

# Proton Pump Inhibitors Awareness among Physicians and Pharmacists in Primary Healthcare Centres in Abha, Saudi Arabia

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## Abstract

**Background:** Proton pump inhibitors (PPIs) effectively suppress acid secretion and play an important role in peptic ulcer disease and gastroesophageal reflux disease. Physicians and pharmacists' awareness and perception toward PPIs have a crucial role in regulating the use of PPI and preventing any adverse event, drug-drug interaction, or inappropriate use PPIs.

**Aim:** The current study aims to assess proton pump inhibitors awareness level among physicians and pharmacists and its detriments in PHCCs, Aseer region, Saudi Arabia.

**Methods:** An analytical cross-sectional study was applied to answer the main research question. The study targeted all physicians and pharmacists in primary healthcare centres in Abha who will be accessible during the study period from 23 May to 27 July. Data were collected from eligible participants using pre-structured online questionnaire. The questionnaire was developed by the researchers based on intensive literature review and expert's consultation. The questionnaire covered participants' personal data including age and gender, job title, and awareness items regarding PPI types, uses, side effects, and types.

**Results:** A total of 178 participants completed the study questionnaire. 97 (54.5%) participants were pharmacists, 45 (25.3%) were clinical pharmacists, and 36 (20.2%) were physicians. Participants ages ranged from 20-40 years with mean age of  $25.4 \pm 9.7$  years. 78.7% of the participants reported that PPIs are the 1st line pharmacological treatment for peptic ulcer which was insignificantly higher among clinical pharmacists (84.4%;  $P=.077$ ). Omeprazole as the most prescribed PPI was known by 75.8% of the participants. As for Long-term use of PPI adverse reactions, 22.5% reported osteoporosis, 20.2% selected vitamin B12 deficiency, 2.2% reported pneumonia, while 55.1% selected all options, especially pharmacists and clinical pharmacists (60.8% and 60%, respectively;  $P=.017$ ).

**Conclusion and Recommendations:** In conclusion, the current study showed that medical staff in the primary healthcare centres had moderately low knowledge regarding PPI and its indications. The lowest awareness was mainly among physicians relative to pharmacists especially clinical pharmacists.

**Key words:** Proton pump inhibitors, awareness, practice, medical staff, pharmacist, physician, knowledge

## Background

Proton-pump inhibitors (PPIs) are group of medications they act mainly through a complete and protracted reduction of stomach acid production. Among all known categories, there is no apparent proof that one agent works better than another [1-3]. PPIs are extensively prescribed for the prophylaxis and treatment of upper gastrointestinal tract diseases including gastric ulcers, gastroesophageal reflux disease (GERD), and their complications, Helicobacter pylori eradication treatment, indigestion, ulcers due to nonsteroidal anti-inflammatory drugs, stress ulcers, and other disorders due to hypersecretory status [4]. Omeprazole was the first launched PPI in 1989, then other drugs were introduced such as pantoprazole, lansoprazole, rabeprazole, esomeprazole, and ilaprazole. Recently, with more life stress, there is an upward and substantial increase in ordering of PPIs [5].

PPIs still one of the most prescribed medications worldwide. In the United States, PPIs were prescribed in 4% of outpatients in 2002 and 9.2% in 2009. Moreover, sales of PPIs accounted for about 10 billion dollars in 2007 and 13.9 billion dollars with 113 million prescriptions filled annually in 2010 [6]. The global spending on PPIs was 7 billion USD by 2006, while between April 2013 and March 2014, the PPI esomeprazole (Nexium®) was the third order-selling drug in the USA with 19.3 million prescriptions and profits of about 6.3 billion USD [7, 8]. The high increase in PPI prescribing rate during the last several years initiated a main question regarding the appropriate utilization of these drug category [9].

The construction of regulatory guidelines regarding the prescription of PPIs had a significant role in reducing inpatient use of PPIs prescriptions, only among those not receiving PPIs at the time of hospital admission. Many reported prescriptions were dispensed to outpatient clients, and hence, were dispensed mainly through community pharmacists [10]. The awareness and perception of both physicians and pharmacists towards PPIs have a crucial role in regulating the use of these drugs and preventing any adverse event, drug-drug interaction, as well as inappropriate PPIs use [11]. The current study aimed to assess proton pump inhibitors awareness level among physicians and pharmacists and its detriments in PHCCs, Aseer region, Saudi Arabia.

