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Diuretics misuse: A cross-sectional study to explore community pharmacist's perceptions of diuretics use and misuse

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ABSTRACT

This study aims to explore the perceptions and observations of community pharmacists regarding diuretic use and misuse in Jordan and their understanding of their expected role in patient education about proper use and misuse. A cross-sectional study was conducted using an online self-administered survey distributed to community pharmacies in various locations in Jordan. Descriptive and correlation analyses are used in data evaluation. A total of 112 respondents (female 61.05% and male 38.95%) completed the survey. Community pharmacists (56.76%) confirmed that individuals without health problems misuse diuretics and 81.82% confirmed that patients are not interested in seeking medical advice before buying a diuretic. Congestive heart failure followed by ascites edema was the main reason for dispensing diuretics with and without a prescription in community pharmacies. Moreover, elderly patients mostly misuse diuretics, and patients with chronic diseases misuse prescribed diuretics, besides using them for weight and fluid loss. Furosemide was the safest diuretic and the most misused diuretic due to its low cost and availability as a locally manufactured drug within the market. For all diuretics, fatigue and electrolyte disturbances were the most reported adverse events. A low rate of dispensing spironolactone in poly cystic ovary syndrome management was reported. Since 82.88% of the participants acknowledged that diuretics are prescription-only drugs, and 87.27% confirmed that diuretics are dispensed without a prescription, most community pharmacists (97.1%) stressed the importance of educating patients about diuretics and their side effects, as well as the necessity for patients to consult their physicians. In conclusion, diuretic misuse was observed among patients in Jordan, and community pharmacists are responsible for increasing public awareness about diuretic misuse. Still, enforcing a prescription-only policy of diuretic dispensing is crucial in restricting diuretic misuse.

INTRODUCTION

Prescription drug misuse (PDM) can be defined as the medication used without a prescription or in ways not intended by the prescriber according to the National Survey on Drug Use and Health and National Epidemiologic Survey on Alcohol and Related Conditions (Schepis *et al*., 2019). PDM has been increasingly reported in the last 10 years, in analgesics and opioid derivatives (Schaefer *et al*., 2017). On the other hand, the term drug abuse indicates the substance is often taken in larger amounts or over a longer period than intended which can be confused with the diagnosis of the Diagnostic and Statistical Manual of Mental Disorders of substance abuse (Hasin *et al*., 2013). Previously published literature related to drug misuse include opioids, analgesics, benzodiazepine, and tobacco/nicotine which have been observed in both developed countries (including the United States and the United Kingdom) and developing countries (McLellan, 2017). Interestingly, the classification of medicine as prescription-only-medicine (POM) and over counter (OTC) drugs in several countries including Jordan is present but not yet enforced in community pharmacies. In Jordan, the public can access a wide range of medications classified as POM which affects the safety and effectiveness of the therapy (Yousef *et al*., 2008).

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Diuretics are medications with many indications, particularly in adjusting body fluids volume and composition through increasing urine production following sodium excretion (Cadwallader *et al*., 2010). Diuretics' reasonable benefits/risk ratio makes them suitable for treating many diseases, including those caused by body fluids, such as hypertension and edema, with side effects including electrolyte disturbances, hypersensitivity, dizziness, weakness, and others (Ellison, 2019). According to the mechanism of action, diuretics can be classified as follows (Wile, 2012): thiazides and related diuretics such as hydrochlorothiazide, metolazone, and indapamide and loop diuretics: furosemide, bumetanide, osmotic diuretics: mannitol, carbonic anhydrase inhibitors: acetazolamide, potassium-sparing diuretics: amiloride and triamterene, potassium-sparing diuretics and aldosterone antagonists: eplerenone and spironolactone. Moreover, unfavorable "physiologic" actions (functional renal failure, hyponatremia, and hypokalemia) and (pseudo-Bartter syndrome, idiopathic edema, and management in the ICU) have been reported in diuretics misuse and abuse, respectively (Bartoli *et al*., 2017).

Few reports have been published designating the misuse of diuretics. Early, one article indicated that diuretic misuse was to control eating disorders that result in fluid retention to achieve lower body weight (Copeland, 1989). In addition, the World Anti-Doping Agency included diuretics in the list of prohibited/banned substances in 1988 after athletes' frequent diuretics abuse to mask other banned/prohibited substances (Mottram, 2018) and for excreting water to lose weight rapidly where the most common reported diuretic is furosemide (a loop diuretics) followed by hydrochlorothiazide (a thiazide) (Cadwallader *et al*., 2010). As a consequence, the use of diuretics is prohibited both in sports competitions and during training sessions; thus, they are routinely screened in antidoping laboratories (Cadwallader *et al*., 2010; Mottram, 2018).

