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Knowledge and practice of community pharmacists about medication use during pregnancy in Erbil city

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Abstract

Background and objective: Community pharmacists, as the most accessible healthcare providers, have an important role in ensuring the safe use of medications during this period; that's why they must have optimal knowledge. This study aims to assess the knowledge and practice of community pharmacists in Erbil City regarding safe medication use and their relationship with sociodemographic characteristics of the community pharmacists.

Methods: A cross-sectional study was conducted among community pharmacists who work in Erbil City, Kurdistan Region, Iraq. A total of 350 community pharmacists were selected by convenience sampling method for interviews using a structured questionnaire on medication safety during pregnancy. SPSS version 26 was used for data entry and analysis. A P-value of ≤0.05 is regarded as statistically significant.

Results: Out of the total participants (n=350), more than half (51.4%) were between the ages of 26 and 30 years, and 58.6% and 52.3% were female and single, respectively. About 91% of participants held a bachelor's degree in pharmacy, and 63.7% had less than 5 years of experience. The study found that 49.7% of respondents had good knowledge and 51.7% had safe practices. Age and marital status were significantly associated with knowledge (P-value: 0.009 and 0.005, respectively), and gender was significantly associated with practice level, P = 0.002.

Conclusion: Although approximately half of the pharmacists had good knowledge and safe practice in handling pregnancy medications, the remaining half of them lacked essential skills that may influence the quality of the care received by patients. Therefore, we need special educational interventions to fill in gaps and ensure safer maternal health outcomes.

Keywords: Community Pharmacists, Medication, Knowledge level, Practice level, Pregnancy.

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Introduction

Even though ongoing challenges exist when it comes to treating pregnant women due to passing the drug to the fetus through the placenta, certain pre-existing conditions in pregnant women, such as epilepsy, diabetes, and asthma, necessitate ongoing treatment with medications. While multiple potential medical issues arise during pregnancy that did not exist before, including gestational hypertension and diabetes, headaches, vomiting, and heartburn (1, 2).

The safety and effectiveness assessment of therapies used during pregnancy relies on available information. The U.S Food and Drug Administration (FDA) drug label serves as the criterion standard for these pregnancy safety and effectiveness data. The FDA examines both new and existing medications to assess their safety potential while offering pregnancy and lactation-related recommendations (3).

Community pharmacists maintain fundamental responsibility to guide pregnant women alongside ensuring their medication safety (4). The accessibility of pharmacists as healthcare providers leads pregnant women to regularly seek their advice regarding medication utilization thus establishing the necessity of pharmacist knowledge and practice in medication counseling for this population (5).

Multiple drug classification systems have emerged throughout time to offer healthcare professionals proper guidance for their clinical decisions. The U.S. FDA classification system (old categories A, B, C, D, X) operates together with the Pregnancy and Lactation Labeling Rule, Australian Therapeutic Goods Administration (TGA) system and European Medicines Agency (EMA) guidelines (6-8).

The FDA's old classification system is predominantly taught in pharmacy curricula in local institutions in Erbil, making it reasonable to believe that community pharmacists possess better familiarity with this system when compared to newer categorization approaches. That's why this study uses the FDA's outdated classification framework in the questionnaire development.

Despite the vital role community pharmacists play in counseling pregnant mothers on the delicate matter of medication use during pregnancy, which necessitates additional caution to safeguard both the mother and her unborn child, the regional assessment of pharmacy practice in this critical field remains inactive since no extensive research has been conducted in Erbil City and the broader Kurdistan region. Although patient-side studies, such as one examining over-the-counter medication use among pregnant women in Duhok city, have highlighted the

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extent of unsupervised medication use in the region (17), pharmacist-side knowledge and practice remain unexamined locally.

This study aims to evaluate the knowledge and practices of community pharmacists in Erbil City regarding medication use during pregnancy, highlighting areas needing improvement. The findings will help inform training and policies to enhance pharmacist competency and improve maternal and fetal health in the region.

