



Knowledge and Awareness of Pediatric Dental Prescription Among Dentists

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Abstract

BACKGROUND: Pediatric prescriptions pose a unique set of risks of medication errors, predominantly because of the need to make dosage calculations. Children have different physiological, pharmacokinetic and pharmacodynamic parameters compared to adults and therefore they require individual dosages. In particular, preventing dosing errors is an important part of ensuring safe and quality patient care in the pediatric population. The aim of this research is to assess the Knowledge and awareness of pediatric dental prescription among dentists. **METHODS:** A sample of 100 dentists was included in the study. The study was conducted through a validated online questionnaire which was filled and submitted by the dentists. The data thus collected was tabulated and analysed. **RESULTS:** Though majority of dentists prescribed the standard drugs for children in pain and infection management the accuracy of dosage calculation, choice of medication and duration was varied among the study population. **CONCLUSION:** Prescribing drug accurately is extremely important as it is necessary to provide optimal effect with minimal side effects for children. To improve standards of care, dentists need to update their knowledge of pharmacology in dental education.

Keywords: Analgesics, Antibiotics, Pediatric prescription

INTRODUCTION

Safety is a primary concern in many professions, including health care. The most common breach in safety that occurs in hospital settings are medication errors. They occur more frequently in the pediatric population than in the adult population.^[1] Pediatrics pose a unique set of risks of medication errors, predominantly because of the need to understand pharmacodynamics of drugs in children and to make dosage calculations, which are individually based on the patient's weight, age or body surface area (BSA), and their condition. This increases the likelihood of errors, particularly dosing errors.^[2]

For pediatrics, incorrect dosing is the most reported medication error. The National Coordinating Council

for Medication Error Reporting and Prevention (NCC MERP) takes the stance that there is no acceptable incidence rate for medication errors, and that the goal should be to continually improve health care systems so that medication errors are prevented. In particular, preventing dosing errors is an important part of ensuring safe and quality patient care in the pediatric population.^[1] The most important aspect for selection of a drug and establishment of the proper pediatric dosage is the fact that the pediatric patient is not just a small adult. New-born, children and adolescents have different physiological, pharmacokinetic and pharmacodynamic parameters compared to adults. The differences are mainly related to the changes

occurring during growth and maturation and therefore they require individual dosages.^[3]

Prescribing is the intervention that has the greatest influence on patients' health requiring complex series of sub-competencies like making a diagnosis, setting a therapeutic goal, choosing the approach, the best drug option, route and frequency of administration, duration of therapy, writing the prescription, patient information, monitoring drug effects and, lastly, reviewing the prescription. Dental prescriptions help providing transient treatment or treatment in particular. Nevertheless, dentists require knowledge about drugs and must follow the international recommendations for prescribing.^[4,5]

MATERIALS AND METHODS

The study was conducted for a period of 3 months through an online survey. A sample of 100 dentists was selected based on the assumption that 50% of the dentists had adequate knowledge and awareness about dental prescription in India, with margin of error of 0.10. The ethical approval of the study was obtained from the Institution Review Board and Ethical committee (EC NO- EC111). Dentists with a BDS degree and who were willing to participate were included in the study. The link to the online questionnaire was provided to the participants through various social media platforms like WhatsApp, Instagram, Facebook and E-mail. The participants were instructed to answer the questionnaire by clicking on the hyperlink.

The online questionnaire consisted of 28 questions excluding demographic information like Name, Age, Sex, and Place of practice, Duration of practice and Designation. The questionnaire covered questions regarding pediatric dental prescription.

Data collected was subjected to descriptive analysis of all the explanatory and outcome parameters using mean and standard deviation for quantitative variables, frequency and proportions for categorical variables. SPSS for Windows Version 22.0 was used to perform statistical analyses and the value of $p < 0.05$ was considered statistically significant.

RESULTS

The questionnaire was answered by a total of 100 Indian dentists out of which 64 were males and 36 were females. Of the participants, 18 were General

dentists, 12 were house surgeons/interns, 49 were Postgraduate students and 21 were dental specialists.

