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Review Article

Misuse, Abuse, and Dependence of Over-the-Counter Medicines: A Systematic Review

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ABSTRACT

Background: Over-the-Counter (OTC) medicines are commonly used for the management of minor illnesses and are easily available without a prescription. Although these medicines are considered safe when used correctly, inappropriate use, misuse, and dependence are increasingly being reported worldwide. **Objectives:** The present study aimed to systematically review the published literature regarding the patterns, causes, and health consequences of OTC medicine misuse, abuse, and dependence. **Materials and Methods:** A systematic search was conducted in PubMed, Scopus, Web of Science and Cochrane Library for studies published between January 2014 and December 2024. Observational and survey-based studies involving human participants that reported misuse or dependence on OTC medicines were included. Titles and abstracts were screened, followed by full-text assessment for eligibility. Data were extracted from the selected studies and summarized qualitatively according to PRISMA guidelines. The review was conducted and reported according to PRISMA 2020 guidelines. **Results:** A total of 33 studies met the inclusion criteria. Analgesics and non-steroidal anti-inflammatory drugs were the most frequently reported medicines, followed by codeine-containing products, cough suppressants, antihistamines, and antidiarrheal agents. Common reasons for misuse included easy accessibility, self-medication practices, and lack of awareness regarding adverse effects. Reported complications included hepatotoxicity, gastrointestinal irritation, cardiovascular effects, and drug dependence. **Conclusion:** OTC medicine misuse represents an important public health concern. Increasing public awareness, appropriate pharmacist counseling, and better monitoring of high-risk OTC medicines are necessary to promote safe use and prevent associated health complications.

Keywords: Abuse, Dependence, Misuse, Over-the-counter drugs, Self-medication, Systematic review.

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INTRODUCTION

Over-the-Counter (OTC) medicines are drugs that can be purchased without a doctor's prescription and are commonly used to treat minor illnesses such as pain, cough, cold, allergies, and gastric discomfort (Millar *et al.*, 2018). These medicines play an important role in self-care and help reduce the workload on healthcare facilities. Because they are easily available and inexpensive, many people use them without consulting a healthcare professional.

However, the easy accessibility of OTC medicines often creates a false belief that they are completely safe. As a result, many individuals use them in higher doses, for longer durations, or for conditions for which they are not recommended. Such inappropriate use is referred to as misuse (Yood *et al.*, 2007). In some situations, medicines are intentionally taken for non-medical purposes, such as to produce euphoria or sedation, which is considered abuse. Repeated misuse or abuse may eventually lead to psychological or physical dependence.

Several groups of OTC medicines have been associated with this problem, particularly analgesics, codeine-containing cough preparations, antihistamines, nasal decongestants, and dextromethorphan products (Prescott *et al.*, 2000). Continuous or excessive consumption of these medicines may cause serious health complications, including liver damage, gastrointestinal bleeding, cardiovascular problems, and addiction.

Since pharmacists are the first point of contact for patients seeking non-prescription medicines, understanding the patterns of misuse is essential. Therefore, this study was conducted to systematically review published literature on the patterns, causes,

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and health consequences of OTC medicine misuse, abuse, and dependence (Amoako *et al.*, 2003).

MATERIALS AND METHODS

Study Design

This study was carried out as a systematic review in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.

Search Strategy

A literature search was performed using PubMed, Scopus, Web of Science, and Cochrane Library databases. Studies published between January 2014 and December 2024 were considered. Keywords used in the search included "over-the-counter drugs", "OTC medicines", "non-prescription drugs", "misuse", "abuse", "dependence" and "self-medication". Reference lists of relevant articles were also checked to identify additional studies.

Inclusion Criteria

Studies were included if they:

- Involved human participants,
- Reported misuse, abuse or dependence of OTC medicines,
- Were observational, survey-based or cross-sectional studies,
- Were published in English.

Exclusion Criteria

Review articles, editorials, conference abstracts, case reports, animal studies and studies involving only prescription medicines were excluded.

Study Selection

Two reviewers independently screened the titles and abstracts. Full-text articles were assessed for eligibility. Any disagreements were resolved through discussion.

Data Extraction

Information extracted from each study included author name, year of publication, country, study design, study population, type of OTC drug involved, and major findings.

