

RESEARCH ARTICLE



A Cross-Sectional Study of Knowledge, Attitudes, and Safety Practices of Consumers in Over-the-Counter Medication Usage

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Abstract: A quantitative cross-sectional study was conducted from March to May 2025 to study over-the-counter (OTC) medication usage patterns among 2,000 Indian consumers aged 15 years and above. Data collection utilized a validated online questionnaire covering demographics, knowledge levels, usage behaviors, and safety practices. Results revealed that 71% of participants had used OTC medications within six months, predominantly analgesics (56%), antipyretics (43%), and antacids (39%). While 68% demonstrated moderate awareness of OTC drug safety, critical gaps emerged in safety practices - only 32.7% regularly verified expiry dates, and 27% who experienced adverse effects did not seek medical consultation. Urban residents and those with higher education levels showed significantly better knowledge scores ($p < 0.05$). The study identified concerning trends: 50.6% never consulted healthcare professionals about OTC use, 24.6% procured medications through online platforms, and 48.6% reported experiencing adverse effects. It is worth noting that only 32.8% consistently read medication labels, and 33.4% never checked usage instructions. Market analysis indicated strong brand preferences, with Dolo (21.1%), Crocin (21.0%), and Digene (20.6%) emerging as leading choices. The results indicate substantial gaps in consumer awareness and safety practices, necessitating enhanced regulatory oversight, structured public education programs, and increased pharmacist involvement in OTC medication counseling.

Keywords: Over-the-counter medications; Self-medication; Consumer safety; Medication adherence; Public health education

1. Introduction

Over-the-counter (OTC) medications represent a significant component of self-healthcare management, enabling individuals to treat minor ailments without prescription requirements [1]. The global OTC pharmaceutical market has witnessed substantial expansion, reaching USD 157.0 billion in 2023, with projections indicating growth to USD 210 billion by 2030 [2]. This growth trajectory reflects changing healthcare behaviors, increased health awareness, and improved access to pharmaceutical products through diverse retail channels [3]. The Indian OTC medication landscape presents unique characteristics and challenges. Market research indicates that approximately 65% of urban and semi-urban Indian residents engage in self-medication practices, particularly utilizing analgesics, antipyretics, and gastrointestinal medications [4]. The regulatory guidelines for OTC drugs in India operates under Schedule K of the Drugs and Cosmetics Rules, 1945, though enforcement mechanisms remain less stringent compared to international standards [5].

Recent pharmacoepidemiological studies have documented significant risks associated with unsupervised OTC medication use. Analysis of adverse drug reaction databases reveals that 35-40% of reported complications in community settings stem from inappropriate OTC drug consumption [6]. Risk factors include incorrect self-diagnosis, dosing errors, drug-drug interactions, and prolonged usage without medical supervision [7]. Vulnerable populations, including pregnant women, elderly individuals, and patients with chronic conditions, face heightened risks from uninformed OTC medication use [8]. The digital revolution has transformed OTC medication access patterns in India. E-pharmacy platforms have expanded rapidly, yet studies indicate that 12-18% of online medication purchases may involve products of questionable quality or authenticity [9]. This digital transition, while improving accessibility, introduces new challenges in ensuring medication safety and quality control [10].

Socioeconomic factors significantly influence OTC medication usage patterns. Research indicates correlation between education levels, income status, and appropriate medication use behaviors [11]. Urban populations demonstrate higher likelihood of consulting

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healthcare professionals about OTC medications compared to rural residents, though this consultation remains infrequent across all demographics [12].

The role of community pharmacists in OTC medication dispensing requires particular attention. While pharmacists often serve as primary points of contact for OTC purchases, studies indicate that only 30-35% of consumers receive adequate counseling during these transactions [13]. This gap in professional guidance becomes more critical as the complexity and variety of available OTC products increase [14]. Consumer education regarding OTC medications faces multiple challenges. Traditional information sources, including product labeling and package inserts, often fail to effectively communicate usage guidelines and potential risks [15]. Social media and peer influences increasingly shape medication choices, sometimes leading to misinformed decisions [16]. The World Health Organization has emphasized the need for enhanced pharmacovigilance in OTC medication use, particularly in developing nations where regulatory oversight may be limited [17]. Recommendations include strengthening post-market surveillance, implementing standardized reporting systems for adverse effects, and developing comprehensive consumer education programs [18]. Although there is a growing significance of OTC medications in public health, systematic evaluation of consumer knowledge, attitudes, and practices remains limited in the Indian context. Previous studies have typically focused on specific geographic regions or demographic groups, leaving gaps in understanding broader population trends [19]. The present research work aims to address these knowledge gaps by assessing the use of OTC medications across various demographic segments.

