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## Over-the-Counter Opioid-Containing Antitussives in Derna, Libya: A Cross-sectional Survey of Pharmacy Sales and Misuse Indicators

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### ABSTRACT

Over-the-counter (OTC) antitussives that contain opioid or opioid-like compounds (notably codeine and dextromethorphan) are readily available in many communities, creating potential for misuse and dependence. In Derna, Libya, anecdotal evidence suggested heavy local use of certain OTC cough preparations. To describe the availability and sales patterns of common OTC antitussives in Derna pharmacies and to identify local indicators of misuse or non-therapeutic use. A structured, anonymous questionnaire was administered to pharmacy staff across Derna between November and December 2022. The instrument focused on the most sold OTC antitussives, typical purchaser demographics, quantities requested, selling times, and whether staff treated suspected abusers differently. Data were entered and analyzed using SPSS; descriptive statistics are presented. Seventy-nine pharmacies participated (response rate 79%). The most commonly reported product sold was Tusskan (76/79, 96.2%), while codeine-containing preparations accounted for 3/79 (3.8%). Purchasers were predominantly male (77/79, 97.5%); the majority were aged 31–45 years (56/79, 70.9%), with the remainder aged 15–30 years (23/79, 29.1%). Most pharmacists (68/79, 86.1%) reported higher sales in the evening. More than half of purchasers requested more than two packets per visit (41/79, 51.9%). At the pharmacy level, daily sales most often reached five bottles (56/79, 70.9%), and monthly sales were commonly reported as  $\geq 50$  bottles (79/79 combined: 46 reported 50, 33 reported  $>50$ ). Only 11/79 (13.9%) of pharmacists said they dealt with suspected abusers the same way as other customers. Signals consistent with non-medical use high sales volume of a single product (Tusskan), frequent evening purchases, predominantly male adult users requesting multiple packets were observed in Derna. These findings underscore the need for improved local surveillance, pharmacist training in identification and management of OTC misuse, public education, and consideration of regulatory measures for high-risk OTC antitussives.

### 1. INTRODUCTION

Over-the-counter (OTC) medications represent a cornerstone of contemporary healthcare systems by providing individuals with convenient and affordable access to treatment for minor ailments without the need for a medical prescription. They enable patients to manage self-limiting conditions, thereby reducing pressure on healthcare services and contributing to improved public health outcomes when used correctly (Hughes et al., 2001).

However, inappropriate use and self-medication with OTC products can pose serious health risks, including toxicity, dependence, and adverse drug reactions, particularly in settings with weak drug regulation and limited pharmacovigilance (Wazaify et al., 2005). Among the range of OTC products, antitussive (cough-suppressant) medications are among the most frequently misused. These preparations often contain active ingredients such as dextromethorphan (DXM), codeine, diphenhydramine, or guaifenesin, which are intended to relieve cough associated with upper respiratory tract infections. Notably, DXM and codeine possess psychoactive properties at supratherapeutic doses and have been increasingly abused for their euphoric or dissociative effects (Bryner et al., 2006). The consequences of such misuse can be severe, ranging from respiratory depression and liver toxicity—especially when combined with paracetamol-containing formulations—to cognitive impairment and even death. Globally, misuse of OTC cough syrups has emerged as a growing public health concern, particularly among adolescents and young adults. Reports from the United States, the United Kingdom, and several Middle Eastern countries have documented a rise in the recreational use of DXM-containing products, colloquially referred to as “robotripping,” “purple drank,” or “lean”. These trends are often driven by the perception that OTC medicines are inherently safe, coupled with their widespread availability in community pharmacies without sufficient monitoring. In Libya, the misuse of OTC medications remains underreported and under-researched. The country’s fragmented healthcare infrastructure and limited enforcement of pharmaceutical regulations contribute to widespread self-medication practices (Alahrish et al., 2025). Community pharmacies frequently serve as the first point of healthcare contact, especially in rural and underserved areas, where patients often seek symptom relief directly from pharmacists rather than physicians (Shaboun & Elraid., 2024). Consequently, the sale of codeine- and DXM-containing syrups without prescription oversight remains a potential issue. The city of Derna, located in eastern Libya, presents a particularly relevant case study due to its socioeconomic challenges, youthful population, and constrained access to healthcare services. Local pharmacies are the primary source of medications for common ailments such as cough and cold, positioning them at the center of potential OTC misuse patterns. Despite anecdotal reports from pharmacists and healthcare workers about increasing misuse of codeine-containing cough syrups, no systematic study has yet examined this issue in Derna or the surrounding region. Understanding the patterns, motivations, and demographics associated with OTC antitussive misuse is critical for developing effective public health interventions, regulatory reforms, and awareness campaigns. Therefore, the present study aims to investigate the prevalence and behavioral trends surrounding the misuse of OTC cough medications among residents of Derna, Libya. It also seeks to identify the factors contributing to misuse, such as accessibility, lack of awareness, and insufficient pharmacy regulation. The findings are expected to support policymakers, pharmacists, and educators in promoting rational drug use and mitigating the growing problem of OTC medicine abuse in the Libyan context.

