Medication knowledge among first year university students in northern Thailand

Dujrudee Chinwong[1], Sarinya Pinsakul[1], Wichai Paengkhrua[1], Surarong Chinwong[1]

AFFILIATION
1 Department of Pharmaceutical Care, Faculty of Pharmacy, Chiang Mai University, Thailand

CORRESPONDENCE TO
Surarong Chinwong. Department of Pharmaceutical Care, Faculty of Pharmacy, Chiang Mai University, 239 Suthep Rd, Tambon Su Thep, Mueang Chiang Mai District, Chiang Mai 50200, Thailand. E-mail: surarong@gmail.com ORCID ID: 0000-0001-6801-3340

KEYWORDS
Thailand, paracetamol, medication knowledge, health sciences, non-health sciences

Received: 4 May 2022, **Revised:** 1 November 2022,
Accepted: 19 December 2022

Popul. Med. 2023;5(January):2 https://doi.org/10.18332/popmed/157811

ABSTRACT

INTRODUCTION This cross-sectional study assessed medication knowledge levels among first year students at a university in northern Thailand and compared students from health sciences and non-health sciences.

METHODS A self-administered questionnaire survey was performed in a university located in northern Thailand, including six faculties of health sciences, ten faculties of social sciences, and five faculties of basic sciences and technology. Participants comprised first-year students (aged ≥18 years) studying at this university in 2016. Information was collected regarding medication knowledge levels using 19 questions of 4 drug types, including paracetamol, anti-inflammatory drugs, antibiotics, and ophthalmic drugs in 4 areas: indications of drugs, dosage regimens and precautions, storage and expiration, and appropriateness of drug use.

RESULTS Of 400 students (87 health sciences, 313 non-health sciences), the average score on medication knowledge was 12.3 ± 2.7 (max score=19). Students from health sciences had higher medication knowledge levels than those from non-health sciences (14.0 ± 1.8 vs 11.9 ± 2.8; p<0.001).

CONCLUSIONS First year university students had medication knowledge at a moderate level, and health sciences students had higher knowledge levels. Universities should promote and provide medication knowledge to their students.

INTRODUCTION

Medication knowledge is essential for university students. When Thai university students have minor illnesses, such as headaches, sore throat, or fever, they usually take medications from pharmacies, hospitals, or self-medicate. Thus, medicine is an essential daily product. Students should know the necessary information about medication used in everyday life, but many students do not have sufficient medication knowledge, leading to adverse drug events. Studies among university students in other countries showed that students lack or have little knowledge of medication[1-7]. A study in Nepal found that 95% of students were self-medicated. Still, most lacked or had little knowledge of medication such as antibiotics, analgesics/antipyretics, cough preparations, anti-allergics, and antiulcerants[1]. Furthermore, a study in Brazil revealed that 86% of students were self-medicated, but some had inadequate medication knowledge[6]. A study among Portuguese university students showed they believed that to self-medicate was not a good idea; however, the majority admitted to using self-medication[3]. The main reason for self-medication was to quickly and effectively relieve their illness symptoms[1,6]. Other possible reasons for self-medication were believing in their knowledge of medications to be used for their symptoms and feeling that it was unnecessary to see a doctor due to a simple disease[6]. The main sources of drug information and acquisition to treat common illnesses were pharmacists, parents, and friends[5]. However, overall medication knowledge and literacy remained quite low among adolescent students, including university students[2,4-7]. Healthcare students were more likely to have high medication knowledge levels than non-healthcare students[6].

Having a basic knowledge of medication is essential for students to treat their illnesses capably. Studies on medication knowledge among university students in Thailand remain limited; therefore, this study aimed to assess the level of medication knowledge among first-year students at a university in northern Thailand and compare

knowledge levels between health sciences and non-health sciences students.

METHODS

Study design and participants

This cross-sectional survey was performed in a university located in northern Thailand with around 28000 students from 21 faculties, including six faculties of health sciences, ten faculties of social sciences, and five faculties of basic sciences and technology. Participants comprised first-year students (aged ≥18 years) studying at this university in 2016. The sample size was estimated using Yamane's formula for a finite population (28000 students) and a margin of error set at 0.05[8], requiring at least 394 students to participate. Proportional sampling was used in this study. A total of 400 students were chosen by proportional sampling, which was proportional to the overall percentage of participants in each faculty; this was based on the number of students in the Academic Year 2015. Before completing the questionnaire, all individuals freely participated in this study and provided informed consent.

