

# Attitude and Practices of Paediatric Dentists towards Parental Guidance on Dental Trauma.

## A cross-sectional survey



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### Abstract

**Aim** There is a lack of sufficient information about the protocols followed by paediatric dentists in informing parents about traumatic dental injuries as a part of anticipatory guidance. Hence, the aim of this study was to assess paediatric dentists' attitudes and practices about parental guidance regarding these injuries.

**Material and Methods** This was a cross-sectional survey conducted using a validated questionnaire emailed through Google form to approximately 2500 paediatric dentists in various world regions. The sampling method used was a list-based sampling frame followed by simple random sampling. Participants were recruited through national member societies of the International Association of Paediatric Dentistry, personal contacts and social media groups. Only paediatric dentists with at least three years of experience after their post-graduation were only included in the study. Their attitudes and practices towards parental education on dental trauma during the child's first and recalled dental visits were assessed as per their age, gender, country of post-graduation qualification and years of experience in the profession. Chi-Square test was used to evaluate the association between the paediatric dentist response and the continent of practice. Kruskal-Wallis H test was used to assess the level of significance within each variable in relation to the continent of practice. A 95% confidence interval with a significance level of  $\alpha = 0.05$  was used.

**Results** This study comprised of 447 responses from paediatric dentists from all over the world. More than half of the respondents practiced in Asian countries (52%). Information given to parents during the child's first dental appointment, the most effective way to educate parents, and parental guidance showed significant association with country of practice ( $p < 0.001$ ). A small proportion of the participants (26.17%) provided this information only on parental request. Only 33.05% of paediatric dentists routinely provided information to parents on the prevention and emergency management of dental trauma, and 57.02% gave parents first aid information on oro-facial and dental trauma. The majority of respondents (78.23%) gave specific information to parents on dental trauma of primary teeth than avulsed permanent teeth (64.73%). Emergency care for soft-tissue injuries was imparted by a lesser proportion of paediatric dentists (41.87%), while a few (1.37%) did not give any such information.

**Conclusion** The overall attitude and practice of paediatric dentists toward parental education on traumatic dental injuries were not satisfactory. Many paediatric dentists do not impart education on emergency care and dental trauma prevention in primary teeth. Parents should be informed about oral hygiene instructions and prevention-oriented interventions during the first visit and about managing traumatic dental injuries.

