

Original Research

Abuse of Dextromethorphan, Naphazoline, and Carbamazepine in Community Pharmacies and Health Centers

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Received (first version): 15-Jul-2025

Accepted: 12-Aug-2025

Published online: 10-Jan-2026

Abstract

Purpose: This study aims to collect data on the prevalence of abuse of dextromethorphan, naphazoline, and Carbamazepine from pharmacies and comprehensive health centers in Al-Karak, Jordan. Moreover, it seeks to understand the medical staff awareness and knowledge of this issue.

Method: This cross-sectional study was conducted between July 2023 and October 2023 and two questionnaire forms were constructed. The first one was handed to pharmacists in twenty community pharmacies in Al-Karak. The second one was distributed to physicians who work in five comprehensive health centers in the same area. Results and conclusion: This study showed that cold and cough medications containing dextromethorphan and ophthalmic solutions containing naphazoline are the most widely abused OTC drugs (55% and 45%, respectively). Most pharmacists (95%) agreed that dextromethorphan can cause euphoria and hallucination at high doses, and 80% recognized that naphazoline can cause similar effects. All physicians (100%) stated that OTC drugs can be abused, and all participants reported that dextromethorphan and naphazoline can cause euphoria and hallucinations if overused. Most participants from both pharmacies and health centers had faced suspected cases of OTC drug abuse. Almost 95% of pharmacists suspected the abuse of dextromethorphan and naphazoline, and 60% noted that suspicious customers were both regular and strangers. Among health center participants, 80% prescribed these drugs daily, while 20% prescribed them 2 to 6 days per week. The main reasons for abuse were identified as these drugs were non-prescribed and easily accessible. Regarding carbamazepine abuse, which is a prescribed drug, 55% of pharmacists stated that carbamazepine has a potential for abuse, and the demand for it had increased recently. Moreover, 65% reported that people often requested multiple packs at once. Among physicians, 80% stated that carbamazepine has a potential for abuse and 40% observed that specific individuals requested carbamazepine more frequently than others did and displayed signs and symptoms of carbamazepine abuse.

Keywords: Dextromethorphan, naphazoline, carbamazepine, abuse, OTC drugs, pharmacists and physicians

INTRODUCTION

Prescription drugs are those that a pharmacist will dispense after receiving a prescription from a doctor, dentist, or other healthcare professional with the legal authority to provide them¹. Non-prescription drugs, commonly referred to as over-the-counter drugs (OTC), are drugs that are available from licensed medical professionals without a prescription². OTC medications are accessible without a prescription and can be obtained directly from associated pharmacies/stores because they are typically regarded as safe^{3,4} to treat a variety of minor disorders⁵.

Over the years, there has been a steady increase in the intentional drug abuse of OTC and prescribed medications. OTC medicine abuse has become more widely recognized in recent years among patients, particularly teenagers and young adults⁶. the definition of abuse is "any intentional, non-therapeutic use of a drug product or substance, even once, with the goal of attaining a desired psychological or physiological effect"⁷. Research demonstrates that the improper use of over-the-counter medications can have negative effects on users and their families that might be physical, psychological, or financial⁸.

OTC drugs have no age restriction or quantity limit and are generally accessible, affordable, and legal, which makes them easy to abuse. Many patients believe that OTC pharmaceuticals are safer than illegal or prescription drugs⁹. OTC pharmaceuticals can be abused by those who abuse prescription drugs or illicit substances. In situations where other substances are not available, OTC drugs can be substituted¹⁰. In Jordan, OTC medications are recognized as an essential component of healthcare¹¹ and the pharmaceutical industry has seen a steady rise in the usage of OTC products¹². In Jordan, community pharmacies are the primary healthcare facilities that are the most reachable¹³.

The accessibility to OTC drugs has impacted the public's perception of safety and a lack of information regarding their potential for abuse, dependence, and injury while encouraging self-care⁸. Therefore, a risk could be obtained from utilizing OTC medications¹³. These include inaccurate self-diagnosis, insufficient dosage, problems with addiction after long-term

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use, unfavorable drug reactions, and drug interactions^{14,15}. Furthermore, the active components in certain OTC medications have the potential to be abused at doses higher than those advised¹⁶. Previous studies conducted in Jordan reported that several OTC drugs that are commonly abused. These include cold and cough preparations especially those containing dextromethorphan, systemic nasal decongestants, analgesics, and antihistamines such as chlorphenamine and diphenhydramine. Laxatives like loperamide and ophthalmic products that include sympathomimetics like naphazoline for itchy red eyes or antihistamines like antazoline for allergic conjunctivitis are also frequently abused in Jordan^{7,17}. These usage patterns are usually linked to alcohol and illicit drug use¹⁸.

Dextromethorphan was approved as an OTC antitussive by the Food and Drug Administration (FDA) of the United States in 1958. After the FDA evaluated the available safety and efficacy information on the medication in the 1970s, it was widely believed to be both safe and effective¹⁹. Between 2004 and 2010, the Substance Abuse and Mental Health Services Administration (SAMHSA) reported an increase in the frequency of admissions to emergency rooms related to antitussive medications like dextromethorphan. Euphoria and dissociative hallucinations are just a couple of the clinical signs and symptoms that DXM has the potential to produce²⁰⁻²².

The Drug Enforcement Administration requested in 2007 that the Food and Drug Administration hold a meeting of its advisory committee to discuss whether dextromethorphan should be recommended for scheduling under the Controlled Substances Act. The meeting was held in order to provide a scientific and medical evaluation of dextromethorphan and its potential for abuse. After that, rates of admissions to emergency rooms related to antitussive medications leveled off in 2011.

On the other hand, in Jordan, there has been a rise in the abuse of ophthalmic medications over the last five years. Many of these are purchased from pharmacies without a prescription and are used to experience effects that affect the mental state^{7,23,24}. The ophthalmic preparations that contain anticholinergics, antihistamines, and/or decongestants, such as tropicamide, cyclopentolate, naphazoline, and antazoline, are the most frequently reported ones to be abused²⁴. The abuse of Prisoline® and Naphcon® eye drops which contain naphazoline has been previously reported in Jordan from the perspective of pharmacists using a cross-sectional survey approach^{25,26}. Community pharmacists were not aware of this tendency until five years ago¹⁷. These medications were often used as less expensive and substitute for other illegal or controlled drugs²⁵.

In another aspect, the demand for some products that contain carbamazepine as an active ingredient has increased recently. The Food and Drug Administration (FDA) has approved carbamazepine as a prescription medication for the treatment of trigeminal neuralgia, psychomotor and grand mal seizures, as well as manic and mixed episodes of bipolar disorder²⁷. While, data on carbamazepine addiction and abuse are limited in the literature, and the medication is not recognized as having the potential for abuse, many case studies mentioned in the literature suggest a possible risk of carbamazepine abuse.