## 2. METHOD

### Study Design and Setting

A cross-sectional, pharmacy-based survey was conducted in Derna, Libya, during November–December 2022. The questionnaire targeted community pharmacies across the city and was administered to pharmacists or responsible pharmacy staff.

#### Questionnaire and Variables

The instrument collected information about:

- 1 The antitussive products most sold at the pharmacy (options included Tusskan, codeine preparations, and Covonia / Covona),
- 2 Purchaser demographics (sex and age group),
- 3 Whether staff managed suspected abusers differently,
- 4 Typical time of sale (morning vs evening),
- 5 Quantities requested per individual, and
- 6 Pharmacy-level sales volumes (daily and monthly categories). The questionnaire and study procedures were developed under the auspices of the Faculty of Pharmacy, University of Derna.

### Data Analysis

Data were entered into SPSS for descriptive analysis. Categorical variables are presented as counts and percentages. No inferential statistical tests were performed because the primary aim was descriptive surveillance.

### 3. ETHICAL CONSIDERATIONS

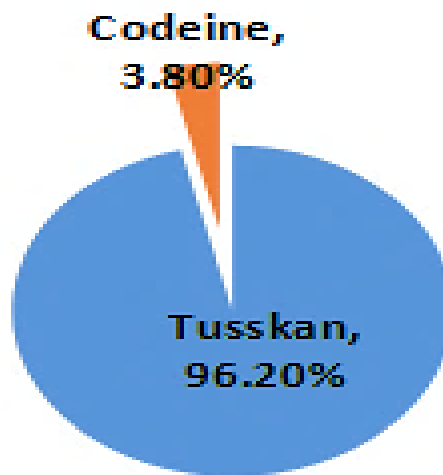
Participation was voluntary and anonymous. Pharmacists provided verbal consent before answering.

### 4. RESULT

#### Response Rate and Product Availability

Out of 100 community pharmacies approached in the city of Derna, 79 agreed to participate, yielding a response rate of 79%. This high participation reflects strong engagement and suggests a general willingness among pharmacists to share their experiences regarding over-the-counter (OTC) cough medication sales.

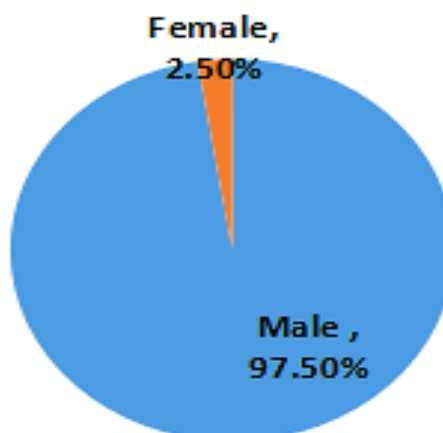
The overwhelmingly predominant product reported as the most frequently sold antitussive was Tusskan syrup, cited by 96.2% (76/79) of participating pharmacies. Only 3 pharmacies (3.8%) reported codeine-containing cough preparations as their primary sellers (**Figure 1**). The near-universal dominance of Tusskan underscores its wide acceptance and accessibility across the city. This pattern mirrors findings from similar pharmacy-based surveys conducted in the Middle East and North Africa, where a small number of dextromethorphan (DXM)-containing brands dominate OTC cough syrup markets (Alanazi et al., 2024).