2. Materials and Methods

2.1. Study Design

A cross-sectional survey methodology was implemented between March and May 2025 to assess OTC medication usage patterns. The study utilized a digital data collection approach through a structured questionnaire, enabling broad geographical coverage across India. The study protocol was approved by the Institutional Ethics Committee of Minerva College of Pharmacy (Protocol number: MCP/EC/2025/037) [20].

2.2. Sample Size Determination

The sample size calculation incorporated population parameters derived from previous regional studies. Using the formula for finite populations: $n = [Z^2\alpha/2 \times p(1-p)] / e^2$, where $Z\alpha/2$ represents 1.96 at 95% confidence level, p equals 0.5 for assumed maximum variance, and e denotes 0.025 as the margin of error. The calculation yielded a minimum required sample of 1,537 participants. Accounting for potential incomplete responses and data quality issues, the target sample size was set at 2,000 participants [21].

2.3. Participant Selection and Recruitment

The study employed a stratified random sampling approach across urban, semi-urban, and rural locations. Participation eligibility required individuals to be 15 years or older, with the ability to comprehend English or regional languages, and access to digital communication platforms. Healthcare professionals were excluded to minimize bias from specialized knowledge. The recruitment process utilized social media platforms, institutional networks, and community organizations to ensure diverse demographic representation [22].

2.4. Survey

2.4.1. Initial Design

Expert consultation with clinical pharmacists, public health specialists, and consumer behavior analysts informed the preliminary questionnaire structure. The instrument incorporated validated elements from previous international studies on medication use behaviors [23]. A panel of six experts, including clinical pharmacologists, community pharmacists, and public health researchers, evaluated the questionnaire content. Content validity indices were calculated for individual items (I-CVI) and the overall scale (S-CVI), with modifications made to items scoring below 0.78 [24].

2.4.2. Pilot Testing

The instrument underwent pilot testing with 50 participants representing diverse demographic profiles. Based on feedback regarding clarity, comprehension, and completion time, necessary refinements were made to question phrasing and response options [25].

2.4.3. Data Collection

The final questionnaire, was distributed via Google Forms, comprised five different sections. The demographic information section gathered data on age, gender, education level, occupation, and residential location. Knowledge assessment evaluated participants' understanding of OTC medications, including recognition of common categories, appropriate usage conditions, potential risks, contraindications, and drug interactions.

The usage patterns section documented frequency of OTC medication use, commonly purchased types, procurement sources, storage practices, and duration of use. Decision-making factors assessed influences such as price considerations, brand preferences, advertisement impact, healthcare professional recommendations, and peer influences. The safety practices section evaluated label reading habits, expiry date verification, adverse effect monitoring, and healthcare professional consultation patterns. Data quality was verified by mandatory response fields for critical questions, along with logic checks for response consistency. The system included duplicate response detection mechanisms, regular data backup protocols, and secure storage measures. Real-time monitoring of response patterns ensured data integrity throughout the collection period.

2.5. Statistical Analysis

Data analysis employed IBM SPSS Statistics version 26.0. The analytical approach included descriptive statistics for demographic and usage patterns, complemented by chi-square tests for examining associations between variables. Multiple logistic regression analysis identified significant predictor variables. All statistical analyses are carried out at 95% confidence intervals, with statistical significance at $p < 0.05$.

3. Results and Discussion

3.1. Demographic Characteristics

Analysis of the 2,000 respondents showed a diverse age distribution, with 26.5% aged 18-30 years, 25.2% between 31-50 years, 25.5% above 50 years, and 22.8% below 18 years. Gender distribution indicated male predominance (64.8%) compared to females (35.2%). The occupational breakdown showed students constituting 26.0%, followed by homemakers (25.1%), working professionals (24.6%), and other occupations (24.3%) [26].

