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Patterns And Risk Factors Of OTC Medication Misuse Among Saudi Youth And Strategies For Community-Pharmacy Intervention

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Abstract

Over-the-counter (OTC) medication misuse is an emerging public health concern among youth, with potential implications for safety and long-term health outcomes. This study investigated the prevalence, patterns, and determinants of OTC medication misuse among Saudi youth and explored the role of community pharmacists in mitigating such behaviors. Findings indicate that a substantial proportion of participants engaged in misuse behaviors, including prolonged use, concurrent consumption of multiple OTC products, and inconsistent adherence to medication instructions. Multilevel factors contributed to misuse, encompassing individual cognitive perceptions, interpersonal influences from peers and family, and system-level determinants such as unrestricted accessibility and persuasive pharmaceutical advertising. Participants demonstrated high trust in community pharmacists and a strong willingness to receive counseling and participate in pharmacist-led educational interventions, highlighting the strategic role of pharmacies in preventive efforts. The study underscores the need for comprehensive, multilevel interventions that combine education, social norm reinforcement, and structural measures to promote safe OTC medication practices and cultivate responsible self-medication behaviors among Saudi youth.

Keywords: Over-the-counter medications, misuse, Saudi youth, community pharmacists, self-medication, medication literacy, preventive interventions.

Introduction

Over-the-counter (OTC) medications are widely used to manage common health complaints such as pain, fever, allergic symptoms, and minor infections without the need for a prescription. Their accessibility and convenience support self-care practices, reducing pressure on formal healthcare services and promoting patient autonomy. However, OTC medicines are not without risk; inappropriate use, including incorrect dosing, extended duration, concurrent use with other drugs, and use for non-medical purposes, can result in adverse reactions, medication dependence, and masking of serious health conditions (Hajjar & Wazaify, 2021; Al-Garni et al., 2022). Adolescents and young adults are particularly vulnerable to OTC medication misuse due to developmental, social, and environmental factors that shape health-seeking behaviours and risk perceptions (Vella & Dodd, 2020).

Globally, patterns of OTC medication misuse among youth have been linked to limited health literacy, peer influence, and ease of access to medications without professional guidance (Vella & Dodd, 2020). Adolescents often rely on informal sources such as family, friends, or internet platforms for advice on medication use, which may contribute to unsafe practices and misuse (Smith et al., 2019). In community pharmacy settings, young consumers frequently do not seek or receive professional counselling when purchasing OTC products, increasing the likelihood of misuse or inappropriate use (Brown & Johnson, 2017).

In Saudi Arabia, OTC medication use is common across all age groups, and self-medication is deeply embedded within health-seeking practices. High rates of self-medication have been documented among primary healthcare consumers, with analgesics and respiratory products frequently used without medical supervision (Aljadhey et al., 2015; Al-Garni et al., 2022). Community pharmacists report that OTC medicines such as sedative antihistamines, dextromethorphan-containing cough remedies, and analgesics are among the most misused products, with misuse driven both by attempts to self-manage ongoing symptoms and by recreational use, particularly among younger customers (Algarni et al., 2022). Contributing factors include advice from non-professional sources, low awareness of medication risks, and pervasive advertising of OTC products (Algarni et al., 2022). Although research in the Saudi context has explored general patterns of self-medication, there remains a paucity of focused investigation on OTC medication misuse among youth, its underlying risk determinants, and effective intervention strategies to address it.

Community pharmacies are primary points of access for OTC medicines, positioning pharmacists as critical agents in identifying misuse, providing counselling, and implementing harm-reduction interventions. Empirical evidence suggests that pharmacists' proactive engagement—through structured questioning, patient education, and refusal to sell potentially misused products—can mitigate the risks of OTC misuse (Algarni et al., 2022). However, community pharmacists face barriers such as limited regulatory guidance, perceived lack of authority to restrict sales, and challenges in engaging young consumers effectively. Therefore, understanding patterns and risk factors of OTC misuse among Saudi youth is essential for designing targeted community-pharmacy interventions that enhance medication safety and promote responsible self-care.

This study examines patterns of OTC medication misuse among young people in Saudi Arabia and investigates the associated risk factors. It further evaluates potential strategies for intervention at the community pharmacy level, with the aim of informing public health policies, strengthening pharmacy practice, and safeguarding the health of youth in the Kingdom.

Study Objectives

The primary objective of this study is to examine the patterns and determinants of over-the-counter (OTC) medication misuse among Saudi youth.