There is a need for patient education through understanding the philosophy underlying body fluids and weight reduction, grasping the reasons for curbing and controlling water intake, performing routine clinical laboratory testing, treatment compliance, the adverse events resulting from excessive administration of diuretics, and complete adherence to physician instruction in their dosage regimen (Bartoli *et al*., 2017). Therefore, the importance of pharmacists' participation in patient education has been revealed in previous studies in other countries (Okuyan *et al*., 2021; Stuhec, 2021).

This study aims to explore the perceptions and observations of community pharmacists regarding diuretics use and misuse among patients depending on their experience in drug dispensing and assess the sources of information they routinely use in community pharmacies. Furthermore, to investigate community pharmacists' understanding of their role in patients' education on diuretic use and to enhance the role and involvement of pharmacists as healthcare providers. Accordingly, pharmacist training is likely to restrict diuretic dispensing to prescription-only drugs and alongside will increase public awareness of diuretic misuse.

METHODOLOGY

Study design

This was an observational, web-based cross-sectional study using a validated, pretested electronic questionnaire shared with a sample of 150 community pharmacists in Jordan.

Study population

The selection criteria included the pharmacists currently working at Jordanian pharmacies who agreed/consented to participate in this study. The exclusion criteria were pharmacists working in clinics or hospitals, other community pharmacy staff or trainees, and pharmacists who refused to participate in the study**.**

Sample size calculation

The estimation of the sample size is based on about 7,300 pharmacists; the number of pharmacists working in community pharmacies in Jordan and who have a valid pharmacy license according to the Jordan Pharmacists Association (JPA), with a margin of error of 10%, at a confidence level of 95%, and with a 0.5 response probability, was calculated to be 95 pharmacists (Raosoft, 2022), so the target was to reach 100 participants. The study questionnaire was distributed to 150 community pharmacists, and 112 completed the questionnaire with a response rate of 75%.

Study design and setting

A cross-sectional, questionnaire-based study was conducted on the Jordanian community pharmacists during the period from March to May 2022. A structured, self-administered questionnaire was designed by a group of faculty members in the School of Medicine, Al-Balqa Applied University based on a literature review of diuretics misuse (Bartoli *et al*., 2017; Cadwallader *et al*., 2010; Mottram, 2018; Wile, 2012) and this study objectives. A separate panel, including faculty members and experts in pharmacology and pharmacoeconomics, evaluated the content for the validity of the questionnaire draft, and adjustments were performed based on their commendations. Moreover, a web-based pilot study (20 community pharmacists who were randomly selected) was accomplished to confirm the registered and the most prescribed diuretics in the Jordanian local market, the length, and the design of the questionnaire; the questions are appropriate (reflect this study objectives), clear, and understandable. The pilot study feedback was collected to update the questionnaire but not used for final data analysis. An updated version of the questionnaire was used to invite community pharmacists to participate in this study using social media websites and community pharmacists' Facebook and WhatsApp closed groups. On the first page of the questionnaire, there was a brief introduction to inform the participants that the study aims to explore their perceptions about diuretics misuse, data will be used for scientific research purposes, and a declaration confirms the confidentiality of the study outcomes and the time needed to complete the questionnaire. Community pharmacists were asked to participate and complete the study or refuse participation by clicking either agree or disagree button and were informed that once they submit their response, their consent to participation in this study will be achieved. Personal information was not requested to keep all participants' identities anonymous. The questionnaire comprised 32 closed-ended questions with multiple choices that were distributed using Microsoft forms®. It contained four parts: the first part (1 question) is an interface that clarifies the purpose of the study and confirms the confidentiality of information; the second part (4 questions) contains the participants' demographic data questions, such as gender, age, community pharmacy location, and educational level; the third part (23 questions) contains questions related to the participants' perceptions and observations related to diuretics registered in Jordan including their use, adverse events,

age-related use, and the nonprescription pattern of their use with an emphasis on the use of spironolactone in poly cystic ovary syndrome (PCOS). The last part (four questions) was related to community pharmacists' understanding of their role in patient education and their observations concerning diuretic misuse about the patient category and the type of diuretic. Figure 1 depicts the flowchart of the survey plan workflow.