A person seeking to abuse an OTC drug may visit multiple pharmacies to obtain the same medication or return to the same pharmacy several times. Additionally, the absence of proactive measures by pharmacists to monitor patients use of OTC medications has created numerous potentials for abuse²⁸⁻³⁰. Pharmacists are frequently overworked, and the ongoing, stressful workload of filling prescriptions lessens their capacity to become a pharmacovigilant. Given these challenges, several studies are required across different governorates of Jordan to have a better understanding of drug abuse for both OTC and prescription medications and to determine if there is a difference in abuse pattern and prevalence over different parts of Jordan. Therefore, in this study will focus on examining the abuse of dextromethorphan, naphazoline, and carbamazepine in community pharmacies and health centers in Al-Karak, a governorate in the southern part of Jordan.

METHODS AND PROCEDURES

Study design

The researcher developed two questionnaire forms to address the study aims using a cross-sectional study involving a representative sample of pharmacists, physicians, and nurses in Al-Karak, Jordan, who dispense and prescribe dextromethorphan, Naphazoline, and carbamazepine frequently.

The first questionnaire was distributed to community pharmacies in Al-Karak and was manually collected from the pharmacists. The researcher visited various pharmacies in different areas on different days to deliver the questionnaire to pharmacists and set a time to collect the completed questionnaires. The information and data required were obtained and assessed by pharmacists using a 40-item questionnaire.

The second 35-item questionnaire was distributed to physicians and nurses who work at Al-Karak comprehensive health centers, and the data was collected manually, which required visiting the health center to deliver the questionnaire to physicians and nurses.

The questionnaire was designed to gather information and data without including any identifying questions to maintain participant anonymity. The study involved 20 pharmacies and 5 comprehensive health centers. On the first page of the questionnaire, detailed information about the purpose of the study, methodology, questionnaire structure, and confidentiality was provided, ensuring that participants were fully informed about the research process and their rights. Both pharmacy and health centers questionnaires were divided into nine different parts (Table 1 and Table 2). This study was conducted according to the Declaration of Helsinki for protection of human subjects and approved by the Scientific Research Committee at the School of Medicine, University of Jordan and Directorate of Education and Medical Training at the Jordanian Ministry of Health.

Inclusion and exclusion criteria

The inclusion criteria in this study include; Jordanian



Table 1: Summary of the distribution of questions in the pharmacy questionnaire

Aim of the Question	Explanation	Question Number
Personal information	Age, gender, qualification, experience, and classification of the area in which the pharmacy is located from a socio-economic point of view.	1.1-1.5
Suspected cases and situations that pharmacists might face	Asking pharmacists if they had dealt with suspected cases how this situation was, and how the abuser acted inside their pharmacy. Additionally, it asked about the most abused OTC drug from their perception.	2.1-2.4
Recording pharmacist perceptions about the common OTC drugs that have a potential for abuse	Assessing their knowledge about dextromethorphan and naphazoline abuse.	2.5-2.8
Factors that make dextromethorphan, and naphazoline abused	Many factors are listed in the question to determine whether they are related to the abuse or not.	2.9
Suspected cases and situations that pharmacists might face especially with dextromethorphan, and naphazoline abuse	Ask pharmacists if they have faced any situations and weird cases with people who abuse dextromethorphan and naphazoline and if these people ask for more than one package of these drugs at once. Also, if these people are regular customers, stranger customers, or both.	2.10-2.15
Statistical information for dextromethorphan and naphazoline	Depend on each pharmacy system and sale invoices to determine how much of each item listed in the question is consumed from 2019 to 2023 in each year. Thus, the unreasonable increase will indicate the abuse of this item.	2.16-2.17
Recording pharmacist perception toward carbamazepine abuse and suspected situations that they faced with carbamazepine consumers	the pharmacists were questioned about carbamazepine abuse and if they were aware of its potential for abuse. additionally, if they faced any suspected cases of people who abuse carbamazepine. And if they notice any unreasonable increase in carbamazepine demand recently.	3.1-3.6
Statistical information for carbamazepine	Depend on each pharmacy system and sale invoices to determine how much of each item listed in the question is consumed from 2019 to 2023 in each year. Thus, the unreasonable increase will indicate the abuse of this item.	3.7
Knowledge and awareness of pharmacists about abuse and how to deal with abusers	The questions were formulated to assess pharmacist knowledge and if they differentiate between misuse and abuse of the drugs. In addition, the pharmacist was questioned how they dealt with abusers and if they called official authorities when they noticed any abuse cases. Also, they questioned if they informed people about the serious adverse reactions of some OTC medications and tried to provide another alternative to drugs that might have a potential for abuse.	4.1-4.11

Table 2: Summary of the distribution of the questions in the health center questionnaire

Aim of the Question	Explanation	Question Number
Personal information	Age, gender, specialization, experience	1.1-1.4
Assess the perception of physicians about the abuse of OTC medications	The participants were asked if they were aware that some OTC drugs have a potential for abuse, and they asked which types of OTC medications are abused the most including cold and cough remedies, ophthalmic solutions, or other drugs they think could be abused.	2.1-2.2
Recording physicians' perceptions toward dextromethorphan and naphazoline abuse	Asking about the potential for abuse for each dextromethorphan and naphazoline. Additionally, the physicians were questioned about the effect of dextromethorphan and naphazoline if they were used in large doses	2.3-2.6
determining the extent of prescribing dextromethorphan and naphazoline	The questions were formulated to determine if dextromethorphan and naphazoline are used as a first choice for cases and how often the physician prescribes these drugs to patients. Also, the questions asked if they prescribe these drugs only for serious cases or for all cases in the health center	2.7-2.14
Carbamazepine abuse evaluation	Assess their awareness of carbamazepine abuse and what can cause if consumed in large doses	3.1-3.2
Evaluating medical cases	Determination of Medical cases that require treatment with carbamazepine in the center by designing questions involving the possible cases that require carbamazepine as a drug of choice. As well as recording the increase in medical cases requiring carbamazepine in their treatment.	3.3-3.6
The Practice of Physicians toward carbamazepine prescription	Assessing if they give proper directions and proper counseling for patients who use carbamazepine	3.7-3.8
Recording suspected cases of patients with carbamazepine abuse	Questions were formulated to determine if there are any abuse cases in the health center that the physician deals with if there are any signs on the patient indicating his abuse, and if he asked for carbamazepine rather than other medications	3.9-3.13



Knowledge and awareness of physicians about abuse and how to deal with abusers	The physicians questioned how they deal with abusers and if they call official authorities when they notice any abuse cases. Also, they questioned if they informed people about the serious adverse reactions of some OTC medications and tried to provide another alternative to drugs that might have a potential for abuse.	3.14-3.17
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pharmacists and physicians who work in Al-Karak health centers and pharmacies that have been operational since 2019 and earlier. The exclusion criteria are non-Jordanian pharmacists and physicians, pharmacies that are not located in Al-Karak, and pharmacies that have been out of work for 3 months or more between 2019 and 2023.

