



Patient Knowledge and Utilization of Over-the-Counter (OTC) Medications: A Comprehensive Study

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: <https://doi.org/10.9734/jpri/2024/v36i97583>

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/122675>

Original Research Article

Received: 21/08/2024

Accepted: 06/09/2024

Published: 13/09/2024

ABSTRACT

Background: Over-the-Counter (OTC) medications are the drugs that do not require prescription. In earlier times, self-medication of OTC drugs was not considered a healthy practice. But now FDA stated that "when these medications are used according to guidelines, they are considered safe and effective". Although along with the potential benefits over-use and miss-use is considered harmful and can cause potential side effects.

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Cite as: Amjad, Umair, Wasiaq Ali, Talha Rehman, Muhammad Aamir, Mahnoor Shahzadi, Abdullah, Muhammad Ahmed Saeed, M. Sohaib Sultan Sabri, Adeel Salah, Mahnoor Qaisar, and Muhammad Zahid Iqbal. 2024. "Patient Knowledge and Utilization of Over-the-Counter (OTC) Medications: A Comprehensive Study". *Journal of Pharmaceutical Research International* 36 (9):131-43. <https://doi.org/10.9734/jpri/2024/v36i97583>.

Objective: The research is carried out with objective to assess patient knowledge regarding OTC medicines use pattern, potential side effects and interactions.

Methods: The cross-sectional, observational study was conducted in different cities of Punjab, Pakistan. Data was collected on validated questionnaire after getting consent from 162 patients. And SPSS version 26 was used for statistical analysis of the collected data. Patients below 18 years of age were excluded from the study.

Results: A total of 162 patients participated in the current study. A statistically non-significant association was observed between the participants' gender and their level of knowledge regarding OTC medication, with a p-value of 0.442. However, a statistically significant association was found between having healthcare providers among family members and knowledge about OTC medication, with a p-value of 0.015 and an effect size of 0.008, indicating a weak positive association. Additionally, geographical location demonstrated a direct positive effect, with a p-value of 0.001 and an effect size of 0.330, which reflects a moderate positive association according to Cohen's classification.

Conclusion: Gender does not affect overall knowledge of OTC medications; however, education has a direct impact on understanding and using medications. Among the sources of information regarding OTC medications, healthcare providers within family members are identified as the most significant source.

Keywords: Over-the-counter (OTC); patient knowledge; usage pattern of over-the-counter medications; side effects of OTC.

1. INTRODUCTION

Medications that do not require a physician's prescription are known as over-the-counter (OTC) medicines [1]. Examples include painkillers such as: aspirin, paracetamol, and some anti-allergic i.e., loratadine. These are also referred to as non-prescription medicines [2]. According to the FDA, OTC medicines are safe and effective for use when used according to the product label instructions and the directions of a healthcare provider [3].

Over-the-counter (OTC) medications are considered effective and often the first choice for treating minor health issues. The practice of self-medication with OTC medicines is sometimes referred to as "responsible self-medication" [4]. Knowledge plays a crucial role in disease management and the cost-effectiveness of treatment when purchasing and using these medications without consulting a healthcare provider [4]. These medications are perceived by patients to be readily available, safe, and effective for use without professional consultation [5]. Individuals can obtain OTC medicines from pharmacies, grocery stores, and even supermarkets [5].

The concept of responsible self-medication has a long global history. However, in the 1960s, self-medication was often viewed as unnecessary and unhealthy. Today, some countries actively promote and encourage these

practices at the national level [6]. Reports indicate that 50-70% of the population in developed countries have used over-the-counter (OTC) medications [7]. The marketing and market share of OTC medications play a significant role in this trend. According to published data, OTC medications account for 30% of the market in Poland, compared to 10-20% in other European countries [8].

In the UK, an estimated 13% of consultations for minor illnesses occur in general practice, while 5% take place in Accident & Emergency (A&E) departments [9]. OTC medications commonly used include anti-allergic, antipyretic, and analgesic drugs, with NSAIDs being the most frequently utilized class [10]. A study in Germany shows a significant portion of the population regularly uses NSAIDs and other analgesic drugs [11]. The availability of non-steroidal anti-inflammatory drugs as OTC medications has led to an increase in their consumption over the past 20 years [12].

When considering patient awareness and sources of information about OTC medications, several key sources are often cited. These include medications previously prescribed to the patient for the same condition, recommendations from family members or friends who have used these medicines, and information gathered from books or the internet [13].

