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Prevalence and Determinants of Parental Over the Counter Medication Use by Parents for Managing Children's Dental Pain in Chennai: A Cross-Sectional Study.

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ABSTRACT
Background: Over-the-counter (OTC) medication use for managing children's dental pain is a common yet under-recognized public-health issue in developing countries. Easy access to pharmacies, limited awareness, and socioeconomic constraints often lead parents to administer analgesics or antibiotics without professional advice. However, inappropriate self-medication in children poses risks such as dosing errors, delayed diagnosis, and adverse drug effects.
Aim: To assess the prevalence, patterns, and determinants of parental OTC medication use for children's dental pain in Chennai, and to evaluate associated knowledge, attitudes, and practices (KAP).
Materials and Methods: This cross-sectional study included 900 parents across all administrative zones of Chennai. A structured questionnaire was developed and validated (Cronbach's $\alpha = 0.86$); content validity and psychometric reliability were confirmed. Data were collected on sociodemographic factors, KAP toward OTC use, and preferred pain-management practices. Descriptive and inferential analyses were performed.
Results: 49.7% reported using OTC medications; primarily paracetamol and ibuprofen for children's dental pain. Lower education levels and lower socioeconomic classes showed higher self-medication tendencies. Although 58% recognized common analgesics, only 29% were aware of potential risks and side effects. Many parents believed mild dental pain could be treated at home, and a substantial proportion assumed antibiotics would prevent worsening symptoms. Reliance on pharmacists and previous personal experiences also influenced medication choices.
Conclusion: OTC medication use for pediatric dental pain is widespread and strongly shaped by educational and socioeconomic factors. Strengthening community awareness, enforcing pharmacy-level regulation, and integrating oral-health education into schools and public-health programs are essential to promote safe medication practices
Keywords: Good Health and Well-Being, Pediatric Oral Health, Health Literacy Improvement, Safe Access to Healthcare Services, Community Health Education, Parental Self-Medication Behavior, Pharmacy-Level Regulation, Child Health and Safety, Over-the-Counter Medication Safety, Analgesics, Prescription, Tooth pain, Self Medication, Parental attitude, Health Literacy, Access to Health Services, Pharmacies/legislation & jurisprudence, Health Education, Community, Child Health Services, Public Health Dentistry.
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INTRODUCTION

Dental pain is among the most frequent reasons for seeking oral healthcare in children and is primarily attributed to caries progression, pulpitis, or eruptive discomfort during mixed dentition. Unlike adults, children depend on parental decision-making for pain management, and in many cases, parents resort to self-medication with over-the-counter (OTC) drugs rather than seeking professional dental consultation. The easy accessibility of non-prescription analgesics such as paracetamol and ibuprofen in community pharmacies contributes to this behavior. Although such medications offer temporary relief, their unsupervised use poses significant risks, including incorrect dosing, delayed professional intervention, and potential systemic toxicity in pediatric patients.[1,2]

In developing countries such as India, parental reliance on OTC drugs for children's ailments is a widespread yet understudied phenomenon, shaped by factors like socioeconomic constraints, limited pediatric dental access, and misconceptions about the safety of common analgesics. [3,4] Previous reports indicate that 45%–70% of Indian parents self-medicate their children for common illnesses such as fever or pain without medical supervision.[5] However, studies specifically examining OTC medication use for dental pain in children are scarce, particularly within urban Indian populations where pharmacy access is high and preventive dental awareness is limited.

