RESEARCH ARTICLE

Medical staff's knowledge, practice and attitude about proton pump inhibitors at Al-Nu'man General Hospital in Baghdad, Iraq

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ABSTRACT

INTRODUCTION: Proton pump inhibitors (PPIs) remain the primary evidence-based treatment for upper gastrointestinal disorders, including gastro-esophageal reflux disease, dyspepsia, and peptic ulcer disease. Their effectiveness has led to their overuse, resulting in potential risks for patients and significant economic impacts.

OBJECTIVE: This study aimed to evaluate the knowledge, attitude and practice of medical staff at Al-Nu'man General Hospital about PPI use.

METHODS: A cross-sectional study about PPI use was conducted at Al-Nu'man General Hospital from 1 October to 1 December 2022. Thirty-one doctors and 83 pharmacists participated in our study and were randomly selected. Data were collected through a self-administered questionnaire covering knowledge (20 items), attitude (8 items), and practice (6 items). We measured knowledge, attitude, and practice and then used SPSS version 23 to analyse their associations with the participant's professions.

RESULTS: Of 114 participants, 31(27.2%) were doctors and 83 (72.8 %) were pharmacists. Most participants, 28(90.3%) doctors and 68(81.9%) pharmacists, have a fair knowledge of PPIs, which was statistically non-significant, with a p-value of 0.26. All participants showed a positive attitude towards PPI. Although 20(64.5%) doctors and 62 (74.7%) pharmacists had good practice in prescribing PPI, 11 (35.5%) doctors and 21 (25.3%) pharmacists have a bad practice regarding PPI use; however, this difference was statistically non-significant, with a p-value of 0.28.

CONCLUSION: The study indicated that the doctors and pharmacists who working at Al-Nu'man General Hospital had fair knowledge, positive attitudes, and good practices concerning PPI.

Key words: Proton pump inhibitor, Knowledge, Attitude, Practice, Doctor, Pharmacist.

INTRODUCTION

Currently, proton pump inhibitors (PPIs) are the most effective drugs inhibiting hydrochloric acid secretion, and they are the commonly prescribed drugs for the treatment and prophylaxis of gastrointestinal problems.[1] PPIs are the preferred drugs for treating gastro-esophageal reflux disease (GERD), erosive esophagitis, active duodenal ulcer, and pathologic hypersecretory conditions such as Zollinger-Ellison syndrome.[2] PPIs reduce the risk of bleeding from ulcers caused by aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs) and prevent NSAID-induced ulcers. Furthermore, PPIs are used to prevent and manage stress ulcers and eradicate Helicobacter pylori.[2]

In recent decades, overuse of these drugs in outpatient clinics and hospitals has led to a significant increase in healthcare spending and an increase in the risk of possible side effects. The most common side effects are headache, abdominal pain, diarrhoea, bloating, nausea and constipation. They usually are mild and reversible upon discontinuation of the drug.[3] The risks and benefits of long-term PPI use must be carefully considered, especially in young patients whose treatment with these drugs could last many years.

PPIs increase the incidence of vitamin B12 deficiency, especially in older people,[4] and the possibility of hip, spine, and wrist fractures and long-term PPI on chronic use.[5,6] PPIs have been associated with an increased

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risk of acute interstitial nephritis and chronic kidney disease, reducing calcium absorption and inhibiting osteoclast function, and having community-acquired respiratory infections and nosocomial pneumonia.[6] Long-term use of PPIs may cause infections, impaired absorption of nutrients, dementia, kidney disease, and hypergastrinemia-related side effects. So, experts advise using the smallest effective dose of PPIs for the shortest period.[7,8]

