

## ORIGINAL ARTICLE

# Knowledge and Perception on Emergency Contraception Among Undergraduate Pharmacy Students in Malaysia

Nurhasni Amirah binti Anis<sup>1</sup>, Aina Amanina Abdul Jalil<sup>2</sup>, Aliah Mohd Asarani<sup>3</sup>, Nur Wahida Zulkifli<sup>1</sup>, Nur Sabiha Md Hussin<sup>1</sup>

<sup>1</sup> Department of Clinical Pharmacy, Faculty of Pharmacy, Universiti Teknologi MARA (UiTM), Selangor Branch, 40450 Shah Alam, Selangor, Malaysia

<sup>2</sup> Department of Pharmacy Practice and Clinical Pharmacy, Faculty of Pharmacy and Health Sciences, Universiti Kuala Lumpur Royal College of Medicine Perak, 30450 Ipoh, Perak, Malaysia

<sup>3</sup> Department of Obstetrics and Gynaecology, Te Whatu Ora Waitaha/Health New Zealand Canterbury, 8011 Christchurch, New Zealand

## ABSTRACT

**Introduction:** Emergency contraception (EC) is an important method for preventing unintended pregnancies. By being knowledgeable and readily available to dispense this medication, pharmacists play a crucial role in preventing unintended pregnancies, which can have significant social, economic, and health repercussions. This study aimed to assess the knowledge and perception of EC among undergraduate pharmacy students in Malaysia, examining the socio-demographic factors associated with these dependent variables. **Materials and methods:** A cross-sectional study was conducted among 355 pharmacy students from 20 institutions offering a Bachelor of Pharmacy (Hons.) program. The data was collected from April to June 2022. The questionnaire was formatted as a web-based questionnaire consisting of 33 questions divided into three sections. Independent t-test and one-way ANOVA was used to compare the means in student's knowledge and perception. Chi-square test was used to identify the association between the demographic variables and the knowledge and perception. **Results:** Three hundred and fifty-five students participated in the survey. Participants' mean (SD) knowledge score was 5.31(2.94) of 10 items. Factors affecting the mean knowledge of participants include academic year ( $P<0.001$ ), institution type ( $P<0.001$ ), race ( $P<0.001$ ), religion ( $P<0.001$ ), residence area ( $P=0.013$ ), and prior knowledge of EC ( $P<0.001$ ). The mean (SD) score of perception was 36.8 (4.9) from 50. Most of the students had an average perception of EC. **Conclusion:** The findings indicate that the majority of students held average perceptions but lacked sufficient knowledge about EC, highlighting the need to address these knowledge gaps for the development of an effective educational program.

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## Corresponding Author:

Nur Sabiha Md Hussin, Master  
Email: nursabiha@uitm.edu.my  
Tel : +601121557606

## INTRODUCTION

Approximately 121 million unintended pregnancies took place each year between 2015 and 2019. Within this category, 61% resulted in abortion, amounting to a total of 73 million abortion procedures annually (1). In Malaysia, unintended pregnancies occur at a rate of 42.9% and 50% of unintended pregnancies result in abortion, while a significant number of them cause maternal death and permanent health complications (2). Effective family planning with the use of appropriate contraceptives may aid in preventing unintended pregnancies and adverse maternal and foetal outcomes. Malaysia has a contraceptive prevalence rate (CPR) of

34.3% (3) among married women who use effective contraception as compared to Singapore (55.1%) and Thailand (77.5%) (4).

Given the high prevalence of unintended pregnancies, especially in Malaysia with its elevated rates of abortion, maternal mortality, and long-term health complications resulting from such pregnancies, emergency contraception (EC) emerges as a crucial tool for mitigating the problem. EC serves as the first line of immediate resolution after unprotected intercourse (5), offering a potential solution to address the challenges associated with unintended pregnancies. EC refers to a range of contraceptive methods that can be used to prevent pregnancy after unprotected sexual activity. These methods, which include emergency contraceptive pills like ulipristal acetate (UPA), levonorgestrel (LNG), and combined oral contraceptive pills, as well as copper-containing intrauterine devices (IUDs) inserted into the

uterus (6) to prevent pregnancy within a specific window of time after sexual activity (7). The effectiveness of EC pills ranges from 75 to 95 percent if taken within 72 hours of unprotected sexual activity, whereas the IUD's effectiveness exceeds 99 percent if inserted within five days (8).