All these factors depend on patients' knowledge of medications. Various reasons for using OTC

medicines include the desire for quick relief from conditions such as headaches, abdominal cramps, and fever [9]. These medical conditions typically do not require direct supervision from a healthcare provider [14]. And here are some benefits and advantages of OTC medications: cost effective treatment, reduction in time as there is no or less need of consultation. It promotes self-treatment and lower the burden on both the patient and health care system, these are conveniently available medications [15].

Despite the benefits of OTC medicines, several issues arise due to low literacy rates, poor awareness of their proper use, and irrational use of medications. These issues include antibiotic resistance, polypharmacy, drug interactions, and potential side effects [16], when someone lack adequate knowledge it may result in over use, drug abuse and non-compliance to the medication [17], the readily availability of these medicines has increased the incidents of disease related morbidity especially in patient with pre-existing chronic disease [18]. This can lead to missed opportunities, such as identifying medical conditions caused by dietary habits or other aspects of daily life that could be improved through lifestyle changes. Without consulting a healthcare provider, these conditions may go undiagnosed, potentially worsening over time. This could result in more serious health issues and higher treatment costs in the future [19].

The objective of this research is to evaluate patient knowledge on the correct use of over-the-counter (OTC) medications, as well as their understanding of the potential side effects and interactions associated with commonly used OTC medications.

2. METHODOLOGY

The cross-sectional, observational study was conducted by students from a private medical institute in Lahore to assess patients' knowledge of OTC medications. Data collection occurred from July 10, 2024, to July 25, 2024. A total of 222 questionnaires were collected, but 60 were incomplete and subsequently rejected.

2.1 Inclusion Criteria

The study included all those patients who came to the pharmacy to buy OTC medication & wanted to participate. The questionnaire was given to those willing patients to fill out.

2.2 Exclusion Criteria

All the patients who are less than 18 years of age are excluded from the study.

After the inclusion and exclusion criteria, the sample size of the study remained to 162 patients out of 222 patients. A validated questionnaire was used to evaluate patients' understanding. Data was gathered from 10 pharmacies from various regions of Punjab, Pakistan. The questionnaire was distributed to patients who consented to participate, and a pharmacist supervised all data collection. Data was collected through stratified convenient sampling technique. The questionnaire included multiple sections, beginning with a consent form outlining the study's objective, introduction, procedure, and confidentiality.

The questionnaire consisted of 40 questions divided into different sections. The first section collected demographic data, including age, gender, healthcare providers in the family, religious beliefs about medication use, access to healthcare providers, location, education level, marital status, and employment status. The second section assessed patients' knowledge of commonly used OTC medicines and included a series of questions with correct answers. Few knowledge questions that were asked includes: source of information, safe daily dose of Panadol, what will happen after exceeding daily dose of Panadol, do they think using any supplement can cause change in color of urine, which tablet do they use in diarrhea, which tablet was contraindicated in ulcer, and how they store their OTC medications. A 60 percent right answers for the asked questions were considered as adequate knowledge of patients about OTC medication.

The third section contained eight questions to evaluate how, when, and why patients use OTC medicines, as well as questions regarding their OTC use habits. The fourth section aimed to understand any side effects observed by patients after using OTC medicines. The fifth section used yes/no questions to assess patients' knowledge about drug interactions after using any OTC drug.

2.3 Statistical Analysis

To analyze the collected data, we used the 26th version of SPSS. Standard deviation (SD) and mean were employed to summarize the data. To

determine if the data followed a normal distribution, kurtosis and skewness tests were applied. The null hypothesis was tested using independent t-tests or One-way ANOVA tests. Categorical data were evaluated using either Fisher's exact test or the chi-square test. Effect size was measured using Cramer's V or Phi (ϕ). A P-value of less than 0.05 was considered significant.

3. RESULTS

A total of 162 patients participated in the current study. Female participants comprised 23.5% of the total, which was lower compared to the percentage of male participants. Additionally, 38.9% of the patients had chronic conditions. The majority of participants (35.2%) were employed full-time. Further demographic details of the respondents are provided in Table 1.

