
Community pharmacists' and assistant pharmacists' perspectives on non-prescription analgesics in Erbil: a cross-sectional study

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ABSTRACT

Background and objectives: Community pharmacists play a crucial role in providing counselling on self-medication using non-prescription analgesics (NPAs); ensuring pharmacy staff have adequate expertise is critical for safe and effective patient care. This study aimed to assess the knowledge of pharmacists and assistant pharmacists in Erbil City regarding NPAs.

Methods: A cross-sectional survey was conducted among 400 community pharmacy staff in Erbil. A structured questionnaire assessed demographic characteristics and knowledge of NPAs, including their uses, side effects, interactions, and appropriate populations. Chi-square tests were used to explore associations between knowledge level and participant characteristics.

Results: The majority of participants (90.3%, n = 361) demonstrated sufficient knowledge of NPAs, while a smaller percentage (9.8%, n = 39) had poor knowledge. Significant gaps were found in pediatric dosage, NSAID interactions, and use in high-risk populations. Gender ($p = 0.006$) and academic degree ($p < 0.001$) were significantly associated with knowledge level. Female participants had significantly higher knowledge than males (93.8% vs. 85.0% sufficient knowledge, respectively), and bachelor's degree holders also had significantly higher knowledge than diploma and postgraduate participants (93.8%, 86.8%, and 57.1% sufficient knowledge, respectively).

Conclusion: Community pharmacy professionals in Erbil demonstrated sufficient knowledge regarding NPAs overall, but gaps in safety-related knowledge remain that could put patient care at risk. To close these gaps, those in non-clinical roles and postgraduates should receive specialized training and participate in ongoing education.

Keywords: Community pharmacists, Assistant pharmacists, Non-prescription analgesics

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INTRODUCTION

Pain can be classified as acute or chronic. Acute pain is caused by tissue damage and involves multiple systems, while chronic pain is characterized by inflammation in the brain, spinal cord, and peripheral regions, reducing pain thresholds (1). According to a 2002-2004 World Health Survey, 28% of the population worldwide reported having pain (2). Pain is a worldwide issue that affects everyday activities, healthcare, economic systems, and quality of life (3).

Non-prescription analgesics (NPAs) are drugs that the general population can obtain without a prescription. They are available in different countries and come in different brands, dosages, formulas, and container sizes (4). Opioids are often combined with other CNS-active medications to treat comorbid diseases and improve analgesic efficacy in chronic pain patients; gabapentinoids can also be used as an opioid adjuvant (5). According to clinical standards, NPAs are recommended for common pains such as postoperative pain, tension-type headaches, migraines, osteoarthritis, general and acute back pain, and tooth pain. Because topical NSAIDs are more effective and have fewer adverse effects, they are advised for joint discomfort, and special care is frequently taken when dealing with vulnerable groups (6, 7).

Overdosing is a major concern with paracetamol, a commonly used analgesic with a narrow therapeutic index, which can result in hepatotoxicity, making it the leading cause of acute liver failure and catastrophic poisoning episodes in developed countries (8). Paracetamol and other NPAs can be misused for self-diagnosis and self-treatment, resulting in symptomatic care that fails to address the underlying issue. Multiple formulations used in polypharmacy may result in

acute toxicity. In severe cases, liver transplantation is the only effective treatment for acute liver failure caused by a paracetamol overdose (9).

Medication overuse headache (MOH) affects 1% to 2% of the population worldwide, impacting 63 million people. Cultural norms, regional prescription trends, medicine availability, and pricing all influence MOH development; prochlorperazine, ergotamine, caffeine, and paracetamol are frequently implicated (10). NPAs like ibuprofen and paracetamol are commonly used for pregnancy-related pain, but they can cross the placental barrier, potentially affecting the developing fetus (11).