Questionnaire validation and pilot testing

The questionnaires were created based on information gathered from a literature review about the abuse of prescribed and non-prescribed medications and the abuse of dextromethorphan, naphazoline, and carbamazepine and several experts validated the questionnaires. Then a pilot study test was performed to develop and improve the questionnaires and to assess the questionnaires clarity, reliability, and reproducibility. The questionnaires were distributed to five pharmacies and the volunteers were asked to complete them. After pilot testing, no modifications were made to the questionnaire, which the volunteers found understandable and the formal study did not incorporate the responses from the pilot testing.

Statistical Analysis

Data analysis was conducted using IBM SPSS the statistical package for social science (SPSS®). The correlation between categorical variables was assessed using the chi-squared test (χ^2). The analysis was conducted using the Kruskal–Wallis (K-W) test. P-value was used to assess the Statistical significance and was considered at $P \leq 0.05$ as significant.

RESULTS

Characteristics of study samples

Pharmacies sample characteristics

Twenty pharmacies that met the criteria of being pharmacies run by Jordanian pharmacists and were operated continuously since at least 2019 were involved in the study. Participants were distributed between males (30%, n=6) and females (70%, n=14) (Figure 1). Regarding age, 60% (n=12) of the participants as a whole were in the range of 22–30 years, followed by 25% (n=5) in the age range of 31–40 years, and 10% (n=2) and 5% (n=1) in the age range of 51–60 years and 41–50 years, respectively (Figure 1).

Regarding experience, most pharmacists have 1-3 years of experience with 40% (n=8) of the total sample, followed by 4-6 years, 7-10 years, and more than 10 years of experience with 20% (n=4) for each group from the total sample (Figure 1). According to the survey results, the majority of respondents (85%, n = 17) to the study stated their pharmacies were situated in a high/ medium socio-economic class area. While, only 15% (n = 3), said their pharmacies were situated in a low socio-economic class region.

Health Centers sample characteristics

Five comprehensive health centers were involved in this study. The majority of the respondents in these centers (n=3), or 60% were in the 31–40 age range, and the remaining 40% (n=2) were in the 22–30 age range. The highest percentage of the total sample was for females with 80% (n=4), while males were 20% of the total sample (n=1). Regarding professional roles, 80% (n=4) of the participants were physicians, and only 20% (n=1) of them were a nurse. The majority of respondents (60%, n=3) were with 4-6 years of experience, while 40% (n=2) of them were with 1-3 years of experience (Figure 1).

Abuse of OTC medications

Pharmacist perception toward the potential for abuse of OTC medications, as reported by the participants

For a variety of reasons, including their ability to induce euphoria and psychological and mind-altering effects, some OTC medications have the potential to be abused. Therefore, participants were questioned if they thought that various OTC medications were being abused. Based on the results, 19 out of the participants (95%) agreed that there is a chance that some OTC drugs could be abused.

The majority of participants 55% (n=11) reported that cold and cough remedies especially those containing dextromethorphan as an active ingredient are the most commonly abused OTC medications. On the other hand, 45% (n=9) of the participants had chosen ophthalmic solutions that contain naphazoline as the most abused OTC drugs. In open answers, some individuals had chosen other OTC drugs that can cause abuse with frequent administration. Some of them were paracetamol as analgesics, and multivitamins specifically vitamin D.

Participants were distributed evenly between dextromethorphan (85%, n=17) and naphazoline (85%, n=17) that these have a potential for abuse. Moreover, the study discovered that 95% of the participants either agreed or strongly agreed that dextromethorphan can cause a case of euphoria and hallucination when it is consumed in large doses, while only 5% disagreed with dextromethorphan effect in consumption of large doses. Additionally, 80% of respondents either agreed or strongly agreed that naphazoline can induce euphoria and mental-altering effect in large doses, and 20% disagreed with this effect of naphazoline even in large doses of consumption (Table 3).

Comprehensive health centers physicians perceptions toward the potential for abuse of OTC medications

According to the findings, all participants in the health centers (100%, n=5), stated that OTC medications have a potential for abuse. All of them (100%, n=5) recognized the abuse potential of OTC medications, especially cold and cough remedies that