Data analysis

Descriptive statistics were used to evaluate the results of this study. All study data were obtained as percentages. Excel was used to compute percentages in addition to creating graphs. Statistical analysis was carried out using a statistical package for the social sciences (Statistical Package for the Social Sciences, SPSS Inc., Chicago, IL) version 24.0. Comparisons were performed using Pearson's chi-square test/Fisher's exact test for categorical variables. The level of significance was set at $p < 0.05$.

RESULTS

Study participants

Of the 112 participants who completed the questionnaire, two-thirds of the sample were females as shown in Table 1. Regarding the participants' residence, one-third of the participants were from Amman, the capital governorate and one-third from the central region, while the rest were distributed between the southern and northern governances. These percentages correlate well with the population density characterizing Jordan's population distribution (DOS, 2015). Most of the community pharmacists hold bachelor's degrees in pharmacy (88.29%), and 11.71% had completed postgraduate studies. The ages of the participants were distributed as follows: one-third was in the age group 31–45 years and the second third was in the range over 45 years old with a lesser percentage in the 18–25 years (22.52%) and 36–30 years' groups (17.12%). Table 1 shows the sociodemographic data of the participants who completed the survey.

Pharmacist perceptions regarding diuretics dispensing

Even though most respondents (82.88%) acknowledged that diuretics are prescription-only drugs, they affirmed that they dispense diuretics without a prescription (OTC) as shown in Figure 2A. This figure compares respondents' rate to diuretics' indications when it is dispensed with and without a prescription. As can be observed, the indications for diuretic dispensing with and without prescription, respectively, were as follows: hypertension (83.92% and 54.55%), followed by edema (9.01% and 19.09%), and kidney-related problems (4.50% and 9.09%). It should be pointed out that diuretics were also dispensed without a prescription for obesity and Central Nervous System (CNS) stimulants in sports (12.73% and 1.82%, respectively).

Regarding the respondents' source of scientific information about diuretic use, their academic education was the main source (39.5% and 46.4% male and female, respectively). However, the preference for other sources was different between the two genders. For the male participants, the order was the social media, physicians, official health websites of the Jordan Food and Drug Administration (JFDA) and the Ministry of Health (MOH), and finally medical representatives. While in the female participants, the order was official health website of the

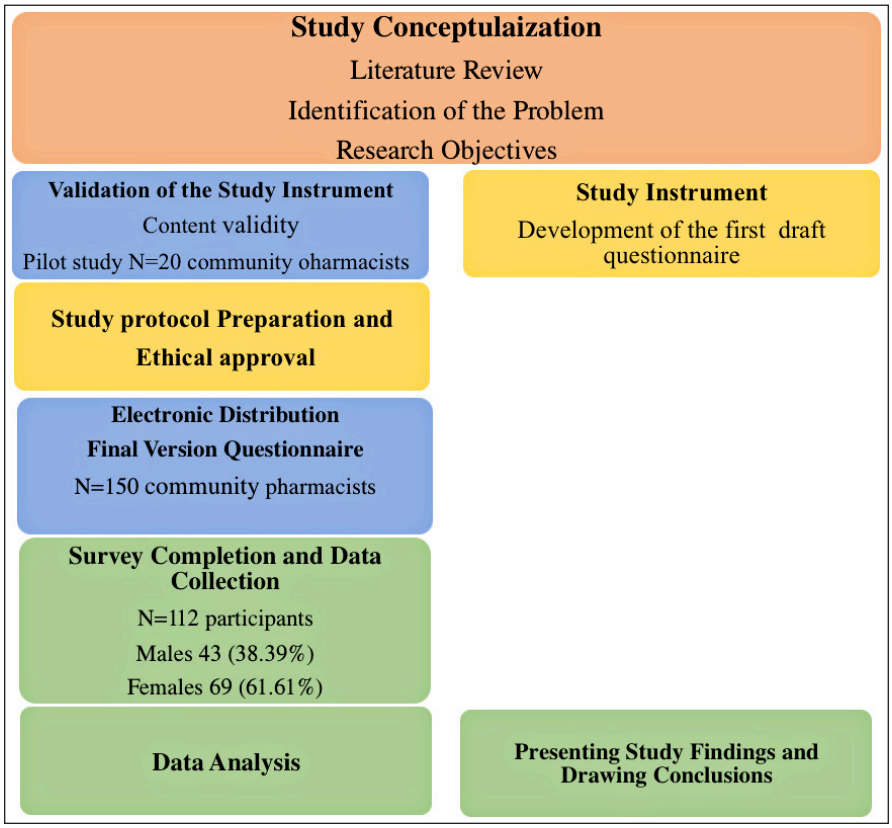

Figure 1. Flowchart showing the survey plan workflow and response rates of the participants.