Omeprazole, the first clinically usable PPI, has been used in some countries for over two decades. To date, five structurally related benzimidazole sulfoxide PPIs have been approved for use in the United States to treat various gastric acid hypersecretory disorders. These include omeprazole, esomeprazole (the active enantiomers of omeprazole), lansoprazole, pantoprazole, and rabeprazole.[9] The knowledge of PPIs among the medical staff is essential for the rational use of PPIs. A published descriptive-analytical study in 2019 indicated that medical staff in China, especially nurses, lack awareness concerning the rational use of PPIs.[10] Clinical pharmacists can utilise their professional pharmaceutical knowledge to compensate for any deficiency of knowledge among clinicians; this will ensure the safety of patients and improve the quality of medical care.[11] A study in Riyadh, Saudi Arabia, reported that doctors and pharmacists showed better knowledge than nurses, and physicians have a low knowledge of PPIs side effects and drug-drug interactions.[12] Another study in Saudi Arabia showed that medical staff in the primary healthcare centres had moderately low knowledge regarding PPI and its indications, and the lowest awareness was mainly among physicians relative to pharmacists, especially clinical pharmacists.[13] An Indian survey found that emergency care residents also tend to overuse PPIs like their counterparts in developed countries.[14]

Doctors may know little about the guidelines for using PPIs. Although 94% of Chinese physicians prescribed PPIs for stress ulcer prophylaxis (SUP), surgeons knew little about the SUP guidelines.[15] Many updated guidelines have been published about upper GIT diseases and the use of PPIs in their prevention and management.[16.17]

Knowing the knowledge, attitude and practice of medical staff about PPIs use is crucial to planning training courses to raise the effectiveness of treatment and avoid potential side effects, considering that PPIs are used extensively in the community, primary health centres and hospitals. This study aims to evaluate the medical staff's knowledge, practice, and attitude about proton pump inhibitors use at Al-Nu'man General Hospital in Baghdad, Iraq, in 2022.

METHODS

Study design and the setting: An analytic cross-sectional study was conducted at Al-Nu'man General Hospital in Baghdad, Iraq, from 1 October to 1 November 2022.

Ethical consideration: Preliminary approval was obtained from Al-Nu'man General Hospital to conduct the study. The research committee in Baghdad/Al-Russafa Health Directorate approved the protocol under the code of ethics in searches adopted by the Ministry of Health in Iraq. The participant's acceptance to fill out the form was considered verbal acceptance for participation.

Definition of the enrollment criteria: Medical doctors and pharmacists working at Al-Nu'man General Hospital are targeted for participation. We exclude persons who refused to participate in the study. We enrolled 31 medical doctors and 83 pharmacists in this study.

Sampling: Doctors and pharmacists working at Al-Nu'man General Hospital were chosen by a simple random sampling method.

Questionnaire design: The author designed the questionnaire based on similar questionnaires in previous studies. Many experts from relevant specialities have revised the final draft of the questionnaire that was pre-tested on a sample of 30 individuals of the same target to know the time needed to fill it out and determine any problematic, sensitive, unclear, or unneeded questions. The questionnaire was corrected to make it suitable and acceptable for

the medical staff. Data from the pilot were not included in the final analysis. The internal consistency of questions achieved a Cronbach's alpha was 0.79, proving their reliability. The first section of the questionnaire included demographic information about respondents, such as gender, age, education, professional type, and experience in practice. The second, third, and fourth sections were related to the level of knowledge, attitude, and practice toward PPI use. The first 20 questions measured the level of knowledge. Respondents selected 'yes', 'no' or 'I do not know' based on their knowledge and were encouraged to give only one answer to each question. Each correct answer was given 1 point, and an incorrect answer and 'Don't know" was given 0 points. A participant was considered to have good knowledge if he/she got 16-20 points (>75%), fair if got 10-15 (50-75%), and poor if got less than 10 points.

The following eight questions were to assess the attitude. Answers were based on the five-point Likert scale. We gave 5 points for 'completely agree', 4 for 'almost agree', 3 for 'indifferent', 2 for 'almost disagree', and 1 for 'completely disagree'. Those who got less than 20 points (50%) were considered to have a negative attitude, and those who got 20 and above were considered positive. The last section of the questionnaire had only six questions. We allocated 5 points for "always", 4 for "often", 3 for "sometimes", 2 for "seldom", and 1 for "never". The level of practice was categorised as bad if the score was less than 15 points and good if it was≥ 15 points.