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The inappropriate use of OTC analgesics and antibiotics for dental pain can mask underlying odontogenic infections, resulting in delayed diagnosis, abscess formation, or systemic spread requiring emergency treatment.[6] Additionally, dosing errors are common because pediatric pharmacokinetics differ from those of adults, and excessive or repeated use of paracetamol or NSAIDs may lead to hepatotoxic or gastrointestinal adverse effects.[7,8] These risks are compounded when parents rely on previous experiences or non-professional advice from pharmacists, friends, or relatives.[9]

Studies from other countries show a similar problem. Al-Qahtani et al. (2020) found that more than 60 percent of Saudi parents gave painkillers to their children for a toothache without visiting a dentist.[10] In India, Jain et al. (2021) and Narang et al. (2022) reported that many adults also use OTC drugs for dental pain, suggesting that parents may follow the same approach when treating their children.[11,12] These findings highlight the urgent need to study how often parents use OTC medicines for children's dental pain in India and what factors influence this practice.

Given the limited research on this topic and its potential impact on children's oral health, the present study was undertaken to assess how often parents use OTC medications for managing their child's dental pain and to identify the factors influencing this practice in Chennai.

Objectives

1. To determine the prevalence and pattern of parental use of over-the-counter (OTC) medications for managing dental pain in children aged 3–12 years in Chennai.
2. To identify sociodemographic determinants (such as parental education, occupation, and socioeconomic status) associated with OTC medication use.
3. To assess parental knowledge, attitudes, and practices (KAP) regarding the safety and rational use of OTC analgesics and antibiotics in pediatric dental pain.
4. To evaluate the psychometric validity and reliability of the questionnaire used to measure these KAP dimensions.

MATERIALS AND METHODS

This cross-sectional questionnaire-based study was conducted to assess the prevalence and determinants of over-the-counter (OTC) medication use—particularly antibiotics and analgesics—for dental pain management in children among parents and caregivers residing in Chennai, India. The study was carried out between January and December 2024 across multiple pediatric dental clinics and community outreach programs.

Study Design and Participants

The target population comprised parents or primary caregivers of children aged 3–12 years who had experienced dental pain within the past year. A stratified random sampling method was adopted to ensure representation from all major administrative zones of Chennai (North, South, East, West, and Central). Parents who were healthcare professionals or whose children had systemic diseases requiring regular medication were excluded. Based on a prevalence estimate of 50%, a 95% confidence interval, and 5% margin of error, the sample size was calculated to be 884, which was rounded up to 900 participants to enhance reliability.

Ethical Approval

Ethical clearance was obtained from the Institutional Review Board (IRB) of Saveetha Dental College and Hospitals, Chennai (Ref. No.: SDC/SDC/UG-2036/24/PEDO/523). Written informed consent was obtained from all participants after explaining the study's purpose and ensuring confidentiality and voluntary participation in accordance with the Declaration of Helsinki (2013 revision).

Development of the Questionnaire

A structured questionnaire was developed to assess knowledge, attitude, and practice (KAP) among parents regarding the use of OTC antibiotics and analgesics for children's dental pain. The initial version contained 40 items rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The questionnaire was prepared in English and Tamil, ensuring linguistic clarity and cultural adaptability.

Validation and Reliability Testing

The content validity of the 40-item questionnaire was established through expert review by 40 pediatric dentists who evaluated each item's relevance, clarity, and simplicity. Following their evaluation, 16 items demonstrating high content agreement were retained for the final version. The Item Content Validity Index (I-CVI) averaged 0.89, and the Scale Content Validity Index (S-CVI/Ave) was 0.91, confirming excellent content validity. Criterion validity was determined by correlating responses with the Parental Self-Medication Practice Index (PSMPI), showing a positive correlation ($r = 0.74$, $p < 0.001$). Reliability testing among 50 pilot participants yielded a Cronbach's alpha value of 0.86 and a Guttman split-half coefficient of 0.83, confirming high internal consistency. Exploratory factor analysis produced a KMO value of 0.81 and a significant Bartlett's test of sphericity ($\chi^2 = 218.6$, $p < 0.001$), explaining 62.4% of total variance, thereby establishing good construct validity.