Table 1. Sociodemographic data of the participants ($N = 112$).

Demographics		
Sex:	Male	38.95%
	Female	61.05%
The pharmacy location:	Amman	32.43%
	Northern Province	10.81%
	Central Province	34.23%
	Southern Province	22.52%
Educational qualifications:	Pharmacist (BSc graduate)	88.29%
	Pharmacist (Higher education)	11.71%
Age:	18–25 years	22.52%
	26–30 years	17.12%
	31–45 years	30.63%
	>45 years	29.73%

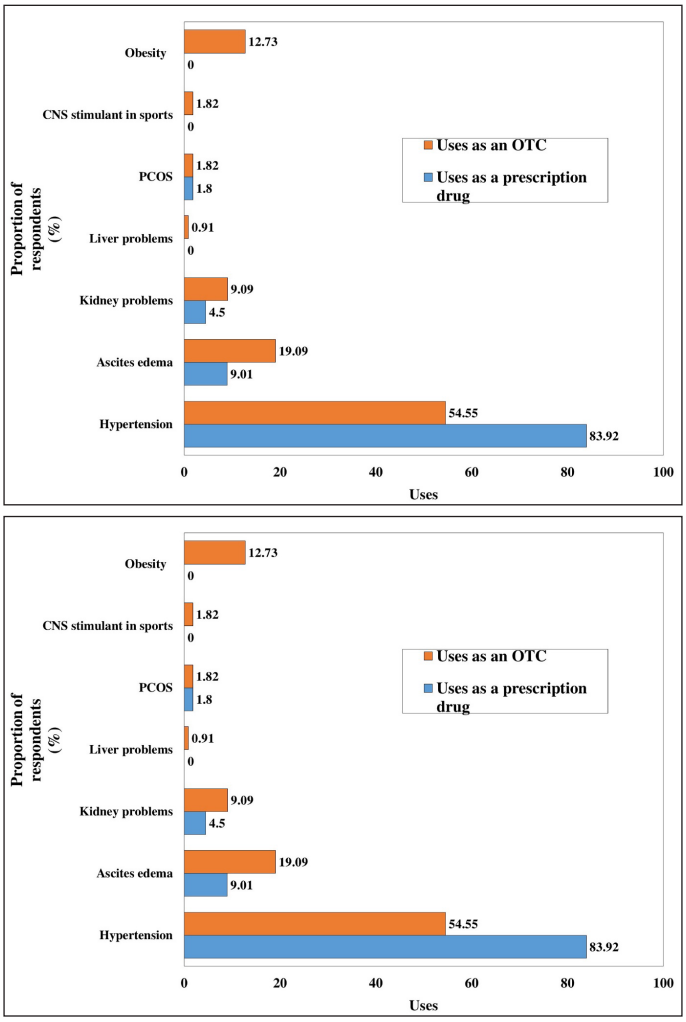

Figure 2. (A) Responses related to the uses of diuretics as prescription-only and OTC drugs. (B) Responses related to the most commonly dispensed diuretic as prescription-only and OTC drugs.

JFDA and the MOH, medical representatives and social media (same frequency), and finally the physicians. Figure 3 shows the percentages of responses regarding the source of information based on their gender.

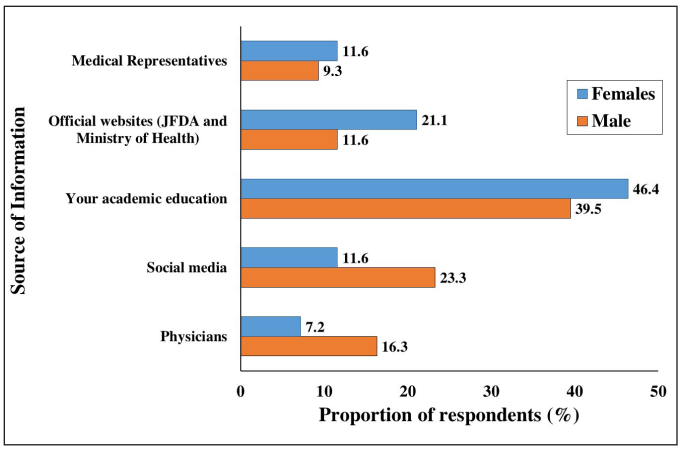

Figure 3. Preferences of the source of information between male and female study participants.