Subjects and Methods

This descriptive cross-sectional study was carried out among community pharmacies in Erbil City, Kurdistan Region/Iraq, and spanned approximately 8 months, starting in October 2024 and ending in May 2025. The research population consisted of licensed community pharmacists who currently practice at community pharmacies in Erbil City. The sample size was calculated by using statistical software (Epi Info version 7). Based on information from the Erbil Branch of the Syndicate of Kurdistan Pharmacists, the estimated sample size was initially calculated to be 317, but it has been increased to 350 to mitigate the risks associated with nonresponse and missing data occurrences. This adjustment is based on an expected frequency of 50%, a confidence interval level of 95%, and a margin of error of 5%. The convenience sampling method was used to select participants. The study included working community pharmacists registered at the Erbil City Syndicate with a minimum of one year of experience. However, community pharmacists who were unavailable or did not consent to participate were excluded from the study.

A well-designed, pre-validated research questionnaire was used for the purpose of data collection. This period started following the pilot study, spanning from November 1st to February 15th. It encompassed face-to-face interactions during visits to community pharmacies in Erbil City, offering direct communication and prompt elucidation to enhance question understanding.

The questionnaire consisted of 3 main sections: the Sociodemographic Information Section, which obtained fundamental details from respondents, such as age, gender, marital status, pharmacy experience in years, and education level. The Knowledge Assessment Section required participants to first recognize FDA pregnancy drug risk categories, and then in the second component, they were provided with a list of 47 drugs, which included prescription medications, over-the-counter products, supplements, and herbal drugs. Pharmacists assessed drug safety by labeling medications as "safe" if they believed the drug belonged to Categories A or B, while they labeled

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them as "not safe" if they thought it fell into Category C, D, or X. They could mark "not sure" as an option when they had doubts regarding drug safety.

The last section was the Practice Assessment Section, which contained seven practice-based questions to examine pharmacists' approaches to counseling pregnant women along with their choice-making practices and the educational resources they use to give advice.

The total knowledge score ranged from 0 to 51, with the median score of 33 being used to classify participants into two groups: good knowledge level (≥33) and insufficient knowledge level (<33). The total practice score ranged from 0 to 7, with the median score of 4.14. Participants scoring above the median were categorized as in the safe practice group, while those below the median were in the unsafe practice group.

Ethical Consideration: Before starting the study, written ethical approval was received from the research ethics committee of the College of Pharmacy in October 2024. All participants provided their verbal consent through voluntary participation before the study started, ensuring they understood the research's aims and remained anonymous.

Data analysis: SPSS version 26 was used for data entry and analysis. Two approaches were used: first, using descriptive statistics to find out the frequencies, percentages, medians, and standard deviations of the variables, and second, using analytic statistics like the chi-square test for categorical variables. The significance level was set at $P \leq 0.05$.

Results

Out of the total participants (n = 350), most of the pharmacists (180; 51.4%) were between the ages of 26 and 30 years, with a mean age of 29.06±5.08 years. The gender distribution showed that most of the respondents were females (205; 58.6%), and the female-to-male ratio was 1.41:1. The majority were single (183; 52.3%), possessed a bachelor's degree in pharmacy (318; 90.9%), and had less than 5 years of experience (223; 63.7%). Additionally, a significant portion (141; 40.3%) reported seeing between 0 and 5 pregnant patients per week, and 20.3% of the respondents had participated in a training course, while 79.7% had not, as shown in Table 1.

The level of knowledge of community pharmacists is demonstrated in Figure 1 below, which shows how much CPs know about FDA pregnancy drug risk categories, with category X having the highest correct recognition rate at 71.7%. The knowledge results are further presented in Table 2 and Table 3, which display the percentages of correct answers from participants for over-the-counter (OTC) drugs and prescription-only medications (POM),

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respectively. The study found that overall, 49.7% of respondents had a good knowledge level and 50.3% had a poor knowledge level, which is shown in Figure 2.