RESULTS

A total of 3000 records were identified through database searching. After removing duplicates, 2600 records remained for screening. Following title and abstract screening, 125 articles were selected for full-text review. Out of these, 92 articles were excluded because they did not meet the inclusion criteria. Finally, 33 studies were included in the qualitative analysis (Figure 1).

The included studies were conducted across multiple geographical regions, including Europe, North America, Asia, Africa, and the Middle East. Most studies were cross-sectional surveys, while a few were observational or retrospective evaluations. Study populations varied and included general public participants, university students, community pharmacy customers, athletes, and elderly patients.

Types of OTC medicines involved

The most frequently reported drug categories associated with misuse were analgesics and Non-Steroidal Anti-Inflammatory Drugs (NSAIDs). Paracetamol and ibuprofen were commonly used for pain and fever, but several studies reported excessive dosing and prolonged use. Codeine-containing combination products were also widely reported, particularly in the United Kingdom, Australia, and Ireland, where dependence and repeated purchase behavior were observed.

Cough and cold preparations containing dextromethorphan and antihistamines were commonly misused, especially among adolescents and young adults. Some individuals intentionally used these medicines for their sedative or euphoric effects. Nasal decongestants were reported to be overused for prolonged periods, leading to rebound nasal congestion.

Antidiarrheal agents such as loperamide were also reported in several studies. High-dose consumption was associated with serious cardiac complications. Antibiotics obtained without a prescription were reported in community settings, indicating inappropriate self-medication practices.

Reasons for misuse

Several factors contributed to OTC medicine misuse. The most commonly reported reason was easy availability without a prescription. Many individuals believed OTC medicines to be completely safe and therefore did not follow recommended dosage instructions. Self-medication for pain, cold, cough, and minor illnesses was frequently reported.

Students commonly used analgesics during examinations to manage headaches and stress. Some participants used cough syrups and antihistamines to help with sleep or relaxation. In certain cases, medicines were intentionally used for recreational purposes. Lack of awareness regarding adverse effects and insufficient counseling at the point of sale were also major contributing factors.

Health consequences

Misuse of OTC medicines resulted in a variety of health problems. Excessive paracetamol use was associated with hepatotoxicity, while NSAID overuse was linked to gastrointestinal irritation and bleeding. Dependence symptoms were commonly reported with codeine-containing products.

Table 1: Characteristics of studies included in the systematic review.

Author (Year)	Country	Study Design	Population	OTC Drug(s) Involved	Key Finding
Elander *et al.*, 2014	UK	Survey	Adults with pain	Analgesics	Frequent analgesic use is associated with dependence risk.
Koffeman *et al.*, 2014	Netherlands	Cross-sectional	General population	NSAIDs	High-risk NSAID use observed without awareness of adverse effects.
Almalak *et al.*, 2014	Saudi Arabia	Cross-sectional	Students	Analgesics	Students commonly used OTC analgesics during examinations.
Mehuys *et al.*, 2014	Belgium	Observational	Rhinitis patients	Decongestants	Long-term nasal decongestant overuse reported.
Gittins *et al.*, 2014	UK	Observational	Substance misuse service patients	Sedatives/antihistamines	OTC medicines frequently misused in substance misuse populations.
Vaso *et al.*, 2015	Brazil	Retrospective	Athletes	NSAIDs	Athletes frequently used NSAIDs without medical supervision.
Lo *et al.*, 2015	Taiwan	Observational	General public	Codeine cough medicines	Codeine-containing cough products showed abuse potential.
Cryer *et al.*, 2016	USA	Survey	Adults	NSAIDs	Many participants exceeded recommended NSAID dosing.
Wojta-Kempka *et al.*, 2016	Poland	Cross-sectional	Adults with pain	Analgesics	Self-medication with OTC analgesics common for pain relief.
Wright *et al.*, 2016	Scotland	Survey	General population	Codeine products	Increasing pharmacist reports of codeine misuse.
Zaprutko *et al.*, 2016	Poland	Questionnaire	Adults	Cough preparations	Internet information contributed to misuse behavior.
Abood *et al.*, 2016	Yemen	Observational	Community pharmacy customers	Analgesics/antihistamines	Misuse of OTC medicines frequently reported in pharmacies.
Cairns *et al.*, 2016	Australia	Retrospective	General population	Codeine combinations	Increasing misuse of codeine combination analgesics observed.
Brass *et al.*, 2016	USA	Retrospective	Public users	Paracetamol	Risk of acetaminophen overuse identified.
Fingleton *et al.*, 2016	UK	Cross-sectional	Adults	Analgesics/antihistamines	Dependence symptoms linked to OTC analgesics.
Chan *et al.*, 2016	UK	Observational	Nightlife attendees	Sedative cough mixtures	Recreational misuse of OTC cough medicines identified.
Mhatre *et al.*, 2016	India	Cross-sectional	General population	OTC medicines	OTC drug misuse associated with adverse events.

