

# Knowledge, attitude, and practice of pediatricians regarding pediatric liquid medicaments

K. L. Girish Babu<sup>1</sup>, Geeta Maruti Doddamani<sup>2</sup>, Kumaraswamy Naik L.R.<sup>3</sup>

<sup>1</sup>Department of Dentistry, Hassan Institute of Medical Sciences, Hassan, Karnataka, India,

<sup>2</sup>Department of Orthodontics and Dentofacial Orthopedics, The Oxford Dental College and Hospital, Bommanahalli, Hosur Road, Bangalore, Karnataka, India,

<sup>3</sup>Department of Dentistry, Belagavi Institute of Medical Sciences, Belgaum, Karnataka, India

**Correspondence:** Dr. K. L. Girish Babu

Email: docgirish77@gmail.com

## ABSTRACT

**Objective:** To assess the knowledge, attitude, and practice of pediatricians regarding pediatric liquid medicaments (PLMs) and its effect on dental health. **Materials and Methods:** A convenience sample of 103 pediatricians was asked to answer a questionnaire. **Results:** A total number of 87 pediatricians completed the questionnaires. They considered age and body weight of the child (58%), cost of the medicine (40%), and pharmaceutical company (37%) to be relevant while prescribing. Eighty-eight percent of pediatricians knew that the PLM was sweet in nature. Sixty-seven percent of pediatricians stated that pH of PLM is responsible for deleterious effect on teeth. Seventy-two percent of pediatricians were aware of hidden sugars present in PLM. Only 48% of pediatricians were aware of availability of sugar-free medicine. Seventy percent of pediatricians were of the opinion that sugar-free medicine is not as sweet as sugar-containing medicines and is more expensive (65%). **Conclusion:** Knowledge, attitude, and practice of pediatricians regarding PLMs and its effect on dental health were not satisfactory.

**Key words:** Knowledge, pediatric liquid medicaments, pediatrician

## INTRODUCTION

Pediatricians have the opportunity to influence the oral health of children as they are the first health professionals to come in contact with infants and young children. They are in an ideal position to influence the supply and use of pediatric medicines. However, they often have a difficult task of ensuring the compliance of the patient to a particular medication regimen.<sup>[1]</sup> Compliance of liquid medication can be improved by the addition of sugars such as sucrose. Although artificial substitutes are used, sucrose is most widely used by the pharmaceutical industry.<sup>[2]</sup>

Clinical observations linking long-term oral medication to rampant dental caries were performed since 1953.<sup>[3]</sup> The most conclusive evidence was given by Roberts and Roberts<sup>[4]</sup> and Feigal *et al.*<sup>[5]</sup> The medicines that have sucrose as sweetening agent also possess high viscosity that results in low salivary clearance and high cariogenic potential.

There is growing concern among pediatric dentists about the increased consumption of “hidden sugars” in pediatric liquid medicaments (PLMs) by children,

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especially those who are chronically ill. Pediatricians are mainly responsible for pediatric prescriptions and supply of information to parents. It is therefore essential for the pediatricians to be aware of the infectious nature of dental caries and its association with PLM and make appropriate decisions regarding their prescription. Hence, the purpose of this study was to assess the knowledge, attitude, and practice of pediatricians regarding PLMs and its effect on dental health.

## MATERIALS AND METHODS

A cross-sectional, descriptive study was conducted among pediatricians. A convenience sample of 103 pediatricians, including private practitioners and doctors from government hospitals, was asked to answer a questionnaire. Prior permission was obtained from the concerned hospital authorities. Informed consent was obtained from each of the respondents and their anonymity was assured by means of coding the returned questionnaires. Both sexes were adequately represented and their ages ranged from 32 to 63 years.

The questionnaire was adapted from the work of Bradley and Kinirons<sup>[6]</sup> and Bawazir *et al.*<sup>[7]</sup> This questionnaire was subsequently modified according to the purpose of this study. The modified questionnaire was validated from four experts on the subject. The questionnaire elicited information on reasons for prescription and preferences in the selection of PLM among the pediatricians. Questions also pertained to contents, properties of PLM, and their relation to dental health. Following distribution of questionnaires, all the responses were collected 1 day after delivery. Pediatricians who did not respond by filled out questionnaires were contacted again after a week. All answers were treated with utmost confidentiality. Data were collected and analyzed using SPSS 11.0, and the results were expressed as absolute values and percentages.