The specific objectives are to:

1. Identify the types and patterns of OTC medications commonly misused by Saudi youth.

2. Examine individual, social, and system-level risk factors associated with OTC medication misuse.

3. Assess Saudi youths' knowledge, attitudes, and risk perceptions regarding OTC medication use.

4. Explore the current role of community pharmacists in preventing OTC medication misuse.

5. Identify feasible and acceptable community-pharmacy intervention strategies to reduce OTC medication misuse among youth.

Research Questions

1. What are the prevailing patterns of OTC medication misuse among Saudi youth?

2. What individual, social, and healthcare-system factors are associated with OTC medication misuse in this population?

3. What levels of knowledge and risk awareness do Saudi youth demonstrate regarding OTC medication use?

4. How do Saudi youth perceive the role of community pharmacists in promoting safe OTC medication use?

5. What community-pharmacy-based strategies are most acceptable and effective for preventing OTC medication misuse among Saudi youth?

LITERATURE REVIEW

Global Patterns of OTC Medication Misuse Among Youth

Over-the-counter (OTC) medications constitute a cornerstone of modern self-care practices, offering accessible and cost-effective treatment for minor and self-limiting conditions. Nevertheless, the ease of access to OTC products has contributed to a growing body of evidence documenting patterns of misuse and abuse, particularly among adolescents and young adults. OTC medication misuse encompasses a spectrum of behaviors, including consumption beyond recommended dosages, prolonged or inappropriate duration of use, use for non-indicated conditions, and concurrent use with other substances. Abuse, in contrast, refers to intentional non-medical use to achieve psychoactive or recreational effects. Both forms pose substantial public health risks, including toxicity, dependence, delayed diagnosis of underlying conditions, and increased healthcare utilization (Hajjar & Wazaify, 2021; Algarni et al., 2022).

Globally, several categories of OTC medications have been consistently identified as prone to misuse among youth populations. Analgesics—particularly non-steroidal anti-inflammatory drugs (NSAIDs) and combination products—are frequently misused for pain management beyond safe dosing thresholds. Cough and cold preparations containing dextromethorphan, first-generation antihistamines with sedative properties, and stimulant-containing products are also commonly implicated, often due to their psychoactive effects when consumed in excess (Hajjar & Wazaify, 2021). Emerging evidence further suggests that misuse patterns vary according to cultural context, regulatory strictness, and market availability, underscoring the importance of localized research.

Prevalence trends indicate that adolescents and young adults represent a disproportionately affected demographic. Narrative and systematic reviews report higher rates of OTC misuse among individuals aged 15–25 years compared to older adults, driven by developmental factors such as risk-taking behaviors, experimentation, and limited risk perception (Vella & Dodd, 2020). While prevalence estimates vary across regions due to methodological heterogeneity, the literature converges on the conclusion that youth constitute a critical risk group warranting targeted preventive interventions. The normalization of self-medication, combined with increased reliance on digital health information sources, further exacerbates misuse tendencies among younger populations.

Risk Factors Associated with OTC Medication Misuse

The misuse of OTC medications among youth is a multifactorial phenomenon shaped by the interaction of individual, social, cultural, and system-level determinants. At the individual level, health literacy emerges as a central predictor of safe medication practices. Studies consistently demonstrate that limited understanding of dosing instructions, side effects, contraindications, and drug interactions significantly increases the likelihood of misuse (Hajjar & Wazaify, 2021). Youth with lower medication literacy are more prone to perceive OTC drugs as inherently safe, leading to risk underestimation and inappropriate consumption.

Psychological and behavioral factors further contribute to misuse. Academic pressure, occupational stress, and sleep disturbances have been associated with increased reliance on analgesics, sedatives, and stimulant-containing OTC products as coping mechanisms (Vella & Dodd, 2020). Sensation-seeking tendencies and experimentation, characteristic of adolescence and early adulthood, also play a role, particularly in the misuse of products with psychoactive potential.

Social and cultural influences exert a substantial impact on OTC medication behaviors. Peer norms and family practices often shape early attitudes toward self-medication, with informal advice frequently substituting for professional guidance. In many cultural contexts, including Middle Eastern societies, medication sharing within families is normalized, inadvertently fostering unsafe practices. Media and pharmaceutical advertising further influence perceptions by promoting OTC products as quick and harmless solutions, often downplaying potential risks (Algarni et al., 2022). The proliferation of health-related content on social media platforms compounds this issue, as misinformation and anecdotal recommendations circulate widely among youth.

At the system level, the widespread availability of OTC medicines, combined with variable regulatory enforcement, creates structural conditions conducive to misuse. Easy access without mandatory professional consultation lowers the threshold for inappropriate use. Additionally, inconsistent regulation of online pharmacies and cross-border medicine sales has introduced new pathways for unsupervised acquisition of high-risk OTC products (Hajjar & Wazaify, 2021). These systemic vulnerabilities highlight the need for integrated regulatory and professional responses.