Pharmacist perceptions regarding patients' attitudes toward diuretic use

In this study, 87.27% of the respondents affirmed that diuretics are dispensed without a prescription, whether for chronic disease patients or undiagnosed ones. On the other hand, two-thirds of the respondents acknowledged that patients on prescribed diuretics were compliant in taking their medication according to the dosing regimen. Remarkably, more than half of the participants (58.56%) confirmed that diuretics are always available in the market, and half of the participants (53.64%) believed that patients who buy diuretics for the first time did not seek medical advice. The results also showed that about half of the participants (41.44%) confirmed that diuretics are prescribed to elderly patients and approximately half of them (48.65%) take diuretics without a prescription.

Pharmacist perceptions regarding the economic factors related to diuretic dispensing

Most participants confirmed that the low economic situation was a motive to buy diuretics without a prescription. Almost half of the participants confirmed that patients are not interested in natural alternatives to diuretics despite the availability and low price of herbal diuretics in Jordan. In addition, most participants confirmed that patients prefer a low-priced diuretic on purchase. On the other hand, more than two-thirds of the study participants confirmed that furosemide (Lasix®) or alternatives were the most available OTC and the most used and misused diuretic (Table 2).

Pharmacist perceptions regarding safety considerations during dispensing diuretics

Most of this study participants confirmed that patients are not interested in conducting periodic examinations of the liver and kidneys during their chronic use of diuretics as shown in Table 2. Interestingly, the participants affirmed that patients in Amman preferred to visit physicians to make routine medical laboratory checks (kidney function tests and blood electrolytes) before prescription renewal more than the patients in the central and southern provinces, and the lowest percentage was in the Northern Province.

Table 2. Community pharmacists' responses regarding patients' safety measures and economic factors affecting diuretic misuse.

Patients' preferences regarding safety measures prior to and during diuretic use (%)				
	Geographical area			
	Amman	**Central Province**	**Northern Province**	**Southern Province**
Patients' interest in conducting periodic lab examinations during their chronic use of diuretics	25.9	51.9	3.7	18.5
Patients prefer to visit physicians before prescription renewal	42.1	21.1	15.8	21.1
Economic factors controlling patients' diuretic misuse (%)				
	Yes	**No**		
Economic factors as a reason for seeking diuretics without a prescription	92.73%	7.27%		
Patient seek herbs with a diuretic effect as an alternative to synthetic diuretics	44.95%	55.05%		

About half of the participants (44.55%) confirmed that salt disturbances/deficiencies are the most common side effect of diuretics, followed by fatigue due to hypotension, headache, and dry mouth, as they did not mention any sensitivity as a side effect. Figure 4 depicts the most reported adverse events by the respondents. Most community pharmacists (97.1%) stressed that there is a need to educate the patients about the uses and the side effects of diuretics and the necessity for patients to refer to their physicians since 82.88% of the participants believed that diuretics are prescription-only drugs.

Pharmacist perceptions regarding the use and misuse of various classes of diuretics

More than half of the community pharmacists (56.76%) confirmed that individuals without health problems misuse diuretics. Most of the study participants (81.82%) confirmed that patients are not interested in seeking medical advice before buying a diuretic when more than two-thirds (63.30%) of the study participants believed that furosemide (Lasix®) or its alternative was the most prescribed diuretic, followed by hydrochlorothiazide (Esidrex®) (21.10%) or its alternative, spironolactone (Aldactone®) (9.17%), and bumetanide (6.42%), respectively. Fewer participants mentioned using indapamide, eplerenone, and metolazone (1.00% each). Remarkably, more than two-thirds of the study participants (74.07%) confirmed that furosemide (Lasix®), or its alternatives, was the most purchased drug without a prescription, followed by hydrochlorothiazide (Esidrex®) (12.04%) or its alternatives, spironolactone (Aldactone®) (7.41%), and bumetanide as the least dispensed medication (6.48%). Half of the study participants confirmed that furosemide (Lasix®) or its alternatives (50.46%) was the safest drug, followed by hydrochlorothiazide (Esidrex®) (30.28%) or its alternatives, spironolactone (Aldactone®) (13.76%), and bumetanide (5.5%), respectively.

Figure 2B shows the percentage of responses among the participants of this study. There were no significant differences ($p > 0.05$) in the response of all respondents in all provinces of Jordan about the most prescribed or nonprescribed drug (i.e., furosemide and hydrochlorothiazide).

