions if they agreed to participate in the study.

Results

A total of 342 students participated in the study. Most respondents were female (64.9%). Regarding the age of students, almost 100% were less than 25years. About 40.4% of respondents were engineering students, and 36.2% of respondents were students from health-related faculty (medical, pharmacy, nursing, nutrition). Students from social humanities majors have a good knowledge of RUM but contribute to a high number of poor attitudes (4.7%). The socio-demographic characteristics and their association with the adequacy of knowledge and attitude toward the rational use of medicines and drug safety awareness are shown in Table I.

Students' knowledge and attitude can be affected by assessing mass media or social media to gather information about health and medicines (Table II).

About 37.9% of students accessed Instagram, and only 6.5% of students used Facebook to search the information about health and drugs. Students with a health major usually used Instagram (37.9%) more than Line/Whatsapp chatbot (22.5%). More than half (54.1%) of the students have moderate knowledge of the rational use of medicines and moderate awareness about drug safety (56.7%). However, most of the students (80.1%) have a good attitude about the rational use of medicines.

The mean knowledge score of participants was 3.38 (SD 0.69), students' attitude score was 3.52 (SD 0.64), and drug safety awareness was 2.92 (SD 0.81). There was a significant correlation between knowledge and attitude toward RUM (p = 0.001; r = 0.292), and knowledge and students' awareness of drug safety (p = 0.02; r = 0.126). The detailed item score for each parameter is explained in Appendix A, B, C and D.

In the correlation test between these three aspects of RUM, as shown in Table I, there is a significant relationship and a weak and direct correlation between knowledge of RUM and attitude toward RUM as evidenced by the results of Spearman's rank correlation analysis with a significance value of 0.000 and a correlation value of 0.292, and attitude of RUM has a significant relationship (p = 0.0001) with a weak and unidirectional relationship strength (r = 0.345). However, knowledge of RUM and awareness of treatment safety did not have a significant relationship (p > 0.05).

Table I: Socio-demographic characteristics and their association with the adequacy of knowledge and attitude toward rational use of medicines, and drug safety awareness

Demographic variable		Total N (%)	Adequacy of RUM's knowledge N (%)			Adequacy of attitude toward RUM's N (%)			Adequacy of safety awareness N (%)		
			Good	Moderate	Poor	Good	Moderate	Poor	Good	Moderate	Poor
Gender	Male	120 (35.1)	51 (42.5)	67 (55.8)	2 (1.7)	91 (75.8)	28 (23.3)	1 (0.9)	21 (17.5)	76 (63.3)	23 (19.2)
	Female	222 (64.9)	104 (46.8)	118 (53.2)	0 (0.0)	183 (82.4)	38 (17.1)	1 (0.5)	74 (33.3)	118 (53.2)	30 (13.5)
Age (Years old)	18-25	340 (99.4)	155 (45.6)	183 (53.8)	2 (0.6)	272 (80.0)	66 (19.4)	2 (0.6)	94 (27.7)	193 (56.8)	53 (15.5)
	26-35	2 (0.6)	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	1 (50.0)	1 (50.0)	0 (0.0)
Major	Social humanities	19 (5.6)	10 (52.6)	8 (42.1)	1 (5.3)	0 (0)	3 (15.8)	16 (84.2)	5 (26.3)	11 (57.9)	3 (15.8)
	Sciences	61 (17.8)	24 (39.3)	37 (60.7)	0 (0.0)	42 (68.9)	18 (29.5)	1 (1.6)	5 (8.2)	37 (60.7)	19 (31.1)
	Health	124 (36.2)	62 (50.0)	62 (50.0)	0 (0.0)	108 (87.1)	16 (12.9)	0 (0.0)	59 (47.6)	65 (52.4)	0 (0.0)
	Engineering	138 (40.4)	59 (42.8)	78 (56.5)	1 (0.7)	108 (78.3)	29 (21.0)	1 (0.7)	26 (18.8)	81 (58.7)	31 (22.5)
Income per month (IDR)	<5,000,000	328 (95.9)	150 (45.7)	176 (53.7)	2 (0.6)	263 (80.2)	62 (19.2)	2 (0.6)	90 (27.4)	186 (56.7)	52 (15.9)
	5,000,000-10,000,000	12 (3.5)	4 (33.3)	8 (66.7)	0 (0.0)	10 (83.3)	2 (16.7)	0 (0.0)	4 (33.4)	7 (58.3)	1 (8.3)
	>10,000,000	2 (0.6)	1 (50.0)	1 (50.0)	0 (0.0)	1 (50.0)	1 (50.0)	0 (0.0)	1 (50.0)	1 (50.0)	0 (0.0)
Total		**342**	**155 (45.3)**	**185 (54.1)**	**2 (0.6)**	**274 (80.1)**	**66 (19.3)**	**2 (0.6)**	**95 (27.7)**	**194 (56.7)**	**53 (15.6)**