Pediatric dental practice

Majority (85%) of the participants stated that they treated children in their dental practice.

Prescription of medications in pediatric dental practice

Majority (96%) of participants stated that they prescribe medication for children with dental pain and infection. The common route of drug administration used by dentists showing 80% of the participant's preferred oral suspension is represented in **Figure 1**.

Dosage and duration

A significant proportion (82%) of the participants stated that they calculate dosage before prescribing medication where majority being dentists with >5 years of practice ($p < 0.03$) as shown in the **Table 1**. Of the 100 participants, 30% said that they recommend dosage based on weight and age; 23% according to weight; 12% based on half the adult dose and 5% based on age whereas 23% were not clear about the dose calculation as depicted in **Figure 2**. Antibiotics were prescribed for 5 days by 58% of the participants: 41% for 3 days and 1% for 7 days. Similarly, 52% of the participants stated they prescribe analgesics for 3 days; 44% as per the requirement and remaining 4% prescribed as a course of 5 days.

Prescription of analgesics and drug allergy

A significant proportion of the participants (99%) stated they take history of any drug allergy in pediatric patients before prescribing medications. The commonly prescribed analgesic showing majority (42%) preferred combination of Ibuprofen and Paracetamol is represented in **Figure 3**. Most frequently prescribed drug if the child is allergic to Penicillin was Azithromycin (27%) followed by Ciprofloxacin (24%), Clindamycin (24%), Cephalexin (15%), Ofloxacin (5%) and Erythromycin (5%).

Out of total participants, 64% said that pre-operative analgesics are beneficial in pediatric patients for procedures like extraction and 70% agreed that drug dosage should not be increased if there is more pain. Though 92% of the participants stated that they were aware of NSAIDS contraindications, 25% of them had partial knowledge about the same. When asked about the maximum number of times Ibuprofen can be

prescribed in a day 49% of the participants prescribed twice a day of which 61.8% were <5 years of duration of practice ($p < 0.03$). Similarly, 35% of the participants stated that the maximum number of times Paracetamol can be prescribed is four times a day of which 48.9% belonged to >5 years of duration of practice ($p < 0.02$) as shown in the **Figure 4**.

Choice of antibiotics in oro-dental condition

Less than half of the participants (47%) stated they prescribe anti-inflammatory drugs, analgesics, antibiotics and proteolytic enzymes as line of treatment for cellulitis for a patient aged 7 years and weighing 15 kgs. Out of the remaining participants 44% said along with these they also prescribe magnesium sulphate dressing; 7% said they only prescribe antibiotics, while 2% only prescribed anti-inflammatory drugs and analgesics.

Amoxicillin was prescribed thrice daily for 5 days by 44% of the participants followed by twice daily for 3 days (19%), twice daily for 5 days (19%) and thrice daily for 3 days (16%). Similarly, 40% stated they prescribe Amoxicillin + Clavulanic acid twice daily for 5 days; 27% twice daily for 3 days; 24% thrice daily for 5 days and 8% said thrice daily for 3 days.

The answers to the outcome of improper antibiotic usage are shown in **Table 2** which indicated varied response. Almost 100% participants said that they take time to instruct the patient regarding usage of medicines.

DISCUSSION

This study provides an overview of pediatric medication prescription and awareness among dentists which included general dentists, house surgeons/interns, postgraduates and dental specialists. Prescribing medicines is a complex task that requires theoretical and clinical knowledge combined with practical skills.