Pharmacist perceptions regarding diuretic use in PCOS

Community pharmacists stated that spironolactone prescription for the treatment of PCOS was weak (46.79%) to moderate (47.77%), respectively. Only 3% confirmed that diuretic use in PCOS management was equally high or too high (2.75%). The rate of dispensing of spironolactone without a prescription in PCOS treatment was weak as reported by 62.96% of the participants compared to 36.11% of participants. According to the participants' responses, there was a significant difference ($p < 0.05$) in the trend of spironolactone dispensing whereas the female participants reported a higher trend of dispensing spironolactone in PCOS compared to male participants.

Pharmacists' educational role in patient diuretic misuse: participant response—gender correlation

To assess the understanding of community pharmacists of their role in patients' education about diuretics misuse regarding their gender, correlation statistics were performed for eight questions: do patients purchase diuretics without suffering a body fluid related-disease (misuse)? Was the economic factor the main reason for diuretic misuse? Do patients look for the lowest price when purchasing diuretics? And community pharmacists were asked about their role in patients' education and about the importance of compliance with their dosage regimen, the importance of follow-up with their physicians, dose regimen adjustments, diuretics adverse events, and performing routine laboratory checks. As can be seen in Table 3, there were no significant differences ($p > 0.05$) between the participants' gender regarding their responses when correlated with their educational part about diuretic misuse except for the one related to patient education about the importance of performing routine laboratory checks ($p < 0.05$).

DISCUSSION

Self-medication and dispensing prescribed medications without a referral to a physician is a problem in developing countries, including Jordan (Gogazeh, 2020; Ratanadadas *et al*., 2021). This is the first study to explore the community pharmacist's perception and observations of the use and misuse of diuretics in Jordan and to explore their understanding of their expected role in patients' education about diuretics. The main finding of this study confirmed that there is a trend in dispensing diuretics without referring to a physician or following routine laboratory checks. As mentioned earlier, the potential for this attitude among community pharmacists and patients is due to the nonenforced policy of prescription-only drugs that allowed access of the public to a wide range of medications, including diuretics

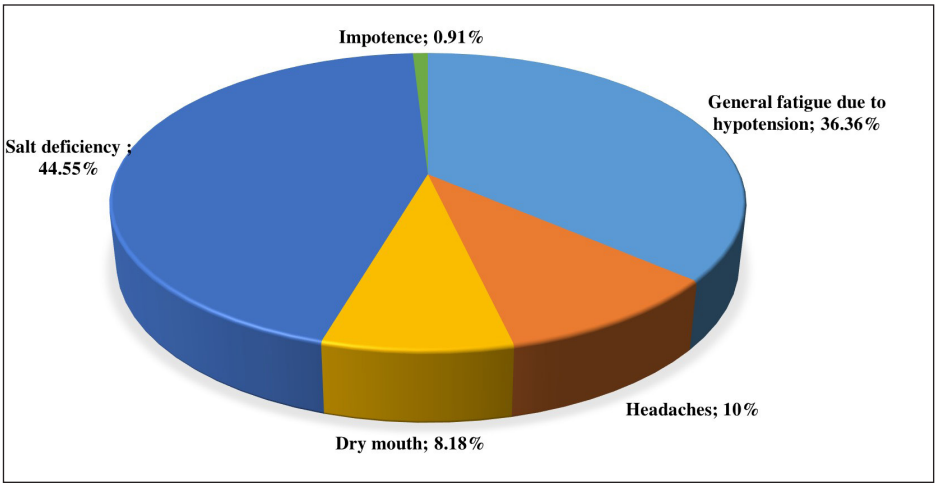

Figure 4. Adverse events reported by the respondents.

Table 3. Percentage frequencies of respondents' perception of diuretics misuse and the educational role of the pharmacists correlated to their gender ($N = 112$).

Question	Opinion of respondents	Male	Female	*p*-value*
Do you think patients purchase diuretics without suffering a body fluid related-disease (misuse)	Agree Do not agree	48.8% 51.2%	60.9% 39.1%	0.209
Was the economic factor the main reason for diuretic misuse?	Agree Do not agree	86.0% 13.9%	94.2% 5.8%	0.143
Do patients look for the lowest price when purchasing diuretics?	Agree Do not agree	76.8% 23.3%	85.5% 14.4%	0.233
Do patients purchase diuretics without suffering a body fluid related-disease (misuse)	Agree Do not agree	48.8% 51.2%	60.9% 39.1%	0.209
Do you think pharmacists can efficiently participate in educating patients about the need to refer back to their physicians for correct diagnosis?	Agree Do not agree	76.7% 23.3%	85.5% 14.5%	0.237
Do you think pharmacists can efficiently participate in educating patients to follow up with the physicians for correct dose regimen adjustments?	Agree Do not agree	76.7% 23.3%	85.5% 14.5%	0.237
Do you think pharmacists can efficiently participate in educating patients about the importance of routine laboratory checks throughout diuretics?	Agree Do not agree	62.8% 37.2%	82.6% 17.4%	0.019**
Do you think pharmacists can efficiently participate in educating patients about diuretic adverse events?	Agree Do not agree	95.3% 4.6%	94.2% 5.8%	0.784

* Based on chi-square calculation.
** Statistically significant differences between gender ($p = 0.05$).

