Perception of Inappropriate Use of Proton Pump Inhibitors Among Community-Dwelling Older Adults

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Abstract

Background

Long-term use of proton pump inhibitors (PPIs) in older adults is a prevalent issue and associated with adverse health outcomes. There is limited evidence about older adults' perception of PPI use and its associated side effects. This study aimed to examine the knowledge and awareness of older adults about PPI use and its side effects and willingness to stop PPI and its associated factors.

Methods

This cross-sectional study was conducted on a convenience sample of 120 older adults from three local healthcare centers located in Irbid, Jordan. Older adults' perception of PPI use was measured by Patients' Perceptions of Proton Pump Inhibitor Risks and Attempts at Discontinuation Survey.

Results

The majority of older adults were not familiar with any report linking PPI use with side effects, reported no concern related to the chronic side effects of PPI, and had not discussed the benefits and risks of PPI with their primary care providers (PCPs). Although a majority did not try to stop PPI, most older adults were willing to stop PPI due to its side effects, particularly if recommended by PCPs. Factors associated with long-term use of PPI included age, indication for gastrointestinal reflux disease (GERD), improvement of GERD symptoms, and being comfortable to reduce or stop PPI. Recommendations by PCPs to stop PPI ($p = 0.049$) and a greater level of concern about long-term side effects of PPI ($p < 0.0001$) were the only two statistically significant predictors of previous attempts to stop PPIs.

Conclusions

Concern about PPIs is associated with attempts to stop PPI, particularly with PCPs' recommendation. The risks and benefits of PPIs should be discussed with PCPs to avoid making inappropriate decisions regarding PPI therapy. The Long-term use of PPIs should be carefully evaluated.

1 Background

Medications are prescribed for older adults for their benefits in treating illnesses and managing their symptoms [1]. However, a recent study revealed that at least one drug was inappropriately prescribed for more than 50% of community-dwelling older adults in the United States (US) [2]. Another study found the prevalence of inappropriate prescription of medications for older adults in community health centers was high, reaching 40%. The prescription of medications should be compatible with the recommendations of

the US Food and Drug Administration (FDA) [3]. Inappropriate prescription of medications is associated with iatrogenic diseases, drug-drug interactions, and drug-nutrient interactions [3].

In addition, inappropriate prescription of medications is associated with a high prevalence of gastroesophageal reflux disease (GERD) [4]. Proton-pump inhibitors (PPIs) are the drug of choice to manage GERD [3]. According to the American College of Gastroenterology (ACG), the recommended period time for PPI use in GERD is no longer than 8 weeks [5]. However, according to a recent study, 55% of older adults had been inappropriately consuming PPIs for at least one year [3]. Long-term use of PPI is associated with serious negative consequences, including osteoporosis, pneumonia, fractures, multiple vitamin deficiencies, and colon cancer [6]. Moreover, according to Harrison et al. (2018), the estimated annual cost of inappropriate prescription of PPI for American community-dwelling older adults was $59,272 [7].

Many research studies have investigated the perception of healthcare providers about PPI use in older adults [8, 9]. However, very limited research identified the perception of PPI use among older adults themselves. They tend to be passive in expressing their perception related to potential risks and benefits of their medications, while physicians' perceptions are more explicit [10]. Patients' rights to actively express their perceptions related to their care plan are legally supported by legal doctrines of informed consent. However, patients tend to transfer the responsibility for thinking of the risk/benefit ratio of medications to their physicians [11].

Possibly a single recent study conducted to examine the perception of PPI use among older adults, found the majority of older adults are not familiar with the adverse effects of PPI use [10]. Also, the majority of patients were not concerned at all about the potential side effects of long-term use of PPI. They were also unwilling to stop using PPIs despite their serious negative consequences [12]. Even when a physician had discussed the side effects of PPI use with the patients, only 9% responded positively and asked their physicians to stop their PPI [10]. However, older adults felt uncomfortable discussing whether to stop PPIs with their providers [10]. Older adults asked for PPIs for non-evidence based medical indications. Moreover, the most common attitude toward prescription medications among older adults was confidence and trust in the physician own decisions. However, older adults seem to doubt the competence of the physician when asking for discontinuing PPIs [11]. Even if there is no medical indication for PPI, older adults insisted to have their physicians prescribe PPI for them. Around 38% of PPI prescriptions were socially given for older adults by their physicians [11].