Data collection: The researcher collected data from 1 October to 1 December 2022. Each respondent received an anonymous questionnaire from the researcher. Participants were informed about the study's objective through verbal interactions and in the form of brief descriptions written at the start of the questionnaire. There was no motivation or tension among the participants. Their identity was kept unknown, and the privacy of their responses was confirmed to them. The principal researcher collected the questionnaires from respondents on the spot, checked the questionnaire for completion, and the respondents were encouraged to respond to any unanswered items. We predefined that a questionnaire was valid for analysis only if 100% of the questions were answered.

Table 1 | Characteristic features of the participants distributed according to profession.

	Physicians No. (%)	Pharmacist No. (%)	Total No. (%)
Age (28±6.1)			
≤ 25 years	1 (3.2)	50 (60.2)	51 (44.7)
26–40 years	21 (67.7)	32 (38.6)	53 (46.5)
>40 years	9 (29.0)	1(1.2)	10 (8.8)
Education			
Bachelor	12 (38.7)	81 (97.6)	93 (81.6)
Master	4 (12.9)	2 (2.4)	6 (5.3)
Ph.D.	15 (48.4)	0(0.0)	15 (13.2)
Experience in practice			
≤ 5 years	11 (35.5)	61 (73.5)	72 (63.2)
6–10 years	8 (25.8)	19 (22.9)	27 (23.7)
11–20 years	7 (22.6)	3 (3.6)	10 (8.8)
>20 years	5 (16.1)	0 (0.0)	5 (4.4)
Gender			
Male	17 (54.8)	33 (39.8)	50 (43.9)
Female	14 (45.2)	50 (60.2)	64 (56.1)
Total	**31**	**83**	**114**

Outcomes: Demographic characteristics of the participants included age, education, experience in practice, and gender. Items related to knowledge, attitude and practice regarding PPIs. Knowledge, attitude, and practice level on PPI use are based on the professional type of the participants. All of these variables were measured using descriptive statistics and calculating the P value.

Statistical analysis: Data were inserted into IBM SPSS statistics version 23 and analysed. Data were analysed using the chi-squared test for the correlation between doctors and pharmacists. Descriptive analysis was done to correlate dependent variables (knowledge, attitude, and practice) with sociodemographic characters. A p-value less than 0.05 is considered to be significant.

RESULTS

We distributed 114 questionnaire forms,

83 (72.8 %) among pharmacists and 31 (27.2%) among physicians. Fifty participants (43.9%) were males, 72 (63.2%) had less than five years of practice, 53 (46.5 %) were aged 26-40 years, and 93 (81.6 %) had only a Bachelor's degree in medicine or pharmacy without higher education. The mean age of respondents was (28±6.1) years. For other sociodemographic features, see table 1.

Table 2 shows the frequency of correct answers to PPI knowledge questions of the doctors and pharmacists. All participants knew the PPI members, and 30(96.8%) doctors and 81(97.6%) pharmacists knew that proton pump inhibitors cure acid-related diseases by stopping hydrochloric acid secretion. On the other hand, only 4(12.9%) doctors and 30(36.1%) pharmacists knew the duration of using PPI to treat gastric ulcers. All differences between the knowledge of doctors and pharmacists were statistically non-significant except questions 6,7, 15,18, and 20, where p-values are 0.021, 0.000, 0.002, 0.016, and 0.000, respectively.

Table 3 shows respondents' frequency and percentage of positive attitudes regarding PPI. All differences between doctors and pharmacists were statistically non-significant except questions 2 and 5, where p-values are 0.032 and 0.029, respectively. The highest positive attitude was reported towards believing that

Table 2 | Frequency of correct responses about PPI knowledge in different medical groups