Table 1. Sociodemographic characteristics (n = 350)

Characteristics	No.	Percentage (%)
Age		
<25	77	(22.0)
26-30	180	(51.4)
31-35	54	(15.4)
36-40	34	(9.7)
>40	5	(1.4)
Gender		
Males	145	(41.4)
Females	205	(58.6)
Marital status		
Single	183	(52.3)
Married	159	(45.4)
Divorced/widowed	8	(2.3)
Years of Experience as a pharmacist		
< 5	223	(63.7)
6 - 9	63	(18.0)
10 -14	49	(14.0)
15-19	12	(3.4)
≥ 20	3	(0.9)
level of education		
Bachelor's degree in pharmacy	318	(90.9)
Master's degree in pharmacy	25	(7.1)
Doctorate degree in pharmacy	7	(2.0)
Average No. of pregnant patients visiting your pharmacy each week		
0–5	141	(40.3)
6–10	68	(19.4)
11–15	50	(14.3)
16–20	51	(14.6)
More than 20	40	(11.4)
participation in training course		
yes	71	(20.3)
no	279	(79.7)
Total	350	(100.0)

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Table 2. knowledge of community Pharmacists towards Safety of over-the-counter (OTC) drugs (n = 350)

Drug Name	Correct Answers No. (%)
Acetaminophen	345 (98.6)
Aspirin	80 (22.9)
Guaifenesin	169 (48.3)
Dextromethorphan	177 (50.6)
Pseudoephedrine	243 (69.4)
Diphenhydramine	277 (79.1)
Loratadine	266 (76)
Cetirizine	196 (56)
Famotidine	196 (56)
Omeprazole	130 (37.1)
Ferrous gluconate	232 (66.3)
Folic acid	347 (99.1)
Magnesium sulfate	74 (21.1)
Vitamin A	282 (80.6)
Castor oil	205 (58.6)
Senna	188 (53.7)

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Table 3. knowledge of community Pharmacists towards Safety of prescription-only-medications (POMs) (n = 350)

Drug Name	Correct Answers No. (%)
Pantoprazole	198 (56.6)
Ondansetron	297 (84.9)
Metoclopramide	152 (43.4)
Enoxaparin	288 (82.3)
Amoxicillin	338 (96.6)
Ceftriaxone	250 (71.4)
Cefixime	282 (80.6)
Meropenem	135 (38.6)
Azithromycin	228 (65.1)
Ciprofloxacin	237 (67.7)
Tetracycline	294 (84.0)
Metronidazole	222 (63.4)
Fluconazole	205 (58.6)
Acyclovir	160 (45.7)
Mebendazole	192 (54.9)
Insulin	280 (80.0)
Metformin	263 (75.1)
Methyldopa	317 (90.6)
Enalapril	246 (70.3)
Atorvastatin	228 (65.1)
Isotretinoin	331 (94.6)
Oral contraceptives	302 (86.3)
Duphaston (Dydrogesterone)	282 (80.6)
Inhaled Salbutamol	71 (20.3)
Inhaled Budesonide	145 (41.4)
Valproic acid	235 (67.1)
Carbamazepine	229 (65.4)
Sertraline	199 (56.9)
Citalopram	191 (54.6)
Paroxetine	194 (55.4)
Alprazolam	221 (63.1)