NSAIDs like ibuprofen are commonly used in pediatrics to relieve pain and fever. However, the different dosages for newborns between three and six months raise concerns about age-related pharmacokinetics and safety, since ibuprofen may induce transient kidney failure and renal vasoconstriction, and is contraindicated in infants with renal impairment (12).

Community pharmacy professionals — pharmacists and pharmacy technicians — prepare medications, assist with the entire process of obtaining, receiving, storing, and distributing them, and counsel patients and medical professionals on how to use them correctly (13). Community pharmacists play a crucial role in guiding the public on health-related concerns, including advice on NPAs. However, challenges include other medical professionals' resistance to pharmacists taking on more responsibilities, along with pharmacists' own competence and motivation to embrace change (14).

NPAs are frequently used in public settings; however, improper usage or administration can have major negative health effects. Community

pharmacy employees have a vital role in promoting safe and effective use, particularly in locations with little regulatory control. However, the level of knowledge that pharmacy staff in the Kurdistan region hold regarding the pharmacological mechanisms, safety profiles, and indications of these medications has not been extensively studied. This study aims to evaluate pharmacists' and assistant pharmacists' understanding of non-prescription analgesics while employed at community pharmacies in Erbil City.

METHODS

Study Design and Setting

This cross-sectional study was conducted from October 2024 to April 2025 in community pharmacies in Erbil city center, Kurdistan Region of Iraq.

Sampling Method

This study used a cluster sampling method. Erbil city was divided into 108 geographic quarters based on administrative divisions from the Ministry of Municipality and Tourism map. From these, 37 quarters were randomly selected using a simple lottery method. Approximately 200 pharmacies were located within the selected quarters. In each pharmacy, any available and willing pharmacist or assistant pharmacist was invited to participate using a convenience sampling approach. Inclusion criteria were licensed pharmacists or assistant pharmacists actively working in the selected pharmacies and willing to participate; individuals who were not pharmacists or assistant pharmacists were excluded.

Study Population and Sample Size

The study targeted pharmacists and assistant pharmacists actively working in community pharmacies across Erbil city center. According to

data obtained through direct communication with the Kurdistan Pharmacy Syndicate, approximately 500 community pharmacies were officially registered in Erbil city center at the time of the study. Since chain pharmacies generally employ more than one staff member, the total number of pharmacy staff was estimated at around 650 individuals.

The sample size was determined using the Epi Info sample size calculator, based on an expected knowledge proportion of 25%, derived from a previously published study conducted in Erbil that assessed pharmacy staff's knowledge of over-the-counter medications, consistent with a more recent Erbil-based assessment of pharmacists' knowledge, attitude, and practice toward over-the-counter medications (15, 16). A confidence level of 95%, a margin of error of 5%, and a design effect of 2 (to account for the cluster sampling method) were used. Based on these parameters, the required sample size was calculated at approximately 400 participants, which was achieved in the study.

Data Collection Instrument

Data were collected using a structured questionnaire from January 2025 to April 2025, consisting of two main sections:

Demographics (15 items): covered variables such as gender, age, professional position, years of experience, education level, type of pharmacy, average patient load, language proficiency, syndicate registration, and more.

Knowledge section (10 multi-part items): focused on NPAs, including commonly dispensed agents, therapeutic indications, mechanisms of action, adverse effects, safety in special populations, dosing limits, and the definition of pain. Most knowledge questions had multiple correct answers and required participants to select all that applied.

The questionnaire was developed by the researcher, partially adapted from prior studies and partially composed of original content. It was reviewed and validated by pharmacy experts, with substantial adjustments made based on their feedback. A pilot study involving nine pharmacists was conducted to evaluate clarity, content validity, and feasibility.

The questionnaire was administered in English, as English is the primary language of pharmacy education and professional reference in Iraq, particularly for pharmacists and assistant pharmacists. To address potential variability in English proficiency, on-site clarification was provided for any misunderstood questions, and follow-up visits were conducted to ensure all participants completed the questionnaire accurately and confidently.