Data Collection Procedure

Parents were approached in the waiting areas of pediatric dental clinics and community dental health camps. For

those with limited literacy, trained postgraduate researchers conducted face-to-face interviews in Tamil to ensure accurate data capture. Each questionnaire required approximately 10–15 minutes to complete. All responses were anonymized and coded before analysis to maintain confidentiality.

Data Analysis

Collected data were entered into Microsoft Excel and statistically analyzed using IBM SPSS Statistics version 26.0 (IBM Corp., Chicago, USA). Descriptive statistics, such as frequency and percentage, were used to summarize categorical variables. The Chi-square test was applied to examine associations between parental sociodemographic factors (age, education, income) and OTC medication use. Binary logistic regression analysis identified predictors of OTC drug use. The level of significance was set at $p < 0.05$.

Outcome Measures

The primary outcome was the prevalence of OTC analgesic and antibiotic use among parents for managing their children's dental pain. Secondary outcomes included awareness of drug safety, dosage adherence, source of drug acquisition, and the relationship between parental education and self-medication behavior.

Questionnaire Validation and Psychometric Analysis

A structured questionnaire containing 40 Likert-scale items was initially developed to assess parental knowledge, attitude, and practice (KAP) regarding the use of over-the-counter (OTC) antibiotics and analgesics for managing dental pain in children. The initial item pool was derived from previous literature on self-medication behavior and adapted for pediatric dental contexts to ensure content relevance and cultural suitability.

Expert Validation and Content Validity

The draft questionnaire was subjected to content validation by a panel of 40 pediatric dentists with a minimum of five years of clinical experience and prior research involvement in pediatric pharmacology or behavioral studies. Each expert rated the relevance of each item on a 4-point scale (1 = not relevant, 4 = highly relevant). For each item, the Item Content Validity Index (I-CVI) was computed as the proportion of experts rating the item as 3 or 4. The Scale Content Validity Index (S-CVI) was derived using both the average method (S-CVI/Ave) and universal agreement (S-CVI/UA) across items. Based on Lynn's (1986) criteria, items with an I-CVI ≥ 0.78 were considered acceptable. After evaluation, 16 items demonstrating strong agreement, conceptual clarity, and high discriminative value were retained for the final questionnaire. The mean I-CVI was 0.89, and the S-CVI/Ave was 0.91, indicating excellent content validity and high expert consensus on the representativeness of the retained items.

Criterion Validity

Criterion validity was established by correlating scores obtained from the new 16-item questionnaire with those from an established reference tool, the Parental Self-Medication Practice Index (PSMPI), previously validated for pediatric pharmacological behavior. Pearson's correlation coefficient ($r = 0.74$, $p < 0.001$) demonstrated a moderate to strong positive correlation, confirming satisfactory criterion-related validity and convergent alignment between the two constructs.

Reliability Testing

A pilot test was conducted among 50 parents/caregivers of children aged 3–12 years attending pediatric dental clinics in Chennai. Internal consistency reliability was evaluated using Cronbach's alpha (α). The overall alpha for the final 16-item questionnaire was 0.86, indicating high internal reliability. Item-total correlation coefficients ranged between 0.42 and 0.71, suggesting good inter-item homogeneity without redundancy. Deletion of any single item did not significantly improve the overall alpha value, supporting the retention of all selected items. To further confirm stability, split-half reliability was analyzed using the Guttman split-half coefficient, yielding a value of 0.83, which corroborated the internal consistency findings. No items exhibited floor or ceiling effects beyond 10%, confirming an appropriate response distribution across Likert categories.

Construct Validity

An exploratory factor analysis (EFA) using principal component extraction with varimax rotation was performed to preliminarily assess dimensionality. Two dominant factors emerged with eigenvalues > 1, corresponding to the domains of "Parental Knowledge & Awareness" and "Self-Medication Behavior." Together, they accounted for 62.4% of the total variance, supporting the questionnaire's conceptual structure. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.81, and Bartlett's test of sphericity was significant ($\chi^2 = 218.6$, $p < 0.001$), indicating the data's suitability for factor analysis.