Table 1. Demographic information of the patients. (N=162)

Variables	N(%)
Age	
Age	31.21 \pm 12.59
Gender	
Male	124 (76.5)
Female	38 (23.5)
Is there any health care provider in your family?	
Yes	84 (51.9)
No	78 (48.1)
Any religious belief on medication use?	
Yes	87 (53.7)
No	75 (46.3)
Access to Healthcare provider:	
Regular access	106 (65.4)
Limited access	56 (34.6)
Any chronic condition (e.g. diabetes, hypertension etc.)	
Yes	63 (38.9)
No	99 (61.1)
Geographical Location:	
Urban	86 (53.1)
Sub-urban	28 (17.3)
Rural	48 (29.6)
Education Level:	
No formal education	12 (7.4)
Primary education	26 (16)
Secondary education	38 (23.5)
Technical Training	13 (8)
College Degree	33 (20.4)
Post-graduation	40 (24.7)
Marital/Family Status:	
Single	80 (49.38)
Married	57 (35.2)
Divorced	9 (5.55)
Widowed	2 (1.23)
With children	11 (6.79)
Without children	3 (1.85)
Employment Status:	
Employed full time	57 (35.2)
Employed part time	18 (11.1)
Unemployed	23 (14.2)
Retired	11 (6.8)
Student	40 (24.7)
Home-maker	13 (8)

A post-hoc pairwise comparison of chi-squared tests for various variables with patient knowledge among 162 patients was conducted to assess their levels of knowledge. The analysis revealed that 36.3% of males had adequate knowledge, which was higher compared to

females. Patients with access to healthcare providers had significantly better knowledge (p-value = 0.015, effect size = 0.008) compared to those without such access. Further detailed information on participants' knowledge about OTC medications is provided in Table 2.

Table 2. Knowledge of participants (N=162)

Variables	Patient knowledge N (%)		P-value*	Effect size#
	Adequate knowledge	Inadequate knowledge		
Gender				
Male	45 (36.3)	79 (63.7)	0.442	-
Female	11 (28.9)	27 (71.1)		
Is there any Health care provider in your family?				
Yes	30 (35.7)	54 (64.3)	0.869	-
No	26 (33.3)	52 (66.7)		
Any kind of religious belief on medication use:				
Yes	39 (44.8)	48 (55.2)	0.005	0.002
No	17 (22.7)	58 (77.3)		
Access to Healthcare provider:				
Regular access	44 (41.5)	62 (58.5)	0.015	0.008
Limited access	12 (21.4)	44 (78.6)		
Any chronic condition (e.g. diabetes, hypertension etc.)				
Yes	21 (33.3)	42 (66.7)	0.866	-
No	35 (35.4)	64 (64.6)		
Geographical Location:				
Urban	39 (45.3)	47 (54.7)	<0.001	0.330
Sub-urban	12 (42.9)	16 (57.1)		
Rural	5 (10.4)	43 (89.6)		
Education Level:				
No formal education	5 (41.7)	7 (58.3)	0.05	0.261
Primary education	4 (15.4)	22 (84.6)		
Secondary education	18 (47.4)	20 (52.6)		
Technical training	7 (53.8)	6 (46.2)		
College degree	12 (36.4)	21 (63.6)		
Post-graduation	10 (25)	30 (75)		
Marital /Family Status:				
Single	30 (37.5)	50 (62.5)	0.259	-
Married	22 (38.60)	35 (61.4)		
Divorced	3 (33.3)	6 (66.7)		
Widowed	0 (0.0)	2 (100)		
With children	1 (9.1)	10 (90.9)		
Without children	0 (0.0)	3 (100)		
Employment Status:				
Employed full time	26 (45.6)	31 (54.4)	0.117	-
Employed part time	6 (33.3)	12 (66.7)		
Unemployed	7 (30.4)	16 (69.6)		
Retired	1 (9.1)	10 (90.9)		
Student	10 (25)	30 (75)		
Home-maker	6 (46.2)	7 (53.8)		

The p-value was calculated using the chi-square test, as the data were non-parametric. The effect size was determined using the Phi coefficient, which measures the strength of association between categorical variables

All the information regarding patient OTC use patterns, potential side effects, and interactions was also examined. Only 34% of patients were found to habitually use OTC medications. A larger number of patients were aware that long-term use of OTC medications could cause severe side effects. Further details on patient OTC use patterns, potential side effects, and interactions are provided in Table 3.

Fig. 1 shows opinions with sources of information on OTC medicines from all the respondents. In all the categories the health care providers are the richest source of information to all the participants. However, Books are the minimum source of information for all the participants. More details about all the confounders can be obtained from Fig. 1.

