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Original Research

Evaluation of the Rational Drug Use (RDU) literacy among undergraduate students

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Abstract

Background: Irrational drug usage is a global concern. WHO recommended a strategy for integrating education and awareness on the rational use of medicine into general education programs. **Objective:** To evaluate the rational drug use (RDU) literacy among the undergraduate students of Ubon Ratchathani University. **Methods:** This mixed-methods research consists of a quantitative cross-sectional study with a self-administered RDU literacy questionnaire and a qualitative in-depth interview study. Descriptive statistics and inferential statistics were used in the quantitative study. Thematic analysis was used in the qualitative study. **Results:** Students who participated in this study included 640 undergraduate students. Approximately half of the participants never studied a RDU-related course (50.94%). Although the findings revealed that most of the participants (73.13%) had good RDU literacy, many participants had less frequency of the right options on some questions (e.g., advertisement of health products). Health sciences students were 2.8 times more likely than non-health sciences students to have good RDU literacy (AOR=2.835, 95% CI: 1.752-4.587). Four main themes were derived from the qualitative study: 1. Definition of RDU; 2. Facilitators; 3. Concerns; 4. RDU country. **Conclusion:** While the majority of participants demonstrated good RDU literacy, some actually engaged in irrational drug use. Activities promoting RDU literacy among undergraduate students, particularly in faculties other than health sciences, are still required.

Keywords: Rational drug use (RDU); literacy; undergraduate students

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INTRODUCTION

The World Health Organization (WHO) states rational drug use (RDU) employs patients having medications that are appropriate for their medical requirements, in the appropriate dose, duration, and at a reasonable cost.[1,2] Irrational drug usage is a global concern. It influences a country's medication safety and financial security.[3,4] WHO recommended a strategy for integrating education and awareness on the rational use of medicine into general education programs.[1]

RDU literacy refers to a person's ability to access, understand, screen, evaluate, and make decisions regarding the use of information to modify behavior and select the appropriate services and health-related products that contribute to their good health.[5,6] RDU education should occur in schools and undergraduate colleges since students without it lack the required knowledge and skills to make sound judgments.[1] However, there has been little research related to RDU literacy among university students.[1,7]

In Thailand, the universal health coverage (UHC) scheme was established in 2002, about half of the population now visiting public healthcare facilities, causing a decrease in self-medication medicine purchased.[8,9] Nonetheless, with the increasing access to government healthcare facilities, the purchasing of vitamins and food supplements has increased enormously as a result of promotional influence. In 2018, the National Drug System Development Committee announced a policy to move Thailand into an RDU country.[10] The policy's ultimate objective is through RDU to ensure that the Thai people have access to essential medications that are available, in safe, affordable, high quality,

and effective manner through RDU.[10,11] The Ubon Ratchathani University was founded in 1990. It is a public university located in the southern region of North-East Thailand area. To the authors' knowledge, this study may be a pioneer in expanding RDU literacy among undergraduate students. This study aimed to explore the RDU literacy among the undergraduate students of Ubon Ratchathani University (UBU).

METHODS

A quantitative cross-sectional questionnaire survey and qualitative in-depth interviews were combined in this mixed-methods research study.

Study Population

The study was conducted during June 2021-May 2022. The UBU undergraduate students were invited to take part in this research. The participants' inclusion criteria were: 1. The undergraduate students in the academic year 2021 studying in health sciences faculty and non-health sciences faculty; 2. age between 19 to 24 years old; 3. Ability to consent. All participants in the quantitative study gave written informed consent. Sixteen participants in the interview study gave their verbal consent.

The sample size was derived with Yamane's formula: n = N/(1+Ne^2), where n = sample size; N = population (number of students = 14,733); e = 1 – precision = 0.05; precision = 95% CI.[12] The sample size was calculated to be 389. However, the response rate of the questionnaire survey varied from 14% to 70% among university students.[13] As a result, the sample size was increased to total 640. Participants were recruited using convenience and snowballing sampling methods. A participant information sheet was developed and distributed to the participants. Various kinds of digital communication, such as email, Facebook, and line application, were utilized to reach out to the student participants. For the qualitative study, convenience sampling methods were used to select participants from the quantitative part to be recruited for the interview study. The interested participants were invited to choose their preferred date and time slots, and the interview sessions were then scheduled accordingly.

Ethical Consideration:

Participants' privacy was ensured throughout the data collection and analysis process. The UBU Research Ethics Committee (No. UBU–REC– 58/2564) gave their approval to this study.

Study Design

This study was carried out at the UBU in Thailand. This study used an online questionnaire. In the qualitative section, interviews were conducted with Google meet in Thai using a topic guide.[14,15]

Survey Instrument

Online survey questionnaire in Thai language.

The original RDU literacy survey was developed and validated by the Health Administration Division, Ministry of Public Health (MoPH).[16,17] This survey is available for public use. This study received permission from the Chief Pharmacy Officer, Health Administration Division to use and adapt the RDU literacy survey for this study.

Part 1 of the questionnaire consisted of demographic information about the participants. Part 2 includes 28 RDU literacy items in four domains: 1. medicine labels (6 items), 2. advertisement of health products (7 items), 3. medicine usage (5 items), and 4. vocabulary related to health literacy (10 items).