Author (Year)	Country	Study Design	Population	OTC Drug(s) Involved	Key Finding
Stone *et al.*, 2017	USA	Interviews	Elderly patients	Pain & sleep medicines	Older adults misused OTC drugs due to misunderstanding instructions.
Kimergård *et al.*, 2017	UK & Ireland	Cross-sectional	Codeine users	Codeine analgesics	Codeine users often sought help for dependence.
Hill *et al.*, 2018	Scotland	Observational	Pharmacy patients	Codeine/antihistamines	Misuse of multiple OTC sedative medicines identified.
Al Kubaisi *et al.*, 2018	UAE	Cross-sectional	University students	Analgesics	Self-medication widely practiced among students.
Karami *et al.*, 2018	USA	Retrospective	Teenagers	Dextromethorphan	Adolescent abuse of cough suppressants reported.
Schifano *et al.*, 2018	UK	Retrospective	General public	Loperamide	Loperamide misuse linked with cardiac toxicity.
Lee *et al.*, 2018	USA	Retrospective	Patients	Loperamide	High-dose loperamide associated with serious adverse effects.
Barrett *et al.*, 2018	UK	Cross-sectional	Pharmacists	Codeine combinations	Pharmacists reported frequent suspected misuse.
Mill *et al.*, 2018	Australia	Retrospective	Hospital patients	Codeine combinations	Hospital admissions related to OTC analgesic abuse observed.
Tesfamariam *et al.*, 2019	Ethiopia	Cross-sectional	Community population	OTC medicines	Self-medication common in community settings.
Mensah *et al.*, 2019	Ghana	Cross-sectional	Rural residents	OTC medicines	Limited awareness about risks of self-medication.
Kotwani *et al.*, 2021	India	Interviews	Consumers	Antibiotics	Non-prescription antibiotic misuse prevalent.
Al Mazrouei *et al.*, 2021	UAE	Prospective	Community pharmacies	Analgesics	Pharmacist involvement reduced OTC misuse.
Yasmeen *et al.*, 2023	Saudi Arabia	Cross-sectional	Pharmacy visitors	Cough products	High non-prescription use of cough medicines.
Shammah *et al.*, 2024	Iraq	Cross-sectional	Community pharmacies	Steroids/cold medicines	Pharmacies reported widespread OTC misuse.
Bronkhorst *et al.*, 2024	South Africa	Cross-sectional	Community users	Codeine products	Public awareness of codeine harm was low.

High-dose loperamide use was associated with cardiac toxicity and arrhythmias. Long-term use of nasal decongestants resulted in rebound congestion and chronic rhinitis. Sedative antihistamines and cough preparations were associated with drowsiness, impaired concentration, and risk of accidents.

Role of pharmacists

Several studies highlighted the important role of community pharmacists in identifying potential misuse. Pharmacists were often able to recognize frequent purchasers of high-risk medicines and provide counseling regarding proper dosage and duration. Educational interventions and stricter monitoring of certain OTC medicines were reported to reduce inappropriate use. A summary of the included studies and their major findings is presented in Table 1.

DISCUSSION

The findings of this review indicate that misuse of OTC medicines is a common problem across many countries. Analgesics and codeine-containing preparations were the most frequently involved medicines. The major contributing factors included easy availability, lack of awareness about adverse effects, and the practice of self-medication (Wazaify *et al.*, 2005).