In the current study, we are interested in examining the perception of long-term use or inappropriate prescription of PPI in community-dwelling older adults of its. Accordingly, the purpose of this study is to examine the knowledge and awareness of older adults about using PPIs and their side effects and willingness to stop PPI and its associated factors.

2 Methods

2.1 Design, Setting, and Participants

A descriptive, correlational, and cross-sectional study was conducted on a convenience sample of 120 community-dwelling older adults from three local healthcare centers located in Irbid, northern Jordan. All older adults (≥ 55 years old) who regularly visit the healthcare centers during January 2020 for routine checkups and prescription renewal were recruited in the study.

2.2 Measurements

Patients' perception of inappropriate use of PPI was measured by Patients' Perceptions of Proton Pump Inhibitor Risks and Attempts at Discontinuation Survey, which was developed by Kurlander et al. (2019) [10]. The current survey has 51 items with multiple-choice responses on questions related to eligibility, PPI side effects, GERD symptoms, PPI use, alternative indications for PPI, and demographics. For example, the participants were asked to respond, with dichotomous options (yes/no) whether they have ever tried stopping PPI because of concern about long-term side effects. In addition, they were asked to rate their concern and familiarity with PPI side effects, using a 4-point Likert scale including "1 = not at all," "2 = slightly," "3 = somewhat," or "4 = extremely." Additional data on the duration and frequency of PPI were also collected. Finally, questions on basic sociodemographic characteristics, including age, gender, marital status, and level of education were included at the end of the survey.

The survey was translated into Arabic by two experts in English linguistics and the health profession. The survey was backward translated into English by an associate professor in English literature. There was no major difference between the two English versions. In case of discrepancy, all three professors reviewed in details the two English versions and came to a consensus decision regarding the disputed items. The survey was piloted on four older adults using PPIs for different indications, selected from a local health clinic. The researchers asked these older adults to think loudly about the clarity of the questions when completing the Arabic version of the survey. These older adults did not have difficulty understanding the 51 items of the survey.

2.3 Data Analysis

Descriptive analysis including means, standard deviations, and frequencies were used to examine the characteristics of participants, PPI use, indication, and side effects, and patients' perception and awareness of PPI use. Differences in participants' willingness to stop PPI use between groups were analyzed by chi-square tests. Multiple linear regression was used to examine predictors of the duration of PPI. Logistic regressions were used to examine predictors of previous trails to stop PPI.

2.4 Ethical Consideration

This study was approved by the Institutional Review Board (IRB) department of Jordan University of Science and Technology and the administrative office of each healthcare center (IRB approval # 749–2019). Written informed consent was obtained from all participants included in the study. All personal data of participants were de-identified and confidential. The researchers emphasized the privacy of

collected data and voluntary participation in the study. The researchers informed the participants that they could withdraw from the study anytime they want without any negative effect on their treatment plan.

3 Results

3.1 Participants' Demographic and Clinical Characteristics

One hundred and twenty participants completed the study with a response rate of 97.43 %. The characteristics of respondent participants were female (50.8%), only completed their high school (25.0%), married (83.3%), and ever tried reducing (87.5%) or stopping (89.5%) PPI use. A majority reported having a primary care provider (PCP) (90%), using PPI for GERD (71%), using PPIs at least once per day (62%), and taking PPIs for longer than two years (73%). Pantoprazole was the most commonly used PPIs by 90% of the participants. Vitamin D deficiency was the most commonly reported chronic disease that participants did believe it is linked with PPI use. However, vitamin B12 deficiency was the most commonly diagnosed chronic disease among the participants. The gastroenterologist recommended using PPI for the majority of participants (60.8%), with 54.2% seeing the gastroenterologist for GERD. Participants reported significant improvement of symptoms being on PPIs, with 88.4% reporting moderate to full resolution of GERD symptoms.

3.2 Awareness and perception of PPI adverse effects

A majority (95%) were not familiar with any report linking PPI use with side effects. A majority (64.2%) did not believe that PPI use is associated with side effects. Around 53% were not aware of any side effects associated with PPI. Nevertheless, most participants (83.3%) reported no concern related to the chronic side effects of PPI. Most participants (90%) had not discussed the benefits and risks of PPI with their PCP. Although most participants (80%) felt comfortable discussing with their PCP whether to stop or reduce PPIs, A PCP had recommended reducing the dose of PPI for only 9.2%. Ten percent of participants reported a previous trail to stop PPI due to concerns about side effects, and most of them (91.7%) did so without a PCP's recommendation. A detailed description of participants' demographic and clinical characteristics is outlined in Table 1.