Three professionals with appropriate expertise and qualifications in the RDU were requested to review the questionnaire to score the clarity and relevance of the information.[18] A value of larger than 0.5 was determined to be acceptable for the Item-Objective Congruence (IOC) (-1 = no; 0 = I'm not sure; 1 = yes).[19] The IOC varied from 0.6 to 1.0 on the survey questionnaire. A Cronbach's alpha coefficient above 0.60 was considered reliable. The Cronbach's alpha coefficient obtained = 0.621. Multiple choice question (MCQ) exams were used to evaluate a participant's level of RDU literacy. Each right answer earned 1 point, whereas incorrect responses received 0 point. Participants' RDU literacy scores were divided into two categories based on a modified Bloom's cut-off point: to evaluate appropriate RDU literacy, good ≥ 80 % (22-28 scores), and poor < 80% (< 22 scores) were used.[20,21]

Qualitative study

The authors developed an interview guide based on their prior literature review and employed it after piloting it.[22,25] To verify content validity, a panel of three experts with appropriate experience for the study evaluated the semi-structured interview guide.[18] A 7-question semi-structured interview guide was developed and allowed for additional probing questions.[26]

Analysis

To determine the demographic data and the RDU literacy, descriptive statistics were employed. Logistic regression was utilized to explore the significant relationship among variables.[27] STATA version 14 was used to conduct the analysis. Candidates of factors for multivariable logistic regression analysis were chosen based on a p-value < 0.20.[28] A p-value of 0.05 or lower was statistically significant.

The qualitative study was done after the quantitative part. It aimed to further explore the perceptions of the students in terms of RDU literacy. Semi-structured interviews were conducted with 16 participants by TS. The interviews took 30 and 45 minutes each. The interviews were conducted in Thai through Google meet and transcribed verbatim, then checked for accuracy before using qualitative thematic analysis.[14,29] Throughout the thematic analysis process, the following stages took place: 16 interviews were transcribed. Two researchers (TS, CP) studied, reread, and immersed themselves in the data. The framework from the semi-structured interviews was used to create the codes. Other emergent codes were also created and incorporated. They proceeded line by line through the transcripts, highlighting probable codes and then started

coding and established a coding system. Categorizations were made and the code structure was restructured. The inter-coder agreement approach was utilized in this study. TS and CP agreed on more than 80% of the codes. CA, TS and BY investigated the broader subjects highlighted by the emerging codes.

RESULTS

This research included a total of 640 participants. Females made up the vast majority of those who took part (69.69%). The top three sources of RDU information that the participants used were physicians (52.50%), pharmacists (18.91%), and the internet (10.16%). Table 1 shows the demographic characteristics of the participants in the quantitative survey study.

Table 1. Demographic characteristics of the participants in the quantitative study (n=640)

Characteristics	**No (%)**
Gender	
Male	194 (30.31)
Female	446 (69.69)
Agea (mean±SD, 20.30±1.43; range 19-24)	
Less than 20	258 (40.31)
20-24	382 (59.69)
Faculty	
1. Health Sciences (n=190, 29.69%)	
Pharmaceutical sciences	145 (22.66)
Nursing	33 (5.16)
Medicine and public health	12 (1.88)
2. Non-health sciences (n=450, 70.31%)	
Engineering	120 (18.75)
Agriculture	32 (5.00)
Science	24 (3.75)
Liberal arts	91 (14.22)
Political science	80 (12.50)
Business school	75 (11.72)
Law	23 (3.59)
Applied arts and architecture	5 (0.78)
Underlying disease	
No	593 (92.66)
Yes	47 (7.34)
Studied in the rational drug use (RDU) study course Characteristics	
Never	326 (50.94)
Have been studied RDU topics in some courses	278 (43.44)
Have been studied in RDU specific course	36 (5.62)
Source of rational drug use information	
Physician	336 (52.50)
Pharmacist	121 (18.90)
Internet	65 (10.16)
Family	31 (4.84)
Book, magazine, leaflet	28 (4.38)
Other healthcare providers	21 (3.28)
Nurse	11 (1.72)
Friends	10 (1.56)
Facebook	8 (1.25)
Television	5 (0.78)
Application	4 (0.63)
Year	
1	258 (40.31)
2	157 (24.53)
3	76 (11.88)
4	94 (14.69)
5[b]	33 (5.16)
6[b]	22 (3.44)

Note.
[a] Age of teenage (aged less than 20 years) and adult (20-24 years of age)
[b] The 5th and 6th year students were the students from the College of Medicine and the Pharmaceutical Sciences Faculty

RDU Literacy

RDU literacy scores were as follows: good RDU literacy (468 participants, 73.13%); and poor RDU literacy (172 participants, 26.88%). The majority of the participants gave correct responses to all questions in the RDU literacy questionnaire except for some questions related to the advertisement of health products and equipment used to measure the liquid medication (Table 2).

Analysis of logistic regression

The relationship between attributes and RDU literacy was investigated using a multivariable logistic regression model (Table 3). Students in health science faculties were 2.8 times more probable to have adequate RDU literacy than students in faculties other than health sciences (Adjusted OR=2.835, 95% CI: 1.752-4.587, $p < 0.001$). Furthermore, males (Adjusted OR=0.574, 95% CI: 0.389-0.846, p=0.005) and students without medical issues (Adjusted OR = 0.220, 95% CI: 0.076-0.635, p=0.005) were also less likely to have good RDU literacy than female and students with medical conditions.

Qualitative research

Table 4 shows the characteristics of the 16 participants in detail. Four major themes of RDU literacy among the participants were identified, as presented below.

Definition of RDU

All students had the concept of RDU, which referred to how individuals used medications appropriately, neither excessively nor insufficiently, and in line with their physician's instructions.