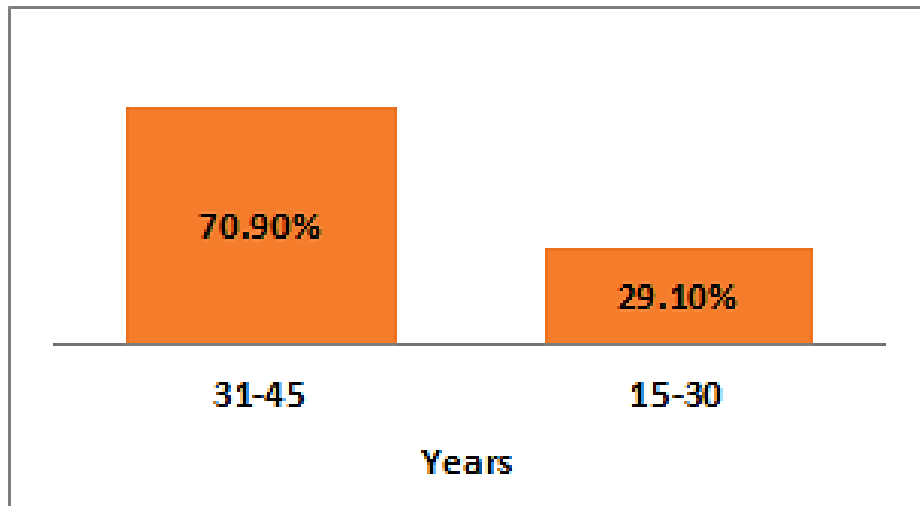
**Figure 1.** Most Sold Antitussive Products Reported by Pharmacies in Derna, Libya.

#### Purchaser Demographics and Behavior

The majority of purchasers were male (97.5%, 77/79), with only two pharmacies reporting female customers buying these products (**Figure 2**). In terms of age distribution, most customers were between 31 and 45 years (70.9%, 56/79), while a smaller group (29.1%, 23/79) fell within the 15–30-year range (**Figure 3**). These results align with prior research indicating that misuse of DXM-containing cough syrups often occurs among males and adults in their 20s to 40s, who are more likely to engage in experimental or recreational drug use (Bryner et al., 2006).



**Figure 2.** Sex Distribution of Purchasers of OTC Antitussive Products.



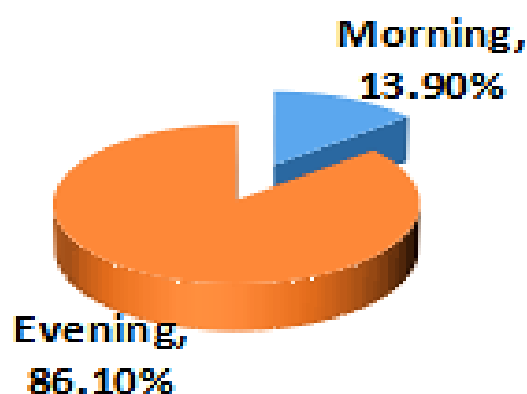
**Figure 3.** Age Distribution of Customers Purchasing OTC Antitussive Syrups.

A noteworthy behavioral finding was that more than half of customers (51.9%) typically requested more than two bottles per visit. Such purchasing behavior exceeds normal therapeutic need, as legitimate cough treatments generally require only one small bottle per course. Similar patterns of bulk purchasing have been identified as a proxy indicator of non-therapeutic intent in prior pharmacy-based studies (Wazaify et al., 2005).

#### **Sales Patterns and Staff Responses**

Most pharmacists (86.1%, 68/79) reported higher sales during evening hours, while sales in the morning or early afternoon were markedly lower. This evening concentration may reflect both customer availability and, potentially, discreet purchasing habits (**Figure 4**).

At the pharmacy level, 70.9% (56/79) estimated an average of about five bottles sold daily, while 25.3% (20/79) reported irregular sales and 3.8% (3/79) reported fewer than five per day. When extrapolated to a monthly scale, 58.2% (46/79) indicated selling around 50 bottles per month, while 41.8% (33/79) reported selling even more than that. Comparable patterns of sustained, high-frequency OTC cough syrup sales have been documented elsewhere as early indicators of community-level misuse (Algarni et al., 2021).



**Figure 4.** Reported Time-of-Day Sales Patterns for OTC Antitussive Products.

Regarding staff responses, only 13.9% (11/79) of pharmacists reported handling suspected abusers in the same way as ordinary customers. The remaining 86.1% (68/79) indicated they used a differentiated approach—either through refusal of sale, counselling, or limiting quantities. This suggests a general awareness among Derna’s pharmacists of possible misuse and a degree of professional vigilance. However, the specific strategies employed were not standardized and warrant further exploration.

## 5. DISCUSSION

This survey revealed several warning signs consistent with the non-therapeutic use of OTC antitussive preparations in Derna. The findings are striking in their uniformity: nearly all participating pharmacies identified Tussskan, a dextromethorphan-containing formulation, as their best-selling cough product. The predominance of a single brand, coupled with repeated requests for multiple bottles, a strong male majority among purchasers, and an evening sales peak, collectively point toward misuse patterns previously described in international literature (Algarni et al., 2021; Alanazi et al., 2024).