## Methods

An analytical cross-sectional study was applied to answer the main research question. The study targeted all physicians and pharmacists in primary healthcare centres in Abha, Aseer region, southern of Saudi Arabia who will be accessible during the study period from 23 May to 27 July. Residency in Aseer region (for at least 6 months), physician and pharmacist at primary healthcare centre in Abha for at least 6 months, being in direct contact with patient or provide direct service and accepted to participate in the study were the inclusion criteria. Physicians and

pharmacists who were at administrative positions or living outside Aseer region were excluded. A consecutive sampling method was applied where all eligible population who are fulfilling the inclusion criteria were invited to participate in the study during the study period.

Data were collected from eligible participants using pre-structured online questionnaire. The questionnaire was developed by the researchers based on intensive literature review and expert's consultation. A panel of 3 experts independently reviewed the study questionnaire to assess content validity and relevance. Any discordance regarding any item was solved by discussion and consensus or voting if there were no consensus. A pilot of 15 participants was conducted and assessed tool applicability and reliability ( $\alpha$ -Cronbach's) of 0.75. The questionnaire covered participants' personal data including age and gender, job title, and awareness items regarding PPI types, uses, side effects and types. For awareness items, each correct answer was scored one point and total summation of the discrete scores of the different items was calculated. A patient with score less than 60% (12 points) of the maximum score was considered to have poor awareness while good awareness was considered if he had score of 60% or more (13 points or more) of the maximum score.

## Data Analysis

After data were extracted, it was revised, coded, and fed to statistical software IBM SPSS version 22 (SPSS, Inc. Chicago, IL). All statistical analysis were done using two tailed tests. P value less than 0.05 was considered statistically significant. Descriptive analysis based on frequency and percent distribution was done for all variables including participants age, gender, job title, PPIs awareness items and participants opinion regarded categories in need to carry out large scale education on rational use of PPI. Crosstabulation was used to assess distribution of awareness level according to participants' personal data and job title. Relations were tested using Pearson chi-square test and exact probability test for small frequency distributions.

## Results

A total of 178 participants completed the study questionnaire. 97 (54.5%) participants were pharmacists, 45 (25.3%) were clinical pharmacists, and 36 (20.2%) were physicians. Participants ages ranged from 20-40 years with mean age of  $25.4 \pm 9.7$  years. Also, most of participants were males (61.8%; 110) (Table 1).

Tables 2, and 3 show distribution of awareness regarding PPI among physicians and pharmacists in primary healthcare centres in Abha, Saudi Arabia. 78.7% of the participants know that PPIs are the 1st line pharmacological treatment for peptic ulcer which was insignificantly higher among clinical pharmacists (84.4%;  $P=0.077$ ). Only 25.8% of the study participants know that PPI is inactive prodrug, with highest knowledge among clinical pharmacists (31.1%;  $P=0.001$ ).

**Table 1: Personal data of physicians and pharmacists in primary health care centres, Abha, Saudi Arabia**

<b>Personal data</b>	<b>No</b>	<b>%</b>
<b>Age in years</b>		
<i>20-30</i>	162	91.0%
<i>31-40</i>	16	9.0%
<b>Gender</b>		
<i>Male</i>	110	61.8%
<i>Female</i>	68	38.2%
<b>Job title</b>		
<i>Physician</i>	36	20.2%
<i>Pharmacist</i>	97	54.5%
<i>Clinical pharmacist</i>	45	25.3%

Table 2. Awareness regarding PPI among physicians and pharmacists in primary health care centres, Abha, Saudi Arabia