"RDU is how you use medicine appropriately, do not exceed the doctor's orders, use as symptomatic, and do not stop the

Table 2. Frequency distribution for 28-item rational drug use (RDU) literacy questionnaire

Topic (28 items)*	Frequency of participants choosing the right option	Percentage (%)
Medicine labels (6 items)		
1. If you take one painkiller pill at 9:00 a.m. and still have discomfort, when can you repeat taking the analgesic?	586	91.56
2. There is a medication syrup labeled for children. How much medication should a toddler that weighs 9 kg take?	605	94.53
3. Which equipment should you use to measure the liquid medication if the doctor has prescribed it in 3.5 cc dosages for the child?	384	60.00
4. As the label shows how to use oral rehydration salts "Dissolve 1 packet in 750 ml water". If you do not have a 750 ml bottle, but you have 500 ml bottle. How many 500 ml bottles of water do you need?	554	86.56
5. Which sort of water is advised for dissolving the oral rehydration salt (ORS)?	623	97.34
6. What is the ORS's expiration date? "Mfg Date 26/12/17, Exp Date 25/12/20"	609	95.16
Advertisement of health products (7 items)		
7. Would you suggest this product (Mothip®) to a patient who had knee pain?	391	61.09
8. Where can you obtain further information about this product?	463	72.34
9. From which website can you obtain information about this product?	514	80.31
10. Do you recommend this product to elderly people based on the product commercial if you listen to this advertisement via the radio?	541	84.53
11. Would you suggest this product (Nam Nao Chao Wei cold press®) to someone who is diabetic?	486	75.94
12. What sort of product is this, as indicated by the product registration number (FDA 10-1-22323-1-0270)?	346	54.06
13. The Food and Drug Administration (FDA) asked manufacturer to withdraw the products (e.g., Valatan 80® (Valsartan 80 mg), Valatan 160® (Valsartan 160 mg), Valsarin 80® (Valsartan 80 mg)) from market due to potential contamination with a probable carcinogen. The FDA asked the patients to take-back the unused medicines to their hospitals. Which medicine patient have been asked to take medicine back to their hospitals?	540	84.38
Medicine usage (5 items)		
14. Which medicine would you select for self-care if you had a cold and sore throat?	411	64.22
15. Which medicine would you use for self-care if you had a muscle pain?	546	85.31
16. Which medicine would you use for self-care if you had an acute diarrhea without infection?	566	88.44
17. Your cousin stated that he desired to purchase the medications that the doctor prescribed for him (Diplen® diclofenac 50 mg), but they were misplaced. Which medication is identical to the one prescribed by your relative's physician?	499	77.97
18. Which medications are accessible at supermarkets or grocery stores?	531	82.97
Vocabulary related health literacy (10 items)		
19. Paracetamol	637	99.53
20. Calorie	627	97.97
21. Cholesterol	633	98.91
22. Steroid	511	79.84
23. Amoxicillin	533	83.28
24. Milliliter	633	98.91
25. Virus	568	88.75
26. Sodium	625	97.66
27. Drug allergy	633	98.91
28. Antibiotics	568	88.75

Note.
*Label/Table/Image/Advert used in the questionnaire were shown in the appendix 1

medication on your own. You have to follow your doctor's instructions" (Informant7, Applied arts and architecture*)*

In addition, all health sciences students referred to the usage of medicine as prescribed dosage was the main concept of RDU.

"RDU is when individual use medicine appropriately, not too much, not too little." (Informant1, Pharmaceutical sciences)

Table 3. Odds ratios for the rational drug use (RDU) literacy[a] (n=640)

Characteristics	Number (%) of respondents		Crude OR 95% CI	p-value	Adjusted OR 95% CI[b]	p-value
	Good	Poor				
Gender						
Male	126 (26.9)	68 (39.5)	0.563 (0.390-0.813)	0.002[c]	0.574 (0.389-0.846)	0.005[c]
Female	342 (73.1)	104 (60.5)	ref		ref	
Age						
Less than 20	183 (39.1)	75 (43.6)	ref	0.013[c]	ref	0.071
20-24	285 (60.9)	97 (56.4)	1.180 (1.035-1.345)		1.282 (0.978-1.680)	
Source of RDU information						
Healthcare professionals[d]	361 (77.1)	128 (74.4)	1.159 (0.773-1.738)	0.473	NA	NA
Others	107 (22.9)	44 (25.6)	ref			
Faculty						
Health sciences	165 (35.3)	25 (14.5)	3.201 (2.012-5.09)	0.000[c]	2.835 (1.752-4.587)	0.000[c]
Non-health sciences	303 (64.7)	147 (85.5)	ref		ref	
Year						
1-3	352 (75.2)	139 (80.8)	ref	0.138	ref	0.208
4-6	116 (24.8)	33 (19.2)	0.720 (0.466-1.111)		1.749 (0.732-4.179)	
Medical condition						
No	425 (90.8)	168 (97.7)	0.235 (0.083-0.665)	0.006	0.220 (0.076-0.635)	0.005[c]
Yes	43 (9.2)	4 (2.3)	ref		ref	
RDU-related course						
Yes	243 (51.9)	71 (41.3)	1.536 (1.078-2.187)	0.017[c]	1.307 (0.899-1.900)	0.160
No	225 (48.1)	101 (58.7)	ref		ref	

Note.
Abbreviation: rational drug use (RDU); confidence interval (CI); Not available (NA); reference (ref)
[a]Rational drug use (RDU) literacy: Good ≥ 80 % (22-28 scores), and poor < 80% (< 22 scores)
[b]Adjusted for characteristics that P-value less than 0.20 for logistic regression analysis.; gender, age, faculty, year, medical condition, RDU-related course
[c] Significant at $p < 0.05$
[d] Healthcare professionals: Physician, pharmacist, nurse, other healthcare providers

Table 4. Demographic characteristics of the participants in the qualitative study (n=16)