OTC Medication Use and Regulation in Saudi Arabia

In Saudi Arabia, self-medication with OTC products is prevalent and reflects broader regional and global trends. Empirical studies indicate high rates of OTC medication use among the general population, university students, and young adults, with analgesics, antipyretics, and cough and cold preparations being the most commonly utilized products (Aljadhey et al., 2015; Algarni et al., 2022). While many users demonstrate basic awareness of medication safety, inappropriate practices—such as exceeding recommended doses or using multiple products concurrently—remain common.

The regulatory framework governing OTC medications in Saudi Arabia is overseen by the Saudi Food and Drug Authority (SFDA), which is responsible for drug classification, registration, and post-marketing surveillance. The SFDA provides clear guidelines for determining prescription versus non-prescription status and regulates labeling, advertising, and distribution practices. These regulatory mechanisms are designed to balance access to essential medicines with patient safety. However, evidence suggests that enforcement at the community pharmacy level faces practical challenges. Community pharmacists report frequent encounters with suspected misuse of both OTC and prescription-only medicines, particularly among younger customers seeking cough suppressants, sedative antihistamines, and pain medications (Algarni et al., 2022).

Furthermore, the rapid expansion of digital health services and online medicine sales has introduced regulatory complexities. While the SFDA has begun addressing online pharmacy regulation, gaps remain in monitoring online OTC distribution and ensuring consistent application of safety standards. These challenges underscore the importance of strengthening regulatory oversight in tandem with professional practice interventions.

Role of Community Pharmacists in Preventing OTC Misuse

Community pharmacists are strategically positioned to mitigate OTC medication misuse, given their accessibility and direct engagement with consumers at the point of sale. International literature demonstrates that pharmacist-led interventions—such as structured patient questioning, targeted counseling, education on safe use, and refusal to dispense when misuse is suspected—can effectively reduce inappropriate OTC consumption and enhance medication safety (Hajjar & Wazaify, 2021).

In the Saudi context, qualitative studies reveal that community pharmacists are acutely aware of OTC misuse and frequently attempt to intervene through counseling and recommendation of safer alternatives (Algarni et al., 2022). However, pharmacists also report several barriers that limit the effectiveness of these interventions. These include time constraints, lack of access to patients' medication histories, commercial pressures, and uncertainty regarding their authority to restrict sales. Additionally, variable levels of training in substance misuse identification and youth communication strategies further constrain intervention capacity.

Despite these challenges, pharmacists consistently express willingness to assume a more proactive role in preventing OTC misuse, particularly if supported by clearer regulatory guidance, professional training, and public awareness campaigns. Strengthening the role of community pharmacies aligns with Saudi Arabia's broader health transformation agenda, which emphasizes preventive care, patient safety, and expanded pharmacy practice roles.

Research Gap

Collectively, the literature underscores that OTC medication misuse among youth is a complex and growing public health issue shaped by intersecting behavioral, social, and systemic factors. While international research provides valuable insights into misuse patterns and pharmacist-led interventions, context-specific evidence from Saudi Arabia—particularly focusing on youth populations—remains limited. Existing studies tend to address self-medication broadly rather than systematically examining misuse behaviors, associated risk factors, and intervention strategies within a unified analytical framework. This gap highlights the need for comprehensive research that integrates epidemiological assessment with practice-oriented solutions tailored to the Saudi community pharmacy context.

Theoretical And Conceptual Framework

This study is anchored in an integrated theoretical framework that synthesizes the Health Belief Model (HBM) and the Social Ecological Model (SEM) to provide a comprehensive explanation of over-the-counter (OTC) medication misuse among Saudi youth and to identify strategic points for community-pharmacy intervention. The integration of these models enables a nuanced examination of how individual cognitive processes, social interactions, and structural conditions collectively shape medication-use behaviors. By bridging behavioral theory with systems-level analysis, the framework offers a robust basis for understanding misuse patterns and for designing pharmacist-led preventive strategies tailored to youth populations within the Saudi healthcare context.

Health Belief Model

The Health Belief Model offers a well-established theoretical lens for analyzing individual-level determinants of health behavior and is particularly suited to examining OTC medication misuse, where risk perception and personal judgment play central roles. The model posits that engagement in health-related behaviors is influenced by individuals' perceptions of susceptibility to harm, the perceived severity of potential consequences, the perceived benefits associated with a given behavior, and the perceived barriers to adopting safer alternatives. These constructs are highly salient in youth self-medication practices, where developmental factors often shape optimistic bias and risk minimization.