The Human Ethics Committee, Faculty of Pharmacy, Chiang Mai University, approved the study protocol.

Developing the questionnaire and collecting data

Students' responses were gathered using a self-administered anonymous questionnaire. The questionnaire was developed according to the study's objectives and literature review to assess students' medication knowledge levels. From the literature review, students should know indications of drugs, dosage regimens and precautions, storage and expiration, and appropriateness of drug use; therefore, these topics were selected to be tested among students. Medications to be tested were paracetamol, anti-inflammatory drugs, antibiotics, and ophthalmic drugs, because students used these medicines frequently.

Regarding content validity, three experts in medication knowledge evaluated the questionnaire's content validity. Each expert assessed whether each question and answer was accurate and relevant to the objectives of the study, based on scores ranging from -1 to +1 (+ 1, congruent; 0 questionable; and -1, incongruent); the index of Item-Objective Congruence (IOC) was calculated. Questions with an IOC of ≥0.5 were kept, but questions with an IOC of <0.5 were deleted or changed after consulting experts. Then the questionnaire was pilot-tested among 20 university students to determine their understanding of the questions and use of acceptable language, and the questionnaire was adjusted accordingly. The reliability of the 19 questions was then tested among 40 students using Cronbach's alpha which was 0.6.

In short, the self-administered questionnaire included two parts: 1) sociodemographic data such as sex, age, faculty of study, family members working in or studying health sciences, experience in taking care of the medications

Table 1. Characteristics of students in health sciences and non-health sciences, Thailand 2016 (N=400)

Characteristics	Total (n=400) %	Health sciences (n=87) %	Non-health sciences (n=313) %	p
Sex				
Male	38.0	28.7	40.6	0.046**
Female	62.0	71.3	59.4	
Age (years), mean ± SD	18.5 ± 0.6	18.5 ± 0.6	18.5 ± 0.6	0.631
Having comorbidities	19.8	21.8	19.2	0.648
Having family members working or studying in health sciences	38.0	65.5	30.4	<0.001**
Having experience in taking care of medications of family members	51.3	55.2	50.2	0.467
Sources of knowledge*				
Pharmacy/hospital	95.3	94.3	95.5	0.557
Television	55.8	59.8	54.6	0.464
Radio	20.8	27.6	18.9	0.099
Print material	49.3	57.5	47.0	0.090
Social network	60.8	66.7	59.1	0.216
Website	36.8	44.8	34.5	0.080

*Students can have more than one answer. **Indicates the statistical significance level (p<0.05).

Table 2. Percentage (%) of correct answers and mean scores on medication knowledge of students in health sciences and non-health sciences, Thailand 2016 (N=400)

Section and Issue	Total (n=400)	Health sciences (n=87)	Non-health sciences (n=313)	p
Percentage of the correct answers (%)				
Section 1: Indication of drugs and basic knowledge of drugs				
Indications of paracetamol	76.5	87.4	73.5	**0.006***
Indications of antibiotics	75.3	85.1	72.5	**0.017***
Indications of anti-inflammatory drugs and antibiotics	40.5	47.1	38.7	0.175
Indications of anti-inflammatory drugs	74.3	80.5	72.5	0.166
Section 2: Dosage regimens and precaution				
Dosage for paracetamol	71.5	74.7	70.6	0.504
Dosage of antibiotics	78.8	88.5	76.0	**0.012***
Overdosing on paracetamol causes hepatotoxicity	31.3	49.4	26.2	**<0.001***
Precautions of anti-inflammatory drugs	15.5	17.2	15.0	0.617
Ophthalmic drugs – basic knowledge	64.8	73.6	62.3	0.057
Section 3: Storage and expiration				
Precautions in the storage of medicines	91.0	97.7	89.1	**0.010***
Storage of medicines with light instability	68.5	88.5	62.9	**<0.001***
Expiration of drugs	91.3	92.0	91.1	1.000
Expiration of ophthalmic drugs	44.8	44.8	44.7	1.000
Characteristics of drug degradation	92.8	98.9	91.1	**0.009***
Section 4: Appropriateness of drug use				
Basics of how to use drugs correctly	73.3	85.1	70.0	**0.004***
Basics of how to use the drugs correctly – using drugs for the right person	86.8	96.6	84.0	**0.001***
What to do after forgetting to take drugs	37.0	44.8	34.8	0.103
How to take drugs correctly	76.3	90.8	72.2	**<0.001***
The dose of a standard teaspoon	42.3	52.8	39.3	**0.027***
Mean score ± SD				
Section 1: Indication of drugs and basic knowledge of drugs (max score=4.0)	2.7 ± 1.0	3.0 ± 0.9	2.6 ± 1.0	**<0.001***
Section 2: Dosage regimens and precautions (max score=5.0)	2.6 ± 1.0	3.0 ± 0.9	2.5 ± 1.1	**<0.001***
Section 3: Storage and expiration (max score=5.0)	3.9 ± 1.0	4.2 ± 0.8	3.8 ± 1.0	**<0.001***
Section 4: Appropriateness of drug use (max score=5.0)	3.2 ± 1.2	3.7 ± 0.9	3.0 ± 1.2	**<0.001***
Total (max score=19.0)	12.3 ± 2.7	14.0 ± 1.8	11.9 ± 2.8	**<0.001***