Scoring and Outcome Measures

The knowledge section responses were scored with a maximum possible total of 37 points; each correct response counted as one point. Based on expert opinion from academic supervisors, knowledge levels were initially categorized as poor knowledge (≤ 12 points), moderate knowledge (13-24 points), and good knowledge (≥ 25 points), but because only a few participants reached the good knowledge level, moderate and good knowledge were combined and presented as "sufficient knowledge" for further analysis.

Data Analysis

Data were entered and analyzed using IBM SPSS Statistics version 25. Descriptive statistics (frequencies and percentages) were used to summarize demographic data and knowledge responses. The number and percentage of

participants who answered each knowledge item correctly were calculated. Associations between demographic variables and knowledge level were assessed using Chi-square tests. A p-value ≤ 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Ethical Committee of Hawler Medical University. Verbal informed consent was obtained from all participants before survey distribution. Participation was voluntary, and all responses were kept anonymous and confidential.

RESULTS

A total of 400 employees from community pharmacies participated in the survey. With 56.8% ($n = 227$) female and 56.5% ($n = 226$) aged 25 or younger, the sample was comparatively young. Most participants (77.0%, $n = 308$) had five or fewer years of professional experience. A majority of participants (59.0%) were pharmacists; the remaining 41.0% were assistant pharmacists.

With only 1.8% and 0.3% of participants holding master's or doctoral degrees, respectively, most participants' educational attainment fell at the bachelor's (56.3%) and diploma (41.8%) levels. These findings are detailed in Table 1.

Table 1. Sociodemographic characteristics of the participants (n = 400)

Variable	Category	Freq.	%
Gender	Male	173	43.3
	Female	227	56.8
Age	≤25 years	226	56.5
	≥26 years	174	43.5
Position	Pharmacist	236	59.0
	Assistant Pharmacist	164	41.0
Marital status	Single	254	63.5
	Married	146	36.5
Residence	Urban	361	90.3
	Suburban	39	9.8
Degree	Diploma	167	41.8
	Bachelor's in Pharmacy	225	56.3
	Master's in Pharmacy	7	1.8
	PhD	1	0.3
Degree source	Public university	166	41.5
	Public institution	95	23.8
	Private university	77	19.3
	Private institution	50	12.5
	Abroad	12	3.0

Regarding professional affiliation, 26% of respondents reported no syndicate affiliation, 23.5% were registered with the Kurdistan health staff syndicate, and 50.5% were registered with the Kurdistan pharmacy syndicate. Detailed professional characteristics are shown in Table 2.

Table 2. Professional characteristics of participants (n = 400)

Variable	Category	Freq.	%
Patients/day	Less than 50	171	42.8
	50-100	173	43.3
	More than 100	56	14.0
Public sector job	Yes	157	39.3
	No	243	60.8
Pharmacy type	Chain (1-5)	70	17.5
	Chain (>5)	125	31.3
	Single pharmacy	205	51.2
Experience	≤5 years	308	77.0
	≥6 years	92	23.0
Weekly hours	<20 hours	81	20.3
	21-40 hours	159	39.8
	>40 hours	160	40.0
Staff same shift	Yes	298	74.5
	No	102	25.5
Syndicate	Pharmacy syndicate	202	50.5
	Health staff syndicate	94	23.5
	Not registered	104	26.0
Languages	Kurdish	373	93.3
	Arabic	293	73.3
	English	286	71.5
	Turkish	60	15.0

Of 400 participants, 90.3% (n = 361) demonstrated sufficient knowledge of non-prescription analgesics, while 9.8% (n = 39) had poor knowledge, as shown in Figure 1. Overall, participants showed a generally sufficient understanding of NPAs, particularly regarding the most commonly dispensed medications and their therapeutic uses. They demonstrated strong awareness of appropriate indications such as mild to moderate pain and fever, and accurately identified the unavailability of certain prescription-only drugs like codeine.