Even though oral emergency contraceptive pills are available over-the-counter in community pharmacies in Malaysia, the prevalence of use is only 11%, compared to the global use rate of EC of 31.8% (9). Low rate of use among the public especially woman is due to low knowledge and awareness of contraception use, myth (4), and its availability (10). Since a pharmacist has a direct contact with the EC users, it is at the highest responsibility of a pharmacist to provide correct knowledge of contraception use and displaying exemplary dispensing practice and counselling.

Unfortunately, the pharmacists' knowledge level and perception regarding the issue has also been found to be on an unsatisfactory level (5). With excellent knowledge and attitude among pharmacists towards EC, they can assist the public with the correct method in using EC with the highest efficacy. Hence, it is essential to address pharmacy students' understanding and attitudes regarding EC early in their academic journey to tackle this issue effectively. There is a lack of extensive research examining pharmacy students' knowledge and attitudes regarding EC, particularly in a local context. As a result, this study was conducted with the goal of evaluating the knowledge and attitudes of undergraduate pharmacy students toward EC.

## MATERIALS AND METHODS

### Study design

This is a cross-sectional study that uses convenience sampling.

### Study Population & Sample Size

The inclusion criteria involve undergraduate pharmacy students from any of the 20 institutions offering Bachelor of Pharmacy (Hons.) in Malaysia who consented to the study. Based on the Malaysian Pharmacy Student Association (MyPSA) data, the number of undergraduate pharmacy student from 20 institutions are 4504 students. By computing the data via Raosoft (11) with a margin error of 5%, confidence level of 95%, and 50% response distribution, the recommended sample size of 355 respondents was used in this study.

### Data Collection

The questionnaire distribution and collection process occurred over 9 weeks from April 5th to June 8th, 2022, aligning with the data collection period from April to June 2022. The questionnaire was designed

by using validated questionnaires from in-depth literature review of previous related published studies (11–14). The questionnaire was formatted as a web-based questionnaire consisting of 33 questions divided into three sections. The first section describes the sociodemographic data of the participants. The second section evaluates the participants' knowledge, while the last section aims to assess the respondent's perception toward EC. The 33-item survey instruments include multiple-choice questions for sociodemographic, multiple-choice question and true/false questions for evaluation of knowledge and Likert-type scale questions in assessing the participants' attitude. The survey was distributed through the institution's email and social media platforms such as Facebook, WhatsApp, and Telegram. Participants were encouraged to share the survey link with their friends and acquaintances, and all respondents could fill in the survey once, with no incentives being provided. The participation of pharmacy students in the study is voluntary and results are highly confidential.

### Statistical Analysis

The data was entered and analysed using IBM Statistical Packages for Social Science (SPSS) version 28.0 for Window, and the descriptive analyses was executed for each variable. All categorical data was presented as frequencies (n) and percentages (%) while continuous data was expressed as mean and standard deviation (SD). Independent t-test and one-way ANOVA was used to compare the means in student's knowledge and perception while Chi-square test was used to identify the association between student's knowledge and perception with the demographic variables.

### Ethical clearance

This study was approved by the Research Ethics Committee, Faculty of Pharmacy, University Teknologi MARA No. REC (PH) 023/2022.

## RESULTS

A total of 355 participants from 20 universities offering Bachelor of Pharmacy programs participated in the survey. Most of the participants in this study were female (82.0%). 43.9% were third year students, 24.8% were second year students, 16.1% were first year students, and 15.2% were fourth year students. Most of them were affiliated with public institutions (91.5%), identified as Malay (91.3%), and practiced the religion of Islam (92.1%). Almost half of the participants live in an urban area (45.1%) while the others were in sub-urban and rural areas with 29.3% and 25.6%, respectively. More than half of participants (74.6%) had knowledge of EC before answering the survey. The demographic data is tabulated in Table I.