*Indicates the statistical significance level (p<0.05). SD: standard deviation.

of family members, and sources of medication knowledge; and 2) medication knowledge based on 19 questions. The 19 questions measured the knowledge of four drug types, including paracetamol, anti-inflammatory drugs, antibiotics, and ophthalmic drugs in four areas: indications of drugs, dosage regimens and precautions, storage and expiration,

and appropriateness of drug use. Each of the 19 questions contained five choices, with only one correct answer (score=1 for a correct answer, score=0 for an incorrect answer); therefore, the scores totaled 19. The details of all questions with the answers are given in the Supplementary file.

Statistical analysis

The data were analyzed using STATA Software, Version 12, with the significance level set as two-tailed and $p<0.05$. Descriptive statistics were reported as mean ± standard deviation for continuous variables and frequency and percentage for categorical variables. The two groups were compared using Fisher's exact test for categorical variables or an independent t-test for continuous variables

RESULTS

Of 400 students, 248 (62%) were females, and 152 (38%) were males; the mean age was 18.5 ± 0.6 years; 87 (21.8%) participants were from health sciences faculties (6), and 313 (78.2%) were from non-health sciences faculties (15) (Table 1). The average score for medication knowledge among the university students was 12.3 ± 2.7 (max score=19). The top-three topics with the highest scores were drug degradation's characteristics (92.8%), expiration of drugs (91.3%), and precautions in the storage of medicines (91%). In contrast, the top-three topics with the lowest scores were precautions with anti-inflammatory drugs (15.5%), paracetamol overdose (31.3%), and what to do after forgetting to take medicines (37.0%). Health sciences students had higher medication knowledge levels than non-health sciences students in each section and all four areas (14.0 ± 1.8 vs 11.9 ± 2.8, respectively, $p<0.001$) (Table 2).

DISCUSSION

The medication knowledge average score among university students was 12.3 ± 2.7 (max score=19), and health sciences students had higher medication knowledge levels than non-health sciences students.

In Section 1, the medication knowledge related to drug indication; students had the two most correct answers to questions about paracetamol (76.5%) and antibiotics (75.3%). However, students had the least knowledge scores on indications for anti-inflammatory drugs and antibiotics, with about 40% of students indicating the correct answer. Imperatively, students should be able to understand the use of antibiotics or anti-inflammatory medications and use them correctly. When students cannot use antibiotics correctly, it could lead to future antibiotic resistance[9]. Some studies related to knowledge of antibiotic use[9-12] found that the public, in general, was unaware of the causes and the roles and capabilities to prevent antibiotic resistance. According to a study by Wun et al.[9] conducted among Chinese in Hong Kong regarding antibiotic resistance knowledge, while most questionnaire respondents (91%) had heard about antibiotic resistance, only 65% agreed that taking incomplete courses or acquiring antibiotics without a prescription would result in unfavorable outcomes. Thus, many were unaware of what led to resistance. Similarly, in a study conducted among 620 students from three different universities in Nepal, most students lacked medication knowledge about the adverse effects of self-medicated antibiotics[1]. Importantly, students should be equipped with the correct knowledge of antibiotics to prevent antibiotic resistance in the future.