Table 3. Represents information regarding patient OTC use pattern, potential side effects and interactions. (N= 162)

Variables	N (%)
Have you ever used two or more OTC medicines at a time?	
Yes	88 (54.3)
No	74 (45.7)
Do you think after continuously using an OTC medicine it becomes Less Effective?	
Yes	105 (64.8)
No	57 (35.2)
Are you habitual to use of OTC medicines?	
Yes	55 (34)
No	107 (66)
Have you ever increased the dose on your own when symptoms are not relieved?	
Yes	74 (45.7)
No	88 (54.3)
Do you think OTC medicines are the first option for minor health issues?	
Yes	125 (77.2)
No	37 (22.8)
Do you think OTC medicines have few side effects than prescription medicines?	
Yes	107 (66)
No	55 (34)
Have you ever felt sleepy after taking anti-allergic medicines?	
Yes	96 (59.3)
No	66 (40.7)
Do you think chronic use of OTC medicines can cause severe side effects?	
Yes	115 (71)
No	47 (29)
Did you know that OTC medicines can cause interactions with other medications and supplements	
Yes	104 (64.2)
No	58 (35.8)
Have you ever consulted any Health care provider regarding Interactions	
Yes	68 (42)
No	94 (58)
Any previous experience regarding medicines interaction?	
Yes	70 (43.2)
No	92 (56.8)
Do you think its important to report any interaction to health care provider	
Yes	127 (78.4)
No	35 (21.6)
Do you think you need more information to prevent interactions?	
Yes	125 (77.2)
No	37 (22.8)