Please insert Table 1 here

3.3 Willingness to stop PPIs

Sixty-five percent of participants were willing to stop PPIs if recommended by a PCP compared to 55 % if recommended by a gastroenterologist ($P < 0.001$). When asking about willingness to stop PPIs due to long-term adverse side effects, 64% were willing to do so. However, their willingness to stop significantly increased to 65.9% if a PCP recommended to gradually decrease the dose of PPI or resume talking PPI in the future if needed and 63.4% if a less potent alternative to PPI was prescribed for them ($P < 0.001$).

3.4 Factors Predicting PPI Duration

Multiple linear regression was calculated to predict the long-term use of PPI among community-dwelling older adults based on their age, PPI indication, being comfortable to stop or reduce PPI, improvement of GERD symptoms, and willingness to stop PPI if the physician recommended that. As seen in Table 2, a significant regression equation was found ($p < .0001$). Most predictors entered into the regression model were statistically significant, while the beta for willingness to stop PPI is insignificant.

Please insert Table 2 here

3.5 Factors Predicting Previous Trails to Stop PPI

Enter binary logistic regression was performed to examine predictors of previous trails to stop PPI. The overall test for the model was statistically significant (chi-square = 24.08, $p < 0.001$). The model correctly classified 89.2% of the cases. All Betas were positive, indicating when a PCP recommended stopping PPI, and the patients talked about side effects of PPI and had greater familiarity and concern about long-term side effects of PPI, the participants were more likely to try stopping PPIs (Table 3). A PCP recommends stopping PPI ($p = 0.049$) and having a greater level of concern about the long-term side effects of PPI ($p < 0.0001$) were the only two statistically significant predictors in the model.

Please insert Table 3 here

4 Discussion

The results of this cross-sectional study provide insight into the awareness and perception of PPI adverse effects and perceived patient-related factors of PPI use in community-dwelling older adults in Jordan.

The current study found that a substantial proportion of respondents were not familiar with any report linking PPI use with side effects, and most participants reported no concern related to the chronic side effects of PPI. This finding is supported by the findings of previous research studies, which confirmed that knowledge deficit regarding the side effects of PPI is prevalent among older adults [10, 11]. Moreover, this finding reflects the profound dereliction of the local governmental and private healthcare institutions in scientific reports dissemination to the public. Our study also found that the majority of respondents (90%) had not discussed the benefits and risks of PPI with their PCPs, although most of them (80%) felt comfortable discussing that with their PCP. This particular finding is consistent with the findings of Kurlander et al. (2019) [10], which found that older adults were passive in discussing what they think about potential risks and benefits of PPI with their PCPs. This finding implies that older adults need to be actively engaged in any discussion of medication therapy-related decisions. PCPs and nurses should be responsible for fostering productive discussions about all issues related to medication prescription with their patients [13].

On the contrary, the current study reported that a low percentage of participants tried to stop PPI use due to its adverse effect profile, with a majority of those doing so without referring to their PCPs. Hence, the justification of why such a proportion of our sample had attempted to cease their PPI without counseling

their providers needs further investigation. One explanation could be due to the fact that the PPIs are an over-the-counter class of medications, which allowed patients to stratify PPIs as self-managed and self-titrated agents [14]. Accordingly, patient education and counseling should be highly implemented and emphasized to improve patient's awareness regarding possible serious adverse effects associated with inappropriate PPI use. Healthcare providers should also emphasize the importance of talking with PCPs before the patient decides to make any change of their medication regimen, even including over-the-counter drugs [15]. Self-titrating of PPI without PCP input would make patients more susceptible to poor health outcomes with a potential misunderstanding of their adverse clinical situations [11].

On the other hand, the current study reported an affirmative response (64%) from the participants when asking about willingness to stop PPIs due to long-term adverse effects, and this percentage significantly increased if the PCP suggested steadily reducing the PPI dose or resuming taking PPI in the future if needed. Taken together, these results suggest that the majority of the participants appreciate PCP's recommendations and trust that the PCP understands the full clinical picture of the patient. This finding emphasized the significant role of health care providers that can play to facilitate the decision-making process of stopping PPI.

