

Abid Hussain

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A Comprehensive Review of Over-the-Counter Medication Practices and Associated Public Health Risks

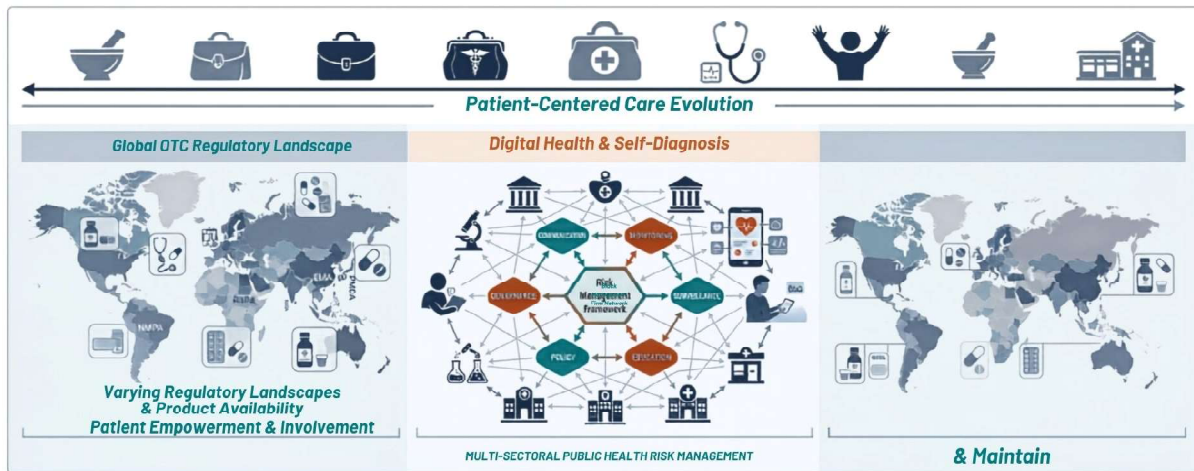
Manish Kumar*, Aditya Narayan Barman, Nazim Hussain, Ahiya Noor, Angshuman Sonowal, Dubom Tayeng, Md Safiqul Islam Sk*

Apex Professional University,
Pasighat, Arunachal Pradesh, India.
*Corresponding Author
Email ID - kumarmanish.taraiya@gmail.com

Abstract

The way healthcare is provided has changed with time. It is now based more on patients taking charge of their own health. One important part of this is people using over-the-counter (OTC) drugs to treat their own illnesses. OTC medications are considered safe and effective when used correctly. However, their global regulation is divided into many different parts, which makes it difficult to monitor APIs in different places and situations. The lack of consistent oversight can lead to different people using it in different ways, which can be dangerous to public health if it's not managed properly. This paper provides a comprehensive review of the global OTC landscape. It looks at how self-medication practices can change based on different things, like digital and physiological factors that lead to self-diagnosis. It also suggests a plan that brings together different sectors to deal with potential public health risks while also letting patients be involved in healthcare decisions.

Keywords: Self-medication, Over-the-Counter (OTC) drugs, Pharmaceutical regulation, Global health surveillance, Self-care



Graphical Abstracts

1. Introduction

According to World Health Organization self medication is when people take medicines by themselves to treat illness or symptoms they have been diagnosed with, or to stop or reduce symptoms of a disease. But in modern public, it is seen as an important part of self care (Baracaldo-Santamaría et al. 105). In today's world people like to control their healthcare choices. Earlier, the same people used to rely on doctors to make decisions for them, but in this modern world, people like to make decisions by themselves to make sure they stay healthy (Cooper 154).

The system for regulating medicine classifies them into two groups they are: Prescription only medicines and Over the counter medicines (Noblin et al. 271). OTC drugs can be directly sold to customers without any doctors prescription as they are considered safe and effective when they are used correctly (Sánchez-Sánchez et al. 112). On the other hand, biochemical line which is used to categorize this is highly porous and depends on national regulatory jurisdictions (Vacher et al. 443). Monitoring of Active pharmaceutical ingredients (APIs) gets harder because strict testing rules in one state might be sold without restrictions in community pharmacies, supermarkets, or open-market stalls in another, making it hard to monitor drugs worldwide (Wu et al. 282).

It is good to take care of our own health, but doing it in the wrong way may create a lot of problems (Hanauer et al. 192). This paper aims to provide a thorough, multi-dimensional review of the global scenario of OTC drug usage. The primary objective of this review is to evaluate epidemiological variances across multiple social and economic regions, evaluate digital and physiological factors that encourage self

diagnosis, map a coordinated strategy that considers all sectors of society to reduce public health risks while respecting patient choices.