For questions in Section 2 about dosage regimens and precautions, the two questions with the least correct answers regarded the dangers of an overdose (31.3%) and precautions with anti-inflammatory drugs (15.5%). Paracetamol has been the most widely used antipyretic and analgesic until now[13]. The toxicity profile of paracetamol has primarily been identified with overdoses, which can cause hepatotoxicity[13]. In this study, about 70% of participants provided correct answers concerning choosing the right dose for paracetamol and taking paracetamol (500 mg) 1 tablet every 4 to 6 hours with a maximum of 8 tablets a day. However, about one-third were unaware that overdosing on paracetamol could cause hepatotoxicity. Several studies investigated paracetamol, for example, knowledge of paracetamol use, overdosing of paracetamol, and liver toxicity from using paracetamol[13-16]. Our result was similar to that in a survey conducted by Cipolat et al.[15] in France, using a self-administered questionnaire among 819 responding patients; only 17.9% had adequate knowledge, and 20.3% were at risk of an unintended paracetamol overdose. A study by Esan et al.[17] conducted in Nigeria among undergraduate students in a private university found that the most commonly used drug for self-medication was paracetamol (75.1%). Still, this study did not assess paracetamol overdose.

More than 90% of students provided the correct answers to questions related to storage and expiration in Section 3, including precautions in the storage of medicines, expirations of drugs, and characteristics of drug degradation. However, about 45% of students provided the correct answer about the expiry of ophthalmic medications that should be used within one month after opening for the first time, suggesting more than one-half of students did not know this. Therefore, pharmacists should always inform patients about the shelf life of ophthalmic drugs.

For questions related to the appropriateness of drug use in Section 4, students had the least knowledge on what to do after they forgot to take drugs (37.0%) and the volume of a standard teaspoon (42.3%). A study among adolescents with asthma showed that the reason for not taking medicine was not that they did not want to take the medicine, but they forgot to take it[18]. Pharmacists should inform patients what to do after they fail to take drugs.

A comparison of medication knowledge between students from health sciences and non-health sciences showed that students from health sciences faculties had more medication

knowledge in each section and all four areas than students from non-health sciences. This could be because students from health sciences are interested in health sciences; therefore, they read or acquire knowledge on medication use more often than non-health sciences students. In line with a study conducted among students in Brazil, students from health sciences had higher medication knowledge levels than non-health sciences students[6].

Limitations

Some limitations should be noted. First, this study relied on self-administered questionnaires. Second, the study was conducted at one university in northern Thailand, so the findings may not be generalized to other university students in the country. Third, the results were limited to first-year students. Future research should compare the results with senior students to see how their knowledge levels of medication use changed. Additionally, as this study was conducted nearly six years ago, a further study should compare the medication knowledge between the first-year and the senior students. Last, the number of students from health sciences and non-health sciences was unbalanced due to the proportional sampling used in this study; only six faculties were related to health sciences, while 15 faculties were related to non-health sciences.

CONCLUSIONS

The first-year university students had medication knowledge with an average score of 12 out of a maximum of 19. Health sciences students had higher medication knowledge levels than non-health sciences students, as expected. Most university students still lacked some medication knowledge, e.g. the precautions and indications of anti-inflammatory drugs, paracetamol overdosing, actions needed after forgetting to take medication, and the expiration of ophthalmic medications. Universities should promote health and provide medication knowledge to their students. Providing online training could increase students' knowledge.