Table II: Access to media for health and drug information sources based on the study programme

Access to media for information about health and medicines	Major				Total (N=551)	
	Social humanities	Sciences	Health	Engineering	Frequency	%
None	2.0	11.0	11.0	19.0	43.0	7.8
Instagram	10.0	30.0	85.0	84.0	209.0	37.9
Chatbot (Line/WhatsApp)	5.0	20.0	45.0	54.0	124.0	22.5
Twitter	4.0	9.0	26.0	50.0	89.0	16.2
Facebook	1.0	7.0	10.0	18.0	36.0	6.5
Internet	5.0	8.0	14.0	23.0	50.0	9.1

Discussion

Irrational medication use can cause adverse effects due to the wrong dose, drug, or direction. Poor prescribing practices lead to unsafe and ineffective treatment; increase the length of the disease or worsen the patient's danger; and add more expensive costs (Mekonnen *et al*., 2021). This study demonstrated that the knowledge of RUM and awareness of medication safety of students was moderate both in male and female students. Linear to a survey in China, female

students are usually more careful and give attention to their health than male students (Yin *et al*., 2022). This result is also similar to the study in Indonesia about awareness of the rational use of antibiotics (Karuniawati *et al*., 2021). Students in health majors have better knowledge and attitude than the other faculty students. The safety awareness in health major students (52.4%) was less than in engineering students (58.7%). This result may be because health major students might have access to searching health and medicine information more often (Ashkanani *et al*., 2019).

The students least understood information about the cost of medicine as part of rational drug use (mean score 2.68). This result is related to students' frame that generic drugs have less activity than branded drugs. Similar to a study in Saudi Arabia, more students lacked knowledge about the pharmacokinetic parameters of generic products (Al-Arifi, 2021). On attitude evaluation, students gave a better response than knowledge assessments. The question about drug consumption at the appropriate time was the least.

Increasing the awareness of drugs will lead to safer drug utilisation (AlHusaini & al Mubarak, 2018). The result of this research showed that students have a moderate awareness of drug safety. Lack of awareness of drug safety among the public affects the underreporting of adverse drug reactions (ADRs) in the pharmacovigilance system (Joshi *et al*., 2015). A study in Lithuania reported poor awareness of ADRs reporting by the public, consistent with the study in Portugal and New York (Matos *et al*., 2015; Walters & Duthie, 2017; Valinciute-Jankauskiene & Loreta, 2021).

In the correlation study between the aspects of RUM, the knowledge of RUM increases and so does the attitude of RUM, thus increase in both aspects of RUM will increase the safety awareness of medication. This is quite similar to other studies which state that there is a significant relationship between the knowledge and the accuracy of drug use with a positive correlation value and a weak relationship (r=0.287) (Hariadini *et al*, 2020). This is in line with the results of a study done by Shafaiyaz and Yamuna which stated that knowledge and attitudes also affect the safety awareness of the rational use of medication (Shafaiyaz & Yamuna Devi, 2019). In addition, another study by Yue also showed that knowledge influences one's cognition and concern about rational drug use (Yue, 2013). Supported by these results, the increase in knowledge and attitude related to rational medicine use raises drug safety awareness.

Conclusion

Students have a moderate knowledge of the rational use of medicines and awareness of medication safety with the correlation between increased knowledge and attitude aspects resulting in the safety awareness of medication use. However, most students had good attitudes toward the rational use of medicines. The knowledge and attitude of college students on rational drug use need to be improved. The faculty of pharmacy in the university should enhance the campaign about the rational use of medicines and drug safety awareness, especially for students from social humanities majors.

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Author contribution

Conceptualization, C.T.Y., and A.F.I; investigation, M.F.E.; methodology, C.T.Y., and M.F.I; data analysis, C.T.Y., A.F.I., and M.F.E.; writing—original draft preparation, C.T.Y., A.F.I., and M.F.E; writing—review and editing, C.T.Y. and A.F.I; statistical analysis, validation, C.T.Y., and M.F.E; supervision, C.T.Y. All authors have read and agreed to the published version of the manuscript.