Validation Parameter	Statistical Method	Value	Interpretation
Item Content Validity Index (I-CVI)	Expert rating (n=40)	89.00%	Excellent

Scale Content Validity Index (S-CVI/Ave)	Mean of I-CVIs	91.00%	Excellent
Criterion Validity	Pearson correlation with PSMPI	$r = 0.74$, $p < 0.001$	Acceptable
Cronbach's Alpha	Internal consistency (pilot n=50)	86.00%	High reliability
Guttman Split-Half Coefficient	Test reliability	83.00%	Consistent
KMO Measure	Sampling adequacy for factor analysis	81.00%	Meritorious
Bartlett's Test of Sphericity	$\chi^2 = 218.6$, $p < 0.001$	Significant correlation matrix	
Variance Explained (EFA)	Two-factor solution	62.40%	Good construct validity

The psychometric evaluation from Table 12 confirmed that the final 16-item questionnaire possesses strong validity and reliability for assessing parental self-medication behavior for children's dental pain. Its concise format, high content representativeness, and internal coherence make it suitable for large-scale epidemiological surveys and cross-cultural validation in pediatric dental research.

RESULTS

A total of 900 parents and caregivers of children aged 3–12 years participated in the study. The age distribution showed that most parents were within the 6–10-year age category group of their child, with smaller proportions representing the younger (4–5 years) and older (11–12 years) groups. Among respondents, 45.5% were males and 54.5% females. In terms of education, a majority had completed primary education (55.3%), followed by secondary (26.8%), and graduate-level education (24.5%), while only a small proportion (6.6%) held postgraduate qualifications. Regarding occupation, unemployed parents constituted 67%, while 28% were engaged in unskilled work, and only a small number reported skilled (2%), professional (1%), or homemaker (2%) status. Socioeconomic classification indicated that 40.5% belonged to Class I, 23.5% to Class II, and the remaining participants to Class III, suggesting diverse representation across income strata (Table 1).

Variable	**Category**	**n**	**%**
Gender	Male	410	45.5
	Female	490	54.5
Education	Primary	498	55.3
	Secondary	241	26.8
	Graduate	221	24.5
	Postgraduate	60	6.6
Occupation	Housewife	19	2.1
	Professional	9	1
	Skilled	18	2
	Unskilled	252	28
	Unemployed	602	67
Socioeconomic class	Class I	365	40.5

	Class II	212	23.5
	Class III	323	36

Table 1: Parent and caregiver demographic profile

Variable	Category	n	%
Age group	3–6 years	297	33
	7–9 years	306	34
	10–12 years	297	33
Gender	Male	468	52
	Female	432	48

Table 2: Child demographic characteristics

The participating children were divided into three age categories: 3–6 years (33%), 7–9 years (34%), and 10–12 years (33%), ensuring balanced age representation. The gender distribution was almost equal, with 52% males and 48% females, indicating minimal gender bias in recruitment.

Variable	Category	n	%
Frequency of dental pain (past 12 months)	None	135	15
	1–2 times	405	45
	3–5 times	225	25
	>5 times	135	15
Dental visit history	Yes	540	60
	No	360	40
Last dental visit timing	<6 months	405	45
	6–12 months	315	35
	>12 months	180	20
Zone of residence	North	180	20
	South	180	20
	East	180	20
	West	180	20
	Central	180	20

Table 3: Frequency of dental pain, dental visit history, and zone of residence

The majority of parents reported that their children experienced dental pain one to two times in the previous 12 months (45%), followed by three to five episodes (25%), while 15% had more than five occurrences, and another 15% reported no pain during the year. A total of 60% of parents had taken their child to a dentist within the past year, of which 45% visited within the last six months, 35% between six to twelve months, and 20% more than a year ago. These findings indicate moderate utilization of pediatric dental care, with a tendency for reactive rather than preventive visits. Participants were evenly distributed across the five administrative zones of Chennai—North, South, East, West, and Central—ensuring adequate geographic representation. Detailed patterns of dental pain frequency, visit history, and residence zone are presented in Table 3.