Awareness items		Total		Job title						p-value
				Physician		Pharmacist		Clinical pharmacist		
		No	%	No	%	No	%	No	%	
What is the 1st line pharmacological treatment for peptic ulcer?	PPI	140	78.7%	28	77.8%	74	76.3%	38	84.4%	.077
	H2 blockers	9	5.1%	2	5.6%	5	5.2%	2	4.4%	
	Both	20	11.2%	1	2.8%	15	15.5%	4	8.9%	
	Don't know	9	5.1%	5	13.9%	3	3.1%	1	2.2%	
Is PPI inactive prodrug?	Yes	46	25.8%	4	11.1%	28	28.9%	14	31.1%	.001*
	No	66	37.1%	7	19.4%	39	40.2%	20	44.4%	
	Don't know	66	37.1%	25	69.4%	30	30.9%	11	24.4%	
Which of the following PPI is most commonly used?	Omeprazole	139	78.1%	29	80.6%	74	76.3%	36	80.0%	.197#
	Pantoprazole	29	16.3%	3	8.3%	19	19.6%	7	15.6%	
	Lansoprazole	2	1.1%	0	0.0%	2	2.1%	0	0.0%	
	Don't know	8	4.5%	4	11.1%	2	2.1%	2	4.4%	
Can PPI be used to prevent stress ulcer?	Yes	127	71.3%	26	72.2%	70	72.2%	31	68.9%	.473
	No	30	16.9%	5	13.9%	19	19.6%	6	13.3%	
	Don't know	21	11.8%	5	13.9%	8	8.2%	8	17.8%	
Can PPI be used to treat acute pancreatitis?	Yes	40	22.5%	5	13.9%	29	29.9%	6	13.3%	.085
	No	88	49.4%	21	58.3%	40	41.2%	27	60.0%	
	Don't know	50	28.1%	10	27.8%	28	28.9%	12	26.7%	
Which of the following (1) is most commonly prescribed?	Omeprazole	135	75.8%	26	72.2%	74	76.3%	35	77.8%	.105#
	Pantoprazole	33	18.5%	5	13.9%	20	20.6%	8	17.8%	
	Lansoprazole	2	1.1%	0	0.0%	1	1.0%	1	2.2%	
	Don't know	8	4.5%	5	13.9%	2	2.1%	1	2.2%	
Does omeprazole have the largest interaction compared with other PPIs?	Yes	71	39.9%	8	22.2%	44	45.4%	19	42.2%	.001*
	No	58	32.6%	3	8.3%	40	41.2%	15	33.3%	
	Don't know	49	27.5%	25	69.4%	13	13.4%	11	24.4%	
Should omeprazole be selected for paediatric patients?	Yes	73	41.0%	13	36.1%	42	43.3%	18	40.0%	.001*
	No	73	41.0%	8	22.2%	44	45.4%	21	46.7%	
	Don't know	32	18.0%	15	41.7%	11	11.3%	6	13.3%	
Under which category is esomeprazole selected in pregnancy?	A	28	15.7%	11	30.6%	15	15.5%	2	4.4%	.029**
	B	82	46.1%	14	38.9%	44	45.4%	24	53.3%	
	C	60	33.7%	11	30.6%	31	32.0%	18	40.0%	
	D	8	4.5%	0	0.0%	7	7.2%	1	2.2%	
Do you think that the newer PPI will produce better and safer effects?	Yes	113	63.5%	24	66.7%	65	67.0%	24	53.3%	.382
	No	16	9.0%	2	5.6%	10	10.3%	4	8.9%	
	Don't know	49	27.5%	10	27.8%	22	22.7%	17	37.8%	

P: Pearson X2 test

#: Exact probability test

\* P &lt; 0.05 (significant)

**Table 3: Awareness regarding PPI among physicians and pharmacists in primary health care centres, Abha, Saudi Arabia**

Awareness items, continued		Total		Job title						p-value
				Physician		Pharmacist		Clinical pharmacist		
		No	%	No	%	No	%	No	%	
In which formula is PPI usually available?	Tablet	76	42.7%	20	55.6%	35	36.1%	21	46.7%	.036*
	Capsule	22	12.4%	8	22.2%	12	12.4%	2	4.4%	
	Injection	2	1.1%	0	0.0%	1	1.0%	1	2.2%	
	All	78	43.8%	8	22.2%	49	50.5%	21	46.7%	
PPI is usually prescribed	Before meals	157	88.2%	30	83.3%	88	90.7%	39	86.7%	.234
	After meals	9	5.1%	1	2.8%	4	4.1%	4	8.9%	
	It does not differ	12	6.7%	5	13.9%	5	5.2%	2	4.4%	
Should PPI be swallowed as a whole piece?	Yes	143	80.3%	29	80.6%	78	80.4%	36	80.0%	.088
	No	17	9.6%	2	5.6%	7	7.2%	8	17.8%	
	Don't know	18	10.1%	5	13.9%	12	12.4%	1	2.2%	
Is it advisable to increase the dose frequency rather than a single dose to improve effect?	Yes	68	38.2%	12	33.3%	36	37.1%	20	44.4%	.020*
	No	63	35.4%	7	19.4%	39	40.2%	17	37.8%	
	Don't know	47	26.4%	17	47.2%	22	22.7%	8	17.8%	
At least, the recommended duration to prescribed PPI for Helicobacter pylori eradication is?	1 week	9	5.1%	1	2.8%	4	4.1%	4	8.9%	.053
	2 weeks	83	46.6%	9	25.0%	52	53.6%	22	48.9%	
	4 weeks	68	38.2%	21	58.3%	31	32.0%	16	35.6%	
	Don't know	18	10.1%	5	13.9%	10	10.3%	3	6.7%	
Does PPI treatment of gastric ulcer take 2 to 3 weeks only?	Yes	83	46.6%	9	25.0%	52	53.6%	22	48.9%	.004*
	No	44	24.7%	10	27.8%	18	18.6%	16	35.6%	
	Don't know	51	28.7%	17	47.2%	27	27.8%	7	15.6%	
Long-term use of PPI can cause adverse reactions such as	Vitamin B12 deficiency	36	20.2%	7	19.4%	21	21.6%	8	17.8%	.017*
	Osteoporosis	40	22.5%	16	44.4%	16	16.5%	8	17.8%	
	Pneumonia	4	2.2%	1	2.8%	1	1.0%	2	4.4%	
	All of them	98	55.1%	12	33.3%	59	60.8%	27	60.0%	