In the context of OTC medication misuse, perceived susceptibility reflects the extent to which young individuals believe they are personally vulnerable to adverse outcomes resulting from inappropriate OTC use. Empirical evidence suggests that youth frequently underestimate their susceptibility, largely due to the non-prescription status of these medicines and their routine availability. Perceived severity pertains to beliefs about the seriousness of potential harms, including toxicity, dependence, organ damage, or long-term health consequences. Low perceived severity has been consistently associated with unsafe medication behaviors, as OTC products are often viewed as inherently benign.

Perceived benefits refer to the advantages that youth associate with OTC misuse, such as rapid symptom relief, convenience, avoidance of clinical consultation, or psychological coping with stress and fatigue. These perceived benefits may outweigh perceived risks, reinforcing misuse behaviors. Conversely, perceived barriers encompass factors that impede safe medication use, including limited access to credible information, time constraints, embarrassment in seeking professional advice, and fear of being questioned or refused products.

Within this framework, community pharmacists serve as critical cues to action, capable of reshaping risk perceptions and influencing behavioral decisions at the point of medicine purchase. Through targeted counseling, risk communication, and patient education, pharmacists can increase perceived susceptibility and severity, highlight the benefits of appropriate use, and reduce perceived barriers to

professional consultation. Thus, the HBM elucidates the cognitive mechanisms through which pharmacist interventions may mitigate OTC medication misuse among youth.

Social Ecological Model

While the Health Belief Model foregrounds individual cognition, it does not fully capture the broader social and structural contexts in which OTC medication misuse occurs. The Social Ecological Model complements the HBM by conceptualizing health behavior as the product of interactions across multiple, interrelated levels: individual, interpersonal, community, and policy environments. This multilevel perspective is essential for understanding youth medication behaviors, which are embedded within social networks, commercial settings, and regulatory frameworks.

At the individual level, factors such as age, health literacy, stress, prior medication experiences, and risk-taking tendencies influence patterns of OTC misuse. At the interpersonal level, family practices, peer norms, and informal advice networks shape attitudes toward self-medication and normalize certain misuse behaviors. The community level encompasses the accessibility and practices of community pharmacies, pharmacist–consumer interactions, commercial pressures, and prevailing social norms regarding medication use. Finally, the policy level includes national regulatory frameworks, enforcement mechanisms, advertising standards, and the legal classification of medicines.

The SEM underscores that OTC medication misuse is not solely a matter of individual choice but is also shaped by environmental opportunities and constraints. Consequently, interventions that focus exclusively on individual education are unlikely to achieve sustained impact. Effective prevention strategies require coordinated efforts that address interpersonal influences, professional practices within community pharmacies, and regulatory oversight. This perspective highlights the importance of situating pharmacist-led interventions within a supportive policy and practice environment.

Conceptual Model of OTC Misuse and Community-Pharmacy Intervention

Drawing on the Health Belief Model and the Social Ecological Model, this study proposes an integrated conceptual model that explicates the pathways leading to OTC medication misuse among Saudi youth and identifies leverage points for community-pharmacy intervention. In this model, individual-level cognitive factors (e.g., low perceived risk, high perceived benefits), interpersonal influences (e.g., peer and family endorsement of self-medication), and system-level conditions (e.g., easy availability of OTC medicines, regulatory gaps, and marketing practices) interact dynamically to increase the likelihood of misuse behaviors.

OTC medication misuse is conceptualized as the outcome of these converging pathways rather than as an isolated behavioral choice. Community pharmacists are positioned as pivotal intermediaries capable of disrupting these pathways through evidence-based interventions. At the individual level, pharmacists can modify health beliefs through counseling and risk communication. At the interpersonal and community levels, they can influence social norms by promoting responsible self-medication and discouraging inappropriate practices. At the policy interface, pharmacists contribute to regulatory objectives by adhering to classification guidelines, monitoring high-risk purchases, and collaborating with regulatory authorities.

By situating community pharmacies at the intersection of individual behavior and health system structures, the conceptual model emphasizes their dual role as access points for OTC medicines and as sites of preventive public health intervention. This integrative framework provides a theoretically grounded basis for analyzing patterns and determinants of OTC medication misuse and for evaluating the feasibility and effectiveness of community-pharmacy-based strategies aimed at protecting youth health in Saudi Arabia.

Methodology

Study Design

This study adopts a cross-sectional mixed-methods design to examine patterns, risk factors, and preventive strategies related to over-the-counter (OTC) medication misuse among Saudi youth. The

quantitative component enables the identification of prevalence patterns and statistically significant associations between misuse behaviors and individual, social, and system-level factors. The qualitative component provides contextual depth by exploring participants' perceptions of OTC use and the role of community pharmacists in misuse prevention. The integration of quantitative and qualitative data enhances the explanatory power of the findings and aligns with the study's theoretically informed, multilevel analytical framework.