Table 1. Demographic Characteristics of Study Participants (N=2,000)

Characteristic	Category	Number (n)	Percentage (%)
Age (years)	<18	456	22.8
	18-30	530	26.5
	31-50	504	25.2
	>50	510	25.5
Gender	Male	1,296	64.8
	Female	704	35.2
Occupation	Students	520	26.0
	Homemakers	502	25.1
	Working Professionals	492	24.6
	Others	486	24.3
Education Level	Primary	312	15.6
	Secondary	486	24.3
	Graduate	824	41.2
	Post-graduate	378	18.9

A concerning trend was observed in medical consultation patterns, as 50.6% of respondents reported never consulting healthcare professionals about their OTC medication use. The frequency of OTC medication usage demonstrated relatively uniform distribution across categories, with 25.3% reporting rare use, 24.8% occasional use, 25.1% frequent use, and 24.8% daily use [27].

3.2. Medication Categories and Brand Preferences

Analysis of OTC medication categories revealed analgesics and antipyretics as predominant choices, with paracetamol-based products accounting for 56% of usage, followed by NSAIDs at 43%.

Table 3: Most Commonly Used OTC Medications and Brand Preferences

Category	Specific Medication	Brand Preference	Usage (%)
Analgesics	Paracetamol	Dolo	21.1
		Crocin	21.0
		Others	13.9
Antacids	H ₂ Blockers	Digene	20.6
		Others	18.4
Cough & Cold	Cough Suppressants	Benadryl	19.1
		Others	20.9
Others	Topical/Supplements	Various	21.0

Gastrointestinal medications, particularly antacids, represented 39% of reported use. The study identified strong brand loyalty patterns, with Dolo (21.1%) and Crocin (21.0%) dominating the analgesic category, while Digene (20.6%) led the antacid segment [28].

3.3. Consumer Decision-Making and Purchase Behavior

The primary motivations for OTC medication use revealed interesting patterns. Quick symptom relief emerged as the leading factor (26.9%), followed by cost-effectiveness (24.8%) and convenience (23.9%). The remaining 24.5% cited a combination of these factors. Purchase decision-making showed reliance on multiple information sources, with self-research leading at 26.3%, followed by pharmacist consultation (24.7%), physician recommendations (24.6%), and marketing influences (24.4%) [29].

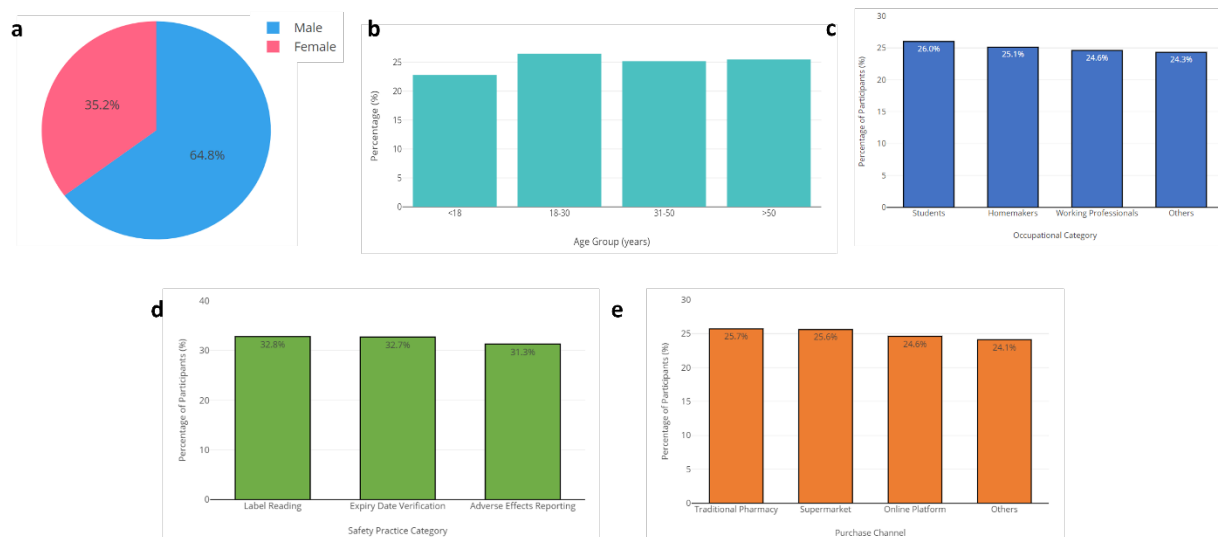


Figure 1a. Gender wise Distribution b. Age-wise Distribution c. Distribution by Occupation d. Safety Practices in OTC Medication Use e. OTC Purchase Channels

3.4. Safety Awareness and Practice Patterns

The study also showed significant gaps in safety practices. Label reading habits showed concerning patterns, with only 32.8% of respondents consistently reading instructions and warnings. Similarly, expiry date verification practices were suboptimal, as only 32.7% reported regular checks before consumption. A noteworthy finding was that 48.6% of participants reported experiencing adverse effects, yet only 31.3% recognized the potential risks of unsupervised OTC medication use [30].