The pharmacological profile of dextromethorphan explains its potential for misuse. Although intended as a safe and effective cough suppressant, at high doses DXM acts as an N-methyl-D-aspartate (NMDA) receptor antagonist, producing dissociative and euphoric effects similar to those of ketamine or phencyclidine (PCP) (Nguyen et al., 2022). Its low cost, broad OTC availability, and lack of prescription control make it a particularly appealing substance for recreational use among young adults. Countries that have documented rising DXM misuse have also reported corresponding increases in emergency department visits and toxic ingestion cases (Substance Abuse and Mental Health Services Administration [SAMHSA], 2016).

Although this study did not directly measure clinical misuse or intoxication at the individual level, pharmacy-based surveillance provides a valuable early signal. Elevated demand, unusual purchasing patterns, and demographic clustering are all recognized indicators that can guide preventive interventions before overt public health consequences arise.

The finding that a majority of pharmacists differentiated their handling of suspected abusers is encouraging and suggests a baseline awareness of the problem. However, the absence of formal guidelines or standardized interventions raises questions about the consistency and effectiveness of such individual pharmacist responses. Studies from other developing contexts have shown that pharmacist-led vigilance can reduce misuse only when combined with training, regulatory support, and public education (Wazaify et al., 2017).

### Public Health Implications

The results of this study highlight several areas for immediate policy and practice attention. Local health authorities could:

- 1 Implement monitoring systems for OTC sales—such as electronic dispensing logs—to detect unusual purchasing trends.
- 2 Provide structured training programs to help pharmacy staff identify and manage potentially harmful OTC purchasing behaviors.
- 3 Launch public awareness campaigns to correct misconceptions about the safety of nonprescription cough medicines.
- 4 Explore regulatory reforms, including restricting pack sizes, enforcing prescription requirements for high-risk preparations, or moving them behind the counter.

Such measures have proven effective in other countries for reducing misuse of both DXM- and codeine-containing products (Algarni et al., 2021; Alanazi et al., 2024).

### Limitations

This study's limitations include its cross-sectional design, reliance on self-reported data, and the absence of objective sales verification or clinical outcomes. The non-response of 21 pharmacies may introduce selection bias, and the data reflect pharmacists' perceptions rather than patient-reported behavior. Moreover, the focus on Derna limits generalizability to other Libyan regions. Nonetheless, these findings provide essential baseline data and generate hypotheses for future research.

### Recommendations for Future Research

Future investigations should integrate pharmacy-based surveillance with hospital toxicology data and qualitative interviews among pharmacists and consumers to identify motivations and misuse mechanisms. Studies evaluating interventions—such as pharmacist education, sales restrictions, and awareness campaigns—would provide valuable insights for national policy. Longitudinal research could also determine whether educational or regulatory interventions lead to measurable reductions in OTC antitussive misuse.

## 6. CONCLUSION

This study provides an important first look into the sale and potential misuse of over-the-counter (OTC) cough preparations—particularly those containing dextromethorphan—in Derna, Libya. The findings reveal a pattern that closely mirrors global trends of OTC cough syrup abuse, with a strong predominance of Tusskan sales, frequent multi-pack purchases, and higher evening sales concentrated among young male buyers. These indicators align with red flags reported in other international studies, suggesting that dextromethorphan-containing medicines may be used for non-therapeutic or recreational purposes in the local community.

Pharmacy staff responses suggest an awareness of misuse risks, as most pharmacists reported handling suspected abusers differently from ordinary customers. However, the absence of standardized guidelines, formal reporting mechanisms, or structured training programs may limit the consistency and effectiveness of these responses (Cairns et al., 2016; Bond & Hannaford, 2018). Establishing professional education initiatives and clear policies for managing suspected OTC misuse could strengthen the role of pharmacists as frontline gatekeepers in harm reduction.

From a regulatory and public health perspective, enhanced surveillance of OTC cough medicine sales—through sales log analysis, digital tracking, or sentinel pharmacy networks—could help identify abnormal purchasing patterns early. Authorities might also consider targeted awareness campaigns and regulatory controls, such as limiting pack sizes or requiring pharmacist oversight for products containing dextromethorphan or codeine.

Despite its limitations, including reliance on self-reported pharmacy data and lack of individual misuse verification, this study highlights a growing area of concern with potentially significant implications for public health, especially among younger demographics. Further research integrating toxicological, clinical, and behavioral data is warranted to confirm misuse prevalence, explore underlying motivations, and evaluate the effectiveness of possible interventions.

In conclusion, while OTC cough syrups serve a legitimate therapeutic purpose, their misuse poses emerging risks that require a coordinated response. Strengthening pharmacy-based monitoring, enhancing pharmacist training, and improving public awareness are crucial steps toward minimizing harm and preserving the safe therapeutic use of these accessible medicines.

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