No.	Questions	Correct answers			X^2 (Pearson chi square)	P value
		Doctor (%)	Pharmacist (%)	Total (%)		
1	PPI is an inactive prodrug	20 (64.5)	39 (47.0)	59 (51.8)	2.777	0.096
2	Omeprazole, pantoprazole, lansoprazole, rabeprazole, esomeprazole are PPIs.	31 (100)	83 (100)	114 (100)	†	†
3	PPIs cure acid-related diseases by suppressing hydrochloric acid secretion.	30 (96.8)	81 (97.6)	111 (97.4)	0.059	0.809
4	PPIs can be used to prevent stress ulcers.	27 (87.1)	75 (90.4)	102 (89.5)	0.255	0.613
5	PPIs can be used to treat acute pancreatitis.	13 (41.9)	38(45.8)	51 (44.7)	0.135	0.713
6	Omeprazole has the largest individual difference compared with other PPIs.	14 (45.2)	57 (68.7)	71 (62.3)	5.312	0.021
7	Omeprazole has the largest interaction compared with other PPIs (No)	22 (71.0)	20 (24.1)	42 (36.8)	21.310	0.000
8	Esomeprazole has the longest acid inhibition time compared with other PPIs (yes)	20 (64.5)	50 (60.2)	70 (61.4)	0.174	0.677
9	Omeprazole can be used in children (yes)	10 (32.3)	42 (50.6)	52 (45.6)	3.062	0.080
10	Rabeprazole can be used in pregnant patients.	21 (67.7)	54 (65.1)	75 (65.8)	0.072	0.788
11	New PPIs are better and safer than old.	23 (74.2)	59 (71.1)	82 (71.9)	0.108	0.742
12	PPI is usually available as enteric-coated capsules or tablets.	20 (64.5)	66 (79.5)	86 (75.4)	2.741	0.098
13	PPI usually be taken at breakfast.	17 (54.8)	51 (61.4)	68 (59.6)	0.409	0.522
14	PPI should be taken after meal.	23 (74.2)	70 (84.3)	93 (81.6)	1.545	0.214
15	PPI Should be swallowed as a whole piece.	31 (100)	62 (74.7)	93 (81.6)	9.614	0.002
16	Frequent doses of PPI are more effective than single dose.	18 (58.1)	38 (45.8)	56 (49.1)	1.362	0.243
17	PPI should be used for only 7 days to eradicate Helicobacter pylori.	18 (58.1)	50 (60.2)	68 (59.6)	0.044	0.833
18	PPI treatment of gastric ulcer takes 2 to 4 weeks.	4 (12.9)	30 (36.1)	34 (29.8)	5.825	0.016
19	PPI as prophylaxis should be continued until high-risk factors are no longer present.	19 (61.3)	58 (69.9)	77 (67.5)	0.760	0.383
20	Long-term use of PPI may cause osteoporosis and pneumonia.	11 (35.5)	63 (75.9)	74 (64.9)	16.190	0.000

The correct answer was yes for all questions except for questions 7, 10, 11, 14, 17, and 18.
†: P-Value was not computed for this question because all participants answers were correct.

Table 3 | Frequency of answering "completely or almost agree" to attitude questions about PPI knowledge

No.	Questions	Answers "completely or almost agree"			X^2 (Pearson Chi-Square)	P value
		Doctor (%)	Pharmacist (%)	Total (%)		
1	Overuse of PPI is common at present in Iraq.	30 (96.8)	81 (97.6)	111 (97.4)	6.921	0.074
2	The main cause of PPI overuse is patients' abuse of PPI.	17 (54.8)	67 (80.7)	84 (73.7)	10.529	0.032
3	The main reason for PPI overuse is stress ulcer prophylaxis	20 (64.5)	56 (67.5)	76 (66.7)	0.658	0.956
4	Overuse of PPI will cause an increase in adverse drug reactions and medical cost.	27 (87.1)	70 (84.3)	97 (85.1)	8.168	0.086
5	It is necessary to carry out large-scale education on the rational use of PPI for medical staff and the public.	30 (96.8)	69 (83.1)	99 (86.8)	10.822	0.029
6	It is necessary to strengthen the management of community pharmacy.	29 (93.5)	76 (91.6)	105 (92.1)	0.761	0.944
7	Use of PPI for short duration does not cause significant side effect	25 (80.6)	69 (83.1)	94 (82.5)	0.232	0.994
8	Over the counter dispensing of PPIs should be restricted	18 (58.1)	48 (57.8)	66 (57.9)	7.813	0.099

PPI is overused in Iraq, with 30 (96.8%) doctors and 81 (97.6%) pharmacists. While the least positive attitude of the doctors was towards blaming the patients for the PPI overuse,17 (54.8%), and the least positive attitude of the pharmacist was towards believing that over-the-counter dispensers of PPI should be restricted, 48(57.8%).