Table 2. Patterns of OTC Medication Usage and Safety Practices

Parameter	Category	Number (n)	Percentage (%)
Frequency of Use	Daily	496	24.8
	Frequent (weekly)	502	25.1
	Occasional (monthly)	496	24.8
	Rare (few times/year)	506	25.3
Label Reading	Always	656	32.8
	Sometimes	666	33.3
	Never	678	33.9
Expiry Date Check	Always	654	32.7
	Sometimes	642	32.1
	Never	704	35.2
Adverse Effects	Experienced	972	48.6
	Not Experienced	1,028	51.4

3.5. Procurement and Storage

Analysis of procurement patterns showed diversification in purchase channels. Traditional pharmacy purchases accounted for 25.7%, while supermarket procurement represented 25.6%. The emerging trend of online purchases (24.6%) raises concerns about medication authenticity and safety. Storage practices indicated that 33.5% of respondents maintained regular OTC medication stocks at home, while 32.0% reported occasional storage, and 34.6% preferred as-needed purchases [31].

3.6. Risk Factors

Chi-square analysis revealed significant associations between educational level and safety awareness ($\chi^2 = 15.42$, $p < 0.001$). Urban residents demonstrated higher knowledge scores compared to rural populations (mean difference = 2.3, $p < 0.05$). Multiple regression analysis identified age ($\beta = 0.31$, $p < 0.01$) and education level ($\beta = 0.28$, $p < 0.01$) as significant predictors of appropriate OTC medication use [32].

Table 4. Factors Influencing OTC Medication Purchase and Usage (N=2,000)

Factor	Sub-category	Number (n)	Percentage (%)
Primary Reason	Quick Relief	538	26.9
	Cost-effectiveness	496	24.8
	Convenience	478	23.9
	Multiple Factors	488	24.4
Decision Making	Self-research	526	26.3
	Pharmacist Advice	494	24.7
	Physician Recommendation	492	24.6
	Advertisement/Brand	488	24.4
Purchase Location	Pharmacy	514	25.7
	Supermarket	512	25.6
	Online Platform	492	24.6
	Others	482	24.1

The findings indicate substantial gaps in public awareness and safety practices regarding OTC medications. The high prevalence of adverse effects (48.6%) coupled with low rates of professional consultation (31.3%) suggests a critical need for enhanced public health education. The increasing trend of online purchases (24.6%) necessitates stronger regulatory frameworks for digital pharmacy platforms [33].

4. Conclusion

This research work on over-the-counter medication usage patterns in India provided several significant results with important implications for public health policy and practice. The research shows a clear need for better educational interventions to promote safer OTC medication practices. The high prevalence of unsupervised OTC medication use, with 50.6% of respondents never consulting healthcare professionals, represents a significant public health concern. The study identified distinct patterns in medication preferences and purchasing behaviors, with analgesics and antipyretics dominating the OTC market. The emergence of online pharmaceutical platforms (24.6% of purchases) presents both opportunities and challenges for medication access and safety monitoring. The strong association between educational status and safety awareness ($\chi^2 = 15.42$, $p < 0.001$) suggests that targeted educational interventions could effectively improve medication safety practices. The results from this study contribute significantly to the understanding of OTC medication use patterns in India and provide an evidence base for developing targeted interventions to enhance medication safety and public health outcomes.

Compliance with Ethical Standards

Conflict of Interest Statement

The authors declare no conflicts of interest regarding the publication of this manuscript. None of the authors have any financial or personal relationships with the pharmaceutical brands mentioned in this study or with competing products. The research was conducted independently without any commercial or financial support from pharmaceutical companies or related organizations.

Statement of Ethical Approval

This study was conducted after obtaining approval from the Institutional Ethics Committee of Minerva College of Pharmacy (Protocol number: MCP/EC/2025/037). The research was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

Statement of Informed Consent

Informed consent was obtained from all individual participants included in the study. For participants under 18 years of age, parental/guardian consent was obtained. The online questionnaire included a mandatory informed consent section that participants

had to complete before proceeding with the survey. Participants were informed about the study's purpose, voluntary nature of participation, and confidentiality of collected data. They were also made aware of their right to withdraw from the study at any time without any consequences.

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