Characteristics	No (%)
Gender	
Male	12 (75.00)
Female	4 (25.00)
Age[a] (mean±SD, 22.69±1.23; range 19-24)	
Less than 20	1 (6.25)
20-24	15 (93.75)
Underlying disease	
No	13 (81.25)
Yes	3 (18.75)
Year	
1	1 (6.25)
2	3 (18.75)
3	4 (25.00)
4	3 (18.75)
5[b]	2 (12.50)
6[b]	3 (18.75)
Studied in the rational drug use (RDU) study course	
Never	6 (37.50)
Have been studied in RDU specific course	3 (18.75)
Have been studied RDU topics in some courses	7 (43.75)
Faculty	
1.Health Sciences (n=7, 43.75%)	
Pharmaceutical sciences	5 (31.25)
Nursing	1 (6.25)
Medicine and public health	1 (6.25)
2. Non-health sciences (n=9, 56.25%)	
Engineering	1 (6.25)
Agriculture	1 (6.25)
Science	3 (18.75)
Liberal arts	0 (0.00)

Political science	1 (6.25)
Business school	2 (12.50)
Law	0 (0.00)
Applied arts and architecture	1 (6.25)

Note.
[a]Age of teenage (aged less than 20 years) and adult (20-24 years of age)
[b]The 5th and 6th year students were the students from the College of Medicine and the Pharmaceutical Sciences Faculty.

Although the majority of students demonstrated enough understanding of the concept of rational drug usage, they actually frequently forgot to take medications as prescribed. Some students stated that they discontinued antibiotic regimens if they felt better. They discontinued antibiotics because they did not want the medication to accumulate in their bodies.

*"*I have tonsillitis all the time. I usually forget to take my medications. I stopped taking medicine, when I felt better, despite that there were 3-4 pills left. I did not want to waste time by taking additional medication. I do not want drugs to build up in my liver and kidneys." (Informant11, Business school*)*

Facilitators to encourage RDU literacy

Lectures or courses related to RDU literacy

Most health sciences students said the facilitators that encourage RDU literacy were their knowledge, which was mostly gained from lectures or courses that they have been studying. Some healthcare students mentioned many subjects that have RDU literacy helped them, for example, pharmacotherapy, RDU.

"I think the subjects that provide great examples of RDU is pharmacotherapy." (Informant3, Pharmaceutical sciences)

Some students thought that RDU literacy was accumulated year by year on the campus.

*"*There was no particular subject that make us use reasonable medicine. It was accumulated more and more. It was gradually add the concept and make us use rational medicines." (Informant4, Pharmaceutical sciences)

However, most of the non-health sciences students stated that general education alone was insufficient. There was a dearth of subjects related to RDU. If they attended lectures or subjects related to medication use or RDU, this was as a result of their personal interests.

"I think in general education courses did not have enough content related to medication usage. Therefore, some students are lack of knowledge of self-health care and the RDU." (Informant14, Business school)

Sources of medicine information

Various sources of information (e.g., physicians, pharmacists, health information websites, social media) related RDU were mentioned. Most of the participants said that physicians and pharmacists were trusted resources that students should consult.

"If you are unsure, ask someone who knows such as a doctor or pharmacist. It is not recommended to use the medication by yourself." (Information16, Political science)

The participants said it was easy to search the internet for any information. However, it was difficult to find reliable sources and select proper medication information. Some of them tried the government resources but they were not updated and did not cover the information that they needed. The participants also needed to learn how to obtain information from trustworthy sources, especially from the internet and social networks.

"The student must learn how to obtain information from trustworthy sources." (Informant1, Pharmaceutical sciences)

In terms of self-medication, most students said they relied on the information from their friends who used the health product, and well-known influencers from social media.

" If my friends said the product was good, I would buy it and will not looking for further information." (Informant11, Business school)

*"We saw t*hose *advertisment from Tiktok.* It was simple to buy those products. It easier to ask the buyer than going to ask the doctor. The more famous seller, the more customer want to buy the product." (Informant7, Applied arts and architecture)

Activities that students needed to encourage RDU literacy.

Most participants realized the importance of RDU. They suggested that instead of lectures, more effective and engaging campaign activities (e.g, social media campaign, student club) related to RDU literacy should be launched.

"There should have training course for drug use or student club or *campaig*n*. For people in our generation, if it is in the course, it might not be interesting*." (Informant4, Pharmaceutical sciences)

*"*I want the university organize a training course or activities to educate student about the use of medicine in daily life. It would help people aware of using medication as needed.*"* (Informant12, Science)

"It should be a brief education and highlighting the potential dangers that may increase if the drug is inappropriate used." (Informant*9*, Nursing)

Concerns

Cases of irrational use of medicine in university students were reported (e.g., forgotten, inappropriate dose, inappropriate indication).

"My friend was very thin. However, she took 3-4 tablets of paracetamol at once. (Informant1, Pharmaceutical sciences)

"My friend who is a ladyboy, he takes hormonal birth control himself to create a feminine physique for many years." (Informant7, Applied arts and architecture)

Aside from medication, weight reduction supplements received

the most attention.

"Many students purchased those weight-loss items because they saw Tikok or youtube. It was an extremely appealing commercial advertising. This should be addressed by the government" (Informant4, Pharmaceutical sciences)

Some students thought that providing only general information or the concept of RDU is not enough. There was needed to provide more details to make people understand the reason for the importance of RDU. For example, a campaign called "antibiotics are not anti-inflammatory drugs", faculties or the Ministry of Public Health should provide in-depth information regarding the difference between antibiotics and anti-inflammatory drugs.