Table 4 shows that about one-quarter to one-third of the participants are always/often prescribed or dispensed PPI for nausea, vomiting, abdominal pain or flatulence. On the other hand, 27(87.1%) doctors and 71(85.5%) pharmacists always/often prescribe/dispense PPI for acid reflux. Only the practice of prescribing or dispensing PPI for flatulence has shown a statistically significant difference between doctors and pharmacists, with a p-value of 0.027.

Table 5 shows that 28(90.3%) doctors had a fair knowledge level concerning PPI use compared to 68(81.9%) pharmacists. We found that 114(100%) participants had a positive attitude regarding PPI use. At the same time, 20(64.5%) doctors and 62(74.7%) pharmacists had good practice in prescribing or dispensing PPI. For attitude section, no p-value was computed because all respondents had a positive attitude (values are constant).

DISCUSSION

The study targeted all doctors and pharmacists at Al-Nu'man General Hospital who would be accessible during the study period from 1 October to 1 December 2022. The purpose was to assess their knowledge of, attitude towards, and practice regarding PPIs. Doctors and pharmacists did not have good overall

Table 4 | Frequency of answering "always or often" to practice questions about PPI knowledge

No	Questions	Answers with Always or often			X^2(Pearson Chi-Square)	P value
		Doctor (%)	Pharmacist (%)	Total (%)		
1	Prescribe/dispense PPI for abdominal pain	10 (32.3)	25 (30.1)	35 (30.7)	2.785	0.594
2	Prescribe/dispense PPI for flatulence	8 (25.8)	20 (24.1)	28 (24.6)	10.974	0.027
3	Prescribe/dispense PPI for nausea	12 (38.7)	26 (31.3)	38 (33.3)	4.325	0.364
4	Prescribe/dispense PPI for vomiting	9 (29.0)	23 (27.7)	32 (28.1)	3.668	0.453
5	Prescribe/dispense PPI for acid reflux	27 (87.1)	71 (85.5)	98 (86.0)	3.119	0.374
6	Prescribe/dispense PPI for dyspepsia	22 (71.0)	65 (78.3)	87 (76.3)	4.703	0.319

Table 5 | Knowledge, attitude, and practice about PPI distributed according to the profession.

	Doctor (%)	Pharmacist (%)	Total (%)	Chi-Square	P value
Knowledge					
Poor Knowledge	2 (6.5)	4 (4.8)	6 (5.3)	2.459	0.262
Fair Knowledge	28 (90.3)	68 (81.9)	96 (84.2)		
Good Knowledge	1 (3.2)	11 (13.3)	12 (10.5)		
Overall Knowledge	31 (27.2)	83 (72.8)	114 (100)		
Attitude					
Positive Attitude	31 (100)	83 (100)	114 (100)	-	-
Negative Attitude	0 (0.0)	0 (0.0)	0 (0.0)		
Overall Attitude	31 (27.2)	83 (72.8)	114 (100)		
Practice					
Bad Practice	11 (35.5)	21 (25.3)	32 (28.1)	1.159	0.282
Good Practice	20 (64.5)	62 (74.7)	82 (71.9)		
Overall Practice	31 (27.2)	83 (72.8)	114 (100)		

PPI knowledge, especially about using PPIs in pediatric patients and the duration of gastric ulcer treatment. Treatment of peptic ulcer disease must include eradication of H. pylori. In patients with this infection, the recommended duration of treatment for eradication is 10 to 14 days; however, shorter treatment courses (regimens of one, five, and seven days) are being assessed.[18,19] Details concerning the drugs, doses and durations of the recommended and suggested first-line and salvage regimens for the treatment of Helicobacter pylori infection can be found in the ACG Clinical Guideline.[20] Unfortunately, In this study, only 34(29.8%) respondents knew that PPI treatment of gastric ulcer does not take two to 4 weeks.