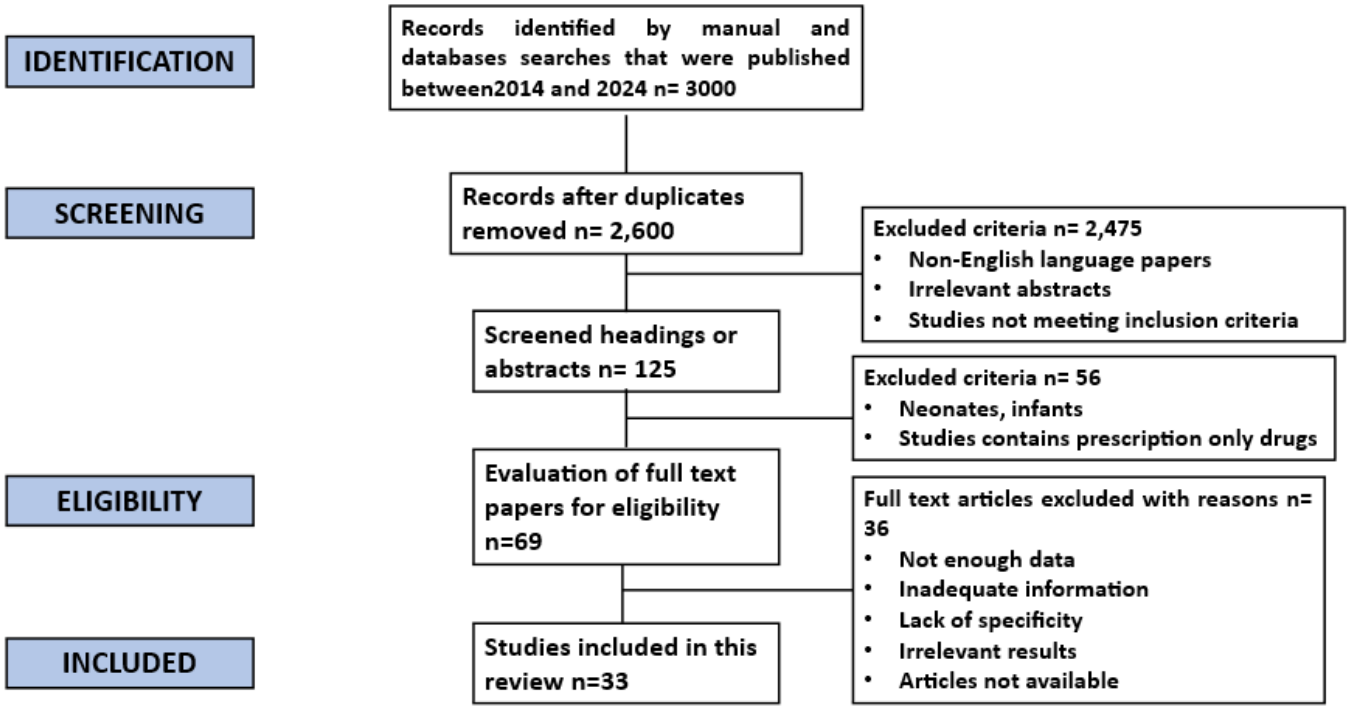

Figure 1: Data extraction and research selection procedure PRISMA diagram.

Many individuals considered OTC medicines to be harmless and therefore used them without proper dosage control. Students commonly used analgesics during examinations, while some individuals used cough preparations and antihistamines for sedative effects. Long-term use of nasal decongestants and loperamide was also reported in several studies (Hughes *et al.*, 2001).

The consequences of misuse were significant. Reported complications included liver toxicity from paracetamol overuse, gastrointestinal irritation from NSAIDs, and dependence associated with codeine products. These findings highlight the important role of pharmacists in identifying inappropriate use and counseling patients regarding safe medication practices (Cooper *et al.*, 2013).

CONCLUSION

OTC medicine misuse, abuse, and dependence represent a significant public health problem worldwide. Easy accessibility and inadequate awareness are major contributing factors. Pharmacist counseling, patient education, and appropriate regulatory control are necessary to promote the safe use of non-prescription medicines and to reduce associated health risks.

LIMITATIONS

One limitation of this review is that only English-language studies were included. In addition, variation in study design and outcome reporting prevented quantitative meta-analysis. Another limitation of this review is the heterogeneity of study populations and outcome measures across the included studies, which made quantitative pooling of data inappropriate.

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ABBREVIATIONS

OTC: Over-the-counter; **NSAIDs:** Non-steroidal anti-inflammatory drugs; **PRISMA:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **UK:** United Kingdom; **USA:** United States of America; **UAE:** United Arab Emirates; **Pharm.D:** Doctor of Pharmacy.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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