**Table I: Association between mean knowledge scores and demographic variables**

Characteristics	Number (%) of respondents	Mean (SD) of knowledge score	P
<b>Gender</b>			0.777 <sup>a</sup>
Male	64 (18.0)	5.07 (3.28)	
Female	291 (82.0)	5.36 (2.88)	
<b>Academic year</b>			
Year 1	57 (16.1)	3.77 (2.53)	<0.001 <sup>a</sup>
Year 2	88 (24.8)	4.03 (2.72)	
Year 3	156 (43.9)	5.78 (2.73)	
Year 4	54 (15.2)	7.69 (2.33)	
<b>Institution type</b>			<0.001 <sup>b</sup>
Public	325 (91.5)	5.00 (2.76)	
Private	30 (8.5)	8.60 (2.87)	
<b>Race</b>			
Malay	324 (91.3)	5.06 (2.82)	<0.001 <sup>a</sup>
Non-Malay	31 (8.7)	7.75 (2.26)	
<b>Religion</b>			<0.001 <sup>a</sup>
Islam	327 (92.1)	5.05 (2.83)	
Buddhism	17 (4.8)	8.35 (2.55)	
Hindu	3 (0.8)	9.00 (1.00)	
Christian	7 (2.0)	8.43 (2.76)	
Other	1 (0.3)	7.00 (0.00)	
<b>Residence</b>			0.013 <sup>a</sup>
Rural	91 (25.6)	4.54 (2.74)	
Urban	160 (45.1)	5.54 (3.10)	
Sub-urban	104 (29.3)	5.63 (2.76)	
<b>Prior knowledge of emergency contraception</b>			<0.001 <sup>b</sup>
Yes	265 (74.6)	6.14 (2.61)	
No	90 (25.4)	2.88 (2.47)	

<sup>a</sup>Calculated by one-way ANOVA; <sup>b</sup>Calculated by independent sample t-test. Knowledge was assessed by giving 1 point to the correct answer and 0 to the incorrect and I do not know answer. The scale measured knowledge from maximum 14 to minimum 0. A score of more than 11 was taken as good knowledge while score of less than 8 was termed as poor knowledge. A score of 8 to 11 termed moderate knowledge. Mean knowledge score of participants was 5.31(2.94). ANOVA = Analysis of variance.

Following the examination of the participants' demographic information as outlined in Table I, it is crucial to investigate their knowledge assessment. Knowledge was assessed by giving 1 point to the correct answer and 0 to the incorrect and I do not know answer. Knowledge scores above 11 were indicative of a high level of understanding, whereas scores below 8 were suggestive of poor knowledge. Scores falling between 8 and 11 were categorised as moderate. On average, participants achieved a knowledge score of 5.31 (2.94), revealing a prevalence of poor knowledge within the studied cohort. The factors examined in the study comprised gender (Male, Female), academic year (Year 1, Year 2, Year 3, Year 4), institution type (Public, Private), race (Malay, Non-Malay), religion (Islam, Buddhism, Hindu, Christian, Other), residence (Rural, Urban, Sub-urban), and prior knowledge of emergency contraception (Yes, No).

To assess the connection between mean knowledge scores and demographic variables, we used an independent t-test for profiles with two variables and one-way ANOVA for those with more than two variables. To interpret the results, if the p-value is below the significance level ( $\alpha = 0.05$ ), it indicates a statistically

significant association between demographic variables and participants' knowledge. Significant associations were observed in academic year ( $P < 0.001$ ), institution type ( $P < 0.001$ ), race ( $P < 0.001$ ), religion ( $P < 0.001$ ), residence ( $P = 0.013$ ), and prior knowledge of EC ( $P < 0.001$ ) with participants' knowledge. There was no significant association between gender and mean knowledge of the participants.

Among 74.6% of participants that have had knowledge about EC prior to answering the survey, most of them learnt about EC from the internet (87.9%), followed by the pharmacist, friend, doctor, family, and others with 34.6%, 27.0%, 13.0%, 12.4%, and 5.9% respectively. The data for the sources of EC information is presented in Table II. Despite many of the participants claiming they had prior knowledge of EC, 90.2% answered incorrectly and mistaken abortion pill for EC pill. Besides, most respondents (78.6%) believe that EC interrupts an established pregnancy, thus causing abortion. Majority of them (89.0%) agreed that there is a risk of congenital abnormalities in women taking oral EC. However, more than half of them (59.2%) understand how EC works by delaying ovulation. The majority (76.6%) recognise that the effectiveness of EC depends on the administration time after unprotected sexual intercourse. The complete response of participants toward knowledge of EC questions is presented in Table III.