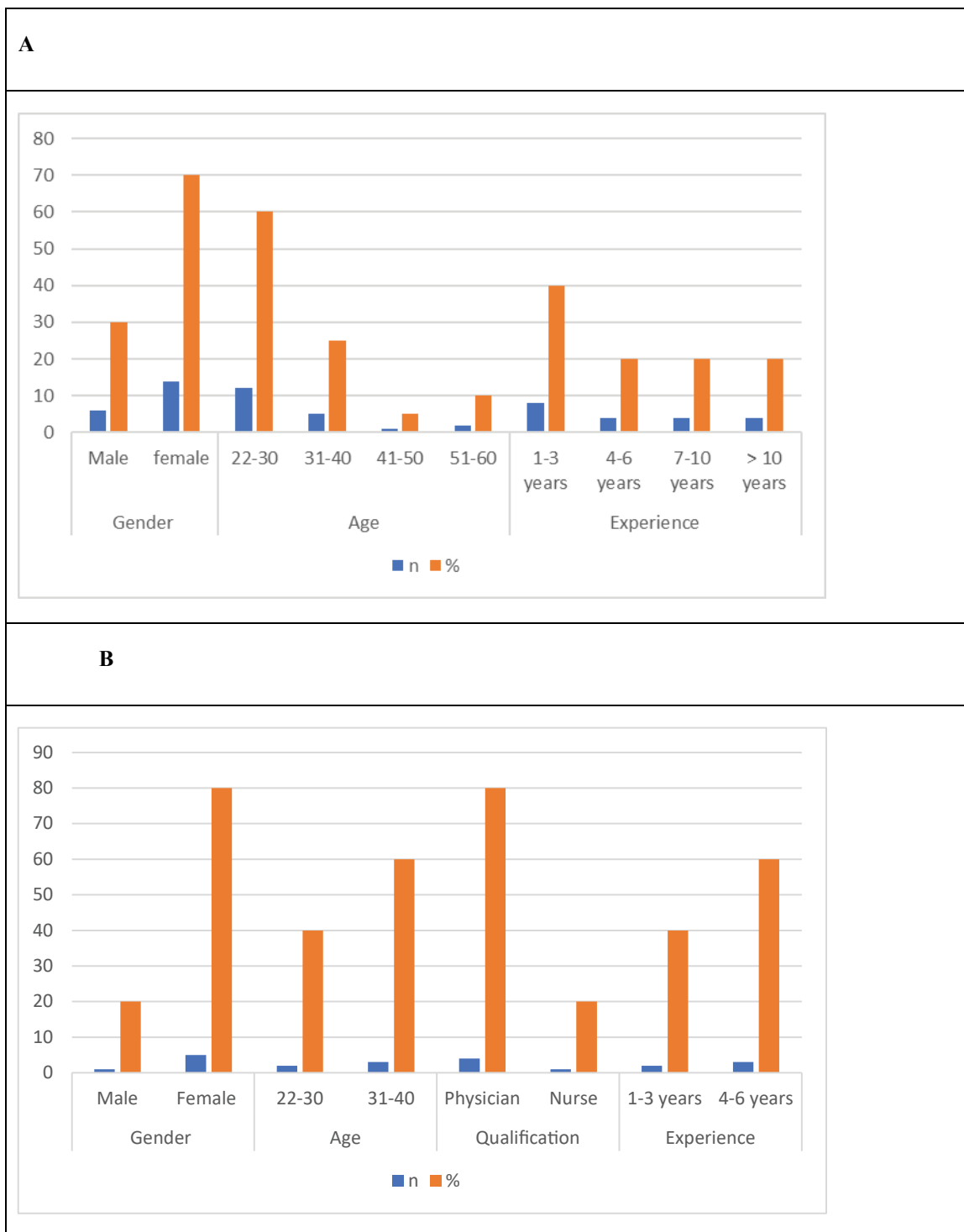


Figure 1. Pharmacies (A) and Health Center (B) demographic data.

Table 3. Percentage of participants in agreement with dextromethorphan and naphazoline effect

Statement	strongly agree		agree		disagree		Strongly disagree	
	n	%	n	%	n	%	n	%
Dextromethorphan can cause hallucination and euphoria in large doses	4	20	15	75	1	5	0	0
Naphazoline can induce euphoria and mental altering effects like mood change in large doses	4	20	12	60	4	20	0	0

contain dextromethorphan and ophthalmic solutions that contain naphazoline.

Furthermore, the statistics revealed that 100% of the participants (n = 5) confirmed the effects of high dosages of dextromethorphan which can cause euphoria and hallucinations and the effect of large doses of naphazoline which can cause changes in mood and mental alteration.

In open answers, some individuals had chosen other OTC drugs that can cause abuse with frequent administration. Some of these medications were laxatives such as loperamide, NSAIDs, muscle relaxants especially those containing orphenadrine, and prescription drugs such as chlorthalidone and clonidine under the most famous brand name Poxidium®.

Suspected situations occurred with dextromethorphan and naphazoline abusers

Suspected cases in pharmacies

According to the findings, the majority of participants (95%, n=19) stated that they had a suspected case of persons who abused certain drugs in their pharmacies previously. Pharmacists responses to suspected drug abuse cases were diverse. The majority of participants (60%, n=12) reported that the kind of suspicious situation that they had was when the customer asked for unreasonably many units of the product at once. While, others reported similar situations in which the customer shouted to get the product if they refused to sell him the product and this reported by 20% (n=4) of participants. In two cases, the customer behaved suspiciously (10%), and in two cases the customer yelled and shouted to get the product (10%) (Table 4).

Suspected cases in pharmacy related to dextromethorphan and naphazoline

Out of the surveyed pharmacists, 95% (n=19) of pharmacists sometimes had a suspected case in their pharmacy with dextromethorphan and naphazoline abusers and only one

Table 4. Suspected abuser that pharmacist participants had previously in their pharmacy

Category	number	percentage
The customer asked for unreasonably many units of the product at once	12	60
The customer behaved suspiciously	2	10
The customer shouts to get the product if you refuse to sell him the product	4	20
The customer yells and shouts to get the product	2	10

respondent (5%, n=1) never had any case in his/ her pharmacy before.

According to the data, the majority of respondents (85%, n=17) observed that some people requested more than one pack of dextromethorphan at a time. Only 30% of the respondents (n = 6) said that those people were experiencing symptoms of a cold and cough. Additionally, 90% (n=18) of participants reported that some people requested more than one pack of naphazoline at once. Only 35% of the participants (n=7) stated that those people were suffering from allergies and the symptoms appeared on them.

These results indicate that there is a high unreasonable consumption of dextromethorphan and naphazoline by certain people and this indicates an abuse of these non-prescribed medications which could be purchased without a prescription.

Customer classification

Most respondents (60%, n=12) stated that customers who act suspiciously and ask for more than one pack of dextromethorphan or naphazoline unreasonably without any cough or allergic symptoms are mixed strangers and regular customers. While, 35% (n=7) of participants reported being all stranger customers.

Prescriptions of dextromethorphan and naphazoline in health centers

Out of physicians surveyed in health centers, 40% (n=2) prescribe dextromethorphan as a first-choice drug for patients who suffer from cold and cough symptoms. While, one physician of the participants (20%) prescribed dextromethorphan only for serious cases that require treatment. Furthermore, the study found that 80% (n=4) of physicians prescribed naphazoline as a first-choice drug for eye allergy and irritation, and 40% (n=2) prescribed naphazoline for serious cases only which require treatment with this agent.

Table 5 illustrates how often physicians prescribe these medications. The majority of participants 80% (n=4) reported that they prescribed dextromethorphan and naphazoline every day, and 20% of participants (n=1) prescribed them two to six times a week.

Table 5: Frequency of prescriptions of dextromethorphan and naphazoline

Category	Every day		2-6 times/ week	
	n	%	n	%
Dextromethorphan	4	80	1	20
Naphazoline	4	80	1	20



Reasons for dextromethorphan and naphazoline abuse

The accessibility, availability, and comparatively low cost of some medications in community pharmacies may all lead to the abuse of a wider variety of OTC and prescription medication types.

According to the data in Figure 2, it seems that all participants had chosen the easy-to-reach drug and being a non-prescribed drug as a reason for dextromethorphan abuse (100%, n=20) for each reason. Moreover, 75% (n=15) had chosen low prices as a reason for dextromethorphan to be abused.

For naphazoline, 95% of participants (n=19) selected easy-to-reach and of being non-prescribed drug for abuse reasons. While, 85% (n=17) of participants stated that the low cost of naphazoline is a reason to be abused.