(Yousef *et al*., 2008). In a previous study in Jordan, diuretics were one of the most common drugs associated with probable drug–drug interaction in polypharmacy patients (Nusair *et al*., 2020) Also, diuretics have been reported as the most prescribed drug used in the combination treatments of hypertension (Essam *et al*., 2013). In 2019, the prevalence of hypertension in Jordan was 22.1% (1.3 M) of the adults (18–69-years-old) (WHO). Knowing that Jordan is classified as a low-middle-income country, according to World Bank Data (worldbank.org), this study showed that the economic state is the driving factor for patients to choose cheap diuretics as described by half of the respondents who confirmed that the elderly and hypertensive patients were the most diuretics users who preferred cheap diuretics since they are one of the cheap antihypertensive drugs (Wisløff *et al*., 2012). Although hypertension treatment started with diuretics and cheap drugs, clinical practice guidelines in different-income countries were variant (Philip *et al*., 2021). Furthermore, the cost-related nonadherence problem was prevalent among hypertensive patients in Jordan (Naser, 2022).

The current results also showed that patients using diuretics as a prescribed drug were highly compliant with following dose regimens since diuretics were mostly used to treat critical illnesses such as hypertension and myocardial infarction. However, according to the respondents, the residence of the patients was not correlated with the percentage of patients who performed periodic laboratory checks ($p > 0.05$) even though national health insurance covers more than 90% of Jordanians (DOS, 2015), a condition that makes routine checks feasible and nonexpensive. The decreased percentage of patients who are referred to physicians before renewing their diuretics prescription can be

attributed to the chronic nature of the diseases (like hypertension). The general policy in Jordan public health insurance is to visit a physician every 3 months for chronic ailments. This fact enhances the preference of patients to seek medical advice from pharmacists before visiting a physician (Nazer and Tuffaha, 2017). As can be observed from the results, elderly patients showed the highest incidence of using diuretics as OTC (misuse) and as prescribed drugs. This can be attributed to the prevalence of cardiac diseases among this category of the Jordanian population (Nazer and Tuffaha, 2017).

Almost half of the participants confirmed that patients do not ask about natural alternatives to diuretics, which is related to high public awareness among Jordanians regarding the side effects of herbal diuretics for weight loss reported earlier (Al-Safi *et al*., 2008). In Jordan, previous studies described herbal medicine for various ailments as part of traditional medicine (Al-Daghistani *et al*., 2021; Al-Hamaideh *et al*., 2017, 2022; Jaber *et al*., 2020). Al-Safi *et al*. (2008) reported the misuse of herbs with diuretic effects in Jordan; however, there are no previous reports regarding synthetic diuretic use or misuse including furosemide. Among the registered diuretics in Jordan, furosemide (marketed as Lasix®) was found to be the most dispensed diuretic, whether as an OTC or a prescription-only drug. The reason behind that is the low cost (1.2$) and the availability of many generic alternatives since it is manufactured locally. This study showed that increased dispensing of furosemide by prescription or OTC can be attributed to its safety and efficacy (Najib *et al*., 2003). Similarly, hydrochlorothiazide has been previously reported as a very safe drug, allowing for its increased misuse within the Jordanian population (Herman and Bashir, 2022). On the other hand, this study investigated the prevalence of using spironolactone use and misuse among diuretics. Spironolactone is an aldosterone receptor antagonist diuretic with antiandrogenic properties. It can be used (off-label use) alone (Vitek *et al*., 2015) or in combination with other medications to attenuate androgen-mediated symptoms of PCOS of hirsutism, acne, and hair loss with a safe adverse effect profile in females (Ganie *et al*., 2020). Despite the prevalence of PCOS in Jordan (Alkoudsi and Basheti, 2020), there was an intermediate sale level of spironolactone as a prescription drug compared to selling it as an OTC drug to manage the symptoms of PCOS. This can be attributed to the fact that the main medical practice of managing PCOS in Jordan is combining metformin and contraceptives and to a small extent, the use of diuretic (spironolactone) in managing the symptoms of PCOS (Alkoudsi and Basheti, 2020; Al-Qudah *et al*., 2022) might refer to the availability of the drug in the market and the increased literature review related to the use of spironolactone effectiveness in PCOS treatment (Al Khalifah *et al*., 2020).