2. Methodology

To get a solid factual base for this review, we did a huge literature search across various academic databases, like google scholar, Science direct, Pubmed, Chocrane database etc. Search results combined Medical Subject Headings (MeSH) terms focusing on OTC drugs, non-prescription medicines, their adverse drug reactions, antimicrobial resistance, etc (Wang et al. 913). The inclusion criteria followed systematic reviews, epidemiological surveys, peer-reviewed cross-sectional studies, and clinical trials published around the world till 2026 (Wu et al. 284). The most important things to consider were study design, sample size, geographic location, how common the condition is, the main types of drugs used, and the clinical results that were documented. To maintain scientific integrity unverified popular literature, speculative blogs, and non-peer-reviewed white papers were excluded.

3. Global Prevalence and Epidemiological Trends

The large-scale patterns of self-medication show a big difference based on health care systems and economic stability (Manandhar 512). In high-income countries, people usually only self-medicate when they can buy medicine from a pharmacy that is carefully monitored by the government (Rauschert et al. 37). For example, according to data that between 71% and 82% of adults in mature markets use OTC drugs or leftover prescriptions from the past for minor conditions that don't get better within any six-month period (Alshahrani et al. 612). In contrast, in low and middle income countries (LMICs), self-medication is often a way of staying alive instead of a choice to make life easier (Mubasher Rehman et al. 815). In many places in Southeast Asia, Sub-Saharan Africa, and some parts of Latin America, community surveys show very high baseline rates of people with HIV. These high rates are due to long wait times, lack of universal insurance, geographic isolation, and severe shortages of doctors (Mubasher Rehman et al. 818).

When we look closely at the different groups of people who self-medicate, we see clear differences. Studies show that women are more likely to self-medicate than men. This is especially true for women who have health problems like menstrual

cramps, migraines, and problems with their family's health (Sánchez-Sánchez et al. 115). Age-based stratification also reveals specific risk factors. Pediatric self-medication is driven by parents reusing old prescriptions or reducing adult doses to match what their children take (Eltom et al. 45; Esposito et al. 12). On the other hand, older adults are at high risk because they often have multiple health problems and take many medications. This makes them very likely to have problems when they add unrecorded over-the-counter (OTC) medications to their existing prescriptions (Perrot et al. 1159).

In addition, a lot of students at universities — especially students studying health, medicine, and pharmacy — take their own medicine without talking to a doctor. The rates of this behavior range from 45.3% to 57.5% (Alsous et al. 345; Alrabiah et al. 711). This group of people uses their limited medical knowledge to diagnose themselves and avoid going to a doctor's office. They often think they can handle medical problems better than they really can (Faqihi and Sayed 234).

4. Types of OTC medications

The world of self-medication is made up of a few main types of active ingredients. While these drugs are effective when used as prescribed, they can cause serious problems when used without supervision (Perrot et al. 1162).

Non-opioid painkillers are the most commonly used type of over-the-counter (OTC) medication worldwide (Rauschert et al. 39). Acetaminophen (paracetamol) is commonly thought to be safe by most people. However, because it is an active ingredient in many over-the-counter brand-name products for colds, sinus pain, and sleep aids, patients often accidentally take too much of it (WHO Drug Information 22). This duplication can be too much for the hepatic glucuronidation and sulfation pathways. Instead, the drug goes into the cytochrome P450 pathway. This causes toxic chemicals that can cause irreversible liver damage.

At the same time, using non-steroidal anti-inflammatory drugs (NSAIDs) like ibuprofen, diclofenac, and naproxen without checking with a doctor can be very dangerous for your kidneys and stomach. These drugs stop the body from making certain chemicals that help protect cells. This can lead to issues like slower blood flow and higher acid levels in the stomach. These issues can cause painful sores in the stomach, ulcers, and, in rare cases, severe bleeding in the stomach. In the kidneys,

NSAIDs reduce the body's natural protective response, which can lead to kidney injury, especially in people with existing kidney disease (Perrot et al. 1165).

The market for cold and flu medicines with multiple symptoms is very sensitive to combination therapy that is not based on science (Nicolini et al. 321). First-generation antihistamines, like diphenhydramine and chlorpheniramine, easily enter the blood-brain barrier. They have a strong effect on the central nervous system and cause drowsiness, which increases the risk of accidents (Brenner 281). Systemic decongestants like pseudoephedrine act as direct sympathomimetic agents, meaning they cause dangerous elevations in blood pressure and heart rate. This can lead to immediate stroke risks for hypertensive patients (Nicolini et al. 325). When people take vasoconstrictors (like oxymetazoline) for more than 3 to 5 days, it can cause a decrease in the activity of certain cells in the nose. This can lead to a condition called "rhinitis medicamentosa," which causes severe nasal congestion.