Upon studying the factors predicting the long-term use of PPI among community-dwelling older adults in Jordan, the current survey reported that age, PPI indication, being comfortable to stop or reduce PPI, and improvement of GERD symptoms were statistically significant ($P < 0.05$) factors affecting the duration of PPI use. It is noteworthy that factor dealing with the willingness to stop PPI if the PCP recommended that was not statistically significant, which advocates that participants trust the recommendation provided by the healthcare provider. This comes inconsistent with the results provided by Kurlander and colleagues (2019) [10]. Hence, the importance and necessity of improving patient counseling and providing an excellent communication environment between patients and PCPs are important factors to achieve optimal patient therapeutic plan.

Moreover, the results of the current study supported the abovementioned theory by examining the factors predicting the trails to stop PPIs. We found that participants were more likely to try stopping a PPI when being recommended by a PCP, talking about side effects of PPI, and having greater familiarity and concern about long-term side effects of PPI. Our findings indicated that concerns associated with potential side effects of PPI are guiding PCPs to recommend stopping PPI or prescribing alternatives to PPIs. Multiple studies have suggested stopping PPIs and substituting them with more safe interventions for GERD including gum-chewing, smoking cessation, fasting for three hours before bedtime, and sleeping on left lateral position with the head of bed elevated [2, 4, 16] However, the effectiveness of these interventions in reducing GERD symptoms still need more investigation. There are some limitations associated with the survey study. For example, participants are elderly patients who may not feel comfortable providing answers that present themselves, or they may not be fully alert of the aims for any given answer. To control this issue, we hired a clinically skillful well-trained research assistant to collect the data and provide full clarification for the purpose of the study and the aim of each question.

5 Conclusions

PPIs are one of the most commonly used medications among community-dwelling older adults. The current study reported on long-term use or inappropriate prescription of PPIs. Concern about PPIs is associated with attempts to stop PPI, particularly with PCPs' recommendation. The risks and benefits of PPIs should be discussed with PCPs to avoid making inappropriate decisions regarding PPI therapy. The long-term use of PPI for older adults should be carefully evaluated, and future research is still needed in this area.

Abbreviations

FDA
Food and Drug Administration
PPI
Proton Pump Inhibitors
US
United State
PCP
Primary Care Provider
GERD
Gastrointestinal Reflux Disease
ACG
American College of Gastroenterology
IRB
Institutional Review Board

Declarations

Ethics approval and consent to participate

This study was approved by the Institutional Review Board (IRB) department of Jordan University of Science and Technology and the administrative office of each healthcare center (IRB approval # 749-2019). Written informed consent was obtained from all individual participants included in the study prior to data collection.

Consent for publication

Personal information about potential and enrolled participants will not be

published.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no conflict of interest

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Authors' Contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by MR and AR. The first draft of the manuscript was written by MR and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Tables

Table 1: Descriptive statistics of the Nurses Sociodemographic & PPI Use. N=120.

	Frequency	Percentage
Gender		
Male	59	49.2
Female	61	50.8
Level of Education		
Less than 8 years	21	17.5
8-11 years	22	18.3
12 years or completed high school	30	25.0
College/junior college/community college	18	15.0
Graduated (BA)	24	20.0
Professional school	5	4.2
Marital Status		
Married	100	83.3
Widowed	4	3.3
Divorced	2	1.7
Never Married	14	11.7
Believe PPI cause side effect		
Yes	43	35.8
No	77	64.2
Concerned about PPI side effects		
No	100	83.3
Yes	20	16.7
Familiar with reports linking PPI with side effects		
Not Familiar	114	95.0
familiar	6	5.0
Ever tried reducing PPI Dose		
Yes	15	12.3
No	105	87.5
Ever tried stopping PPI		
Yes	13	10.8
No	107	89.2
PCP recommend Stopping PPI		
Yes	10	8.3
No	110	91.7
Chronic Diseases Linked to PPI Use		
Chronic Kidney	4	3.3
Dementia	1	0.8
Fractured Bone	1	0.8
Hearth Attack	3	2.5
Osteoporosis	3	2.5
Stroke	1	0.8
Vit B12 Deficiency	10	8.3
Vit D Deficiency	34	28.3
Chronic diseases diagnosed with while taking PPI		
Heart Attack	1	0.8
Osteoporosis	1	0.8
Stroke	1	0.8