Dextromethorphan and naphazoline pharmacy sales

Community pharmacies supply dextromethorphan under two brand names: Riva D[®] and Unifed DM[®]. Participants in the study were asked to track and record the sales of these items from 2019 through 2023. Among the most widely used brands, Unifed DM[®], the highest consumption was recorded in 2023 with a mean of 64.5 packs, while the lowest consumption was recorded in 2019 with a mean of 49.4. This suggests that Unifed DM[®] use increased during this period and this would point to years of abuse of this medicine (Table 6). On the other hand, Riva D[®] is the least commonly used brand. The highest consumption was recorded in 2019 with a mean of 12 and the lowest consumption was in 2022 and 2023 with a mean of 10.

Naphazoline is found in community pharmacies in Jordan under the trade names Prisoline[®] and Naphcon A[®] eye drops. The highest consumption of Prisoline[®] was in 2022, with a mean of

97.7 which indicates a high level of abuse. In 2019, the mean was 68.5, which represents the lowest level of consumption for that year (Table 6). A significant increase in Prisoline[®] sales is noticed according to the findings. Therefore, abuse of this medication is possible by certain people.

Naphcon A[®] is also subject to abuse due to its active ingredient, naphazoline. The sales data show an increase in the consumption of Naphcon A[®] over the years, which indicates abuse of this medication. During 2023, Naphcon A[®] drops were consumed the most, with a mean of 32.3, compared to 2019 where the consumption was with a mean of 21.7 (Figure 3).

Influence of pharmacist gender and experience on the perception of selected practices related to drug abuse

Results of the Chi-square test (Table 7) showed that there is no statistically significant association between the gender of pharmacist participants and their knowledge of the probability of the existence of OTC medications abuse, and if dextromethorphan and naphazoline has a potential for abuse since Chi-square had *p*-values (0.502, 0.891, and 0.113), respectively greater than 0.05. Also, there is no statistically significant association between their gender and their tendency to report suspected cases to special authorities, nor between gender and their right as a health service provider to be informed about the kinds of drugs abused in the local area of the work, since *p*-values for Chi-square analysis (0.573, 0.389), respectively, are greater than 0.05.

On the other hand, results of the Kruskal-Wallis test (Table 8) showed that there is no statistically significant association between the experience of pharmacist participants and their knowledge of the probability of the existence of OTC medication abuse and if dextromethorphan and naphazoline

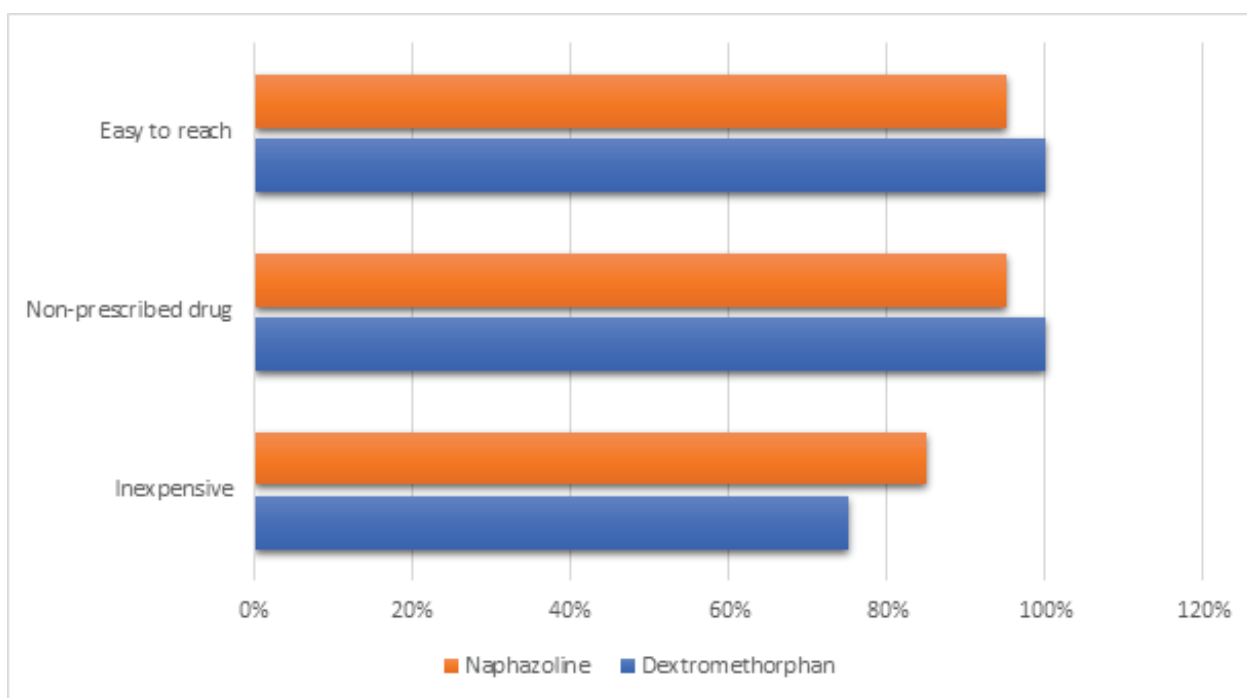


Figure 2. Reasons for dextromethorphan and naphazoline abuse.



Table 6: Unifed Dm® and Prisoline® sales between 2019 and 2023

Medicine	M	SD
Unifed 2019	49.4	52.5
Unifed 2020	53.1	57.4
Unifed 2021	63.6	69.3
Unifed 2022	60.2	66.3
Unifed 2023	64.5	69.5
Mean years	58.2	66.3
Prosolin eye drop 2019	68.5	47
Prosolin eye drop 2020	79.3	63.1
Prosolin eye drop 2021	88.2	73.3
Prosolin eye drop 2022	97.7	82.7
Prosolin eye drop 2023	76.3	88.1
Mean/ years	82	11.3

Table 7: Differences in pharmacists' perception of selected practices related to gender

Variable	Gender	
	Chi-square	p-value
OTC Abuse	0.45	0.502
Dextromethorphan	0.02	0.891
Naphazoline	2.26	0.113
Calling nearby Authorities	0.37	0.573
Health service providers	1.89	0.389

Table 8: Differences in pharmacists' perception of selected practices related to experience

Variable	Experience	
	KW*	p-value
OTC Abuse	1.5	0.827
Dextromethorphan	4.1	0.393
Naphazoline	2.24	0.693
Authorities	2.53	0.639
Health service providers	1.32	0.859