The most alarming part of self-medication is the illegal or poorly regulated purchase of antibiotics over-the-counter, a common practice in many low- and middle-income countries (LMICs) despite clear laws against it (Wu et al. 288). People often take medicines like amoxicillin, azithromycin, or ciprofloxacin to treat viral infections in their upper respiratory tract. These medicines can help, but they should only be taken for a short time (Mubasher Rehman et al. 820). This makes it more likely for bacteria to change and become resistant to the drug. This change can spread quickly among different types of bacteria (Wang et al. 917). The public health ramifications are substantial, rendering conventional treatments ineffective and contributing to an escalation in drug-resistant pathogens on a global scale (Wu et al. 290).

5. Factors that lead people to self-medicate

The decision-making process that leads to self-medication is strongly influenced by social and structural factors. Economically, the direct costs of professional medical consultations, lab tests, and missed work can prevent people from seeking formal medical care (Hong et al. 1014). In health systems characterized by decentralization or constrained by financial limitations, the most economical option for low-income households is the acquisition of a modest quantity of an over-the-counter (OTC) medication from a proximate drugstore (Mubasher Rehman et al. 822).

In addition, it may seem strange but people with more education outside of healthcare have a higher rate of self-medication. This is because people who are highly educated tend to have a lot of confidence in their own health (Sánchez-Sánchez et al. 119).

The way patients and healthcare providers interact with information has completely changed. The internet lets people look up symptoms and get medical advice, but this can sometimes lead to people worrying too much about their health or getting the wrong information (Cooper 158). This digital push is made even stronger by the fact that pharmaceutical companies are using Direct-to-Consumer Advertising (DTCA) a lot (Noblin et al. 275). Marketing campaigns on TV, in print, and on social media make complex chemical substances seem like simple consumer goods. They focus on quick symptom relief but hide the critical warnings about toxicities (Noblin et al. 278).

6. Clinical and Public Health Implications

To understand the full picture of how diseases spread, we need to recognize that when people take their own medicines in the right way, it can have a positive effect on health care systems around the world. If every instance of a self-limiting condition—such as mild tension-type headaches, minor seasonal allergies, or temporary indigestion—required a doctor's visit, primary healthcare facilities would be completely overwhelmed (Baracaldo-Santamaría et al. 110). Responsible self-care is important because it helps to reduce the number of minor health problems that require the attention of medical staff, equipment, and money. This allows medical staff to focus on more serious, complex, and non-self-limiting health issues (Hong et al. 1018). The primary public health concern lies in the transition from responsible use to dangerous misuse. Unsupervised self-medication frequently results in severe adverse drug reactions (ADRs) that require emergency hospitalization (Vacher et al. 448). Registry data shows that self-medication is implicated in roughly 3.9% of all acute ADR-related hospital admissions, with over half of those cases directly attributable to standard OTC products (Vacher et al. 450). Beyond acute toxicity, unmonitored self-treatment poses a serious risk of masking underlying, progressive pathologies, where continuous suppression of symptoms dangerously delays necessary diagnostic workups (Power 146).

7. Regulatory Regimes and Pharmacist-Led Interventions

To make the most of the benefits of self-care while reducing its clinical risks, global public health policy must change the retail environment where these drugs are sold. The old way of dividing medicines into two groups, prescription-only or fully unrestricted, doesn't meet today's pharmacological needs (Indermitte et al. 385). A "Behind-the-Counter" (BTC) class is a way to make sure that prescriptions are safe. This class teaches people how to talk to a pharmacist and how to check a medicine to make sure it is safe. (Indermitte et al. 387). Community pharmacists are in a unique position to serve as important public health resources. They can check patients' medical histories to make sure that their medications don't cause dangerous interactions. They can also make sure that patients are not taking too many medications, and they can spot symptoms that require immediate medical attention.

8. Conclusion and Future Directions

Self-medication is a key part of modern public health that cannot and should not be eliminated. The best way forward is to change from a system where anyone can access anything without restrictions or monitoring to a system that is very structured and allows people to take responsibility for their own self-medication. It takes a lot of different people working together to reduce the public health risks of people abusing over-the-counter (OTC) drugs. National regulatory authorities must continually re-evaluate and update OTC schedules based on local data, while public health agencies implement targeted community education campaigns. By combining strong regulation, clear public health messages, and active pharmacist involvement, modern healthcare systems can successfully give patients more control while keeping clinical safety standards high.

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