There is sufficient and consistent evidence that the proton pump inhibitor omeprazole effectively treats gastro-esophageal reflux in children.[21] Only 52(45.6%) respondents knew that omeprazole could be used for pediatric patients. Previous studies have demonstrated that anti-acid therapy with proton pump inhibitors (PPIs) can inhibit pancreatic secretion and can used for the treatment of acute pancreatitis (AP).[22] However, there are no systematic reviews for the evidence, therapeutic efficacy, or safety of anti-acid therapy with PPIs in AP.[22] In our study, only 51(44.7%) respondents knew that PPI can treat acute pancreatitis.

Data show that a standard and double-dose of a PPI provide comparable effectiveness for the complete resolution of heartburn in patients who require long-term PPI therapy and that a change in prescribing practice will be needed for the cost-effective treatment of patients with GERD.[23] The Australian Therapeutic Guidelines and American Gastroenterological Association recommend that PPI use be limited to 4–8 weeks for the symptomatic relief of uncomplicated GERD.[24] If symptoms are not alleviated, the PPI dose may be increased or administered twice daily until symptoms are controlled.[24] In this study, only 56(49.1%) respondents knew that it is advisable to increase the dose frequency rather than a single dose to improve the effect. We found that 11(13.3%) pharmacists had good knowledge of PPI compared to 1(3.2%) doctor. One of the reasons for this contrasting result could be the low percentage of physicians who participated in this study.

Fortunately, in the present study, 99(86.8%) respondents thought it is necessary to carry out large-scale education on the rational use of PPI for medical staff and the public. The optimisation of issues concerned with the selection, administration, usage, and dosage of drugs may lead to the gaining of better therapeutic effects.[25] Intervention by clinical pharmacists significantly enhanced the overall rate of rational PPI use in the general surgery department, with a significant reduction in unindicated drug usage.[25] Furthermore, 38(33.3%) respondents al-

ways/often prescribe/dispense PPI for nausea, 35(30.7%) for abdominal pain, 32(28.1%) for vomiting, and 28(24.5%) for flatulence, indicating a satisfied practice of respondents toward PPI use.

A study carried out in Iraq to evaluate the effect of chronic use of PPIs on bone mineral density showed that the proton pump inhibitors have a profound effect on bone mineral density and long-term use of proton pump inhibitors is commonly related to the development of osteoporosis and osteopenia of lumbar spines.[26] Similarly, another study published in 2021 in Iraq proved that prolonged treatment with PPIs has apparent effects on kidney function in the laboratory and an influence on liver function.[27] A study conducted at the National Diabetes Centre, Mustansiriyah University, Baghdad, Iraq, reported that PPIs improved glycemic indices and metabolic profile in T2DM patients by augmenting gastrin serum levels. [28] A Study of acute renal failure in the users of proton pump inhibitors in Iraq showed that only 30 patients of 120 patients with acute renal failure consulted the hospital were PPIs users; this may refer to the presence of a relationship between proton pump inhibitors and acute renal failure.[29]

Limitations: Despite the useful information learned from this study, several limitations require mentioning. First, due to time constraints, we limited the study to only a sample of the medical staff. An extensive study is required by including other healthcare providers at our hospital and those working at the hospitals of all Iraqi provinces to figure out the actual national situation of PPI use in Iraq.

CONCLUSION

The study indicated that the medical staff had fair knowledge, positive attitude and good practice regarding PPI use. Frequent professional development programs and training for healthcare professionals are required to reduce the widespread overuse of PPI. It is necessary to have these programs about the illnesses that require PPI treatment and when PPI will not be beneficial. Collaboration between doctors and pharmacists is essential for preventing PPI overuse in our hospital.

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Abbreviations list: American College of Gastro-enterology (**ACG**), Gastro-Intestinal Tract (**GIT**), Gastro-oesophageal reflux disease (**GERD**), Helicobacter pylori (**H. pylori**), Non-steroidal anti-inflammatory drugs (**NSAIDs**), Proton pump inhibitors (**PPIs**), Stress ulcer prophylaxis (**SUP**).

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