Reliability metric	Value	Interpretation
Cronbach's alpha	0.86	Excellent internal consistency
Guttman split-half coefficient	0.83	High test reliability
Mean inter-item correlation	0.47	Acceptable homogeneity
Number of items	16	

Table 4: Reliability statistics of the 16-item questionnaire

Table 4 shows that the internal consistency testing of the 16-item Likert-scale questionnaire showed excellent reliability. The overall Cronbach's α = 0.86, indicating strong internal coherence among items assessing parental knowledge, attitudes, and practices regarding OTC medication use for children's dental pain. Item–total correlation coefficients ranged from 0.42 to 0.71, suggesting that each item contributed meaningfully to the overall construct. The Guttman split-half coefficient = 0.83, confirming test stability.

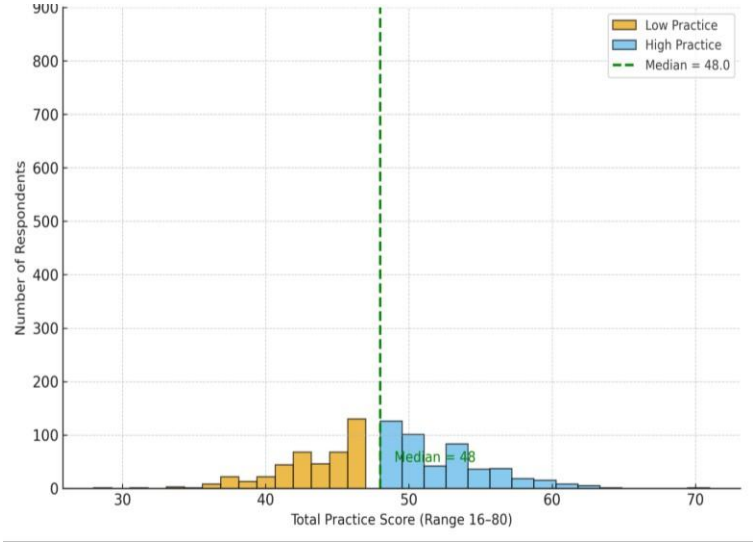

Figure 1: Distribution of OTC practice scores among 900 parents in Chennai. The histogram illustrates the frequency of total practice scores derived from the 16-item questionnaire. The green dashed line represents the median score (43), which served as the cut-off to categorize respondents into High and Low practice groups. The total practice score (sum of 16 items; possible range = 16–80) had a mean ± SD of 42.8 ± 9.3. Scores were approximately normally distributed (Shapiro–Wilk p = 0.071).

Based on the median score of 43, participants were dichotomized into High Practice (≥ 43) and Low Practice (< 43) categories for comparative analysis. Overall, 49.7% of respondents were classified as having High Practice, implying frequent or confident use of OTC medication for their children's dental pain, whereas 50.3% demonstrated Low Practice, reflecting cautious or minimal self-medication behavior.

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Table 5: presents the association between key sociodemographic variables and the practice of using over-the-counter (OTC) medications for managing dental pain in children among 900 parents and caregivers in Chennai