## RESULTS

A total number of 87 pediatricians completed the questionnaires. They considered age and body weight of the child (58%), cost of the medicine (40%), and pharmaceutical company (37%) to be relevant while prescribing PLM. None of them prescribed tetracycline. Most the pediatricians (95%) preferred oral route of drug administration to children and prescribed syrup form (79%). Although 88% of pediatricians knew that the PLM was sweet in nature, only 20% felt that they can cause dental caries. Sixty-seven percent of

pedsiatricians stated that pH of PLM is responsible for deleterious effect on teeth; however, only 19% were aware that PLM is acidic and can cause tooth erosion (14%). A large number of respondents (47%) thought that PLM causes staining of teeth. Although 72% of pediatricians were aware of the hidden sugars present in PLM, only 48% of them provided oral health instructions following their intake. Concerning the sweetening agents added in PLM, pediatricians cited sucrose (38%), fructose (25%), glucose (24%), sugar substitutes (8%), and corn syrup (5%) [Table 1].

Only 48% of pediatricians were aware of availability of sugar-free medicine, and their main sources of information were conferences/seminars (30%), undergraduate training (26%), and health literature (24%). Seventy percent of pediatricians were of the opinion that sugar-free medicine is not as sweet as sugar-containing medicines and is more expensive (65%). However, 62% of them agreed that all the PLMs should be made available as sugar-free medicines. Availability in pharmacy (31%) was the main factor that influenced them during dispensing of drugs [Table 2].

## DISCUSSION

In the present study, most of the pediatricians considered age and body weight of the child during prescribing liquid medicaments. Some of them also considered pharmaceutical company and cost of the medicines. The cost of the medicines was considered by many of the doctors working at the government hospitals as they mostly attend to children from economically weaker sections of society. However, contrary to this, a study reported that factors such as patient's financial status, availability of the medicines, habits, and drug companies' preferences were the least relevant according to pediatricians.<sup>[8]</sup> Syrup form was the most preferred choice of pediatricians probably because most of the PLMs are sweetened to improve the palatability of children. Although majority of the pediatricians knew that hidden sugars present in PLM make them palatable, they were unaware of its role in causation of dental caries and erosion. The pharmaceutical company incorporates large quantity of sugars, especially sucrose, in the formulation of PLM. Sucrose is widely used due to its properties as a preservative, antioxidant, solvent, and thickening agent. It is also available in low-cost, nonhygroscopic and can be easily processed.<sup>[6,9]</sup> The medicines that have sucrose as sweetening agent also possess high viscosity and can be readily fermented by oral acidogenic bacteria. Furthermore, these PLM have slow salivary

**Table 1: Knowledge, attitude, and practice of pediatricians regarding sugar containing pediatric liquid medicaments**

Question number	Questions	Frequency (%)
1	What factors do you consider before prescribing medication to children?	
	Cost of the medicine	35 (40.22)
	Patient's preference	13 (14.94)
	Body weight of the child	25 (28.73)
	Age and body weight of the child	51 (58.62)
	Pharmaceutical company	33 (37.93)
	Type of sugar present	0
2	Do you prescribe tetracyclines to children?	
	Yes	-
	No	87 (131)
3	Which route of drug administration do you prefer for children?	
	Oral	83 (95.40)
	Intramuscular	4 (4.59)
	Intravenous	3 (3.44)
	Rectal	4 (4.59)
	Others (please mention)	0 (0)
4	Do you dispense or offer the choice of form of medication?	
	Yes	24 (27.58)
	No	63 (72.14)
5	For a young patient (1–6 years), do you prefer to prescribe?	
	Syrups	69 (79.31)
	Dispersible tablets	9 (10.34)
	Both	15 (17.24)
6	Are PLMs sweet/acidic/bitter?	
	Sweet	77 (88.50)
	Acidic	17 (19.54)
	Bitter	27 (31.03)
7	Which property of PLM do you feel causes deleterious effects on teeth?	
	Viscosity	19 (21.83)
	pH	59 (67.81)
	stickiness or adherence	23 (26.43)
	sugar content	31 (35.63)
	All of the above	29 (33.33)
	None of the above	0
8	Are you aware of the hidden sugars present in the PLM?	
	Yes	63 (72.41)
	No	25 (28.73)
9	Name the commonly used sweetening agent (s) present in PLM?	
	Glucose	21 (24.13)
	Fructose	22 (25.28)
	Sugar substitutes	7 (8.04)
	Sucrose	33 (37.93)
	Corn syrup	4 (4.59)
10	Can PLM cause tooth erosion or decay or stains?	
	Erosion	12 (13.79)
	Decay	18 (20.68)
	Stain	41 (47.12)
11	Do you usually inform and guide child's parents about the risk of dental caries associated with PLM?	
	Yes	26 (29.88)
	No	61 (70.11)