*Kruskal-Wallis

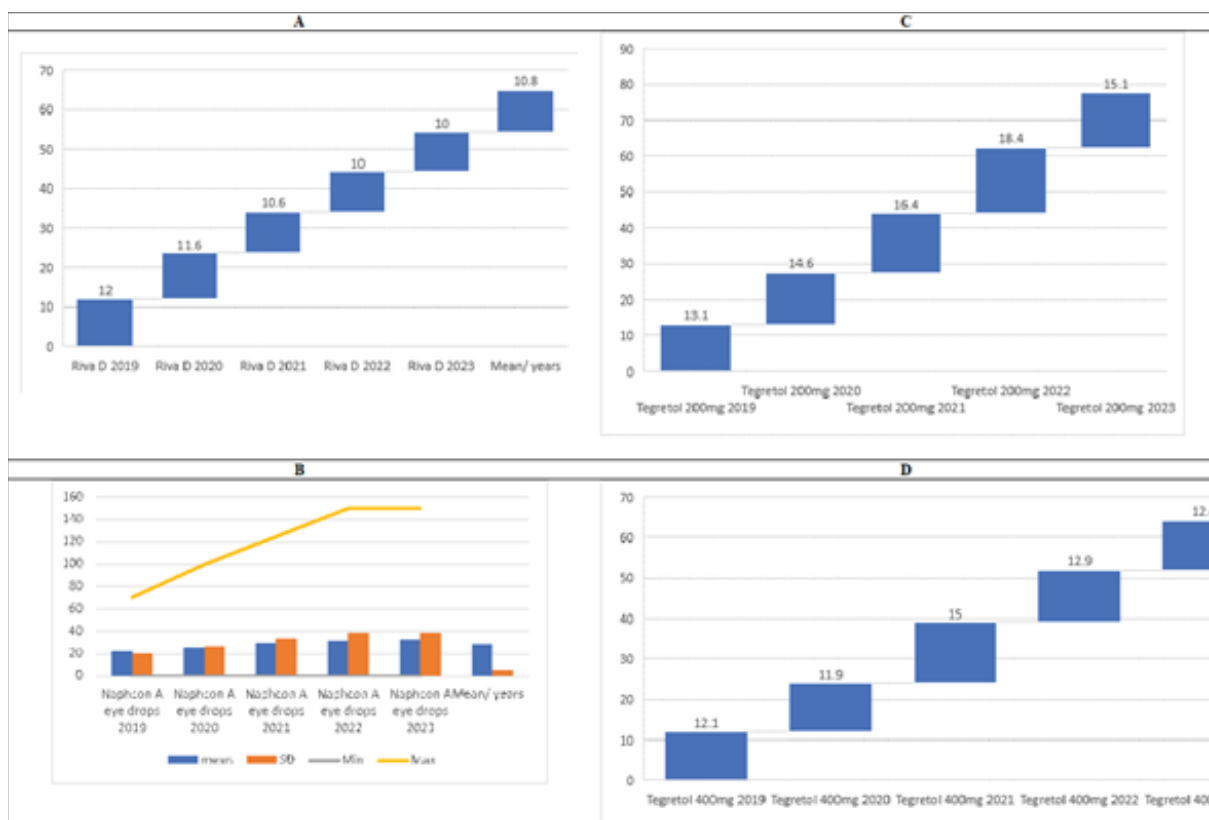


Figure 3. Comparison of sales between 2019 and 2023 of Riva D® (A), Naphcon A®, Tegretol 200 mg® (C), and Tegretol 400 mg® (D).

have a potential for abuse since p -values (0.827, 0.393, 0.693), respectively, are greater than 0.05. Also, there is no statistically significant association between their experience and their tendency to call special authorities to inform them of a suspected case of abuse, and between experience and their right as a health service provider to be informed about the kinds of drugs abused in the local area of the work p -values = 0.639, and 0.859, respectively.

Carbamazepine potential for abuse

Pharmacists records for carbamazepine abuse

The pharmacists were asked if carbamazepine has a potential for abuse. Pharmacists were distributed almost evenly; 55% (n=11) think that carbamazepine has a potential for abuse, and 55% (n=11) noticed an increase in carbamazepine demand recently. Most participants (65%, n=13) stated that they noticed certain people asked for more than one pack of carbamazepine medication at once. As well as, 40% (n=8) of participants had a suspected situation with customers who use carbamazepine.

According to the survey results, the majority of respondents (50%, n=10) stated that carbamazepine can induce euphoria and excitement. Additionally, 50% (n=10) of pharmacists stated that all customers who asked for carbamazepine had a medical case requiring treatment with this medication, such as neuropathy, while 45% (n=9) of participants assumed that none of these customers had a medical condition related to carbamazepine treatment.

Physicians records about Carbamazepine abuse

The majority of physicians (60%, n=3) reported that epilepsy including simple and complex partial seizures and generalized tonic-clonic seizures are the most common cases treated with

carbamazepine in health centers, followed by neuropathy and prevention of bipolar disorder with the percentage of 20% for each (Figure 4). Furthermore, all physicians (100%, n=5) stated that epileptic and neuropathic cases had increased in the previous years. However, four out five physicians (80%) reported that carbamazepine has the potential for abuse and can induce the effect of euphoria and excitement. All of them (100%, n=5) ensure to provide appropriate counseling to their patients and inform them to take the recommended dose and not to exceed the maximum dose.

The majority of physicians (80%, n=4) stated that some people insisted on taking certain medications that have a potential for abuse. According to carbamazepine, 40% of the respondents (n=2) noticed that some people asked for carbamazepine more frequently than others, and they had many suspected cases and situations with people who use carbamazepine and they deal with them, as well as noticed signs and symptoms on these people indicating carbamazepine abuse.

Carbamazepine pharmacy sales and abuse

Carbamazepine is available in Jordanian community pharmacies under many different brand names. The most commonly recorded brands were Carbatol 200 mg[®], Tegretol 200 mg[®], Tegretol 400 mg[®], Neurotrop 300 mg[®], and Neurotrop 600 mg[®]. Participants were asked to record the number of carbamazepine packs sold from 2019 to 2023. The most commonly recorded brand was Carbatol 200 mg[®], which reached its highest consumption in 2021 with a mean of 22.6 and the lowest consumption was in 2023 with a mean of 17.8 (Table 9).