Study Setting and Population

The study is conducted in community pharmacies, universities, and youth-oriented community centers across selected urban and semi-urban regions in Saudi Arabia. These settings were chosen to capture diverse youth experiences with OTC medication access and use.

The target population consists of Saudi youth aged 18–30 years, reflecting a demographic group with high autonomy in self-medication practices and frequent engagement with community pharmacies. Participants are required to have used at least one OTC medication within the preceding six months to ensure relevance and recall accuracy.

Sampling and Sample Size

A non-probability convenience sampling strategy is employed to recruit participants from the selected settings. This approach is appropriate given the exploratory nature of the study and the absence of a centralized sampling frame for OTC medication users.

The final sample comprises 250 participants, which is adequate for multivariate statistical analyses and consistent with sample sizes used in comparable pharmacy practice studies.

Inclusion criteria include:

Saudi nationality

Age between 18 and 30 years

Self-reported use of OTC medication within the past six months

Ability to read and understand Arabic or English

Exclusion criteria include:

Current enrollment in a pharmacy or medical degree program

Use of OTC medications solely under physician supervision

Presence of severe cognitive or communication impairments

Data Collection Instruments

Data are collected using a structured, self-administered questionnaire comprising four sections.

The OTC Medication Misuse Behavior Questionnaire assesses patterns of misuse, including inappropriate dosing, prolonged use, polypharmacy, and non-medical use. Items are adapted from validated self-medication and misuse scales used in previous international studies, with contextual modifications for the Saudi setting.

The Risk Factor Assessment Scale, grounded in the Health Belief Model and Social Ecological Model, measures individual-level cognitive factors (perceived susceptibility, severity, benefits, and barriers), interpersonal influences (peer and family norms), and system-level determinants (availability, advertising exposure, and regulatory awareness).

The Pharmacy Intervention Perception Tool evaluates participants' awareness of, trust in, and receptivity to community pharmacist interventions, including counseling, risk screening, and educational support. This section also explores perceived barriers to engaging with pharmacists.

The questionnaire is reviewed by a panel of pharmacy practice and public health experts to establish content validity and is pilot-tested with a small group of participants to ensure clarity and reliability.

Data Analysis

Quantitative data are analyzed using statistical software. Descriptive statistics (frequencies, percentages, means, and standard deviations) are used to summarize participant characteristics, patterns of OTC misuse, and risk factor distributions.

Multivariate regression analyses are conducted to identify independent predictors of OTC medication misuse, adjusting for demographic variables and theoretically relevant constructs derived from the HBM and Social Ecological Model. Statistical significance is set at $p < .05$.

Qualitative responses from open-ended questionnaire items are analyzed using thematic analysis. Data are coded inductively, and emerging themes related to misuse motivations, perceptions of pharmacist roles, and intervention acceptability are identified. Triangulation of quantitative and qualitative findings enhances interpretive validity.

Ethical Considerations

Ethical approval for the study is obtained from the appropriate institutional research ethics committee. Participation is voluntary, and informed consent is obtained from all participants prior to data collection. Anonymity and confidentiality are strictly maintained, with no personally identifiable information collected. Participants are informed of their right to withdraw at any stage without penalty. All data are securely stored and used exclusively for research purposes in accordance with ethical and regulatory guidelines.

Validity and Reliability of the Instruments

The validity and reliability of the research instruments were systematically established to ensure methodological rigor and the credibility of the study findings. Multiple forms of validity were addressed throughout the instrument development and testing process.

Content validity was ensured through an expert review process. The initial version of the questionnaire was examined by a panel of specialists in pharmacy practice, public health, and health behavior research, who evaluated the relevance, clarity, and comprehensiveness of the items in relation to the study objectives and the guiding theoretical frameworks, namely the Health Belief Model and the Social Ecological Model. Based on their feedback, minor revisions were made to refine item wording, remove redundancy, and enhance cultural and contextual suitability for the Saudi youth population. Face validity was subsequently assessed during pilot testing with approximately 20 participants representative of the target group. Participants reported that the questionnaire items were clear, easy to understand, and logically organized, confirming the appropriateness of the instrument in terms of language, structure, and length.

Construct validity was supported by the theoretical grounding of the questionnaire domains. All instrument sections were explicitly derived from established constructs within the Health Belief Model and the Social Ecological Model. During data analysis, construct validity was further examined by testing hypothesized relationships between OTC medication misuse behaviors and individual, interpersonal, and system-level risk factors using multivariate regression analysis, with observed associations aligning with theoretical expectations.