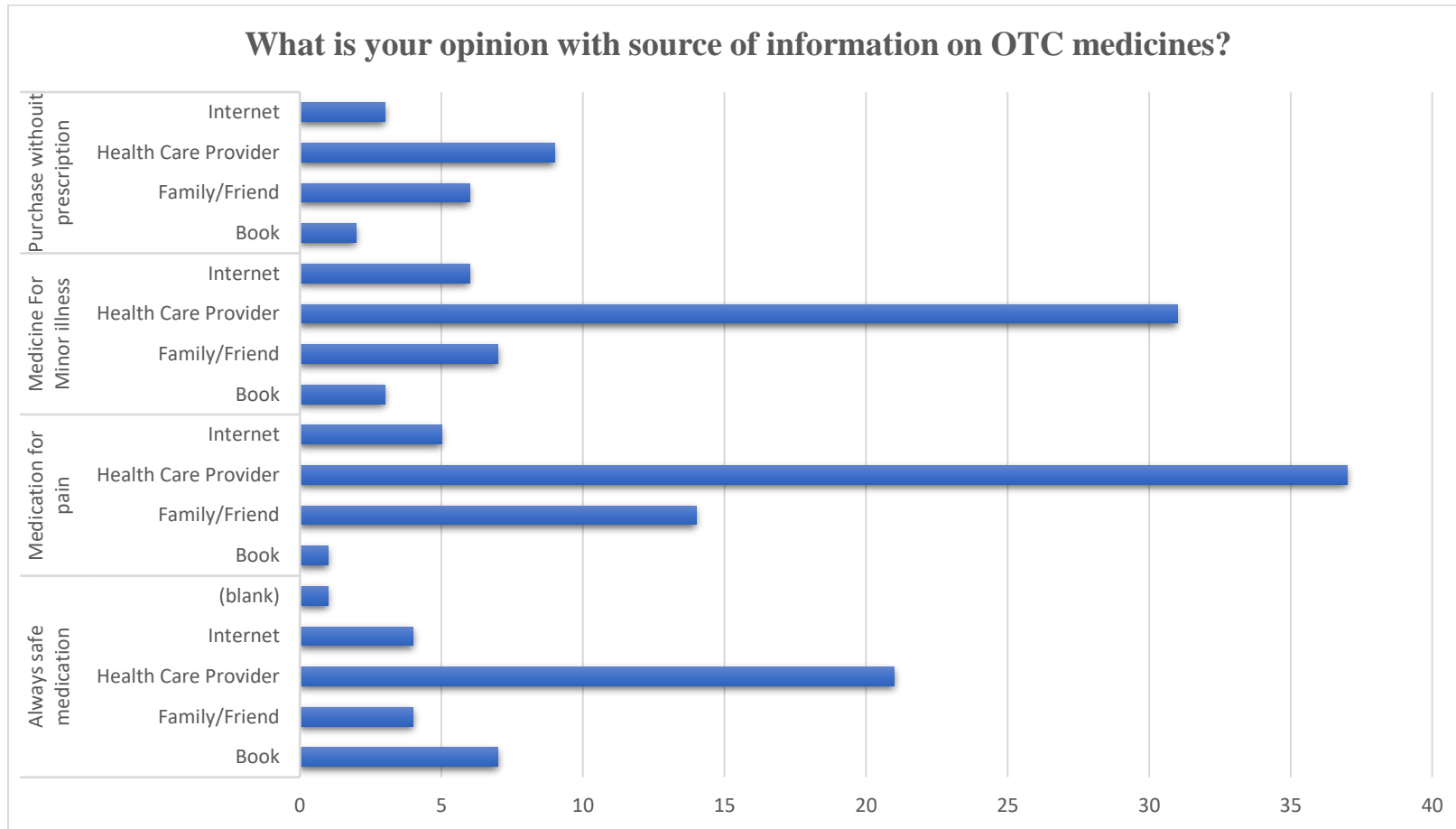


Fig. 1. Opinions with sources of information on OTC medicines

4. DISCUSSION

This study is pioneering in its assessment of patient awareness regarding the use of OTC medicines in any region of Punjab, Pakistan. No previous research in Pakistan has evaluated the awareness of OTC medicine use among patients with coronary disease. The study involved a total of 162 patients, with fewer females participating compared to males. This gender disparity likely reflects the higher male population in various areas of Punjab, as reported by the Abbas et al in Pakistan [20]. Furthermore, inadequate knowledge of females was more as compared to the males and the percentage was 71.1% get the P value of clear 0.442.

A statistically non significant association was reported with the presence of healthcare providers in a family with the P value of 0.869. Which proves that the presence of health care providers does not have any effect on better knowledge of respondents regarding the OTC medications and their uses the grand findings of this study are quite different from the others studies which was conducted in 2021 by Iqbal et al according to which the presence of healthcare providers can significantly improve the knowledge of patients regarding the disease [21].

The present study shows that religious beliefs have a statistically significant impact (P value 0.005) on the use of OTC medications and the level of knowledge about these medications among our patients. Those with strong religious beliefs demonstrated better understanding of the proper use of OTC medications compared to others. This may be due to the emphasis on appropriate medication use within their religious teachings. Additionally, religious beliefs are often linked to educational background, highlighting the importance of accurate information when using OTC medications. The present study is well supported with a previous study conducted in Malaysia which proves the similar kind of findings [22].

The study also indicates that the presence of chronic diseases such as hypertension or diabetes mellitus does not have a statistically significant effect on the use of OTC medications or the knowledge regarding these medications. This suggests that whether or not patients have these chronic conditions, their use of and knowledge about OTC medications remain unaffected. The findings of the current study are

supported by a study conducted in Saudi Arabia in 2022, which reported similar results regarding the use of OTC medications and chronic disease management [23].

Similarly, the study indicates a statistically significant effect of patient education on the use and knowledge of OTC medications among all respondents. This suggests that higher levels of education are associated with better knowledge and more appropriate use of OTC medications. These findings are consistent with various studies conducted in different countries, which show that increased patient knowledge about both OTC and prescription medications leads to a better understanding and more effective use of these treatments [24, 25, 26].

The results from current study, show that there is no significant association between relationship status (i.e. marital status single, married, widowed with or without children) and knowledge of patients regarding OTC medicines as their p-value is 0.259 which is more than 0.05 so the knowledge of patients about OTC medication is not affected by their marital status. The study was conducted in Lebanon which professed that the p-value of marital status has no significant association [27]. Another study conducted in Thailand on self-medication with OTC claimed that there is no significant association as their p-value is 0.233 which is more than 0.05 [28].

When data was analyzed to find any kind of association between employment status and knowledge of patients, we found no significant association because the p-value was 0.117. A previously conducted study, in Asmara, Eritrea claimed significant association between occupational/employment status and knowledge [29]. However, similar results to the current study were found in a study conducted in 2021 in Thailand on self-medication with OTC [30].

The current study proved that when the question was asked from the respondents whether they used two or more OTC medicines at a time more of the respondents around 54.3% replied 'Yes', that they have used more than two medicines at a time. A similar study that was conducted in 2000 in FINLAND, results from that study showed that 8 persons have used two or more than two OTC NSAIDs, along with different percentages with different OTC medicines [31].

Furthermore, this study revealed that around 54.3% of the patients thought that after

continuously using an OTC medicine it would become less effective. Results showed that 44% of patients become habitual to use of OTC medicines while a study was conducted in 2005 according to which only around 8.5% of patients are frequent users (daily users) of OTC analgesic medicines [32].