Knowledge of correct dosing — such as the maximum recommended amount of paracetamol — was also relatively high. Participants were more

confident identifying major side effects of NSAIDs, such as gastrointestinal bleeding and kidney impairment, than less common symptoms such as headaches. Recognition of acetaminophen overdose consequences was high for liver damage but less consistent for secondary symptoms like nausea or abdominal discomfort.

Participants generally understood the risks of NSAID use in hypertensive individuals. However, a notable gap was observed in awareness of potential drug-drug interactions — particularly between NSAIDs and blood thinners — highlighting a critical area for targeted educational improvement. Full response breakdowns are presented in Table 3.

Table 3. Knowledge of non-prescription analgesics

Question	Response option	Correct?	Freq.	%
Which analgesic (no Rx) is most dispensed?	Acetaminophen	Y	373	93.3
	Ibuprofen	Y	266	66.5
	Diclofenac potassium	Y	261	65.3
	Codeine	N	380	95.0
Main uses of NPAs?	Relief of mild-moderate pain	Y	376	94.0
	Fever reduction	Y	321	80.3
	Pain relief in chronic illness	N	292	73.0
	Management of inflammation	Y	107	26.8
Mechanism: NSAIDs vs paracetamol?	NSAIDs inhibit COX; paracetamol acts in CNS	Y	272	68.0
	Both block COX; only NSAIDs reduce inflammation	Y	181	45.3
	Paracetamol enhances NSAID effects less directly	N	330	82.5
Max daily dose of acetaminophen (adults)?	4000 mg	Y	291	72.8
Common side effects of NSAIDs?	Stomach upset	Y	237	59.3
	Gastrointestinal bleeding	Y	308	77.0
	Headaches	Y	97	24.3
	Kidney impairment	Y	262	65.5
	Liver failure	N	201	50.2
	Dependency	N	346	86.5

Question	Response option	Correct?	Freq.	%
What can happen in acetaminophen overdose?	Liver damage	Y	354	88.5
	Kidney failure	Y	184	46.0
	Nausea and vomiting	Y	194	48.5
	Abdominal pain	Y	173	43.3
	Heart attack	N	351	87.8
	Respiratory depression	N	348	87.0
Why avoid NSAIDs with high blood pressure?	Increase BP via fluid retention/kidney damage	Y	351	87.8
	Decrease BP to dangerously low levels	N	358	89.5
	Interfere with blood thinners / clotting risk	Y	111	27.8
Who should not take NSAIDs without a doctor?	Pregnant women	Y	343	85.8
	Individuals with asthma	Y	306	76.5
	The elderly	Y	205	51.2
	Active individuals	N	310	77.5
Which NPA should not be given to infants <6	Paracetamol	N	314	78.5
	Ibuprofen	Y	193	48.3
	Diclofenac potassium	Y	270	67.5
Best definition of “pain”?	Sensory and emotional reaction to injury	Y	271	67.8
	Unpleasant feeling from illness or stress	Y	264	66.0
	A short-lived feeling that always goes away	N	305	76.3

Y = yes, this is a correct answer; N = no, this is not a correct answer.

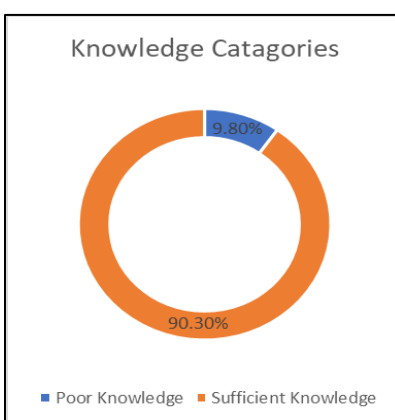


Figure 1. Knowledge categories

A significant association was found between knowledge level and gender ($p = 0.006$), with female participants more likely to demonstrate sufficient knowledge (94.3%) than males (85.0%). Educational qualification was also significantly associated with knowledge ($p < 0.01$); participants with a bachelor's degree had the lowest proportion of poor knowledge (6.2%), followed by diploma holders (12.6%), while postgraduates had the highest proportion of poor knowledge (50.0%).