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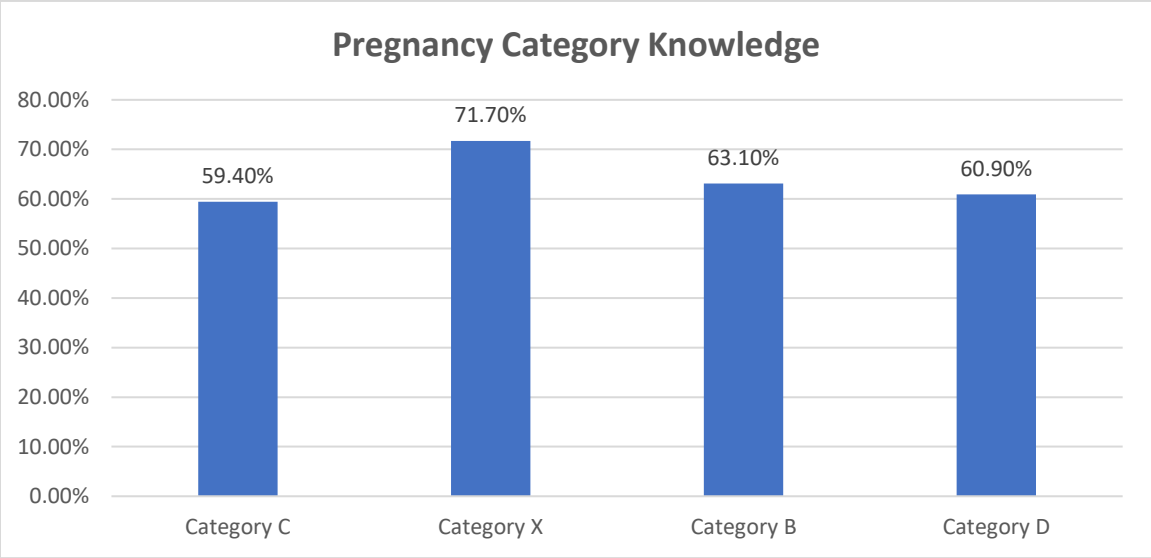

Figure 1. Knowledge of community pharmacists towards FDA pregnancy categories. (n = 350)

Figure 2. Distribution of Knowledge Levels Among Participants

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The practice of community pharmacists is summarized in Table 4; the responses to seven practice-related questions are shown to assess how CPs manage medication use during pregnancy. The study found that overall, 51.7% of CPs claimed adherence to safe practices, while 48.3% engaged in unsafe practices, as shown in Figure 3.

The association between socio-demographic characteristics, optimal knowledge, and safe practice is shown in table 5, and it has been demonstrated that age and marital status were significantly associated with knowledge levels, while gender was significantly associated with practice levels. Finally, a statistically significant association was found between practice level and knowledge (P = <0.001). Among pharmacists engaging in unsafe practices, 59.7% had poor knowledge, while 36.8% possessed good knowledge. A larger proportion, 63.2%, of those claiming to practice safely exhibited good knowledge, in contrast to 40.3% of those who demonstrated poor knowledge, as shown in Figure 4.

Table 4. Practice of community pharmacists about medication use during pregnancy (n = 350)

No.	Practice Question	Response Options	No. (%)
1	How often do you check pregnancy status before dispensing meds?	Always	136 (38.9)
		Frequently	83 (23.7)
		Sometimes	83 (23.7)
		Rarely	47 (13.4)
		Never	1 (0.3)
2	What is your course of action when a pregnant woman requests advice?	Refer to doctor	102 (29.1)
		Based on knowledge	150 (42.9)
		Check references	96 (27.4)
		Ask colleague	2 (0.6)
3	How do you handle uncertain safety data in prescribed meds?	Consult reference	100 (28.6)
		Contact doctor	143 (40.9)
		Suggest alternative	50 (14.3)
		Refuse	57 (16.3)
4	Do you update your knowledge on meds during pregnancy? How?	Seminars/workshops	34 (9.7)
		Journals/guidelines	65 (18.6)
		Online sources	156 (44.6)
		Do not update	52 (14.9)
		Rely on old knowledge	43 (12.3)