Tegretol[®] is present in Jordanian community pharmacies in two doses, 200 mg and 400 mg. Tegretol 200 mg[®], reached

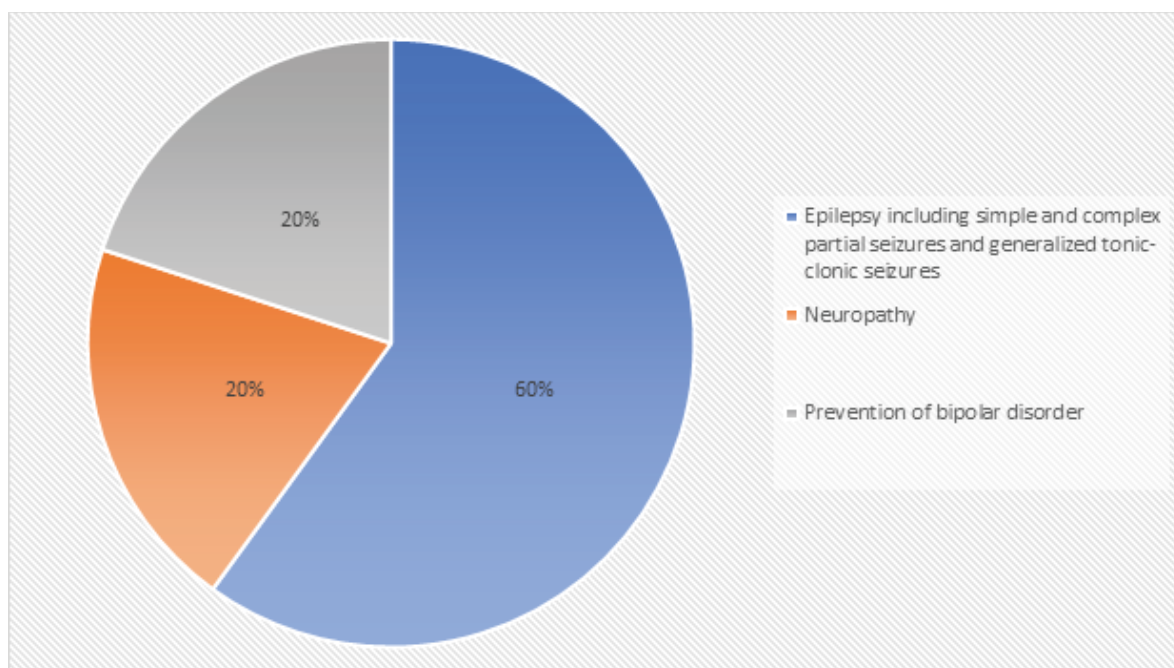


Figure 4. Common medical cases treated with carbamazepine in health centers.

Table 9: Carbatol 200mg[®], Neurotop 300mg[®] and Neurotop 600mg[®] sales between 2019 and 2023

Medicine	M	SD
Carbatol 200 mg 2019	20.5	20.2
Carbatol 200 mg 2020	20	15.1
Carbatol 200 mg 2021	22.6	20.6
Carbatol 200 mg 2022	19.4	20.6
Carbatol 200 mg 2023	17.8	15.3
Mean /years	20.1	1.7
Neurotop 300mg 2019	2.1	6.9
Neurotop 300mg 2020	1.1	4.5
Neurotop 300mg 2021	1.4	4.5
Neurotop 300mg 2022	1.7	6.7
Neurotop 300mg 2023	2.7	11.2
Neurotop 600mg 2019	1.3	3.9
Neurotop 600mg 2020	1.3	3.9
Neurotop 600mg 2021	1.1	4.5
Neurotop 600mg 2022	0.8	3.3
Neurotop 600mg 2023	1.3	4.5
Mean years	1.5	0.56

its highest consumption in 2022 with a mean of 18.4, while its lowest consumption were in 2019 with a mean of 13.1 (Figure 3). Tegretol 400mg[®] sales was the highest in 2021 and the lowest was in 2020 (Figure 3).

Neurotop 300 mg[®] and Neurotop 600 mg[®] were the least common brands that is available in community pharmacies in Alkarak. According to the results (Table 9), the highest consumption of Neurotop 300mg[®] was in 2023 with a mean of 2.7 compared to the lowest in 2020 which had a mean of 1.1. Neurotop 600 mg[®] lowest consumption where in 2022 with a mean of 0.8 which indicates the decreased demand for this brand of carbamazepine.

Knowledge and awareness of medical staff about drug abuse

A significant number (90%, n=18) of surveyed pharmacists knew the difference between misuse and abuse. All participants (100%, n=20) agreed with the definition of misuse as the use of the drug for a legitimate medical reason but to use it incorrectly in terms of dosage or duration. The definition of abuse is any intentional, non-therapeutic use of a drug product or substance, even once, to achieve a desirable psychological or physiological effect.

The majority of pharmacists (85%, n=17) were willing to advise suspected drug abusers in a written or verbal form about the risk or how to treat the risks of their behavior. All physicians (100%, n=5) and pharmacists (n=20) warned and advised patients about the expected adverse drug reactions associated with certain drugs especially those that have a potential for abuse. Only 20% of pharmacists (n=4) reported that they dealt with abuser customers as they deal with other normal customers.

The majority of pharmacist respondents (95%, n=19) stated it is unethical to sell abused OTC medications, and they suggested a safer alternative for drugs that have a potential for abuse. All physicians (100%, n=5) called nearby official authorities to inform them about a suspected abuser, while unexpectedly, only 25% (n=5) of pharmacist participants called the nearby authorities.

The majority of pharmacists (75%, n=15) reported that all suspected abuse cases should be referred to physicians, while all physicians (100%, n=5) said that all suspected abusers should be referred to a medical doctor for treatment. From the physicians point of view (100%, n=5), all health service providers staff (Physicians, pharmacists, laboratory specialists, and technicians) must be informed about the kind of drugs abused in the local area, while 85% of pharmacist participants (n=17) either agree or strongly agree with this statement.

DISCUSSION

OTC medications are potent pharmacological substances that might cause harm to patients if taken improperly. Additionally, some people usage of OTC medications and use of illicit substances have been linked³¹. There is proof that misusing OTC medications can have negative effects on individuals and their families that can be medical, psychological, or financial effects⁸. In Jordan, abuse of OTC and prescribed medications has increased in the past years. This study addresses the abuse of certain OTC drugs including cough suppressants that contain dextromethorphan, and ophthalmic solutions that contain naphazoline and a prescribed medication used for treatment of epilepsy such as carbamazepine in Jordan. Indeed, this can assist in alerting healthcare providers (pharmacists, physicians,



and nurses) about the potential abuse of certain medications that do not require a prescription, and their serious impact on health.

According to this study, the primary reason for the abuse of OTC medication is the easy reach of these medications followed by the low price and inexpensiveness of these drugs. Another reason for abuse has been recorded as being these drugs are non-prescribed drugs which makes their accessibility easier than other drugs. The current study findings are consistent with those of a previous study conducted in Jordan¹⁷ which indicated that Jordan, like other countries in the region, allows the general public to purchase almost any medication, both prescription and OTC, from a community pharmacy without a prescription, with the exception of controlled substances. The accessibility and affordability of community pharmacies, along with their availability, could lead to the abuse of a wider variety of OTC and prescription drug types¹⁷.

