

Self-Medication for Toothache in Children: A Cross-Sectional Study

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ABSTRACT

Objective: To construct, validate, and apply a questionnaire to assess and characterize the practice of self-medication performed by parents or children's guardians undergoing dental care. **Material and Methods:** A questionnaire was constructed, validated, and applied through personal interviews in the teaching clinics of two higher education institutions in the Federal District. Absolute and relative frequencies of categorical variables were calculated using descriptive statistics. Quantitative data were presented as mean and standard deviation. The chi-square test measured the association between the studied variables and self-medication. **Results:** One hundred and five participants were interviewed between August 2019 and November 2020. The average age of the participants was 37 (\pm 9) years, and most were mothers of the children who attended (78%) and users of the public health system (94.2%). The average family income was 1.88 minimum wage, and the most prevalent educational level was complete high school (40%). **Conclusion:** Despite the high level of knowledge about medication safety in children, self-medication was practiced in 50% of them. Difficulty in accessing dental treatment was mentioned by most as a justification. Self-medication was associated with dental pain, continuous medication use, and family self-medication habits.

Keywords: Self Medication; Facial Pain; Child.

Introduction

The World Health Organization (WHO) addresses the concept of self-medication as the use of medication to treat self-diagnosed disorders or symptoms, either the intermittent or continuous use of prescribed drugs for chronic or recurrent illnesses or symptoms [1,2]. The acquisition of over-the-counter medications, the reuse of old prescriptions, the sharing of prescriptions among family members and social circles, the use of leftover medications, and even the failure to comply with professional guidelines, extending or prematurely terminating the dosage and time of use indicated in the prescription, are examples that configure the practice of self-medication [3,4]. Consequently, problems arising from self-medication include increased error in disease diagnosis and inadequate treatment of diseases due to the masking of symptoms, excessive or insufficient dosages, and the appearance of undesirable effects and allergic reactions [4,5]. In the contemporary scenario, the habit of self-medication through over-the-counter medications is frequent due to easy access and media marketing. Generally, these medications only treat symptoms and should be used for a short period to treat conditions that do not present significant risks [6].

The practice of self-medication becomes even more critical when it involves children [2,7]. The doses used in most pediatric drugs are extrapolations from doses to adults, and the disregard of physiological differences between adults and children can increase the risk of intoxication and the lack of proof of efficacy and safety [8]. Children are often excluded from clinical trials for the development of new drugs for ethical and legal reasons, which generates the use of medications in an empirical and often questionable way in this group [9]. In addition, children are more susceptible to adverse drug effects due to particularities related to physiological and pharmacokinetic aspects, which are dynamic and change during such development [10]. Studies have shown that most of the time, the children's guardians have inconsistent and insufficient medication information but still practice self-medication in their children [11]. This practice is motivated by the search for relief of signs and symptoms, and mainly anti-inflammatory, analgesic, and antimicrobial drugs are used [2,7].

Regarding oral health, studies have shown that pain relief and discomfort related to tooth eruption [12] and toothache [13] were the main reasons for parents or guardians to self-medication in children. In Brazil, the practice of self-medication in situations involving oral health is carried out mainly by low-income people, with a wage gain of less than three minimum monthly wages, due to the difficulty in accessing dental services, purchasing medications, and receiving professional guidance [2,7,14].

So far, the literature on studies evaluating the practice of self-medication in children with dental needs is scarce. Thus, a better understanding of this issue involving public health can provide data about its occurrence and guide educational measures for patients and families.

This study aimed to construct, validate and apply a questionnaire to assess and characterize the practice of self-medication performed by parents or children's guardians undergoing dental care in situations that involved problems related to oral health.

Material and Methods

Study Design and Location

This is a cross-sectional study. The study consisted of two steps, the first consisting of the development and validation of a questionnaire (Step 1) and the second step for its application to children's guardians treated at the Dental Clinic of the University Hospital of Brasília (HUB) and the Catholic University of Brasília (UCB) (Step 2). This study was approved by the Research Ethics Committee of the School of Health Sciences of the University of Brasília (CAAE 10194819.6.0000.0030, opinion number 3.963.823).