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5	How do you counsel about risks and benefits?	Explain both	144 (41.1)
		Focus on risks	60 (17.1)
		Focus on benefits	31 (8.9)
		Refer to doctor	55 (15.7)
		Only if asked	60 (17.1)
6	How do you handle refusal to take a prescribed med?	Discuss with patient	190 (54.3)
		Inform doctor	83 (23.7)
		Suggest alternatives	32 (9.1)
		Others	45 (12.9)
7	How do you monitor effectiveness and side effects?	Follow-up	40 (11.4)
		Patient feedback	124 (35.4)
		Collaborate with doctor	37 (10.6)
		Others	149 (42.6)

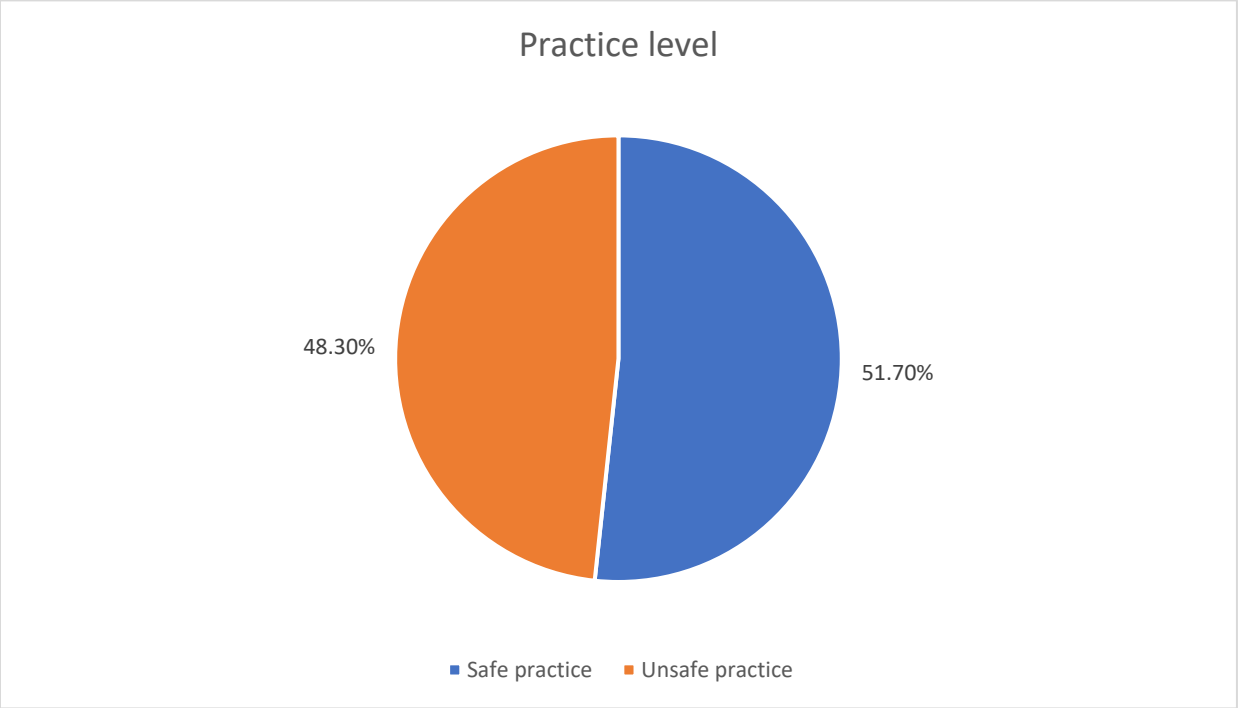

Figure 3. Distribution of Practice Levels Among Participants

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Table 5. Association Between Socio-Demographic Characteristics, Optimal Knowledge and Safe Practice (N = 350)