According to our findings, a large proportion of participants (95%) stated that many OTC medications could be abused easily, and they chose cough suppressants that contain dextromethorphan and ophthalmic solutions that contain naphazoline as the most commonly abused OTC medications with the percentage of 55% and 45%, respectively. This is consistent with a systemic literature review of 54 papers by Schifano et al., which indicated that dextromethorphan was the most commonly abused medicine⁴. This finding is also consistent with a study for ophthalmic solutions abuse in Jordan, including naphazoline reported by Al-Khalailah et al⁷. Their study identified 14.6% of suspected cases of ophthalmic abuse, with eight customers suspected of abusing naphazoline under two brands (seven cases for Prisoline[®], and one case for Naphcon-A[®]. Prisoline[®] and Naphcon-A[®] abuse had previously been reported in Jordan by pharmacists through the use of a cross-sectional survey method²⁶.

This study shows an unreasonable increase in the consumption of dextromethorphan under the brand name Unifed Dm[®] and Riva D[®] from 2019 to 2023 and an increase in the number of naphazoline products purchased under the common brands Prisoline[®] and Naphcon A[®] during the same period.

These unjustified increases correspond to the occurrence of suspected cases at the pharmacies of the participants (95%), involving behaviours such as acting suspiciously, yelling, shouting, or demanding multiple packs of medication at once, despite the absence of associated symptoms or signs in the patients. This parallels findings from a study which found that 94.1% of pharmacies received “suspicious requests” about the abuse of antibiotics, cough and cold remedies, nasal decongestants, and sedative-hypnotics¹⁷.

The study also highlighted carbamazepine abuse; the majority of respondents, 55%, stated that carbamazepine has a potential for abuse and the demand for it had increased recently. Concurrently, over half (65%) of the participants reported that they noticed many certain people asked for more than one pack of carbamazepine at once, and 40% of respondents had a suspected situation with such customers.

In addition, the majority of physician participants (80%) stated that carbamazepine has a potential for abuse, and every participant (100%) assures themselves that patients receiving carbamazepine treatment receive the proper counseling and are advised to adhere to the prescribed dosage guidelines.

According to this study findings, 50% of participants stated that carbamazepine can induce euphoria and excitement. Since carbamazepine has been linked to several beneficial psychotropic effects, it is not surprising that it can occasionally cause negative emotional reactions³². Previous reports on the treatment of alcohol withdrawal have mentioned the euphoric effects and abuse potential of carbamazepine. One previous article³³ detailed two instances of carbamazepine misuse with alcohol. Despite administration of carbamazepine for alcohol withdrawal, both patients continued to consume the medication after being released from the hospital.

In Paisley, located in the West of Scotland, many cases have been reported for carbamazepine abuse; one of them was after ingesting twelve tablets of 100 mg Carbamazepine to “get high” rather than attempt suicide, a 29-year-old male temazepam addict with a history of prior hospital hospitalizations for alcohol withdrawal and parasuicide attempts was admitted³⁴.

This study shows there is an increase in the purchase of certain brands of carbamazepine such as Carbatol 200mg[®], Tegretol 400mg[®], Tegretol 200mg[®], Neurotrop 300mg[®], and Neurotrop 600mg[®] in five years between 2019 and 2023. This may draw attention to the nonmedical use of carbamazepine. Moreover, the observations made by 40% of the physician respondents included: some people requesting carbamazepine more frequently than others, physicians dealing with several suspected cases and situations involving individuals who used the medication, and that they observed symptoms and signs of abuse on these individuals.

According to this research, a significant number of participants (85%) were ready to provide written or verbal advice to individuals who may be abusing drugs regarding the risks associated with their activity or how to manage those risks. Every participant in this study (five doctors and twenty pharmacists) warned or advised patients about the risk of harmful drug reactions, particularly with certain medications that have the potential for abuse.

Strengths and limitations of the study

The main strength in this study lies in being the first attempt to investigate the abuse of cold and cough remedies containing dextromethorphan, and ophthalmic solutions containing naphazoline as OTC medications abuse in Al-Karak. Moreover, carbamazepine abuse is not widely recognized, but this study draws attention to the importance of this problem and increases awareness of the improper use of carbamazepine by some people. On the other hand, this study has some limitations. The sample size was small and the results may not be generalizable to all populations of pharmacists and physicians who deal with similar cases of dextromethorphan, naphazoline, and carbamazepine abuse. The questionnaire had to be delivered by hand, and the researcher had to collect the necessary data



using research tools. Moreover, the majority of the data are derived from the perspectives of pharmacists regarding regular events and this could be subjective and only represents their point of view. Finally, the study was limited to the Al-Karak governorate; all efforts were taken to assure representativeness by covering all parts of the city. Nevertheless, the results may not be generalizable to other governorates in Jordan.

CONCLUSION

Pharmacists and physicians at Al-Karak governorate claimed the possibility of abuse for many OTC medications. The most commonly abused OTC medication in Al-Karak is cold and cough medications that contain dextromethorphan as active ingredients and ophthalmic solutions that contain naphazoline. In addition, many non-prescribed drugs have abuse potential; this study involved a carbamazepine abuse investigation. As many pharmacists and physicians stated that Carbamazepine has a potential for abuse, and could cause euphoria and excitement effect at large doses.

Carbamazepine, dextromethorphan, and naphazoline sales had unreasonably increased in the past five years in Al-Karak community pharmacies, which indicates the recreational use of these medications. However, many people tend to abuse OTC medications because they are less expensive and authorized substitutes for other controlled or illegal drugs. Pharmacists and physicians have an important role when it comes to patient counseling. Pharmacist awareness can lessen the abuse of OTC drugs. Because they are so approachable, pharmacists often serve as the first point of contact for patients and have the chance to advise and instruct them on the proper use of over-the-counter medications. By using their clinical knowledge,

providing patients with written and oral drug information, and earning their confidence, pharmacists can combat OTC medication abuse more effectively. At Al-Karak, pharmacists and physicians reported many suspected cases of abusers of these medications, and most of these suspected cases were for strangers and regular customers who ask for certain drugs especially those which have a potential for abuse in suspected and uncomfortable ways. In many of these cases, the customers do not appear to have any signs or symptoms that require treatment with the dextromethorphan, naphazoline, and carbamazepine and they ask for more than one pack at once, which makes the situation dubious.

AUTHOR CONTRIBUTION

Tala I. Qaraqkeh: Conceptualization, Methodology, Data Collection, Writing – Original Draft.

Shatha M Alomari: Financial Coverage, Writing – Review & Editing

Ahmad R. Alsayed: Supervision, Data Analysis, Visualization, Writing – Review & Editing. Heba A. Khader: Validation, Writing – Review & Editing

Luai Z. Hasoun: Validation, Writing – Review & Editing

Malek A. Zihlif: Supervision, Conceptualization, Writing – Review & Editing

Anas Samara: Writing – Review & Editing

CONFLICTS OF INTERESTS

The authors declare that they have no conflicts of interests.

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