Participants

In Step 1, five judges were selected, and the inclusion criteria were being a university professor in any area of health, a kindergarten teacher, a dental surgeon who frequently sees children, or a parent and/or guardian of children aged 0 to 12 years old. Exclusion criteria for judges were functional illiteracy or demonstration of difficulty in reading and understanding texts. The forms for the judges were sent and returned between March and April 2019.

Step 1 – Elaboration, Construction, and Validation of the Questionnaire

Initially, a discussion was held between the research team, which supported the construction of the questionnaire. The initial version of the questionnaire had 12 questions, divided into three domains: A - Indication of medication use; B - Route of administration, dosage, and pharmaceutical form; C - Knowledge about the safety of medication use in children. In addition, questions were asked to characterize the sociodemographic profile of the study participants. Five judges (one kindergarten teacher, one pediatric dentist, one pediatric nurse, one mother - housewife - and one physician general practitioner) were invited to rate the questions as relevant or irrelevant. They were able to add comments and suggestions. The Content Validity Index (CVI) [15] was calculated for each question. Questions that obtained a CVI more significant than or equal to 80% were accepted, questions with a CVI less than 80% and greater than or equal to 50% were rephrased, and with a CVI less than 50% were discarded. The comments were used to restructure the issues, and the final version of the questionnaire was not resubmitted for judges' evaluation.

Step 2 – Application of the Questionnaire

At this stage, parents or guardians were invited to participate, and those who accepted were individually interviewed after signing the Informed Consent Form. Each interview lasted approximately 30 minutes and was carried out by the researcher in a reserved room while they were waiting for assistance. The researcher read each question to the participant and wrote down the answer. The study participants were interviewed between August 2019 and November 2020.

Sample Size Calculation

The following parameters were considered to obtain the sample size: 0.6 prevalence (p), 5% confidence limit, 95% confidence interval, and a 1.0 effect design [16]. The p used for the calculation was based on Brazilian studies on children's self-medication in dentistry [2,7], as the prevalence of self-medication was considered the study's main outcome. Considering a sample size of 95 participants was obtained, with 10% added for compensation of potential losses, the total number of participants was 105.

Statistical Analysis

Data from the sociodemographic profile and the three domains (A, B, and C) were presented as descriptive statistics. For the analysis of the answers related to domains A, B, and C, only the complete questionnaires for each were computed. Domain C consisted of four questions, each with dichotomous answer alternatives (true or false) about the participants' knowledge about using medications in children. In order to obtain the percentage of correct answers in domain C, one point was assigned for each correct answer and no point for each incorrect answer. The minimum and maximum scores were, respectively, 0 and 4 points.

The chi-square test (significance level = 5%) was used to analyze factors associated with self-medication. The prevalence ratio (95% CI) was used to analyze categorical variables. Data were tabulated and analyzed using the Numbers program for Mac version 10.3.9 (7029.9.8).

Results

All five judges accepted the invitation. Out of the five judges, four were female and one male. The mean age of the judges was 40 years (± 8 years), with a mean of professional experience of 16 years (± 8 years). Out of the twelve questions assessed by the five judges, three were judged as "little relevant" by two of the five judges; the remaining nine questions were considered as "relevant." Only two questions received no change suggestions. After tabulating the data, the CVI was calculated for each item assessed by the judges. Nine questions were kept (CVI = 100%), three were discussed and rephrased (CVI = 60%), and none were excluded. Out of nine questions, six underwent changes according to the comments suggested by the judges. The CVI and the final status of each question are shown in Table 1.

Table 1. Content Validity Index and the final status of each item.

Question	CVI (%)	Status
1	100.0	Kept
2	100.0	Kept
3	100.0	Kept
4	100.0	Kept
5	100.0	Kept
6	100.0	Kept
7	100.0	Kept
8	60.0	Rephrased
9	100.0	Kept
10	100.0	Kept
11	60.0	Rephrased
12	60.0	Rephrased

Out of the 106 participants approached to perform Step 2, all accepted the invitation to participate in the study. Only one participant was excluded for having already answered the questionnaire prior due to the treatment of her other child.