Characteristics	Optimal Knowledge		P-Value	Safe practice		P-value
	No.	%		No.	%	
Age						
≤ 30	117	(45.5)	0.009	137	(53.3)	0.321
>30	57	(61.3)		44	(47.3)	
Gender						
Male	75	(51.7)	0.527	61	(42.1)	0.002
Female	99	(48.3)		120	(58.5)	
Marital Status						
Single	77	(42.1)	0.005	92	(50.3)	0.129
Married	94	(59.1)		82	(51.6)	
Divorced	3	(37.5)		7	(87.5)	
Experience Years						
≤15	170	(49.7)	1	178	(52.0)	0.490
>15	4	(50)		3	(37.5)	
Level of Education						
Bachelor's degree	152	(47.8)	0.073	162	(50.9)	0.375
Master's degree	17	(68)		16	(64.0)	
Doctorate degree	5	(71.4)		3	(42.9)	

Note: Chi-square test was used for most comparisons; Fisher's Exact Test was applied where more than 20% of expected cell counts were less than 5.

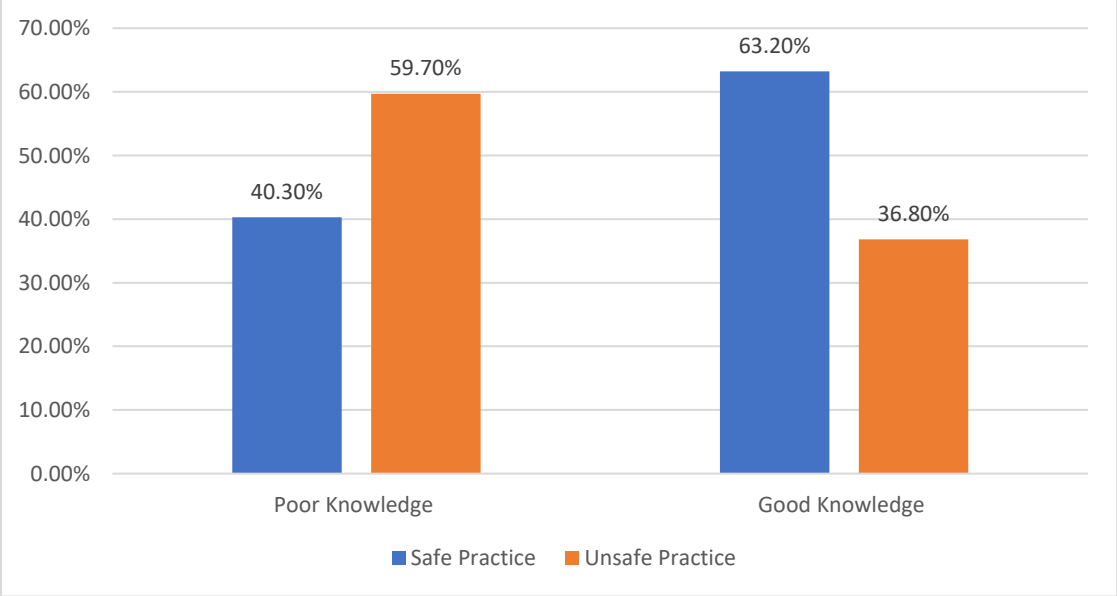

Figure 4. Association Between Practice Level and Knowledge Level (N = 350)

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Discussion

The fundamental responsibilities of community pharmacists include patient care, particularly for vulnerable populations, such as pregnant women. They serve as key information sources due to their frequent interactions with patients and accessible services; hence, they facilitate their participation in medication counselling and overall health support for pregnant mothers (9).

This research aimed to assess pharmacists' knowledge and practices about medication usage during pregnancy, as well as investigate the knowledge gap, existing practices, and future needs of community pharmacists addressing drug safety in this context.

The FDA formerly classified medications according to their teratogenic risk using a five-category system (A, B, C, D, and X). Drugs classified as D and X are often regarded as having the greatest potential for inducing fetal damage. Numerous pharmaceuticals used for managing disorders such as hypertension and seizures are classified under these categories (10-12).