REFERENCES

1. Shah K, Halder S, Haider SS. Assessment of knowledge, perception, and awareness about self-medication practices among university students in Nepal. Heliyon. 2021;7(1):e05976. doi:10.1016/j.heliyon.2021.e05976
2. Kelly T, Conn KM, Zak M. Evaluation of Over-the-Counter Medication Knowledge and Literacy in Adolescent Students. Acad Pediatr. 2018;18(5):556-562. doi:10.1016/j.acap.2018.02.012
3. Alves RF, Precioso J, Becoña E. Knowledge, attitudes and practice of self-medication among university students in Portugal: A cross-sectional study. Nordisk Alkohol Nark. 2021;38(1):50-65. doi:10.1177/1455072520965017
4. Society for Adolescent Health and Medicine. The Use of Medication by Adolescents and Young Adults. J Adolesc Health. 2017;61(3):396-399. doi:10.1016/j.jadohealth.2017.06.003
5. Shehnaz SI, Agarwal AK, Khan N. A systematic review of self-medication practices among adolescents. J Adolesc Health. 2014;55(4):467-483. doi:10.1016/j.jadohealth.2014.07.001
6. da Silva MGC, Soares MCF, Muccillo-Baisch AL. Self-medication in university students from the city of Rio Grande, Brazil. Bmc Public Health. 2012;12(1):339. doi.org/10.1186/1471-2458-12-339
7. Simonsen BO, Johansson I, Daehlin GK, Osvik LM, Farup PG. Medication knowledge, certainty, and risk of errors in health care: a cross-sectional study. BMC Health Serv Res. 2011;11(1):175. doi.org/10.1186/1472-6963-11-175
8. Yamane T. Statistics: An Introductory Analysis. 2nd ed. Harper and Row; 1967.
9. Wun YT, Lam TP, Lam KF, Ho PL, Yung WH. The public's perspectives on antibiotic resistance and abuse among Chinese in Hong Kong. Pharmacoepidemiol Drug Saf. 2013;22(3):241-249. doi:10.1002/pds.3339
10. Alsuhaibani MA, AlKheder RS, Alwanin JO, Alharbi MM, Alrasheedi MS, Almousa RF. Parents awareness toward antibiotics use in upper respiratory tract infection in children in Al-Qassim region, Saudi Arabia. J Family Med Prim Care. 2019;8(2):583-589. doi:10.4103/jfmpc.jfmpc_368_18
11. Gualano MR, Gili R, Scaioli G, Bert F, Siliquini R. General population's knowledge and attitudes about antibiotics: a systematic review and meta-analysis. Pharmacoepidemiol Drug Saf. 2015;24(1):2-10. doi:10.1002/pds.3716
12. Zucco R, Lavano F, Anfosso R, Bianco A, Pileggi C, Pavia M. Internet and social media use for antibiotic-related information seeking: Findings from a survey among adult population in Italy. Int J Med Inform. 2018;111:131-139. doi:10.1016/j.ijmedinf.2017.12.005
13. O'Grady JG. Paracetamol-induced acute liver failure: prevention and management. J Hepatol. 1997;26 Suppl 1:41-46. doi:10.1016/s0168-8278(97)82332-x
14. Severin AE, Petitpain N, Scala-Bertola J, et al. Étude prospective en pharmacie du bon usage et de la connaissance du paracétamol pris en automédication. Good use and knowledge of paracetamol (acetaminophen) among self-medicated patients: Prospective study in community pharmacies. Therapie. 2016;71(3):287-296. doi:10.1016/j.therap.2015.09.003
15. Cipolat L, Loeb O, Latarche C, Pape E, Gillet P, Petitpain N. Le paracétamol: connaissance, usage et risque de surdosage en patientèle urbaine de médecine générale. Étude prospective descriptive transversale. Acetaminophen: Knowledge, use and overdose risk in urban patients consulting their general practitioner. A prospective, descriptive and transversal study. Therapie. 2017;72(4):453-463. doi:10.1016/j.therap.2016.12.012
16. Craig DG, Bates CM, Davidson JS, Martin KG, Hayes PC, Simpson KJ. Overdose pattern and outcome in paracetamol-induced acute severe hepatotoxicity. Br J Clin Pharmacol.

2011;71(2):273-282. doi:10.1111/j.1365-2125.2010.03819.x
17. Esan DT, Fasoro AA, Odesanya OE, Esan TO, Ojo EF, Faeji CO. Assessment of Self-Medication Practices and Its Associated Factors among Undergraduates of a Private University in Nigeria. J Environ Public Health. 2018;2018:1-7 doi:10.1155/2018/5439079
18. Naimi DR, Freedman TG, Ginsburg KR, Bogen D, Rand CS, Apter AJ. Adolescents and asthma: why bother with our meds?. J Allergy Clin Immunol. 2009;123(6):1335-1341. doi:10.1016/j.jaci.2009.02.022

ACKNOWLEDGEMENTS
We are grateful to all students involved in this study for their time and participation. We would like to acknowledge the International Relations Unit, Faculty of Pharmacy, for English editing and proofreading of this manuscript. Part of this study was presented as an oral presentation at the 2019 International Health Conference, St Hugh's College, Oxford, UK, 26–28 June 2019.

CONFLICTS OF INTEREST
The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

FUNDING
There was no source of funding for this research.

ETHICAL APPROVAL AND INFORMED CONSENT
The Human Ethics Committee, Faculty of Pharmacy, Chiang Mai University, approved the study protocol (Approval number: 13/2016; Date: 23 March 2016). Participants provided informed consent.

DATA AVAILABILITY
The data supporting this research is available from the authors on reasonable request.

PROVENANCE AND PEER REVIEW
Not commissioned; externally peer reviewed.