When the question was asked from the respondents whether they think OTC medicines are first option for minor health issues or not 77.2% of respondents thought yes these are the first option. A similar kind of study held in 2017 in Sweden results of which said that around 10% of patients use OTC medicines at first sign of their illness [33].

Around 54.3% of the respondents said that they never increased the dose of OTC medicines on their own when the symptoms are not relieved. Similar kind of study showed that due to lack of knowledge, only 11% and 4% of patients exceeded the daily dose of ibuprofen and other NSAIDs respectively [34].

This study revealed that major proportion of the respondents agreed that OTC medicines have less side effects as compared to Prescription medicines. 34% of the respondents replied that OTC medicines have more significant side effects as compared to Prescription medicines while on the other hand, 66% of the respondents expressed that OTC medicines have less potential side effects in contrast to Prescription medicines. The similar kind of study was held in Southwestern state in Nigeria in 2023 that also enforced that OTC medicines have less harmful effects as compare to Prescription medicines. 67.4% population of the total sample agreed that OTC medicines are safer than prescription medicines [35].

The current study showed that when the respondents were asked have they ever felt sleepy after taking an anti-allergic, most of them said YES they had experienced the sedative effects of an anti-allergic. The ongoing study revealed that about 59.3% of patients have experienced the sedative effects of Anti-allergic. A study that was conducted in 2011 showed that 55% of the sample size reported the sedating effect of cetirizine [36].

Approximately, 71% of the patients responded that chronic use of OTC medicine can cause severe health hazards to them while approximately 29% population responded that

they don't think that chronic use of OTC medicine can cause severe side effects. According to reported results from a study conducted in 2014, hospital-admitted patients with adverse drug reactions 53.8% out of them were due to OTC drugs [37].

While answering the question regarding interactions of OTC medications with other drugs and supplements, 64.2% of patients said that yes, they knew about the interactions of OTC drugs. A review article was published in 2022, it was concluded that there was non-availability of quality data regarding drug-drug interactions with OTC medicines [38]. But, 58% of patients have never asked or consulted any health care provider about these kinds of interactions. A study conducted in Switzerland reported that 47.3% and 25.6% of 203 patients were informed by physicians and community pharmacists respectively, regarding potential drug interactions between OTC and other medicines [39]. Around 56.8% of the respondents never experienced any interaction with OTC medications. Results were reported from a study conducted from 2020 to 2022 and published in 2024 revealed about 15.6% of patients have experienced potential interaction with OTC medicines, supplements, or with both [40].

In current study, most of the respondents around 78.4% think it's important to report drug interactions to health care providers. This study also showed us that 77.2% of respondents think they need more information to prevent drug interactions in future. A study conducted in Switzerland reported that 46.8% of the respondents were aware of drug interactions between OTC medications and other medications [41].

The study indicates that the major source of information for patients on the use of OTC medication is healthcare providers. The second leading source of information for the patient is friends and family. The information from the internet also had a contribution, but less than the other major leading sources. A similar study previously conducted shows that more than 70% of respondents have completed high school, TAFE (Technical and Further Education) and college/university, so it is therefore not surprising that most respondents had adequate functional health literacy scores [42].

When question was asked regarding opinion on OTC medicines from patients those who replied

medicines for pain, 37% of the patients were using the health care provider as the source of information. The other 14% comply with family and friends for the information. Those patients who responded to medication for minor illnesses, 31% out of them have the source of information from health care providers, 6% use the internet as the source of information and some patients also read books for information. Those who have opinions, 'always safe medication to use' these respondents showed a high level of trust in the health care provider. Family or friends are less frequently referenced. A previous study that was conducted was first published in 2014, according to results of that study source of information for 37.8% of patients was health care center and 31.1% of patient took advice from pharmacist, information from family and friend was 36.8% and 30.2% respectively, about 32.7% of patients get to know about OTC from internet [43].

5. CONCLUSION

Over the counter drugs are the drugs that do not need prescription for dispensing. The current study evaluated the knowledge and use of OTC drugs among patients. Gender does not affect overall knowledge of OTC medications; however, education has a direct impact on understanding and utilization of OTC medications. Patients having healthcare provider in the family presented better knowledge and utilization practices. Level of education as well as area of residence (urban area residents) positively impacted the knowledge and utilization of OTC drugs. Majority of the patients presented that healthcare providers in the family were the source of knowledge for them regarding OTC medications. It was concluded that in the case of information on OTC medications major source of information for patients was health care providers. But, still around 77.2% of patients wanted that to prevent drug interactions they wanted more information.

CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models

(ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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