"I think the campaign "antibiotics are not anti-inflammatory drugs" is not enough. The knowledge that you give to the students, has to be in-depth, like we have learned (in pharmacy faculty). The contents have to be attractive to the students in term of how it will impact them." (Informant3, Pharmaceutical sciences)

Some people think that being given more drugs equated to better care and might means that the healthcare professional had more understanding of their illness. Healthcare professionals had to deal with evidence-based medicine, patient's need, and strike the balance between professional and business.

"Patient who have sorethroat come to community pharmacy. If it was a viral infection, pharmacist might dispense ibuprofen to reduce pain and inflammation. However, some patients need more than one drug because they thought that is more care." (Informant3, Pharmaceutical sciences)

Most of the respondents said that the major concern of the RDU would be in their communities. They were trying to encourage the RDU for their families. However, their families did not listen to them. Most of the students revealed that their family and community initiate or alter or discontinue their medications based on information derived from their friends and social media.

"The irrational use in communities were huge concerned." (Informant7, Applied arts and architecture)"

There were so many cases of irrational drug use reported by the participants, especially of self-medication without physicians' prescription or indication. For example, taking NSAIDs every day as a routine instead of drinking coffee, inappropriate use of emergency oral contraceptive pills, taking the "bottle herbal drug" which is an unlabelled herbal medicine with steroid adulterants solution that claims to treat chronic diseases such as diabetes, hypertension, chronic kidney disease. In addition, they frequently reported using health-related products such as dietary supplements, especially for weight loss.

"My uncle used to use pain relievers (NSAIDS) and became addicted to drugs. He take it every day, instead of taking coffee." (Informant7, Applied arts and architecture)

"Some students do not know how to use emergency ontraceptive pills. They do not know when to take the pills properly or do not know the difference between emergency pills and 21 or 28 day birth control? (Informant5, Pharmaceutical sciences)

"There are still have hawkers at my village. They sell the "bottle herbal drug or ferment drug" for 500-600 Bath. Most of customers are the elderly who having chronic disease. They experience feeling better at the beginning but they had hyperglycemia and Cushing's syndrome afterward. They do not care the adverse events. They just want to hear that it helps they feel better." (Informant7, Applied arts and architecture)

The Covid-19 pandemic has limited many people's living options, causing stress and making it difficult to get around. Going out to acquire drugs from a pharmacy or at a hospital was more challenging. This might have lead to people buying medications and dietary supplements for personal use without seeking professional advice from a pharmacist.

"COVID-19 pandemic makes you stressed, which affects your health and your daily life. You can not go to a doctor or a pharmacist to get help. I had to find medicine for myself." (Informant14, Business school)

Some students came to the community pharmacy and bought OTC medicines (e.g., analgesics, antipyretics, antihistamine, antitussive), herbal medicine and dietary supplements (e.g., Andrographis paniculata, properlis spray, vitamin C). They hoped that self-medication will able to prevent COVID-19 infection.

"People are terrified for COVID-19. What are their options? On everything that was a trend, people bought until it out of stock."(Informant4, Pharmaceutical sciences)

RDU country

Most of the participants thought that it will be difficult to move to a RDU country. However, it is still possible, if the stakeholders cooperate and increase the program to introduce RDU to the community.

"I think it is difficult to move to RDU country. The RDU campaign is not concrete enough and not accessible to all people." (Informant1, Pharmaceutical sciences)

The information on the internet is frequently inaccurate and difficult to interpret. The participants suggested that the stakeholders should increase the availability of more up-to-date and accurate information spread on the internet and social media. As a result, students will have access to more accurate information and will inform their families as well.

"New-gen people usually search and trust the information they found. If we provide more RDU information in media, they may have access to more accurate information." (Informant1, Pharmaceutical sciences)

"Everyone should able to access the useful information. Every information should be updated. If students have their self-awareness of RDU, they will help their family and other people." (Informant16, Politic science)

To raise awareness about the quality of RDU content (e.g.,

rational information about medicine, herbal medicine and dietary supplements), the government should continue to develop and spread this information to people. RDU content should be concise and easy to understand. The participants thought that knowledge about using medicine should be not complicated because medicine is one of the basic human needs.

"If people get the correct knowledge about drug use. It will be easy in the future to have the RDU in community." (Informant12 , Science)

Some participants thought that community pharmacy has an important role in encouraging RDU in the community.

"The community pharmacist will able to increase RDU in community." (Informant3, Pharmaceutical sciences)

DISCUSSION

To the authors' knowledge, the majority of research address health literacy, but RDU literacy is limited.[30-32] The intellectual and social abilities that determine a person's competence to acquire, comprehend, and use evidence in the achievement and maintenance of a healthy life are referred to as health literacy,[33-35] which focuses on nutrition, exercise, stress management, smoking and alcohol cessation.[36] RDU literacy is comparable to health literacy but focuses on medications and health products, in terms of comprehension, access to information sources, assessment and decision-making to choose the proper medications and health products.[37]

The majority of the UBU undergraduate students had good RDU literacy. They were able to seek the drug and health information from the internet, especially, from the FDA or the MoPH website. However, the students had a low score in terms of the judgment for health product advertisements.[17] There were many unreliable advertisements on social media (e.g., Tiktok, Instragram, Facebook), which were very popular and had a big impact on students' purchasing behavior.[38] Participants stated that the advertisements with the well-known influencers convinced them to buy those products. The students need to learn about how to judge the reliability and trustworthiness of the advertisement.[38,39] In addition, they should know how to check if medicine and health product are registered with the FDA,[40,41] to report any unregistered health products, and be aware of customer protection laws. Therefore, students' skills in being able to critically evaluate and use information still need to be encouraged.[38,39]