Most participants were women, and mothers of the children attended. The average age of parents or guardians was 37 ± 9 years. The most prevalent educational level was complete high school (40%), and the average family income was 1.88 Brazilian minimum wage (Table 2).

Table 2. Sociodemographic characteristics of parents and children's guardians.

Sociodemographic Characteristics	N (%)
Age (Years) [Mean and SD]	
Female = 37 ± 9	92 (87.0)
Male = 35 ± 7	13 (13.0)
Relationship	
Mother	82 (78.1)
Father	12 (11.4)
Uncle / Aunt	3 (2.9)
Grandmother	8 (7.6)
Schooling	
No Schooling	1 (1.0)
Elementary School	23 (21.9)
High School	52 (49.5)

Higher Education	29 (27.6)
Average Family Income [#]	
< 1 BMW	26 (24.8)
1 BMW ≤ x ≤ 2 BMWs	62 (59.0)
> 2 BMWs	17 (16.2)
Type of Housing	
Rented	28 (26.7)
Homeowner	54 (51.4)
Ceded Housing	23 (21.9)
Residence Location	
Countryside	6 (5.7)
Urban Area	99 (94.3)

BMW: Brazilian Minimum Wage; [#]Minimum Wage = R\$ 1,100.00.

Table 3 summarizes the characteristics of the children under dental care at the HUB and UCB whose parents or guardians were interviewed. The average age was 7 ± 3 years.

Table 3. General health characteristics of children.

Features	Total N (%)
Health System Used	
Public	97 (92.4)
Private	8 (7.6)
General Health Problems	
Absence of Problems	72 (68.6)
Presence of Problems	33 (31.4)
Continuous Use of Medication	
Yes	23 (21.9)
No	82 (78.1)

The data related to the practice of self-medication are presented in Table 4. Most respondents mentioned the presence of dental pain in children. There was a higher prevalence of self-medication when family members had a toothache (73.33%), justified by the difficulty in accessing dental treatment. Four questions in domain C measured the degree of knowledge of parents and guardians about the risks of self-medication in children. The average of correct answers in relation to the scores obtained by the respondents' correct answers was $3.99 (\pm 0.10)$, indicating a high level of knowledge about the topic. However, concerning the pediatric dose used, only 13% of the respondents claimed to use information from the package insert. Half of those interviewed said they used the dose prescribed by the health professional, and 22% used one drop for every kilogram of body weight. Still, 5% claimed to administer the drug directly to the painful tooth. As for the storage location of medicines, despite answering that medicines should be out of reach of children, most reported keeping them in the bedroom or kitchen, which, generally, can be easily accessed by them. Table 4 shows the respondents' answers to the questions related to Domains A, B, and C.

Table 4. Questionnaire answers according to domains A, B, and C about self-medication practices performed by parents and children's guardians.

Questions	N (%)
Has your child ever had or does your child have a toothache?	
Yes	69 (65.7)
No	36 (34.3)
Domain A - Indication of medication use	
In the family, when medication is needed for toothache and dental infection, do you use medicines on your own?	