Bivariate analysis using the Chi-square test was performed to examine the association between sociodemographic characteristics and parental OTC medication practices. Out of the six independent variables analyzed—parent gender, education level, occupation, income class, child age group, and zone of residence—education level and income class demonstrated statistically significant relationships with OTC practice class ($p < 0.05$). The analysis revealed that education level and income class were significantly associated with OTC medication practices ($p = 0.002$ and $p = 0.008$, respectively). Parents with primary-level education were more likely to belong to the High Practice group (57.2%) compared to graduates (40.5%) and postgraduates (36.4%), suggesting that limited health literacy may predispose caregivers to rely more on self-medication. Similarly, families belonging to lower socioeconomic classes (Class II and III) reported higher frequencies of OTC use than those in Class I, indicating that financial constraints and limited access to professional dental care may drive self-treatment behavior. No statistically significant associations were observed between OTC practice and parental gender ($p = 0.447$), occupation ($p = 0.539$), child age group ($p = 0.423$), child gender ($p = 0.359$), or zone of residence ($p = 0.921$). This suggests that the propensity for self-medication is relatively uniform across gender and geographic distribution but is strongly influenced by educational attainment and economic status. Overall, the results highlight that lower educational and income levels are key predictors of unsupervised OTC drug use in pediatric dental pain management, underlining the need for targeted community awareness and parent-oriented oral-health education programs.

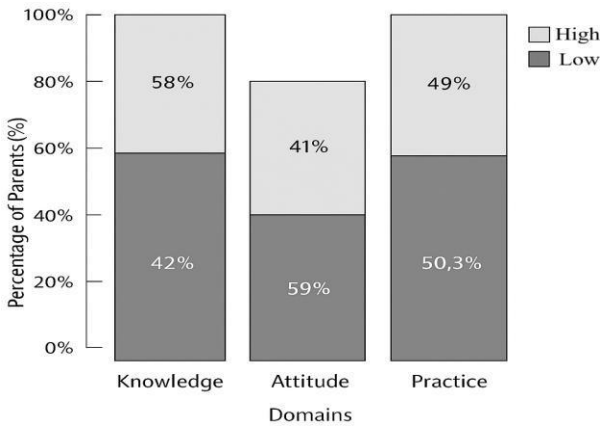

Figure 6: Distribution of High and Low levels across Knowledge, Attitude, and Practice domains among parents/caregivers (n = 900). The stacked bar chart illustrates the proportion of respondents classified as having High or Low domain scores based on median-split categorization. The Knowledge and Practice domains show relatively higher proportions of High-level responses than Attitude, reflecting variability in awareness versus decision-making regarding OTC medication use for children's dental pain.

DISCUSSION

The present cross-sectional study assessed the prevalence and determinants of over-the-counter (OTC) medication use among parents for managing dental pain in children residing in Chennai. Nearly half of the parents (49.7%) reported self-medication practices, indicating that reliance on OTC drugs instead of professional consultation remains a substantial behavioral trend. This pattern is consistent with findings from developing regions, where socioeconomic, cultural, and access barriers influence parental healthcare decisions. [13]

Similar trends have been observed internationally. Al-Qahtani et al. reported that 61.3% of Saudi parents administered analgesics to their children without consulting a dentist. [14] In India, Jain et al. and Narang et al. documented 54% and 46% self-medication rates for dental pain among adults, suggesting that such behavior likely extends to pediatric care through caregiver decisions. [15,16] Collectively, these figures confirm that OTC use for dental pain represents a global yet under-addressed public-health issue.

Education level and socioeconomic status were significant predictors of OTC use. Parents with only primary education showed the highest prevalence of frequent self-medication (57.2%), while those with graduate or postgraduate qualifications were far less likely to use OTC drugs. This association aligns with previous research demonstrating that limited health literacy directly increases the likelihood of self-medication. [17] In India, paracetamol-related hepatotoxicity and NSAID-induced gastric irritation are recognized public-health concerns linked to OTC availability. Bhatnagar et al. reported that inadequate understanding of drug safety contributes to paracetamol misuse and hepatotoxicity. [18]

Lower-income families (Class II and III) also showed significantly higher rates of OTC use, corroborating evidence from South Asian and Middle-Eastern populations where financial constraints and limited service accessibility drive self-care practices. [19,20] Shankar et al. observed comparable findings in Nepal, where cost avoidance and convenience were primary reasons for self-medication. [21]