Reliability was primarily assessed through internal consistency analysis using Cronbach's alpha coefficients. The OTC Medication Misuse Behavior Questionnaire demonstrated good internal consistency ($\alpha = 0.84$). The Risk Factor Assessment Scale also showed satisfactory reliability overall ($\alpha = 0.81$), with acceptable internal consistency for the individual-level Health Belief Model constructs ($\alpha = 0.79$), interpersonal factors ($\alpha = 0.76$), and system-level factors ($\alpha = 0.74$). The Pharmacy Intervention Perception Tool exhibited strong internal consistency, with a Cronbach's alpha coefficient of 0.86. All values exceeded the recommended threshold of 0.70, indicating adequate reliability of the measurement scales.

Pilot testing further supported the reliability of the instruments, as item–total correlation analyses revealed no items with poor discriminatory power. Only minor linguistic adjustments were required prior to final data collection. In addition, standardized administration procedures were employed across all study settings, and the use of a self-administered questionnaire minimized interviewer bias and enhanced consistency in data collection.

Overall, the results indicate that the research instruments possess adequate validity and reliability, supporting their suitability for assessing patterns of OTC medication misuse, associated risk factors, and perceptions of community pharmacist interventions among Saudi youth.

Results

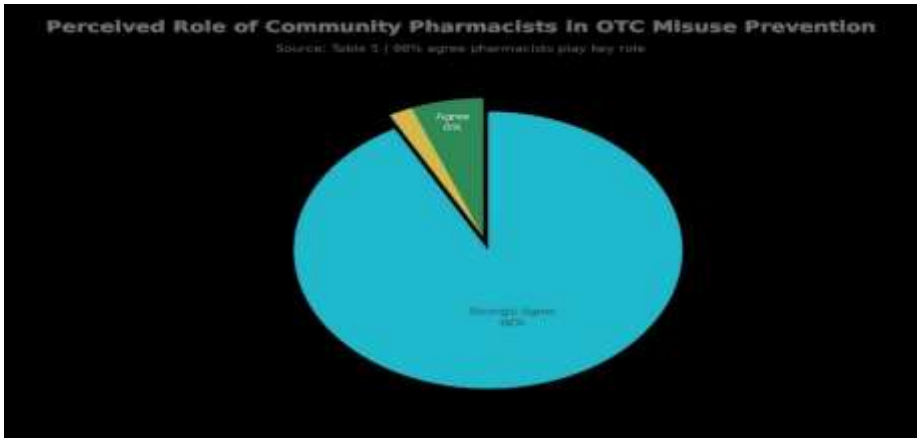
A total of 250 Saudi youth aged 18–30 years completed the questionnaire. The sample included 132 males (52.8%) and 118 females (47.2%). Most participants were university students (46.4%) or held a bachelor's degree (38.8%), while 14.8% reported a high school education or diploma. The majority resided in urban areas (68.0%), with the remainder living in semi-urban regions (32.0%). All participants reported using at least one over-the-counter (OTC) medication within the past six months, with 61.6% indicating monthly pharmacy visits and 24.8% reporting weekly or more frequent visits.

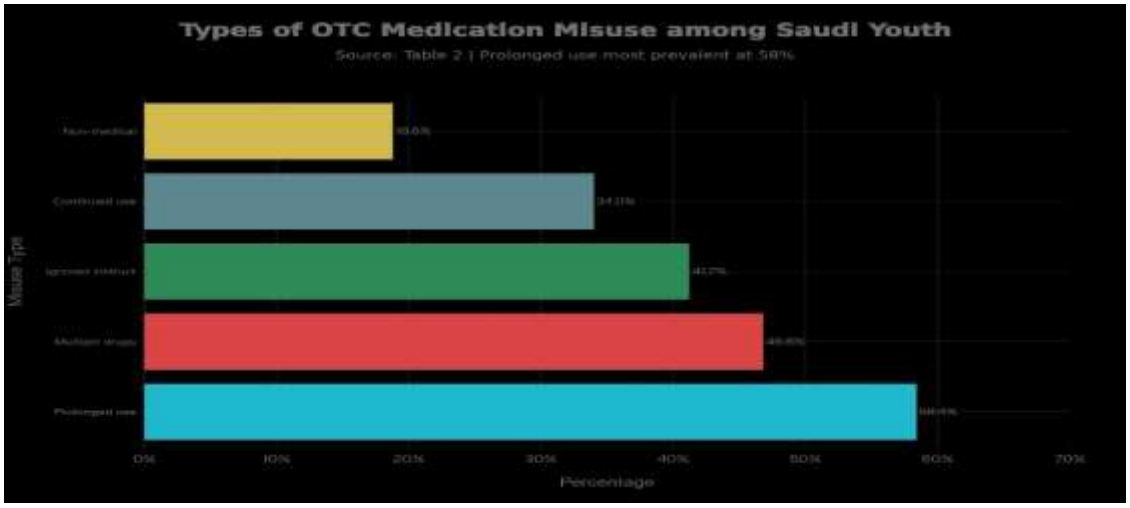
Analysis of OTC medication misuse behaviors revealed that inappropriate use was relatively common among respondents. Prolonged use of OTC medications beyond the recommended duration was reported by 58.4% of participants (sometimes or often), while 46.8% indicated combining more than one OTC medication simultaneously. Failure to consistently read medication instructions was reported by 41.2% of respondents, and 34.0% acknowledged continuing OTC medication use despite symptom improvement. Non-medical use of OTC medications was less prevalent but still notable, with 18.8% reporting using OTC products for purposes other than treating illness. Overall, 63.2% of participants reported engaging in at least one misuse behavior within the previous six months.