**Table II: Sources of emergency contraception information**

Source of emergency contraception information	Frequency (N)	Percent (%)
<b>Internet</b>		
Absent	43	12.1
Present	312	87.9
<b>Family</b>		
Absent	311	87.6
Present	44	12.4
<b>Friend</b>		
Absent	259	73.0
Present	96	27.0
<b>Pharmacist</b>		
Absent	232	65.4
Present	123	34.6
<b>Doctor</b>		
Absent	309	87.0
Present	46	13.0
<b>Other</b>		
Absent	334	94.1
Present	21	5.9

**Table III: Knowledge of emergency contraception among participants**

Statements	Correct responses	Incorrect responses
Misoprostol is one of the oral emergency contraception pills available in the market. [F]	35 (9.9)	320 (90.2)
Emergency contraception pill can be used as a regular contraceptive method. [F]	166 (46.8)	189 (53.2)

CONTINUE

**Table III: Knowledge of emergency contraception among participants. (CONT.)**

Statements	Correct responses	Incorrect responses
Emergency contraception works by preventing pregnancy by delaying ovulation. [T]	210 (59.2)	145 (40.8)
The effectiveness of emergency contraception depends on the time administered after unprotected intercourse. [T]	272 (76.6)	83 (23.4)
To ensure the effectiveness of the emergency contraception, it should be administered within one week after unprotected intercourse. [F]	141 (39.7)	214 (60.3)
Emergency contraceptive pill needs to be taken as soon as possible and preferably within 72 hours after unprotected intercourse. [T]	222 (62.5)	133 (37.5)
Levonorgestrel and Ulipristal can cause allergic reactions. [T]	104 (29.3)	251 (70.7)
Emergency contraception cannot be administered before unprotected intercourse. [T]	144 (40.6)	211 (59.4)
Emergency contraception interrupt an established pregnancy, thus causing abortion. [F]	76 (21.4)	279 (78.6)
There is a chance of congenital abnormalities with women taking oral emergency contraception. [F]	39 (11.0)	316 (89.0)
Proton pump inhibitors decrease the absorption and efficacy of ulipristal acetate. [T]	85 (23.9)	270 (76.1)
Meclizine is an OTC treatment that pharmacists may recommend to manage side effects such as nausea and vomiting, associated with the use of oral emergency contraception. [T]	120 (33.8)	235 (66.2)
Contraindications for progestin-only oral emergency contraception include blood clots, migraines, and liver disease. [F]	23 (6.5)	332 (93.5)
Emergency contraception can be used to prevent pregnancy in the event of sexual violence. [T]	249 (70.1)	106 (29.9)

Data presented as number (%) of participants

Perception was evaluated using a scale ranging from 1 for strongly disagree to 5 for strongly agree, with reverse coding applied to negatively worded questions. The scale measured perception on a range of 10 to

50. A score of 41 or higher was considered indicative of good perception, while a score below 30 suggested poor perception. The average perception score of 36.8 (4.9) falls between the defined categories of good and poor perception. While it does not meet the threshold for good perception (41 or higher), it is higher than the cutoff for poor perception (below 30). Therefore, the average perception score suggests a moderate level of perception.

Majority of the participants (95.5%) agreed that every pharmacy graduate should know about dispensing EC while they also think the patient's medical history is a required information before dispensing EC. More than half of participants agree or strongly agree that they have no issue dispensing EC as it is their professional responsibility as a pharmacist. In contrast, a small group of participants (11.3%) would like to avoid dispensing EC in the future. Similarly, 41.7% of the participants would like to refer the patient to another pharmacist if they feel uncomfortable dispensing EC. 16.0% of participants expressed that they were uncomfortable dispensing EC for moral or religious reasons. Despite that, 77.4% of participants strongly agree or agree that they were comfortable counselling patients about EC. In addition, more than half participants (65.6%) expressed their concern about the side effects of EC. Similarly, 34.4% of participants were concerned that dispensing EC will discourage the use of regular contraception. Nevertheless, more than half of the participants (68.2%) felt confident in dispensing and giving advice on EC.