Pediatric patients require different oral drug delivery systems than other subsets of the population due to their continuing development. Hence dosing and administration requirements are needed. Conventional formulations are not designed for this patient group; thus, manipulation and compounding has become a common practice. Age-appropriate oral drug delivery systems specifically developed to meet the needs of the pediatric population are therefore desired.^[6]

The oral route of administration is the preferred route for patients of all ages for reasons of convenience and stability.^[7] In this study majority of the participants (99%) stated that oral route is the most common route of drug administration. Similar finding was seen in a study done by Tank ND et al. where 99.72% drugs were prescribed by oral route.^[1] In the present study 80% of the participants preferred oral suspension in younger children. Similar result was seen in a study conducted by Gedam DS et al. where syrup and tablet was prescribed in 62.19% and 6.9% respectively.^[8] The result of the present study was not in accordance with the study conducted by Tank ND et al. where tablet and syrup were prescribed in (74.62%) and (21.61%) respectively.^[1] Conventional solid (tablets and capsules) as well as liquid (solutions and suspensions) dosage forms exhibit limitations for the delivery of drugs to pediatric patients, due to the inherent limitations of liquid dosage forms such as a bad taste, portability problems, refrigerated storage conditions, stability issues or challenging controlled release.^[1,6] Therefore, WHO currently favours that children, particularly in developing countries, be treated with oral solid medicines. This claim is not in accordance with the result of present study. Liquid dosage forms may be favourable for certain patients (e.g., neonates and infants) due to the increased dose flexibility and ease of swallowing in comparison to solid products. Current developments have been focused on the design of dry solid formulations to be converted to liquid at the point of administration. Some of the participants (5%) preferred dispersible tablet. Taste masking is a requirement of orally disintegrating formulations with unpleasant tasting APIs (Active Pharmaceutical Ingredient). Improved palatability is traditionally achieved by addition of sweeteners and flavours to the formulation. However, the efficacy of this approach is often limited, and, in addition, the use of these excipients poses safety concern (especially for pediatric patients).^[6]

In our study majority (42%) preferred combination of Ibuprofen and Paracetamol. This was in accordance with the study done by Guzmán-Álvarez et al. where most widely used NSAIDs were ibuprofen and paracetamol, resulting in 25/66 responses (37.9%).^[5]

Safety is clearly a primary consideration in the choice of medication, and both ibuprofen and paracetamol have been associated with safety issues, not all of which appear to be evidence based. Overall, ibuprofen

and paracetamol are considered to have similar safety and tolerability profiles.^[9] A significant number of participants with lesser duration of practice had better knowledge on this in comparison to those with more years of experience.

Poor understanding of different ways of expressing the concentration of drugs in solution, dose calculation errors, and drug administration errors appears to be a global problem for doctors.^[10] One significant step in preventing these errors is ensuring health-care professionals can accurately perform drug dose calculations. Though majority of the participants stated that they calculate dosage before prescribing medication, few were not clear about the same. In the present study, 70% said that dosage should not be increased if pain is more. Similar results were seen in study done by Doshi A et al.^[4]

Amoxicillin is one of the most prescribed antibiotics in the field of dentistry.^[11] A survey in Canada found that the average duration of antibiotic use prescribed by dentists is 6.92 days.^[12] Another survey in the USA found that endodontists prescribe antibiotic use for an average of 7.58 days.^[13] In this survey majority (44%) of the participants prescribed amoxicillin for 5 days.

CONCLUSION

The pediatric population represents a spectrum of different physiologies, and children should not be treated as “miniature men and women” thus monitoring the safety of medicine use in children is of paramount importance. A wide range of answers in our study points towards the necessity of better understanding and updating the current protocols of pediatric medication by the dentists to deliver standard care.