P: Pearson X2 test

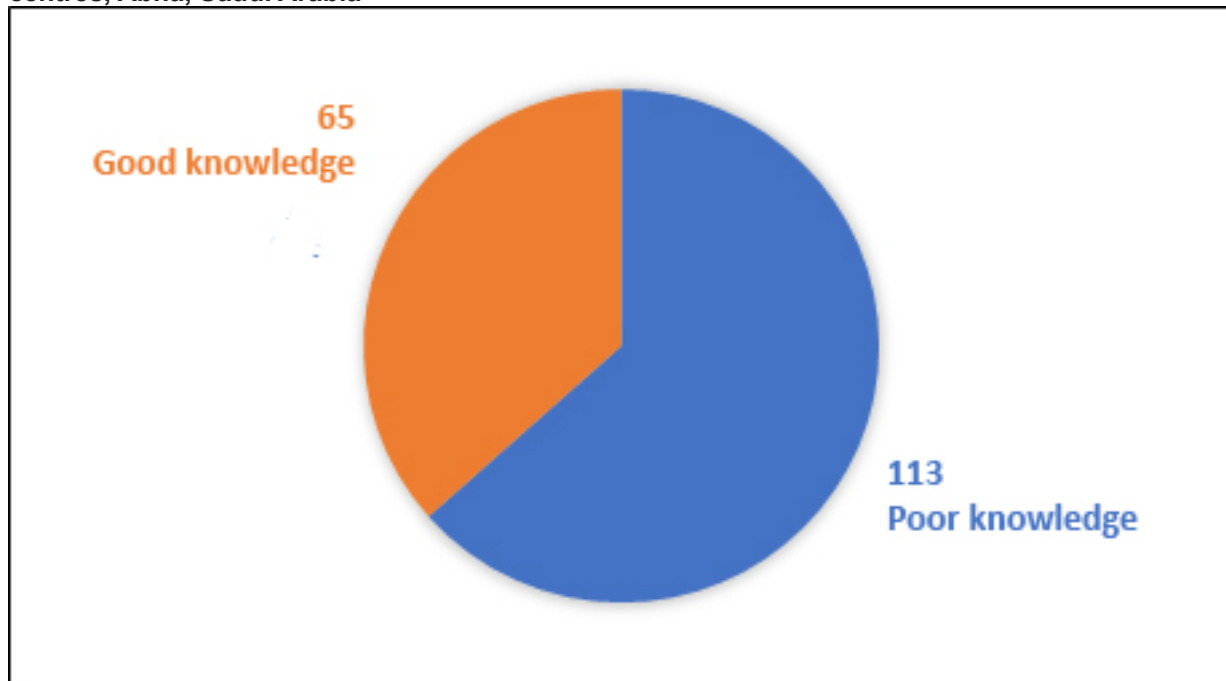
\* P &lt; 0.05 (significant)

**Table 4: Distribution of overall awareness level regarding PPI by participants' personal data**

Personal data	Overall knowledge level				p-value
	Poor		Good		
	No	%	No	%	
<b>Age in years</b>					
20-30	105	64.8%	57	35.2%	.240
31-40	7	50.0%	8	50.0%	
<b>Gender</b>					
Male	69	62.7%	41	37.3%	.790
Female	44	64.7%	24	35.3%	
<b>Job title</b>					
Physician	33	91.7%	3	8.3%	.001*
Pharmacist	55	56.7%	42	43.3%	
Clinical pharmacist	25	55.6%	20	44.4%	

P: Pearson X2 test

\* P &lt; 0.05 (significant)

**Figure 1: Overall awareness level regarding PPI among physicians and pharmacists in primary health care centres, Abha, Saudi Arabia**

## Discussion

The current study aimed to assess awareness level of physicians and pharmacists about PPIs and its detriments in PHCCs, Aseer region Saudi Arabia. The use of PPIs injections considerably increased over the past few years especially at the tertiary hospitals [12, 13]. Recently, studies showed that 86% of patients who received PPIs had no proper indications in the general medical ward of a tertiary Jordanian hospital [14]. Another study revealed that about 25% of the patients hospitalized in an internal medicine department of a tertiary Greek hospital received PPIs, with no significant indication among 81% of them [15].