Although not statistically significant ($p = 0.244$), trends were observed by source of pharmacy education. Poor knowledge was most frequent among those educated abroad (25.0%) and least common among public university graduates (6.0%) (Table 4).

Table 4. Association between knowledge category and sociodemographic and professional characteristics

Variable	Category	Poor No. (%)	Sufficient No. (%)	Total	p
Gender	Male	26 (15.0)	147 (85.0)	173	0.006
	Female	13 (5.7)	214 (94.3)	227	
Age	≤25y	21 (9.3)	205 (90.7)	226	0.642
	≥26y	18 (10.3)	156 (89.7)	174	
Position	Pharmacist	21 (8.9)	215 (91.1)	236	0.378
	Asst. Pharmacist	18 (11.0)	146 (89.0)	164	
Marital status	Single	25 (9.8)	229 (90.2)	254	0.746
	Married	14 (9.6)	132 (90.4)	146	
Residence	Urban	31 (8.6)	330 (91.4)	361	0.056
	Suburban	8 (20.5)	31 (79.5)	39	
Degree	Diploma	21 (12.6)	146 (87.4)	167	<0.001
	Bachelor's	14 (6.2)	211 (93.8)	225	
	Postgraduate	4 (50.0)	4 (50.0)	8	
Degree source	Public univ.	10 (6.0)	156 (94.0)	166	0.244
	Public inst.	12 (12.6)	83 (87.4)	95	
	Private univ.	9 (11.7)	68 (88.3)	77	
	Private inst.	5 (10.0)	45 (90.0)	50	
	Abroad	3 (25.0)	9 (75.0)	12	

No statistically significant associations were found between knowledge level and work-related variables, including average number of patients seen daily ($p = 0.563$), public sector employment ($p = 0.459$), type of community pharmacy ($p = 0.747$), years of experience ($p = 0.861$),

weekly working hours ($p = 0.648$), or whether participants worked alone or with others during the same shift ($p = 0.218$). The distribution of poor versus sufficient knowledge remained consistent across all these factors, as shown in Table 5.

Table 5. Association between knowledge category and work experience

Variable	Category	Poor No. (%)	Sufficient No. (%)	Total	p
Avg patients/day	<50	13 (7.6)	158 (92.4)	171	0.563
	50-100	19 (11.0)	154 (89.0)	173	
	>100	7 (12.5)	49 (87.5)	56	
Public sector	Yes	15 (9.6)	142 (90.4)	157	0.459
	No	24 (9.9)	219 (90.1)	243	
Pharmacy type	Chain (1-5)	8 (11.4)	62 (88.6)	70	0.747
	Chain (>5)	14 (11.2)	111 (88.8)	125	
	Single	17 (8.3)	188 (91.7)	205	
Experience	≤5 years	30 (9.7)	278 (90.3)	308	0.861
	≥6 years	9 (9.8)	83 (90.2)	92	
Weekly hours	<20h	8 (9.9)	73 (90.1)	81	0.648
	21-40h	18 (11.3)	141 (88.7)	159	
	>40h	13 (8.1)	147 (91.9)	160	
Staff same shift	Yes	30 (10.1)	268 (89.9)	298	0.218
	No	9 (8.8)	93 (91.2)	102	

Discussion

This survey found that 90.3% of Erbil community pharmacy staff have sufficient knowledge of NPAs. However, closer analysis reveals substantial gaps, particularly in areas related to safety, such as drug interactions, pediatric use, and identifying high-risk individuals. These findings are consistent with other studies undertaken in the Middle East and around the world, which have identified similar gaps in pharmacists' understanding of analgesic safety (19-21).