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Appendix A: Distribution of answers: Knowledge of RUM section

Code	Questions	Knowledge of RUM (N)					
		Number of answers				Mean ± standard deviation	Median
		SD	D	A	SA		
K1	The given medication must be specific to treat the disease	3	25	125	189	3.46 ± 0.67	4
K2	To treat the same disease, the dose of the given medicine should be the same	39	59	140	104	2.90 ± 0.96	3
K3	How to use the medication must be in accordance with the instructions given by the pharmacist or according to what is written on the drug packaging	2	3	88	249	3.71 ± 0.51	4
K4	The duration of drug consumption for a disease is not always the same	24	63	148	107	2.99 ± 0.88	3
K5	The price of the drugs used must be affordable	34	116	116	76	2.68 ± 0.93	3
K6	The expiration date of the drug should not be ignored	4	9	39	290	3.80 ± 0.53	4
K7	Medicines should not be used after their expiration date	4	13	49	276	3.75 ± 0.58	4
K8	It is important to be aware of the side effects	0	3	68	271	3.78 ± 0.43	4
	Mean ± Standard deviation					**3.38 ± 0.69**	

n: number of respondents; SD: Strongly Disagree, D: Disagree, A: Agree, SA: Strongly Agree

Appendix B: Distribution of answers: Attitude of RUM section

Code	Questions	Attitude of RUM (N)					
		Number of answers				Mean ± standard deviation	Median
		SD	D	A	SA		
A1	I know the doctor's diagnosis of the disease I am experiencing.	5	21	132	184	3.45 ± 0.68	4
A2	I use drugs with the intended use of the disease that I suffer from.	0	2	59	281	3.82 ± 0.40	4
A3	I use the drug according to the applicable drug dosing rules.	1	6	52	283	3.80 ± 0.46	4
A4	I take the medicine on time.	4	31	176	131	3.27 ± 0.67	3
A5	I use the medicine according to the instructions given by the pharmacist or the instructions on the medicine package.	0	6	74	262	3.75 ± 0.47	4
A6	I use the medicine according to the duration that has been instructed by the doctor or pharmacist.	5	28	100	209	3.50 ± 0.71	4
A7	I store the medicine according to the instructions given by the pharmacist or the instructions on the medicine package.	3	27	107	205	3.50 ± 0.68	4
A8	I know the expiration date of the medicine I am taking.	15	57	86	184	3.28 ± 0.89	4
A9	I am aware of the side effects that occur while taking the drug.	4	48	117	173	3.34 ± 0.76	4
Mean± Standard deviation						**3.52 ± 0.64**	

n: number of respondents; SD: Strongly Disagree, D: Disagree, A: Agree, SA: Strongly Agree

Appendix C: Distribution of answers: Safety awareness of medication

Code	Questions	Safety awareness of medication (N)				Mean ± standard deviation	Median
		Number of answers					
		SD	D	A	SA		
S1	I know what the side effects of drugs are.	4	14	106	218	3.57 ± 0.63	4
S2	I never get information about the side effects of drugs.	12	25	128	177	3.37 ± 0.77	4
S3	I know the side effects of drugs can arise from the concurrent use of drugs.	21	61	145	115	3.04 ± 0.87	3
S4	I know the information to report drug side effects from the National Agency of Drug and Food Control (BPOM RI).	96	129	71	46	2.20 ± 0.99	2
S5	I have reported the side effects that I felt	171	86	63	22	1.81 ± 0.95	1
	Mean± Standard deviation					**2.92 ± 0.81**	

n: number of respondents; SD: Strongly Disagree, D: Disagree, A: Agree, SA: Strongly Agree

Appendix D: The results of the correlation test of students' knowledge and attitude versus safety awareness

			Attitude of RUM	Knowledge of RUM	Drug safety awareness
Attitude of RUM	Correlation coefficient	*r*	1	0.292	0.345
	Sig. (2-tailed)	*p*		0.0001	0.0001
Knowledge of RUM	Correlation coefficient	*r*	0.292	1	0.102
	Sig. (2-tailed)	*p*	0.0001		0.059
Drug safety awareness	Correlation coefficient	*r*	0.345	0.102	1
	Sig. (2-tailed)	*p*	0.000	0.059	

r: coefficient correlation; p: *p*-value