Other studies showed that all patients undergoing elective surgeries were prescribed PPIs, but 82.4% of them had abandoned indication. Besides, 35.6% of inpatients were prescribed PPIs, of which 57% had no indications [12, 16]. This explains the importance of improving the knowledge of PPIs among the medical staff which is essential for improving the rationality of PPI application.

The current study revealed that only one third of the study participants were knowledgeable regarding PPIs and its applications. The highest awareness was mainly for its role in peptic ulcers as first line, types of prescribed PPIs, its role in stress ulcers, time of having PPI (before meals), and route of having PPIs. It is clear that more than three quarters of the study participants correctly reported the previously mentioned awareness issues. On the other hand, lower awareness was detected for PPI pharmacological nature, role in treating acute pancreatitis, interaction with other drugs, safety for paediatric prescription and during pregnancy, believe of newer PPIs safety, and duration of prescribing PPI for peptic ulcers and *Helicobacter pylori* eradication.

Our study also showed that higher awareness was detected among clinical pharmacists and community pharmacists than physicians who had very poor level of awareness (less than 10% were knowledgeable). Considering adverse reactions, the current study showed that more than half of the participants correctly know about osteoporosis, vitamin B12 deficiency, and pneumonia, while sporadic adverse reactions were reported by the other half especially vitamin B12 deficiency and osteoporosis. This matches reported adverse events in the literature [17-19].

The current study findings were concordant with those findings reported by Luo et al [20], who reported that the awareness score related to PPI of medical staff was low ( $59.47 \pm 15.75$ ). Also, the level of awareness of pharmacist was significantly higher than that of doctors and nurses ( $P < 0.01$ ), which was related to gender, age, occupation, educational level, professional title, hospital nature, and hospital grade. Another study in India estimated low level of awareness regarding PPI uses and adverse events among emergency care residents [21]. The later study showed that 30% of the residents prescribed acid suppressive drugs for majority of their patients, while 12% prescribed them to almost all patients they attended.

Locally, a study carried out in Jeddah, Saudi Arabia by Alnabulsi et al [22], who reported low level of physician's knowledge on PPI adverse effects and drug-drug interactions as only 20% of physicians reliably advised patients about the possible adverse effects. Also, 33% reported that they discontinued PPIs after reassessment. Gastroesophageal reflux disease and peptic ulcer disease were the most common indications for PPI use. On the other hand, Asdaq SM et al [23], assessed the knowledge, attitude, and behaviour of health care professionals of Riyadh region of Saudi Arabia on the use of PPIs. Authors reported high knowledge among both physicians and pharmacist (68.5% and 66%, respectively) and good attitude towards PPI use compared to nurses. This estimated knowledge level is higher than the current study estimates.

Lack of awareness of these healthcare staff regarding the relevant knowledge of PPI, such as drug characteristics, pharmacological action, mechanism, indication, administration time, administration method, duration, drug interaction and adverse reaction, it is easy to cause overuse of PPIs, decrease efficiency and increase adverse reactions. But only few studies focused on the awareness of PPI topics in medical staff. Consequently, reference to the current situation and possible causes of PPI overutilization in Saudi Arabia [24].

## Conclusions and Recommendations

In conclusion, the current study showed that medical staff in the primary healthcare centres had moderately low knowledge regarding PPIs and their indications. The lowest awareness was mainly among physicians when compared to pharmacists, especially clinical pharmacists. Awareness was high regarding PPI types, indications, and adverse events. However, the awareness regarding drug-drug interaction, duration of prescribing the drugs, and drug safety for some categories issue needs improvement. Improving medical staff level of knowledge and minimizing their dependence on PPIs are recommended. To reduce the extensive misuse of PPI, recurrent professional development programs and trainings for healthcare professionals are required. Furthermore, prescribing guidelines must be developed for PPI reassessment and step-down strategies to ensure good practice.

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