Yes	77 (73.3)
No	28 (26.7)
Why is self-medication practiced in the above situation?	
It doesn't apply to the situation	30 (28.6)
Due to difficult access to the dentist	52 (49.5)
I feel safe about using medication administration	13 (12.4)
Someone I know suggested it to me	2 (1.9)
I give the medicine based on the old prescription I already had at home	5 (4.8)
Others	3 (2.9)
When your child or the child under your care has a toothache, do you give them any medication?	
Yes	52 (49.5)
No	53 (50.5)
What medication do you usually use when your child has a toothache or a dental problem?	
It doesn't apply to the situation	47 (44.8)
Dipyrone	22 (21.0)
Ibuprofen	13 (12.4)
Paracetamol	18 (17.1)
Other	5 (4.8)
Domain B - Route of administration, dosage, and pharmaceutical form	
When your child or a child under your care has a toothache, how do you administer the medication?	
It doesn't apply to the situation	44 (41.9)
I give it to him(her) directly in the mouth	32 (30.5)
I give it to him (her) to swallow with water	20 (19.1)
I pour it or place it directly on the tooth	5 (4.8)
Other	4 (3.8)
What dose do you use when you administer a drug to your child or the child under your care?	
It doesn't apply to the situation	1 (1.0)
The same one I use for an adult (for me, for example)	0 (0.0)
Half the dosage I use for an adult (for me, for example)	6 (5.7)
I use the dosage prescribed by the doctor or dentist	49 (46.7)
I ask a friend	0 (0.0)
I ask at the drugstore	4 (3.8)
I search the Internet	1 (1.0)
I use WhatsApp to have information from a friend	0 (0.0)
I ask an older family member or a more experienced person	3 (2.9)
I try to contact the dentist or the doctor	1 (1.0)
I read the medicine package insert	13 (12.4)
Other	4 (3.8)
I give one drop of medicine per kilogram of the child's weight	23 (21.9)
Domain C - Knowledge about the safety of medication use in children	
Any medicine that can be used in adults can also be used in children.	
True	1 (1.0)
False	104 (99.1)
The same dose used in adults can also be used in children.	
True	0 (0.0)
False	105 (100.0)
When giving medication to younger children, you need to be more careful as they can get side effects from medications more easily.	
True	105 (100.0)
False	0 (0.0)
Medicines can be kept within reach of children at home.	
True	0 (0.0)
False	105 (100.0)
Where do you keep medications in your house?	
Bathroom	0 (0.0)
Kitchen	45 (42.9)
Bedroom	40 (38.1)
They are scattered around the house	2 (1.9)
In clothes pockets	0 (0.0)
In a purse	1 (0.9)

Medicine box	12 (11.4)
Others	5 (4.8)
Has your child ever had any reaction or intoxication when they were given medication for dental pain or infection?	
Yes	1 (1.0)
No	104 (99.1)
When your child was given any medication for a health problem, did they ever experience any reaction or intoxication?	
Yes	13 (12.4)
No	92 (87.6)

There was a significant association between the practice of self-medication administered to children by parents and guardians and their continuous use of medication ($p < 0.05$); and to children who had or had already had a toothache ($p < 0.01$) (Table 5). The other variables studied did not show a significant association with the practice of self-medication.

Table 5. Association between independent variables and self-medication.

Variables	Self-Medication*		p-value
	Yes N (%)	No N (%)	
Guardian Gender			
Female	47 (44.8)	45 (42.9)	0.394
Male	5 (4.8)	8 (7.6)	
Total	52 (49.5)	53 (50.5)	
Relationship with the Child			
Mother	39 (37.1)	43 (41.0)	0.448
Others	13 (12.4)	10 (9.5)	
Total	52 (49.5)	53 (50.5)	
Guardian Schooling			
Elementary School	15 (14.4)	8 (7.7)	0.087
High School	26 (25.0)	26 (25.0)	
Higher Education	10 (9.6)	19 (18.3)	
Total	51 (49.0)	53 (51.0)	
Family Income[#]			
< 1 BMW	16 (15.2)	10 (9.5)	0.216
1 BMW ≤ x ≤ 2 BMWs	40 (38.1)	22 (21.0)	
> 2 BMWs	7 (6.7)	10 (9.5)	
Total	63 (60.0)	42 (40.0)	
Types of Housing			
Rented	17 (20.7)	11 (13.4)	0.081
Own house	21 (25.6)	33 (40.2)	
Total	38 (46.3)	44 (53.7)	
Residence Location			
Countryside	5 (4.8)	1 (1.0)	0.088
Urban area	47 (44.8)	52 (49.5)	
Total	52 (49.5)	53 (50.5)	
Self-medication in the Family			
Yes	49 (46.7)	3 (2.9)	<0.01
No	28 (26.7)	25 (23.8)	
Total	77 (73.3)	28 (26.7)	
Child Gender			
Female	27 (25.7)	23 (21.9)	0.382
Male	25 (23.8)	30 (28.6)	
Total	52 (49.5)	53 (50.5)	
Child Age			
< 6 years	9 (8.6)	22 (21.0)	0.174
6 ≤ x ≤ 10	21 (20.0)	31 (29.5)	
> 10 years	12 (11.4)	10 (9.5)	