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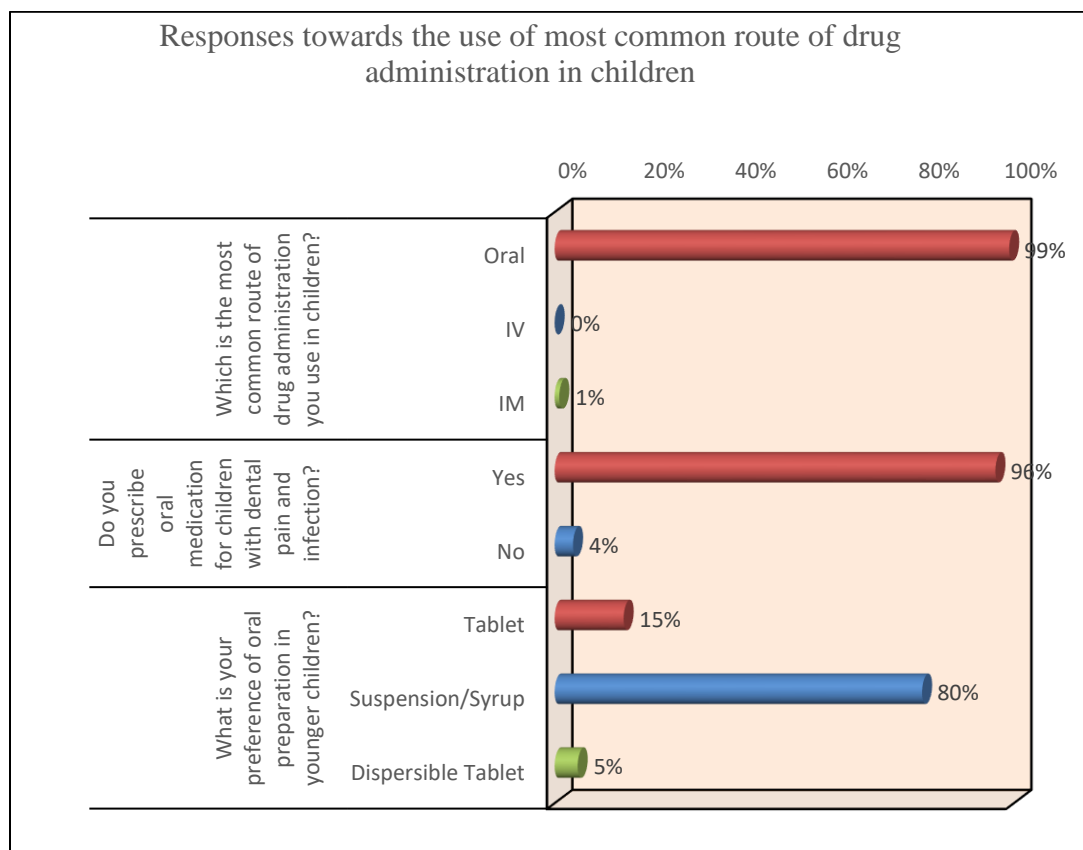
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Figure: 1**Table: 1**

Comparison of responses towards the questions related to drug dosage calculation based on years of experience						
Questions	Responses	< 5 years		> 5 years		P-Value
		n	%	n	%	
Before prescribing medication, do you calculate the drug dosage for the patient?	Yes	41	74.5%	41	91.1%	0.03*
	No	14	25.5%	4	8.9%	