The findings indicate that even though the students had good RDU literacy, some of them did not put this knowledge into practice.[24,42,43] However, students in health sciences, reported that they implemented the acquired knowledge into practice and encourage the messaging of RDU to other students and their families.[29,30]

The factors affecting RDU literacy were the type of faculty and having a medical condition. These findings were consistent with other studies.[30,31] Universities have a critical role to play in improving RDU literacy among students and empowering individuals to make critical choices for themselves and their communities.[44] The majority of students stated that it is important to promote RDU literacy in the university, which is consistent with other studies.[31,45] The students' preferred ways to acquire RDU literacy were to attend campaigns or activities or to explore content about RDU via social media which were extracurricular activities. The minority of students want to attend related lectures or elective courses which would be of personal interest.[45,46]

Antibiotics are available in Thailand from several sources, including healthcare providers, and not healthcare professionals (e.g., people self-medicate by unqualified individuals, relatives, online shopping). Therefore, antimicrobial resistance (AMR) poses a threat to the population.[47,48] There were reports that if they were unable to obtain antibiotics from one source, they would seek them out from another.[47] This might be related to balancing between healthcare using physician and pharmacists' knowledge and attitudes to maintain RDU.[49]

Self-medication to avoid COVID-19 infection is also a source of worry. The COVID-19 pandemic has expanded the social media's effect on the amount of pharmaceutical misinformation, causing public doubt and fear. Self-medication is increasing, which is yet to be safe and effective.[50-53]

Some of the students stated that moving Thailand towards RDU country is possible. However, it still needs time to change. The participants suggested that stakeholders should prepare people with up-to-date and accurate information through the internet and social media because more informed people will be better prepared for RDU literacy.[54,55] People still need public education regarding diseases and medicines, the effective supporting systems of drug and health product information, and empowerment to make responsible decisions regarding their treatment.[56] Community pharmacies are frequently mentioned as having an important role in terms of being reliable information sources and encouraging RDU in the community.[29,57,58]

The faculties of the participants in this study were diverse. The multiplicity of profiles would help to capture the widest possible range of students' perceptions and experiences. However, the limited sample size and the fact that it took place at only one university, might be considered. As a result, this finding may not be representative of Thai university students. More universities, as well as a larger sample size, are needed for further research.[59]

CONCLUSION

Although most of the students had an adequate level of RDU literacy, some of them used drugs irrationally. The university and government should implement strategies to raise RDU literacy and awareness among students, as well as providing them with current and correct information via the internet and social media.

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CONFLICTS OF INTEREST

None

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References

1. World Health Organization. The role of education in the rational Use of medicines 2006 [cited 2022 February26]. Availablefrom:http://apps.who.int/iris/bitstream/handle/10665/205994/B0338.pdf?sequence
2. Dessie B, Atalaye G, Diress E, et al. Practice towards rational drug use at Finotselam and Asirade Zewudie hospitals based on WHO core drug use indicators, Northwest Ethiopia. The Scientific World Journal. 2020;2020:1634294. https://doi.org/10.1155/2020/1634294
3. Lu Y, Hernandez P, Abegunde D, et al. The world medicines situation 2011 2011 [cited 2022 October 20]. Available from: http://apps.who.int/medicinedocs/documents/s18767en/s18767en.pdf
4. World Health Organization. The world medicines situation: World Health Organization; 2004 [cited 2022 April 4]. Available from: https://apps.who.int/iris/bitstream/handle/10665/68735/WHO_EDM_PAR_2004.5.pdf
5. Health Administration Devision Ministry of Public Health. Rational drug use community: RDU community 2020 [cited 2022 April 3]. Available from: https://r8way.moph.go.th/r8wayadmin/page/uploads_file/20201130055026.pdf
6. Yalman F, Tosun N. Determining the effect of health literacy on healthy life style and rational drug use by path analysis. Turkish Journal of Science and Health. 2021;2(3):78-86.
7. Mousavi S, Mansouri A, Ahmadvand A. A bibliometric study of publication patterns in rational use of medicines in Iran. Pharm Pract (Granada). 2013;11(1):38-43. https://doi.org/10.4321/s1886-36552013000100007
8. Food and Drug Administration (Thailand). People purpose and passion: The pathway to success for RDU country 2020 [cited 2022 February 26]. Available from: https://pmac2020.com/site/sidemeeting/schedule/30
9. World Health Organization. The Kingdom of Thailand health system review 2015 [cited 2022 February 26]. Available from: https://apps.who.int/iris/rest/bitstreams/1246951/retrieve
10. Pitaknitinun K, Lawanprasert Y, Vimolkittipong S. Thailand's Legal Framework Concerning Drugs. Journal of Health Science. 2020; 29(Special issue):S15-S30.
11. Jitruknatee A, Martro J, Tosanguan K,et al. National Drug Policies in Thailand:Evolution and Lessons for the Future Journal of Health Science. 2020; 29(Special issue):S3-S14.
12. Nottidge TE, Nottidge BA, Ekrikpo UE. Prevalence and predictors of low back pain in a Southern Nigerian hospital. Ann Afr Med. 2019; 18(3):167-72. https://doi.org/10.4103/aam.aam_59_18
13. Porter SR, Umbach PD. Student survey response rates across institutions: Why do they vary? Research in Higher Education. 2006; 47(2):229-47.
14. Chanakit T, Low BY, Wongpoowarak P, et al. Does a transition in education equate to a transition in practice? Thai stakeholder's perceptions of the introduction of the Doctor of Pharmacy programme. BMC Medical Education. 2015;15(1). https://doi.org/10.1186/s12909-015-0473-4
15. Obiri-Yeboah D, Amoako-Sakyi D, Baidoo I, et al. The 'fears' of disclosing HIV status to sexual partners: a mixed methods study in a counseling setting in Ghana. AIDS Behav. 2016;20(1):126-36. https://doi.org/10.1007/s10461-015-1022-1
16. Health Administration Devision Ministry of Public Health. Rational drug use literacy survey 2020 [cited 2022 March 11]. Available from: https://drive.google.com/file/d/1cMZKfGiyYeMNwhXSrIKpkNTH01zFFVtH/view
17. Phodha T, Maluangnon K, Karnjanarat P,et al. Development of tool and measurement of rational drug use literacy of Thai people 2021 [cited 2022 July 2]. Available from: https://kb.hsri.or.th/dspace/handle/11228/1?locale-attribute=th
18. Azraii AB, Ramli AS, Ismail Z, et al. Validity and reliability of an adapted questionnaire measuring knowledge, awareness and practice regarding familial hypercholesterolaemia among primary care physicians in Malaysia. BMC Cardiovasc Disord. 2021;21(1).
a. https://doi.org/10.1186/s12872-020-01845-y
19. Jarernsiripornkul N, Nakboon S, Anarj K, et al. Survey of healthcare professionals' practices, expectations, and attitudes towards provision of patient information leaflets in Thailand. Int J Clin Pharm. 2020;42(2):539-48. https://doi.org/10.1007/s11096-020-00965-x
20. Kamacooko O, Kitonsa J, Bahemuka UM, et al. Knowledge, attitudes, and practices regarding COVID-19 among healthcare workers in Uganda: A cross-sectional survey. Int J Environ Res Public Health. 2021;18(13):7004. https://doi.org/10.3390/ijerph18137004
21. Seid MA, Hussen MS. Knowledge and attitude towards antimicrobial resistance among final year undergraduate paramedical students at University of Gondar, Ethiopia. BMC Infectious Diseases. 2018;18(1):312. https://doi.org/10.1186/s12879-018-