Total	42 (40.0)	63 (60.0)	
Health System			
Public	50 (47.6)	47 (44.8)	0.149
Private	2 (1.9)	6 (5.7)	
Total	52 (49.5)	53 (50.5)	
Health Problems			
Absence of problems	18 (17.1)	35 (33.3)	0.572
Presence of problems	15 (14.3)	37 (35.2)	
Total	33 (31.4)	72 (68.6)	
Continuous Use of Medication			
Yes	6 (5.7)	46 (42.8)	0.011
No	17 (16.2)	36 (34.3)	
Total	23 (21.9)	82 (78.1)	
Toothache			
Yes	46 (43.8)	6 (5.7)	<0.01
No	23 (21.9)	30 (28.6)	
Total	69 (65.7)	36 (34.3)	
Intoxication with Toothache Medicine			
Yes	1 (1.0)	0 (0.0)	0.310
No	51 (48.6)	53 (50.5)	
Total	52 (49.5)	53 (50.5)	
Intoxication with Medicine for Illnesses in General			
Yes	5 (4.8)	8 (7.6)	0.394
No	47 (44.8)	45 (42.9)	
Total	52 (49.5)	53 (50.5)	

*Self-Medication in Children; BMW: Brazilian Minimum Wage; #Minimum Wage = R\$ 1,100.00.

Discussion

Our study showed that parents and guardians of children undergoing dental care practiced self-medication in nearly half the cases. According to the participants, most children had already presented toothache previously or at the current time; and the main reason given by the respondents was the difficulty in accessing dental treatment. Despite the undeniable importance of oral health, according to the current Brazilian reality, it is still a frequent habit to seek dental care only in cases of pain or discomfort due to difficulty accessing the dentist [17]. Still, self-medication was evident as a family practice since there was an association between its occurrence among members of the family nucleus and the child.

However, self-medication for dental pain in children does not occur exclusively in Brazil and still occurs today. International studies have shown its occurrence in 70% of the Romanian [18] and Turkish [19], 58% in Pakistan [20], 53.8%, 45% in Denmark [21], and 25.2% in Germany [22]. In Brazil, it was observed in 56% of participants [2] to 67.2% of cases of dental pain in children treated at the Infant and Pediatric Dental Clinic of the Faculty of Dental Sciences of the Federal University of Rio Grande do Sul and in the public system at CEMO (Medical and Dental Clinic for Children in Belém do Pará), respectively. In most cases, self-medication for toothache alone is ineffective, requiring professional intervention to analyze the symptoms [23]. It is important to emphasize that analgesic medication can be used in children in the family environment in cases of dental pain. However, it must be performed correctly until dental care is provided, as it is essential. Studies have shown that the prevalence of self-medication was higher among parents with a higher level of education [18,22,24], with the possible explanation being the belief in sufficient knowledge to administer medication to their children. However, in our study, no statistical association was found between the practice of self-medication and socioeconomic and educational features, as in the studies conducted by [19,21]. We observed that most children went to the dental appointment accompanied by their mothers, who are often more present during oral health treatment than their fathers or other guardians [18-21,24].