Although more than half of parents were aware of commonly used analgesics such as paracetamol and ibuprofen, only 29% recognized the potential adverse effects of unsupervised antibiotic or analgesic use. This knowledge–practice gap mirrors the World Health

Organization's (WHO) concerns that while self-care can empower families for minor ailments, weak regulation and insufficient drug-use education can lead to harm. Inappropriate or repeated antibiotic use further accelerates antimicrobial resistance, which WHO classifies as a critical global threat. [22]

Attitudinal data revealed that 46% of parents believed mild dental pain could be treated at home, and 34% assumed antibiotics would prevent symptom worsening. Similar misconceptions have been documented by Eldalo et al., who reported that many parents believed antibiotics were appropriate for any toothache. [23] Such findings emphasize the importance of targeted parental education, highlighting that dental pain in children often reflects infection requiring professional diagnosis and care. In this study, parents' education and income levels were linked to their likelihood of using OTC medications, showing that social factors strongly influence how they manage their children's dental pain. These results align with the findings of Jain et al. and Eldalo et al., who both identified education as a major factor influencing self-medication frequency. [15,23]

Unsupervised OTC drug use in children carries serious pharmacological implications. Due to distinct pediatric pharmacokinetics, inaccurate dosing can lead to toxicity or sub-therapeutic effects. [24] Standing and Tuleu emphasized that pediatric formulations require precise weight-based calculations, and extrapolating adult doses can be dangerous. [25]

From a clinical perspective, self-medication delays professional consultation, allowing dental caries or pulpitis to progress into abscess formation. Kayalvizhi and Senapathi noted that self-medicating dental patients often present with advanced disease requiring invasive procedures such as extractions or pulpectomies. These observations reinforce the importance of preventive dental education at the community and school levels. Dental anxiety contributes to avoiding dental visits, as fear of treatment or past negative experiences can lead parents to rely on self-care instead.[26] Addressing dental fear through behavior management strategies and improving dentist–parent communication indirectly reduces inappropriate self-medication.

Socio-cultural influences were also evident: 31% of respondents relied on pharmacists or friends for medication advice. Comparable reliance on pharmacists was reported among university students in the United Arab Emirates, underscoring the role of pharmacy-level intervention in curbing misuse. [27] Training community pharmacists to identify inappropriate antibiotic requests and counsel parents on safe dosing can significantly reduce OTC misuse. [28]

Globally, similar prevalence levels have been reported in Ethiopia and other developing nations, with 40–45% of dental patients using OTC analgesics or antibiotics. [29,30] Even in high-income countries such as the United Kingdom and the United States, self-care for dental pain persists, particularly in underserved communities, indicating that this problem transcends income and regulatory boundaries. [31] These parallels suggest that self-medication is not purely an economic issue but a complex behavioral and systemic challenge.

To mitigate such practices, multi-level interventions are essential. Strengthening community awareness, enforcing pharmacy regulations, and integrating oral-health education into school and maternal–child health programs are crucial steps. 32] Collaboration between pediatricians, dentists, and pharmacists to deliver culturally relevant, language-appropriate education can further promote rational self-care behaviors. [33]

This study benefits from a large, geographically diverse sample and a well-validated questionnaire with strong psychometric reliability. However, it also has limitations: being a self-reported cross-sectional survey, it is susceptible to recall bias and cannot establish cause and effect relationships. Future longitudinal and interventional studies are recommended to evaluate the impact of parental education or pharmacist-led programs on reducing inappropriate OTC medication practices. Expanding research to rural and peri-urban populations will also clarify how access and awareness gaps affect medication decisions.

CONCLUSION

This study provides a strong evidence that self-medication with OTC analgesics and antibiotics for children's dental pain is highly prevalent and significantly influenced by parental education and socioeconomic status. Despite moderate awareness of common analgesics, misconceptions regarding antibiotic use and dosing persist. These findings highlight the need for better community and parental education, stronger pharmacy regulations, and improved oral-health programs to protect children from the risks of improper medication use.

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