According to the respondents, electrolyte imbalance and general fatigue were the most reported adverse events which correlated well with typical symptoms observed following decreased blood pressure resulting from diuretic use. It has been reported that electrolyte imbalance and the risk of inducing Torsades de Pointes complications following diuretic use were the prominent observed adverse events in cardiovascular clinics among geriatric patients in Jordan (Al-Azayzih *et al*., 2018). This issue should be taken into consideration when implementing patient education programs about diuretic misuse, specifically among elderly patients since diuretics are highly misused by this group of patients. One of the most noteworthy findings of this study is the lack of information about diuretics' adverse events among diuretic users which stressed the need to educate patients about diuretics' safety and effectiveness. As previously reported in a health-related economic study, the awareness of diuretics safety was low in low-income countries (Philip *et al*., 2021).

The dependence of the survey participants on their academic education as a source of information, compared to the use of a lower percentage of the official websites of healthcare authorities can be attributed to the substantial percentage of bachelor's degree holders among participants. The participants are aware of their expected role in patients' education about diuretic misuse irrespective of their gender (Table 3), emphasized their role of clarifying the importance of the patient's referral to their physicians and adherence to their dose regiment, describing the correct use of diuretics and their adverse effects. However, the importance of making routine laboratory checks should be highlighted to male participants when using diuretics. There is an obligatory need to shift the dispensing of diuretics into the prescription-only category to minimize the misuse of this class of drugs. This goal could be achieved when pharmacists recognize their ethical responsibility while advising the patients on the best practices in dealing with medications with understanding the economic factors behind diuretic misuse. In addition, the need for health authorities to enforce the regulations related to dispensing prescription-only drugs will play an essential role in restricting diuretic misusing.

Study limitations

This study's limitations are that the causality cannot be assessed in a cross-sectional study. Moreover, the selection bias toward young pharmacists who are familiar with social media platforms and are more interactive with web-based questionnaires, keeping the identity of the participants anonymous, is decreased. Despite the limited sample size in this study, the inclusion of the participants from all provinces in Jordan increases the representation of the findings. In addition, the prevalence and consistency of findings are outlined in the results which potentiate the need to implement the outcomes of this study all over the Jordanian community pharmacies.

CONCLUSION

Diuretic misuse and dispensing without a prescription were observed among patients with chronic diseases, besides using diuretics for fluid and weight loss. Community pharmacists are aware of the use and misuse of diuretics in Jordan and understand their responsibility to participate in increasing public awareness by describing the correct use of diuretics, guiding patients to follow up with their physicians, and performing routine checks during their treatment with diuretics. Consequently, healthcare professionals should assess patients' needs for accessing medications and be ready to educate and guide them with specific action plans. Health authorities in Jordan (JPA, JFDA, and MOH) are responsible for establishing educational lectures and procedures to the awareness of the misuse of diuretics and imposing regulations on community pharmacists' adherence to medical prescriptions and good practices in dispensing diuretics. The potential for adverse events and patient health state deterioration in the cases of diuretic misuse should also be part of public awareness. This study has identified

potential areas for future investigation of the consequences of diuretic self-medication among cardiovascular disease patients to quantitatively assess the prognosis among these users to correlate it with increasing numbers of hypertension cases in Jordan. Meanwhile, health authorities should consider enforcing diuretic restrictions on prescription-only drugs.

AUTHORS' CONTRIBUTION

Khawla Al-Hamaideh contributed to study design, project administration, funding acquisition, methodology, investigation, critical revising and editing of the original draft, and review and editing of the final manuscript.

Isra Dmour carried out conceptualization, methodology, investigation, formal analysis, data curation, writing of original draft, and reviewing and editing of the final manuscript.

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CONFLICT OF INTEREST

The authors declared no conflicts of interest concerning this article's research, authorship, and/or publication.

ETHICAL APPROVAL

The currentis study followed the World Medical Association Declaration of Helsinki statement (World Medical Association, 2013). The study protocol was approved by the Ethics Committee of the Al-Balqa Applied University (approval no. 26/3/1/527 issued on April 4, 2022). Responders'' submission of completed questionnaires was considered consent to participate in the study.

DATA AVAILABILITY

All data generated and analyzed are included in this research article.

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