The association of participants' perception of EC with demographic variables can be seen as presented in Table IV. There was a significant relationship between institution type ( $p=0.026$ ) and prior knowledge of EC ( $p=0.006$ ), with participants believing that every pharmacy graduate should know about dispensing EC. Besides, race and religion significantly affect participants' concerns over the use of EC. The summary association of participants' perceptions and demographic variation is presented in Table IV.

**Table IV: Perception Questions and Associated p-Values**

Question	P value <sup>a</sup>						
	Gender	Academic year	Institution type	Race	Religion	Residence	Prior knowledge of EC
I believe every pharmacy graduate should have a knowledge on dispensing emergency contraception	0.445	0.088	0.026	0.766	0.693	0.996	0.006
If I feel uncomfortable in dispensing emergency contraception, I will refer the patient to another pharmacist.	0.900	0.149	0.027	0.199	0.280	0.834	0.665
I think there is a need to know about the patients' medical history before dispensing emergency contraception.	0.116	0.225	0.556	0.935	0.995	0.696	0.760
I have no issue in dispensing emergency contraception as it is my professional responsibility.	0.041	<0.001	0.041	0.062	0.360	0.110	0.240
I would like to avoid dispensing emergency contraception in the future.	0.020	0.154	<0.001	0.095	0.196	0.013	0.003
I am concerned about the side effect of emergency contraception	0.030	0.003	0.009	0.038	<0.001	0.294	0.486
I am uncomfortable in dispensing emergency contraception due to moral or religious reasons.	0.199	0.297	<0.001	0.010	<0.001	0.187	0.052
I am concerned that dispensing emergency contraception will discourage the use of regular contraception.	0.403	0.053	0.002	0.029	0.021	0.420	0.215
I am comfortable in giving counselling about emergency contraception.	<0.001	0.118	0.004	0.233	0.103	0.039	0.304
In general, I feel competent in dispensing emergency contraception and giving advice on the proper use of it to those in need.	0.120	0.314	0.032	0.550	0.551	0.732	0.768

<sup>a</sup>Calculated by Chi-square test

## DISCUSSION

Overall, the participants exhibited poor knowledge of the questions related to EC. Even though more than half of participants had prior knowledge of EC, the majority were still mistaken about the principal concept of EC, including the mechanism of action, method of use and timing of consumption to ensure optimal effects. The students were asked about a common misconception about EC consumption that suggest it could interrupt an implanted embryo and implicating abortion and foetal abnormalities. However, a majority of over 78% agreed with the statement, highlighting a concerning topic for discussion about the dissemination of information to the public. The true mechanism of EC is by delaying ovulation, and prevent fertilisation by altering chemical environment prior to union of the gametes (15). Therefore, EC pill consumption will not cause abortion or congenital abnormalities. However, only 21.4% and 11.0% of respondents agreed with this statement, respectively. These findings corroborate the studies in the United States that found 32% of pharmacy students (12,13), 45% of health workers (16) and 40% of Arkansas working pharmacists (17,18) who still believe the EC causes abortion. This misunderstanding was linked to their insufficient educational knowledge while preparing them as competent pharmacists (13). The knowledge gap among pharmacists should be addressed

at their early points of education.

Our findings also show that EC knowledge trends increase with the academic year. The findings are complementary to a pilot study conducted in 2015 that found a linear relationship between knowledge of contraception and academic year (19). An evaluation of the Malaysian Bachelor of Pharmacy (BPharm) syllabus on contraception coverage could not be performed due to limited access to detailed BPharm programmes by individual schools of pharmacy nationwide, apart from very scarce literature on EC topics, methods of delivery, and assessments. Studies from different countries state that the knowledge of EC among pharmacy students can be enhanced by incorporating reliable and valid content, covering the fundamentals of women's health and family planning, clinical aspects, and pharmaceutical care during study years at the university (20–26). Active, experiential learning exercises, such as pharmacotherapeutic workshops, role-play simulations, and community-based pharmacist counselling, have been shown to increase students' knowledge of EC from 86% to 93% (27). Stone et al. pointed out 58% of pharmacy students felt adequately trained after attending intensive coursework and pharmacy practice experiences during their post-graduate training (28). Doctor of Pharmacy (PharmD), a comprehensive degree could be pursued by undergraduate pharmacy students