Assessment of risk factors showed that individual-level cognitive perceptions played a significant role in misuse behaviors. While 71.6% of participants agreed or strongly agreed that misuse of OTC medications could cause serious health problems, only 38.0% perceived themselves as personally susceptible to harm. Perceived barriers were also evident, with 44.4% reporting difficulty understanding medication labels and 36.8% indicating that reading instructions was time-consuming. Interpersonal influences were prominent, as 49.2% of respondents agreed that peers commonly use OTC medications without concern for safety, and 42.0% reported that family practices influenced their own medication use. At the system level, 82.4% strongly agreed that OTC medications are easily accessible without professional guidance, while 57.6% agreed that pharmaceutical advertising encourages frequent use. Awareness of national regulations related to OTC medication safety was reported by only 35.2% of participants.

Perceptions of community pharmacist interventions were overwhelmingly positive. Notably, 92.0% of participants strongly agreed that community pharmacists play an important role in preventing OTC medication misuse, while an additional 6.0% agreed, indicating near-universal endorsement of pharmacists' preventive role. Trust in pharmacists' advice was reported by 89.6% of respondents (agree or strongly agree), and 86.8% expressed willingness to receive counseling before purchasing OTC medications. Furthermore, 84.4% believed that pharmacist-led education could significantly improve safe medication use. Despite these positive perceptions, some barriers were identified, as 28.0% of participants agreed that pharmacists are often too busy to provide counseling, and 21.6% reported feeling uncomfortable initiating medication-related discussions.

Qualitative analysis of open-ended responses supported and enriched the quantitative findings. Participants frequently cited convenience (reported by 62.0%), prior experience with similar symptoms (54.8%), and peer recommendations (39.6%) as key reasons for self-directed OTC use. Many respondents emphasized that proactive counseling, clearer explanations, and greater engagement by pharmacists could reduce misuse, reinforcing the strong quantitative endorsement of pharmacist-led preventive interventions.





Discussion

The present study offers a comprehensive examination of over-the-counter (OTC) medication misuse among Saudi youth, elucidating both the prevalence of unsafe practices and the multilevel factors that underpin them. The findings reveal that OTC medication misuse is widespread, with nearly two-thirds of participants reporting engagement in at least one misuse behavior within the preceding six months. This high prevalence positions OTC misuse as a substantive and underrecognized public health issue among young adults in Saudi Arabia, a population characterized by frequent self-medication and substantial autonomy in health-related decision-making.

The predominance of prolonged OTC use beyond recommended durations and the concurrent use of multiple OTC products reflects a pattern of symptom-oriented self-management that is insufficiently informed by pharmacological guidelines. Such behaviors raise particular concern due to their association with cumulative toxicity, adverse drug reactions, and clinically significant drug–drug interactions. Moreover, the substantial proportion of participants who reported inconsistent reading of package instructions indicates persistent deficiencies in functional medication literacy. Although non-medical use was comparatively less prevalent, its occurrence among a notable minority suggests emerging patterns of inappropriate consumption that warrant early preventive attention.

Application of the Health Belief Model provides a useful interpretive framework for understanding these behaviors. While a large majority of respondents recognized the potential severity of harm resulting from OTC misuse, markedly fewer perceived themselves to be personally susceptible. This incongruence between perceived severity and perceived susceptibility is consistent with the well-documented phenomenon of optimism bias and may partially explain the persistence of risky medication behaviors despite general safety awareness. Furthermore, perceived barriers—such as

difficulty interpreting medication labels and the perception that reading instructions is burdensome—appear to lower the threshold for misuse, thereby reinforcing habitual and uncritical patterns of OTC consumption.