3199-1
22. Khan S, Kambris MEK, Alfalahi H. Perspectives of university students and faculty on remote education experiences during COVID-19- a qualitative study. Educ Inf Technol (Dordr). 2021;1-29. https://doi.org/10.1007/s10639-021-10784-w
23. DeJonckheere M, Vaughn LM. Semistructured interviewing in primary care research: a balance of relationship and rigour. Family Medicine and Community Health. 2019;7(2):e000057. https://doi.org/10.1136/fmch-2018-000057
24. Mekonnen BD, Ayalew MZ, Tegegn AA. Rational drug use evaluation based on World Health Organization core drug use indicators in Ethiopia: A systematic review. Drug Healthc Patient Saf. 2021;13:159-70. https://doi.org/10.2147/dhps.s311926
25. Chauhan I, Yasir M, Kumari M, et al. The pursuit of rational drug use: understanding factors and interventions. Pharmaspire. 2018;10(2):48-54.
26. Desselle SP, Clubbs BH, Darbishire P. Communication in pharmacy higher education to improve work-life and mitigate burnout. Am J Pharm Educ. 2022;86(2):ajpe8616. https://doi.org/10.5688/ajpe8616
27. Nozmi N, Samsudin S, Sukeri S, et al. Low levels of knowledge, attitudes and preventive practices on leptospirosis among a rural community in Hulu Langat District, Selangor, Malaysia. Int J Environ Res Public Health. 2018;15(4):693. https://doi.org/10.3390/ijerph15040693
28. Aheto JMK, Udofia EA, Kallson E, et al. Prevalence, socio-demographic and environmental determinants of asthma in 4621 Ghanaian adults: Evidence from Wave 2 of the World Health Organization's study on global AGEing and adult health. PLOS ONE. 2020;15(12):e0243642. https://doi.org/10.1371/journal.pone.0243642
29. Durand C, Chappuis A, Douriez E, et al. Perceptions, current practices, and interventions of community pharmacists regarding antimicrobial stewardship: A qualitative study. J Am Pharm Assoc (2003). 2022. https://doi.org/10.1016/j.japh.2022.02.003
30. Rababah JA, Al-Hammouri MM, Drew BL,et al. Health literacy: exploring disparities among college students. BMC Public Health. 2019;19(1):1401. https://doi.org/10.1186/s12889-019-7781-2
31. Kühn L, Bachert P, Hildebrand C, et al. Health literacy among university students: A systematic review of cross-sectional studies. Frontiers in Public Health. 2022;9. https://doi.org/10.3389/fpubh.2021.680999
32. Nygård T, Hirvonen N, Räisänen S,et al. Health Education Teachers' Contributions to Students' Multiliteracy Learning. Literacy Research and Instruction. 2022; 61(4):402-21.
33. Nutbeam D. The evolving concept of health literacy. Soc Sci Med. 2008;67(12):2072-8. https://doi.org/10.1016/j.socscimed.2008.09.050
34. Budhathoki SS, Pokharel PK, Jha N, et al. Health literacy of future healthcare professionals: a cross-sectional study among health sciences students in Nepal. International Health. 2018;11(1):15-23. https://doi.org/10.1093/inthealth/ihy090
35. Ngoh LN. Health literacy: A barrier to pharmacist–patient communication and medication adherence. Journal of the American Pharmacists Association. 2009;49(5):e132-e49. https://doi.org/10.1331/japha.2009.07075
36. Smith C, Goss HR, Issartel J, et al. Health literacy in schools? A systematic review of health-related interventions aimed at disadvantaged adolescents. Children (Basel). 2021;8(3):176. https://doi.org/10.3390/children8030176
37. Health Administration Devision MoPH. Rational drug use community: RDU community 2020 [cited 2022 3 April]. Available from: https://r8way.moph.go.th/r8wayadmin/page/uploads_file/20201130055026.pdf
38. Hahnel C, Eichmann B, Goldhammer F. Evaluation of online information in university students: development and scaling of the screening instrument EVON. Front Psychol. 2020;11. https://doi.org/10.3389/fpsyg.2020.562128
39. Rowley J, Johnson F, Sbaffi L. Students' trust judgements in online health information seeking. Health Informatics J. 2015;21(4):316-27. https://doi.org/10.1177/1460458214546772
40. Moore TJ, Mouslim MC, Blunt JL, et al. Assessment of availability, clinical testing, and US Food and Drug Administration review of biosimilar biologic products. JAMA Intern Med. 2021;181(1):52-60. https://doi.org/10.1001/jamainternmed.2020.3997
41. Republic of the Phillippines DoH, Food and Drug Administration,. FDA Advisory No.2020-1142-A || Lifting the Advisory of the following Registered Food Products "Public Health Warning Against the Purchase and Consumption of the Unregistered Food Products" 2022 [cited 2022 16 March]. Available from: https://www.fda.gov.ph/fda-advisory-no-2021-1142-a-lifting-the-advisory-of-the-following-registered-food-products-public-health-warning-against-the-purchase-and-consumption-of-the-unregistered-food-products/
42. Bajait C, Pimpalkhute S, Sontakke S, et al. Evaluation of knowledge, attitude and practice of rational use of medicines among clinicians in a tertiary care teaching hospital. International Journal of Nutrition, Pharmacology, Neurological Disease abbreviation. 2014;4(3):153-7.
43. Chaudhari VL, Mali SN, Dawari AV, et al. Awareness about rational use of medicines among fresh Bachelor of Medicine and Bachelor of Surgery graduates. J Educ Health Promot. 2017;6. https://doi.org/10.4103/jehp.jehp_59_17
44. Cisco J. A Case Study of University Honors Students in Humanities Through a Disciplinary Literacy Lens. Literacy Research and Instruction. 2016;55(1):1-23.
45. Yin C, He X, Shen K, et al. Knowledge and behavior in rational drug use among college students in Zunyi city. Risk Manag Healthc Policy. 2022;15:121-31. https://doi.org/10.2147/rmhp.s347822
46. Turner K, Suwannapong K, Putthikhan P, et al. Evaluation of the integrated model of the rational drug use into the Bachelor of Nursing Science program in Thailand: A mixed-methods study. Belitung Nursing Journal. 2021;7(6):485-92. https://doi.org/10.33546/bnj.1762