The study's participants accurately identified commonly dispensed NPAs and their applications for mild to moderate pain and fever, consistent with research from Jeddah and the United Arab Emirates, where pharmacists also showed a high level of knowledge of analgesic indications (18, 19). Only a small percentage, however, were aware of the significance of drug-drug interactions, especially with anticoagulants (27.8%), or the anti-inflammatory properties of NSAIDs (26.8%). These gaps are noteworthy, particularly given the recognized cardiovascular and gastrointestinal risks associated with NSAIDs. Despite NSAIDs being commonly dispensed without a prescription, a similar study conducted in Saudi Arabia found that many community pharmacists did not regularly screen for risk factors or advise patients about NSAID-related adverse events (21).

In this study, the only statistically significant factors associated with knowledge were gender and level of education. In line with a study conducted in the United Arab Emirates, which found that female pharmacists had superior knowledge and practice scores in pediatric pain management, female pharmacy staff were more likely to exhibit sufficient expertise (18). However, a survey of 215 Saudi community pharmacists found gender variations in migraine medication knowledge, attitudes, and

practice patterns, with male pharmacists outperforming female pharmacists on average (17). These contradictory findings suggest that gender-related differences in knowledge could be context-specific, influenced by factors including patient demographics, cultural roles, therapeutic focus, or access to continuing education. This underscores the importance of further research on the relationship between gender and professional growth, and whether specialized teaching methods could help address gender differences in topic-specific knowledge.

Knowledge and level of education were also strongly associated, with bachelor's degree holders outperforming diploma holders. Interestingly, postgraduate degree holders showed higher rates of poor knowledge; however, given the small sample size ($n = 8$) in this group, these findings should be interpreted with caution. Previous research has shown that higher academic qualifications are frequently linked to increased knowledge, particularly when supported by practical experience and ongoing study (18, 20). Postgraduate pharmacists moving into academic or administrative roles may explain this difference (20).

Work-related factors including years of experience, weekly hours, and shift type did not significantly influence knowledge. This finding challenges the common assumption that practical exposure alone enhances competency. Studies from Saudi Arabia and Norway have shown that while experience supports knowledge retention, it must be supplemented by structured training and professional development to effectively address complex pharmacological issues like drug interactions and special population risks (21, 220).

Moreover, gaps in pediatric and geriatric pain management remain an issue. Fewer than half of

participants in this study correctly identified the safety profile of NPAs for infants and the elderly, reflecting findings from the UAE18. The complexity of pediatric dosing and the subtlety of symptoms in elderly patients may explain this knowledge shortfall, underscoring the need for more specialized training modules.

Several limitations should be noted. The study's scope was limited to urban pharmacies in Erbil, which may not reflect knowledge levels among pharmacy staff in rural or underserved regions. The self-reported nature of the survey may introduce social desirability bias. Categorizing knowledge into two groups — sufficient and poor — may also oversimplify the complex nature of clinical expertise. Lastly, because of the very small sample size, findings about postgraduates' expertise should be interpreted with caution.

The study recommends that community pharmacy professionals receive specialized training and ongoing education, particularly focused on practical skills and correcting common misunderstandings. This could involve regular training sessions or frequent knowledge tests to ensure staff stay up to date with current laws and professional standards. The study also questions the assumption that clinical knowledge develops naturally with practice, implying that learning through experience alone may be insufficient. It encourages future research to explore areas where pharmacists lack knowledge, identify weaknesses in current education programs that might hinder learning or retention of important skills, and better understand how pharmacists' knowledge changes over time.

CONCLUSION

Most Erbil community pharmacy staff have sufficient knowledge of NPAs, but gaps remain in safety-related areas such as drug interactions,

pediatric use, and high-risk populations. Gender and education level significantly influence knowledge. To improve patient safety, targeted training and ongoing professional development are essential. Future studies should investigate why some pharmacists still lack knowledge, examine how current education and training programs can be improved, explore knowledge changes over time, and test different teaching methods to improve safe pharmacy practice.

COMPETING INTEREST

The authors declare that they have no competing interests.

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