*Contd...*

**Table 1: Contd...**

Question number	Questions	Frequency (%)
12	Do you recommend oral hygiene measures to be taken following intake of PLM?	
	Yes	42 (48.27)
	No	45 (51.72)
	If yes	
	Brushing	18 (20.68)
	Rinsing	69 (79.31)
PLM: Pediatric liquid medicament		

**Table 2: Awareness of pediatricians regarding sugar-free pediatric liquid medicaments**

Question number	Questions	Frequency (%)
1	Have you heard about sugar-free medications?	
	Yes	42 (48.27)
	No	45 (51.72)
	2	What is the source of information?
	Health literature	21 (24.13)
	Professional journal	7 (8.04)
	Conferences/seminars	26 (29.88)
	Postgraduate training	6 (6.89)
	Undergraduate training	23 (26.43)
	News media	0
	Print media	0
	From pharmacists sales representatives	5 (5.74)
	Others	3 (3.44)
3	Sugar-free medicine is not as sweet as sugar-containing medicines	
	Agree	61 (70.11)
	Disagree	20 (22.98)
	Not sure	6 (6.89)
4	Sugar-free medicines are more expensive than sugar-containing medicines	
	Agree	57 (65.55)
	Disagree	13 (14.94)
	Not sure	17 (19.54)
5	Should all PLM be available as sugar-free medicines?	
	Agree	54 (62.06)
	Disagree	11 (12.64)
	Not sure	22 (25.28)
6	What are the factors that influence your decisions to dispense sugar-free medicines if made available at your place?	
	Parental requests	25 (28.73)
	Medical status of patient	63 (72.41)
	Information from health literature	21 (24.13)
	Detailing by pharmaceutical representative	19 (21.83)
	Availability in pharmacy	27 (31.03)
	Recommendation by national health policy	23 (26.43)
	Affordability	24 (27.58)
	Mass media advertisement	4 (4.59)
Reports of clinical trial	17 (19.54)	
PLM: Pediatric liquid medicament		

clearance rate and high cariogenic potential. Although pediatricians were knowledgeable of the ill effect of tetracycline on teeth, they appear to be unaware of the effect of liquid medicaments on dental health.

Pediatricians were aware of the hidden sugars in the PLM, but only a few of them informed child's parents about the risk of dental caries associated with liquid medications and recommended for oral hygiene

measures. This finding is concurrent with studies which stated that most of the pediatricians did not give oral health instructions to be followed after intake of medicines.<sup>[8,10]</sup> As high sucrose exposure increases the cariogenicity by the modification of bacterial virulent properties,<sup>[11]</sup> it is advisable to chew sugar-free gum immediately after the intake of sweetened PLM.<sup>[12]</sup>

Due to the concern of sugar-containing PLM, pharmaceutical companies have introduced sugar-free medications into the market. Sugar-free medications are known to be as effective as sugar-containing medications and only 10% are more expensive.<sup>[6,13]</sup> In the present study, around 50% of pediatricians were aware of availability of sugar-free medications. Their main source of information was by attending conferences and seminars, followed by reading health literature and training during undergraduate course. These findings suggest that there is a need for an educational input at undergraduate level and continuing training even after graduation to remain up to date with the changing situation. This finding was similar to other studies.<sup>[7,14]</sup> Most of the pediatricians were of the opinion that sugar-free medications are not as sweet as sugar-containing medicaments and more expensive. Similar results were also reported by Bawazir *et al.*<sup>[7]</sup> The sugar-free medicaments are actually sweet which are sweetened with anticariogenic and anti-acidogenic sweetening agents such as xylitol, mannitol, and sorbitol.<sup>[15]</sup> Other misconception about sugar-free medications may be due to the term “sugar free” as pediatricians would have thought that it is synonym to “sweet-free;” therefore, the use of “sucrose-free” or “noncariogenic medications” could improve the attitude toward sugar-free medications.<sup>[7]</sup>

In a study,<sup>[16]</sup> 30% of pharmacists believed that sugar-free medicaments are more expensive than sugar-containing medicaments while the same number thought that safety and benefits outweigh this higher cost difference. The higher cost spent on these sugar-free medications will protect the patients from further medical and dental complications, which need much more higher cost. Around 62% of pediatricians wanted all liquid medications to be available as sugar-free medicines. In Belfast, 87% of pharmacists felt that all medications should be available in sugar-free form.<sup>[13]</sup> This was attributed to the pressure applied by the British Association of Community Dentistry. Thus, strict implementation of rules of dental societies will improve the oral health of society.<sup>[14,16]</sup> Mentioning as

sugar-free product during prescription will enhance the use of sugar-free medications.<sup>[17]</sup>

## CONCLUSION

Knowledge, attitude, and practice of pediatricians regarding PLMs and its effect on dental health were not satisfactory.

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## Conflicts of interest

There are no conflicts of interest.

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