One of the possible problems arising from the practice of self-medication is drug intoxication. In Brazil, the National Toxic-Pharmacological Information System (SINITOX) of the Oswaldo Cruz Foundation (FIOCRUZ) showed that medicines were the causative agents of 27.1% of the intoxications that occurred in the country in 2017, with a high prevalence in children aged 1 to 4 years of age (18.07%) [25]. In this age group, the misuse of medications may come from self-medication practiced by parents or administration or prescription errors made by health professionals. In our study, 12.4% of the children had been intoxicated by medications administered to treat systemic diseases and about 1% for treating dental problems. Furthermore, there was an association between the practice of self-medication in children and the continuous use of medication for the treatment of systemic diseases, which raises the hypothesis that the routine administration of medication to children, even for reasons of systemic health, encourages parents and guardians to practice self-medication for other purposes as well.

Even though the knowledge demonstrated regarding the safety of medication use in children through the four questions applied on such theme, there was a decoupling between discourse and practice since respondents claimed to use incorrect doses and routes of administration, such as the storage of medication in places easily accessible to children. For pediatric patients, the dosage of the drug must be carefully calculated, in relation to weight or body surface, as there are no standardized doses for children as in adults [26]. There is often a misunderstanding that 1 milliliter is invariably equivalent to 20 drops and that the dosage to be administered is always one drop per kilogram of body weight. However, the number of drops that correspond to each milliliter may vary according to the prescribed drug [27].

Concerning the drug resolution of odontogenic pain, dipyron and paracetamol were the most used non-opioid analgesics, as in other studies [2,23]. Dipyron and paracetamol are non-opioid analgesics routinely used in Brazil, over-the-counter, and referred for the treatment of low-intensity pain [26]. Despite being drugs that do not depend on a formal prescription for their purchase, it is essential to consider the possibility of adverse effects resulting from an overdose, such as hypotension, nausea, and vomiting, as the incorrect use of dipyron for the treatment of fever in 77.6% of children attended at an emergency medical care unit was observed, concluding that it is necessary to provide guidance to those in charge for the use of the medication [28]. Despite frequent prescribing of acetaminophen, the rate of severe toxicity in children remains rare, such as hepatotoxicity, which occurs mainly when doses above the permitted limits are given, especially frequently. Gastrointestinal disorders, asthma crises in susceptible patients, and cardiovascular events may also occur [29]. It is worth mentioning, however, that all the risks present in adult self-medication are potentiated in pediatrics since children have a greater vulnerability regarding their body and a faster and more intense response to medication, which can aggravate a clinical picture, leading to episodes of intoxication and poisoning, severe allergic reactions and even death [30].

Among the study's limitations, the use of a non-probabilistic sample is mentioned. Additionally, the scope of this study was restricted to the only two educational institutions present in the Federal District, a private and a public one, and which attended specific audiences. Thus, there is no way to extrapolate the results obtained to other regions with different socioeconomic and cultural aspects. However, as a positive aspect, it is important to emphasize that this was the first cross-sectional study on the subject in the Federal District.

In summary, considering the results of our study, it is necessary that the health professional correctly prescribes and advises on the use of analgesic medications for pediatric use, even if they are sold over the counter. The professional's orientation when delivering the drug prescription is the paramount step in the rational use of

drugs [1]. Thus, in case of future needs for the use of these drugs, undesirable effects arising from misuse can be avoided.

Conclusion

Despite the participants' high level of knowledge about the safety of medication use in children, self-medication was practiced in 50% of them due to toothache. Difficulty in accessing dental treatment was mentioned by most as a justification. Self-medication was associated with dental pain, continuous medication use, and family self-medication habits.

Authors' Contributions

LGB		https://orcid.org/0000-0002-4859-3453	Methodology and Investigation.
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LOAT		https://orcid.org/0000-0002-1278-0142	Formal Analysis and Writing - Original Draft.
MGT		https://orcid.org/0000-0002-0766-3865	Formal Analysis, Investigation, Resources, Writing - Original Draft and Writing - Review and Editing.
ENL		https://orcid.org/0000-0001-5691-415X	Conceptualization, Methodology, Formal Analysis, Writing - Review and Editing and Supervision.
All authors declare that they contributed to a critical review of intellectual content and approval of the final version to be published.			

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None.

Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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