Beyond individual cognition, the findings underscore the influential role of interpersonal and system-level determinants. Peer and family influences were commonly reported, indicating that OTC misuse is embedded within broader social norms that legitimize self-medication without professional consultation. At the system level, the perception of unrestricted access to OTC medications emerged as the most salient risk factor. This structural accessibility, compounded by the persuasive impact of pharmaceutical advertising and limited awareness of regulatory safeguards, creates an environment conducive to unsupervised and potentially unsafe medication use. Collectively, these findings highlight the limitations of interventions that focus exclusively on individual knowledge without addressing the social and regulatory contexts in which OTC use occurs.

Notably, participants expressed overwhelmingly positive perceptions of community pharmacists as agents of misuse prevention. The near-universal endorsement of pharmacists' preventive role, coupled with high levels of trust and willingness to receive counseling, underscores the strategic position of community pharmacies as accessible and credible points of intervention. These findings align with international evidence supporting pharmacist-led counseling as an effective strategy for improving medication safety. Nevertheless, the perception that pharmacists are frequently too busy, along with reported discomfort in initiating medication-related discussions, represents a critical implementation gap that may constrain the real-world impact of pharmacist-based interventions.

The qualitative findings further enrich the quantitative results by illuminating the motivations underlying self-directed OTC use. Convenience, prior experiential knowledge, and peer recommendations emerged as dominant themes, reflecting a pragmatic and socially reinforced approach to self-care. Importantly, participants' recommendations for more proactive counseling and clearer communication from pharmacists suggest that youth are receptive to professional guidance when it is delivered in an accessible and patient-centered manner.

In sum, the findings of this study underscore the complex, multilevel nature of OTC medication misuse among Saudi youth. Effective mitigation strategies should extend beyond awareness-raising to encompass pharmacist-centered interventions, improved medication labeling, targeted public education, and regulatory measures that promote responsible access. Addressing individual perceptions in tandem with interpersonal norms and system-level structures is essential for fostering safer OTC medication practices and reducing the burden of medication-related harm in this population.

Conclusion

The findings of this study underscore the pervasive nature of over-the-counter (OTC) medication misuse among Saudi youth, with a considerable proportion of participants reporting behaviors such as prolonged use, simultaneous consumption of multiple OTC products, and inconsistent adherence to medication instructions. The results indicate that such misuse is driven by a confluence of factors spanning multiple levels: individual-level cognitive perceptions, including limited personal susceptibility to harm and perceived barriers to understanding instructions; interpersonal influences from peers and family; and system-level determinants, such as unrestricted medication accessibility and the persuasive impact of pharmaceutical advertising.

Crucially, the study identifies community pharmacists as pivotal actors in mitigating OTC medication misuse. The overwhelming trust in pharmacists' guidance and the high willingness of participants to engage in counseling and pharmacist-led educational interventions highlight the untapped potential of pharmacy-based preventive strategies. These findings advocate for the implementation of comprehensive, multilevel interventions that integrate individual education, reinforcement of safe self-medication norms, and structural measures to regulate accessibility and promote responsible use. Enhancing pharmacist engagement, improving medication literacy, and addressing systemic facilitators of misuse are essential for reducing the burden of unsafe OTC practices and fostering a culture of informed and responsible self-medication among Saudi youth.

Recommendations

1. Implement structured counseling protocols at the point of sale to provide individualized guidance on safe OTC medication use.
2. Encourage proactive engagement by pharmacists to address misconceptions, clarify instructions, and counsel on potential risks associated with misuse.
3. Develop educational campaigns targeting youth that focus on proper OTC medication use, reading labels, and understanding dosage guidelines.
4. Simplify labeling and package instructions to improve comprehension and reduce barriers to safe self-medication.
5. Design peer-education programs that leverage social networks to promote responsible medication practices.
6. Engage families in awareness initiatives to reduce normalization of self-directed OTC use within households.
7. Implement policies that ensure responsible availability of OTC medications while maintaining necessary access for legitimate use.
8. Monitor and regulate pharmaceutical advertising to prevent misleading messages that encourage frequent or inappropriate use.
9. Combine individual education, social norm interventions, and system-level strategies to address the multifactorial determinants of misuse.
10. Evaluate the effectiveness of pharmacist-led and community-based programs through longitudinal studies to refine intervention strategies.
11. Establish ongoing surveillance systems to monitor patterns of OTC misuse and emerging trends among youth.
12. Conduct further research to explore barriers to pharmacist counseling and optimal strategies for reducing misuse in diverse settings.

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