who wish to advance training in contraceptive care, whereby a standardised key element of the program focuses on Foundational Knowledge, Essentials for Practice and Care, and Approach to Practice and Care (29). Rim C et al concluded 68% of US institutions offering PharmD agreed contraception content covered in the program is sufficient, whereas 96% of the institutions covered a spectrum of contraceptive types through real case studies (30). Due to the scarcity of Malaysian institutions offering PharmD, most of undergraduate pharmacy students who desire for further training in this area must seek for overseas college enrolment, as evidenced by limited PharmD graduates (31). In our study, some of the participants had an exposure to dispensing contraception during the community pharmacy attachment in the third to fourth year. The current Malaysian BPharm programme standard has outlined a 'community pharmacy' subject as part of mandatory pharmacy practice core courses and community pharmacy attachment as the most suggested form of teaching and learning methodologies to achieve the course learning outcomes (32). Through community pharmacy attachment, the pharmacy students may comprehend more about EC dispensing and counselling while having a rich experience through real case observations. Otherwise, further assessment of curriculum of BPharm and refinement of policy is mandated to allow more training and attachment at maternal health clinics and National Population and Family Development Board Malaysia (NPFDB) clinics that are the main facilities for contraception provision nationwide (33), as to allow insightful practicality and dispensing practice of EC among the pharmacy students.

The Pharmaceutical Services Division, Ministry of Health of Malaysia exemplifies its progressive commitment to ensure quality healthcare, in line with the United Nations Sustainable Development Goal (UN SDG 3; good health and well-being) by taking the next step with the Know Your Medicine program (34). With the aim of spreading awareness on the quality use of contraception, pharmacists are the frontliners in advocating correct information about contraception and its use through various platforms, such as serial information updates in the Know Your Medicine and MyHealth portal (34,35), educational programmes and webinars, road shows, as well as community and social engagement programmes (34). However, our finding revealed most of the participants were informed of EC from the internet, followed by pharmacists, friends, doctors, family, and others. Unfortunately, quality of online information on EC is poor, with most websites failing to provide complete information about EC (36). Up to the present day, website discussions regarding contraception were discussed at superficial level, but less comprehensive coverage on EC use as one of the choices for contemporary "birth control" and "family planning." (34,35). IUD, the most effective EC, was the least discussed EC option. This could be because

IUD insertion is not a common practice, particularly in Malaysia, due to the absence of a clinical practice guideline for IUD insertion in Malaysia (37). With the poor CPR rate, these platforms should be fully utilised to disseminate detailed information on the key aspects of EC use (i.e., types of EC, timing, effectiveness and availability, safety and side effects, psychological and emotional support for users). Pharmacists are the second-highest source of EC information among pharmacy students in Malaysia. Even though EC pills are highly accessible in pharmacies, less than half of the participants sought out pharmacists for information compared to the internet. The finding is comparable to another study assessing the same topic (37,38). This could be due to the fear of judgement, as some pharmacists of Malay ethnicity strongly reject the idea of abortion (39), and it has been found that Malaysian pharmacists lack the correct knowledge of EC, making them mistake the EC pill for the abortion pill (5).

Our participants showed an average perception of EC with a mean score of 36.8 from 50, which is better than several studies assessing the same topic (16,39,40). The finding is in line with a study from India, in which the students have a favourable attitude toward EC despite a low level of knowledge (20,42). However, it is concerning that 41.7% of participants agree, while 21.1% remain neutral, that they will refer the patient to another pharmacist if they feel uncomfortable dispensing EC. The statement is significantly associated with institution type, with public institutions being more likely to do so than private pharmacy schools. The finding contradicts the finding from India, as 62.9% of their participants from private institutions have positive attitude regarding EC (42). However, the result is more likely biased as only a small proportion of private institution (N=30, 8.5%) students participate in the survey compared to public institution students. Regarding confidence in dispensing EC, 77.4% of participants expressed that they are comfortable giving counselling on EC, and 68.2% are confident in their ability to provide EC and counsel individuals in need on how to use it properly. The Malaysian pharmacy student felt more confident in counselling patients on EC than the Arkansas pharmacy student (13). However, an exploratory study assessing their level of confidence in dispensing and counselling practice in the community pharmacy settings shall be conducted to reflect an accurate representation of the competency level.