Figure: 2

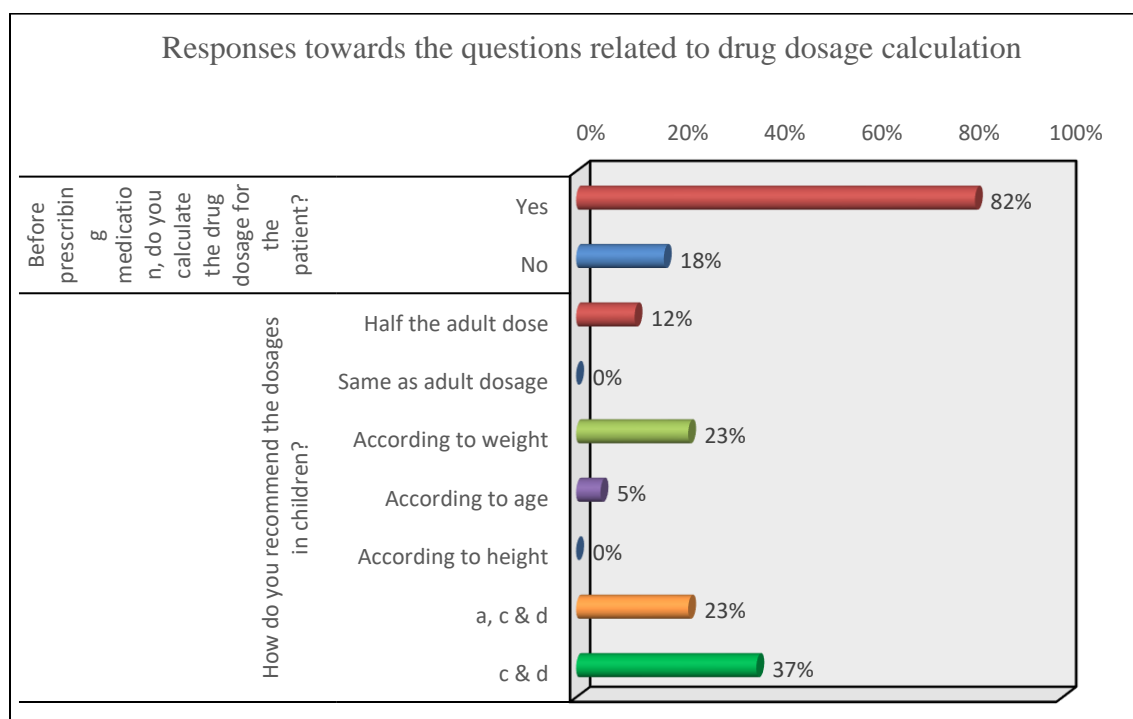


Figure: 3

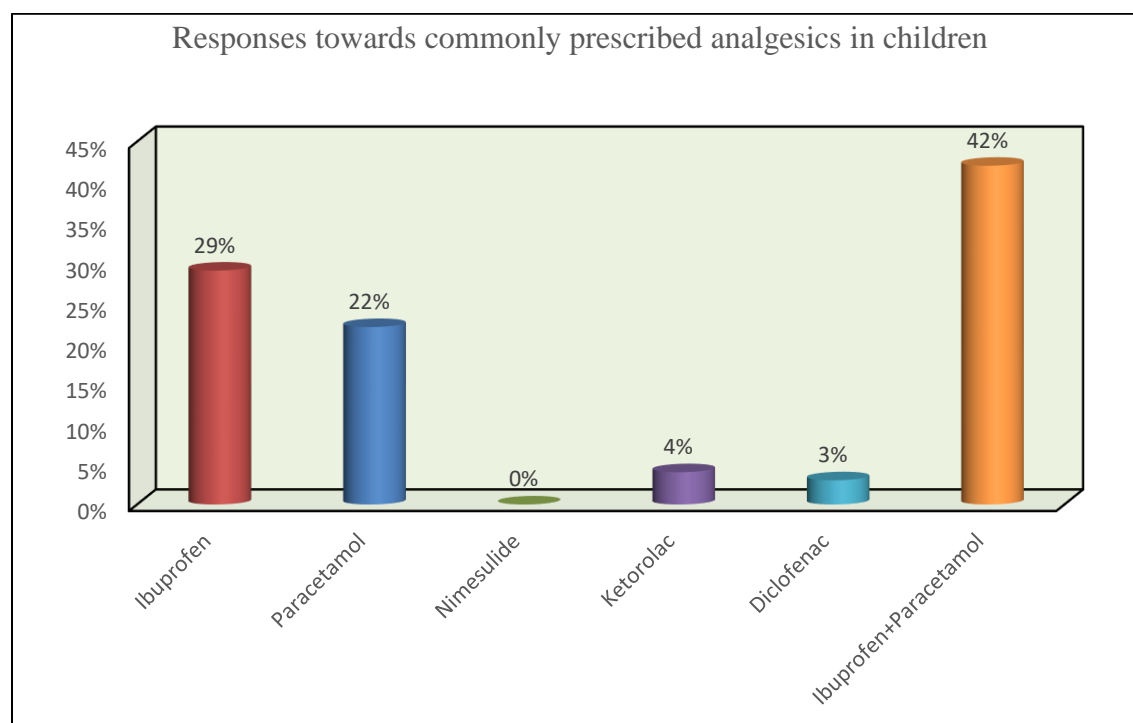
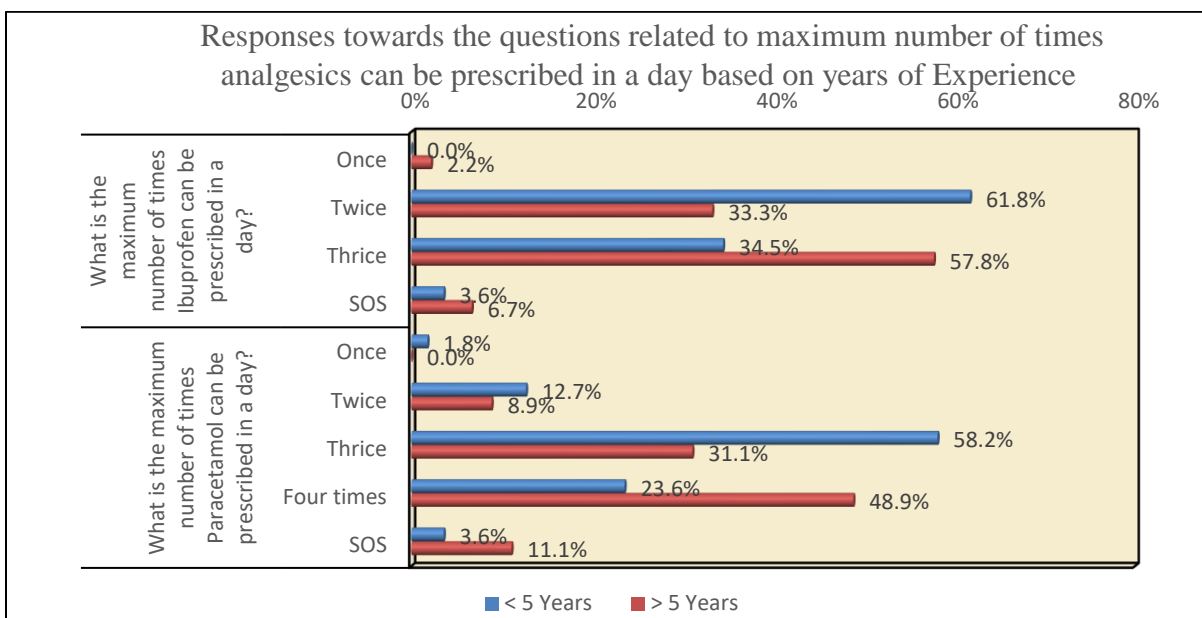


Figure: 4**Table: 2**

Responses towards the question related to outcome of improper antibiotic usage					
Questions	Responses	n	%	χ^2 Value	P-Value
What is the outcome with the improper usage of antibiotics?	Antibiotic Resistance	2	2%	116.120	<0.001*
	Superinfections	1	1%		
	Long Lasting Infections	0	0%		
	Risk of developing diabetes in children	0	0%		
	Risk of development of asthma and allergy in children	2	2%		
	Risk of GI disturbances in children	0	0%		
	Higher treatment costs	0	0%		
	Limited treatment options	0	0%		
	a, b & c	40	40%		
	a, c, d, e & f	12	12%		
	All of the above	43	43%		

LEGENDS

Figure 1: Responses towards the use of most common route of drug administration in children.

Table 1: Comparison of responses towards the questions related to drug dosage calculation based on years of experience

Figure 2: Responses towards the question related to drug dosage calculation.

Figure 3: Responses towards commonly prescribed analgesics in children.

Figure 4: Responses towards the question related to maximum number of times analgesics can be prescribed in a day based on years of experience.

Table 2: Responses towards the question related to outcome of improper antibiotic usage.