47. Pumtong S, Suwannaprom P, Suttajit S, et al. Irrational antibiotic use and distribution in the Thai community: a complex situation in need of integrative solution. Journal of Health Science. 2020;29(Special Issue):S72-S81.
48. Donsamak S, Weiss MC, John DN. Evaluation of antibiotic supply decisions by community pharmacists in Thailand: A vignette study. Antibiotics. 2021;10(2):154. https://doi.org/10.3390/antibiotics10020154
49. Wisell K, Sporrong SK. The Raison D'être for the community pharmacy and the community pharmacist in Sweden: A qualitative interview study. Pharmacy (Basel). 2015;4(1):3. https://doi.org/10.3390/pharmacy4010003
50. Närhi U. Sources of medicine information and their reliability evaluated by medicine users. Pharm World Sci. 2007;29(6):688-94.
51. Malik M, Tahir MJ, Jabbar R, et al. Self-medication during Covid-19 pandemic: challenges and opportunities. Drugs Ther Perspect. 2020;36(12):565-7. https://doi.org/10.1007/s40267-020-00785-z
52. Yang Y. Use of herbal drugs to treat COVID-19 should be with caution. Lancet. 2020;395(10238):1689-90. https://doi.org/10.1016/s0140-6736(20)31143-0
53. Erku DA, Belachew SA, Abrha S, et al. When fear and misinformation go viral: Pharmacists' role in deterring medication misinformation during the 'infodemic' surrounding COVID-19. Res Social Adm Pharm. 2021;17(1):1954-63. https://doi.org/10.1016/j.sapharm.2020.04.032
54. Santos P, Sá L, Couto L, et al. Sources of information in health education: A cross-sectional study in Portuguese university students. Australasian Medical Journal. 2018;11.
55. Nunes C, Almeida CVd, Belim C. Health Literacy in Younger Age Groups: Health Care Perceptions: Informed People Will Be More Prepared People. Open Access Library Journal. 2020;7:1-14.
56. World Health Organization. Promoting rational use of medicines 2022 [cited 2022 March 16]. Available from: https://www.who.int/activities/promoting-rational-use-of-medicines
57. Rasool BKA, Fahmy SA, Abu-Gharbieh EF,et al. Professional practices and perception towards rational use of medicines according to WHO methodology in United Arab Emirates. Pharm Pract (Granada). 2010;8(1):70-6. https://doi.org/10.4321/s1886-36552010000100009
58. Devraj R, Gupchup GV. Knowledge of and barriers to health literacy in Illinois. Journal of the American Pharmacists Association. 2012;52(6):e183-e93. https://doi.org/10.1331/japha.2012.12011
59. Choi SK, Bauermeister J. A Latent Profile Analysis of Online Dating Patterns Among Single Young Men Who Have Sex with Men. AIDS Behav. 2022;26(4):1279-88. https://doi.org/10.1007/s10461-021-03485-5