The findings show 11.3% of participants express their intention to avoid dispensing EC in the future. This statement is significantly associated with gender, institution type, residence area, and prior knowledge of EC. Participants who live in rural areas are more likely to refuse dispensing EC compared to those from urban and suburban. The finding contradicts India's finding (24) and Ethiopia's study (25) which mentioned no difference in attitude between rural and urban pharmacists in

dispensing hormonal contraception. More future studies could investigate the issue and establish the relationship between the two variables, if any (43). Although there are limited studies showing a direct association between residential location and attitude, pharmacy practice can exhibit variations between urban and rural locations due to differences in patient demographics, healthcare infrastructure, and access to resources (44). It was shown that 75% of pharmacists have good dispensing practices in EC if the location of the community pharmacies is in an urban or city area (45). However, a recent study carried out in the United States revealed that rural women do not receive adequate counselling on emergency contraception from pharmacists (46). A systematic review concluded that rural pharmacists provided more professional services, had better working relationships with prescribers, and were more inclined to assume new professional roles and provide a higher level of service (47). In Malaysia, it is estimated that around 25% of the population has unmet contraceptive needs, with some of these individuals residing in rural or urban slum areas (3). There is a pressing need for future research to investigate factors associated with this issue, identify potential obstacles to emergency contraception use among affected populations, and develop effective strategies to address these challenges. These findings hold significant importance for reshaping reproductive health practices and policies, including those relevant to minors.

In addition, our respondents have no issue dispensing EC as it is their professional responsibility, but the same result was not observed in an Australian setting, whereby the pharmacy students feel discomfort in supplying EC on moral or religious grounds (48). There seems to be an existence of moral, religious, professional, and ethical values that contradict EC provisions. Nevertheless, none of the respondents claimed that they would decline supply if asked for EC, suggesting that their moral or religious discomfort would not override their perceived professional obligation to supply. On the other hand, we found that only 16.0% of participants feel uncomfortable dispensing EC due to moral or religious reasons. This might be due to misconception that the contraception pill is akin to the abortion pill, which is not permissible in Islam, Hinduism, Christianity, and most of the religion (49).

There are several limitations to this study. When assessing knowledge using an online questionnaire, we acknowledge the possibility that respondents may search for answers on the internet. While participants' responses and how they answer the questionnaire are beyond our control, we recognise this as a potential limitation of our study. Future studies could employ some strategies including providing clear instructions emphasizing the importance of accurate self-reporting, randomizing the order of questions to reduce answer sharing, designing a mix of straightforward and

application-based questions, and assuring participants of the anonymity and confidentiality of their responses. The conclusions were reached using a convenience sample, with most participants from public institutions (91.5%) and only 8.5% from private pharmacy schools. Although these results might not represent pharmacy students nationwide in Malaysia, we hope that the research's conclusions are significant enough for future use and action, as the study provides valuable insight into the knowledge and perception of EC among pharmacy students in Malaysia. A more balanced sampling strategy should be implemented in future research to resolve this limitation. This strategy may involve the use of stratified random sampling to guarantee proportional representation from both public and private institutions. Furthermore, measures should be implemented to identify and alleviate the specific factors that contribute to the lower response rate from private institutions, thereby improving the overall validity and reliability of the study's conclusions.

## CONCLUSION

This research indicates that pharmacy students in Malaysia possess inadequate knowledge and only a moderate perception of emergency contraception (EC). It highlights the need for policy changes in pharmacy education, particularly addressing curriculum enhancement, continuous development programme for pharmacy students, and better access to resources. These policy changes can contribute to improved public health outcomes and empower pharmacists to play a more effective role in sexual and reproductive health education and services.

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