It is crucial to acknowledge that some drugs with varying ratings may still induce fetal harm, contingent upon the timing of administration during pregnancy and the dose (13). Organogenesis happens throughout the first trimester, rendering this the most susceptible stage. Nonetheless, some drugs, like angiotensin-converting enzyme (ACE) inhibitors, have a fetal impact later in gestation. Medications with established teratogenic risk (e.g., captopril or bosentan) should be avoided in favor of safer options; however, the administration of other drugs during pregnancy may need a more sensitive approach (13).

A significant percentage of CPs in this study recognized medications with potential teratogenic effects, including isotretinoin, ACE inhibitors, statins, valproic acid, paroxetine, alprazolam, tetracyclines, senna, and oral contraceptives, which are deemed unsafe during pregnancy.

When compared to other studies conducted in Saudi Arabia (2017), CPs in this study demonstrated enhanced knowledge of the teratogenic risks associated with paroxetine and valproic acid as contraindicated during pregnancy (5). Similarly, a study in Al-Najaf city, Iraq (2023), showed lower rates of correct identification for the teratogenicity of alprazolam, senna, and statins (14).

The proportion of accurate replies about the most administered medicines during pregnancy exceeds that for teratogenic substances. In this study, acetaminophen (98.6%), amoxicillin (96.6%), and folic acid (99.1%) exhibited the greatest percentages of accurate responses, indicating their safety for usage during pregnancy. This is similar

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to research in developing countries (2024), where most CPs identified folic acid (99.5%), paracetamol (98.1%), and amoxicillin (98.1%) as safe (15).

Other OTC drugs, such as guaifenesin, pseudoephedrine, dextromethorphan, and magnesium sulfate, showed similar trends with a slight difference. However, the knowledge rate of identifying these drugs fell below the findings from the current study, in contrast to the identification rate of ferrous gluconate (94.2%) and famotidine (88.9%), which is better than the current study (15).

Unfortunately, merely 22.9% of pharmacists acknowledged the safety concerns associated with aspirin use during pregnancy. While this percentage is observed to be higher in developing countries, which is equal to 36.7%, it is lower in Al-Najaf city, which corresponds to 20% (1, 15).

Community pharmacists who are older than 30 years (61.3%) and those who are married (59.1%) were significantly (P-value: 0.009 and 0.005, respectively) associated with having optimal knowledge; however, female pharmacists (58.5%) were significantly associated with practicing safely, P = 0.002.

Level of education is also shown to have a positive effect on optimal knowledge level with a P-value that is not statistically significant. As seen in Table 5, the CPs with doctorate and master's degrees show better knowledge levels than those who only have bachelor's degrees.

Compared to a study conducted in Anantapur district, India (2019), optimal knowledge and safe practice were significantly associated with older age, urban areas, higher qualifications, and more years of experience, while gender was only significantly associated with attitude, not with knowledge or practice (16). A comparable knowledge-attitude-practice survey of 350 pharmacists in Erbil similarly found associations between sociodemographic characteristics and pharmacists' knowledge, further supporting the demographic patterns observed in this study (18).

Face-to-face interactions in the study increase the risk of response bias, as participants may provide socially acceptable answers instead of honest ones. Additionally, because this is a cross-sectional study, its generalizability may be limited due to the focus on community pharmacists in Erbil City.

Conclusion

Although in the current study, approximately half of the pharmacists had good knowledge and safe practice in handling pregnancy medications, the remaining half of them lacked essential knowledge and skills that may influence the quality of the care received by patients. This suggests that training programs should be tailored to address

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the basic needs of fresh graduates under 30 who hold bachelor's degrees, with an emphasis on enhancing both their knowledge and safe practice levels. Making these changes is challenging and needs hard work, teamwork, and time from groups like universities, syndicates, drug companies, and pharmacy managers to create ongoing programs and make it obligatory for all to participate. However, before that, quick steps can be taken to help CPs learn about safe medication use during pregnancy, such as offering free educational programs, workshops, and seminars on this topic and providing easy access to medication software for reliable safety information about the drugs.

Competing interest

The authors declare that they have no competing interests.

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