Vit B12 Deficiency	6	5.0
Vit D Deficiency	5	4.2
Have a PCP		
Yes	108	90.0
No	12	10.0
Use for GERD		
Yes	71	59.2
No	49	40.8
Talk with PCP about PPI Side effects		
Yes	7	5.8
No	113	94.2
Talk with PCP about Risks/Benefits of PPI		
Yes	12	10.0
No	108	90.0
PCP recommend reducing PPI		
Yes	11	9.2
No	109	90.8
Comfortable to stop or reduce PPI		
Very uncomfortable	3	2.5
Somewhat uncomfortable	21	17.5
Somewhat comfortable	40	33.3
Very comfortable	56	46.7
Willing to reduce PPI		
Very unwilling	13	10.8
Somewhat unwilling	27	22.5
Somewhat willing	57	47.5
Very willing	23	19.2
Willing to stop PPI if PCP recommend		
Very unwilling	13	10.8
Somewhat unwilling	29	24.2
Somewhat willing	54	45.0
Very willing	24	20.0
Willing to stop PPI if GI Specialist recommend		
Very unwilling	13	10.8
Somewhat unwilling	28	33.3
Somewhat willing	55	35.8
Very willing	24	20.0
Willing to stop PPI due to side effects		
Very unwilling	13	10.8
Somewhat unwilling	29	24.2
Somewhat willing	55	45.8
Very willing	23	19.2
Willing to stop if PCP recommend resuming PPI		
Very unwilling	16	13.3
Somewhat unwilling	25	20.8
Somewhat willing	56	46.7
Very willing	23	19.2

Willing to stop if PCP suggest alternatives		
Very unwilling	17	14.2
Somewhat unwilling	27	22.5
Somewhat willing	53	44.2
Very willing	23	19.2
Willing to stop if PCP recommend to gradually reduce dose		
Very unwilling	16	13.3
Somewhat unwilling	25	20.8
Somewhat willing	56	46.7
Very willing	23	19.2
How bad GERD in last 2 weeks		
No symptoms	77	64.2
Symptoms are noticeable but not bothersome	29	24.2
Symptoms are bothersome every day but do not change your daily activity	11	9.2
Symptoms interfere with your daily activity	3	2.5
Improvement of GERD since being on PPI		
A little improvement	80	66.7
Moderate improvement	37	30.8
Quite a bit of improvement	3	2.5
Type of HP who recommended PPI		
primary care provider	6	5.0
gastroenterologist	73	60.8
pulmonologist	2	1.7
Another type of provider	39	32.5
Seeing gastroenterologist for GERD		
Yes	65	54.2
No	55	45.8
Age (years), mean (SD)		61.35 (6.49)
PPI Duration (year), mean (SD)		3.47 (4.00)

PPI: proton pump inhibitor; GERD: Gastrointestinal reflux disease; PCP: primary care providers; HP: Healthcare providers.

Table 2: Multiple Regression Predicting PPI Duration (N= 120)

Predictor Variable	β	t	p
Age	.269	3.109	.002*
Use for GERD	-.192	-2.062	.041*
Comfortable to stop or reduce PPI	.287	3.323	.001*
Improvement of GERD Since being on PPI	.191	2.099	.038*
Willing to stop PPI if PCP recommend going to old dose	-.176	-1.811	.073
$F_{(5, 114)} = 6.176$, $p < .0001$			

*p<0.05; PPI: proton pump inhibitor; GERD: Gastrointestinal reflux disease; PCP: primary care providers

Table 3: Logistic Regression Predicting Previous Trails to Stop PPIs (N= 120)

Predictor	β	SE	OR	95% CI
Familiar with PPI side effects	0.066	0.097	1.068	[0.883, 1.293]
Talk with PCP about PPI side effects	1.125	0.988	3.081	[0.444, 21.83]
Concern about PPI side effects	0.076*	0.003	1.079	[1.018, 1.144]
PCP recommended stopping PPI	1.650*	0.964	5.207	[0.787, 34.44]

*$p<0.05$; PPI: proton pump inhibitor; PCP: primary care providers