**KEYWORDS** paediatric dentists, parental guidance, traumatic dental injuries.

### Introduction

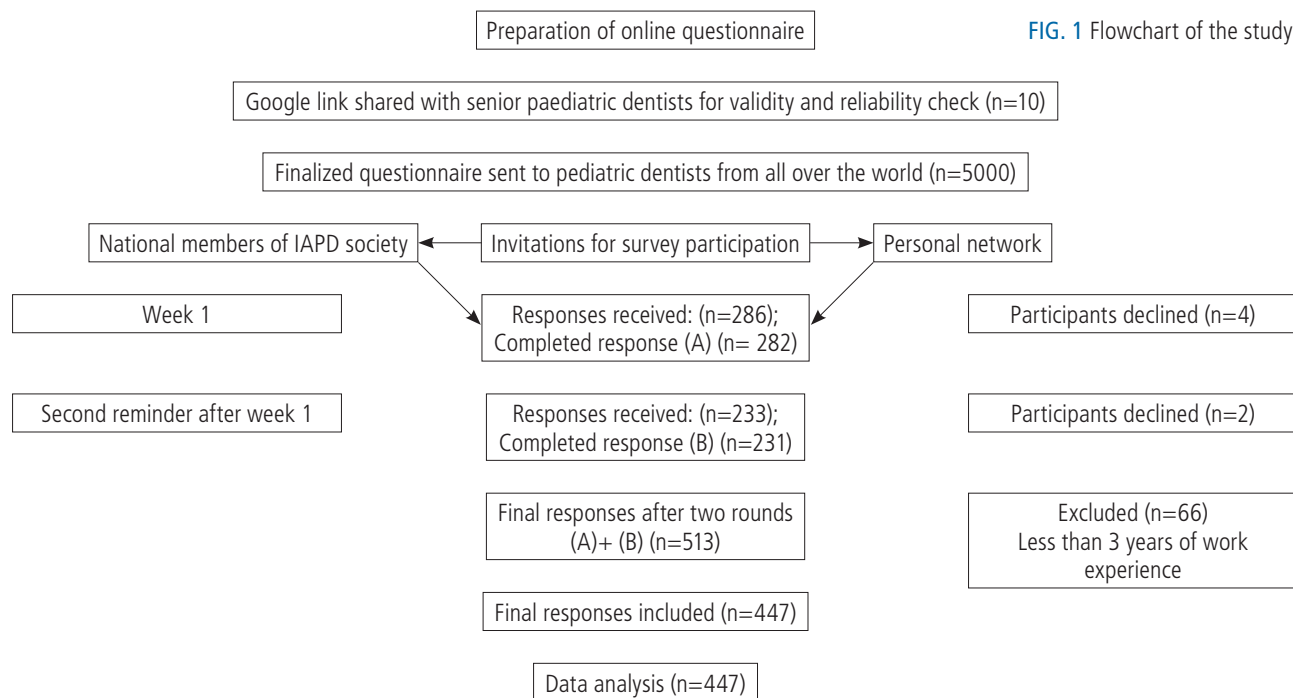
Traumatic dental injuries (TDIs) are widely seen among children. They can lead to dental fractures, pulpal, periodontal ligament involvement and injuries to supporting structures and soft tissues [Quaranta et al., 2016]. Apart from aesthetic, functional, and psychological issues, emergency treatment is usually required in young children involved with TDIs. The most typical place of traumatic injuries in children includes school, home, and playgrounds [Hasan et al., 2010; Campos et al., 2014]. Long-term prognosis of traumatised teeth depends on proper and immediate management at the injury site by the responsible person present and the time difference between the occurrence of trauma and seeking dental treatment professionally [Arikan and Sonmez, 2012; Prieto-Regueiro et al., 2021]. Organisations such as the American Academy of Paediatric Dentistry (AAPD) and the International Association of Dental Traumatology (IADT) have also advocated that paediatric dentists should play a key role in providing dental trauma-related information to parents [Olawale et al., 2019]. Traditionally, paediatric dental specialists are trained to impart information to parents on various oral health practices crucial to ensuring their child's dental hygiene. They are the most suitable figures to educate parents and patients about preventing orofacial injuries as part of the anticipatory guidance during their dental visits. The term 'anticipatory guidance' involves providing comprehensive oral health education to parents by warning them about the possible damages caused by dental trauma and maximising their role in their child's development [Nowak and Casamassimo, 1995]. Research shows that a preventive dental visit by one year of age can

reduce future dental emergencies [Savage et al., 2004]. IADT has even designed a freely available mobile app, 'Tooth SOS' – a First Aid App that provides easy-to-understand information to patients, including parents, regarding the emergency steps to take in case of all dental injuries. Garcia-Godoy et al. [1981] found out that the home is the most frequent location of traumatic accidents in a sample of Dominican school children. Another study conducted in Chile also showed that most of the primary dentition injuries in children occurred at home [Onetto et al., 1994]. The highest incidence of TDIs is around 2–3 years and 7–12 years of age [Diaz et al., 2010; Campos et al., 2014]. Paediatric dentists have an additional responsibility to deliver knowledge, guide and educate parents with all available information and resources during their child's first dental visit to prevent any traumatic dental injury and make a rapid response in case of traumatic injuries. As per the AAPD guidelines, the child's first dental visit to the paediatric dentist should be before the first year of age or when the first tooth erupts [AAPD reference manual 2018]. Early dental visits allow paediatric dentists to provide parents with risk-based anticipatory guidance [Ramos-Gomez et al., 2010; Weber-Gasparoni, 2019]. However, studies have shown that most children did not have their first dental visit during the first 12–18 months of life but only due to emergencies [Agostini et al., 2001; Hartwig et al., 2018]. Existing literature revealed a lack of parental knowledge and awareness related to dental trauma in children [Campos et al., 2014]. Given the role of parents in early childhood caregiving it is important to provide with guidance accordingly. If parents and guardians are adequately informed and educated on the emergency management of TDIs, they can prevent any delay in seeking treatment that might result in an unfavorable and poor prognosis due to the late presentation to the dental clinic [Campos et al., 2014]. Abundant scientific literature is available on the knowledge and practices of caregivers in kindergarten nurseries, schoolteachers, and emergency medical doctors on the management of TDIs. However, to the best of the author's knowledge, the protocols followed by paediatric dentists to inform parents about TDIs have not been assessed so far. Despite there being a strong correlation between appropriate early management and better outcomes for traumatised teeth in children, the literature has demonstrated that parental knowledge of TDI management is insufficient [Nikam et al., 2014; Resmy et al., 2019]. Hence, greater emphasis has to be placed on educating parents on the prevention, diagnosis and management of emergency dental trauma in children. This study aimed to assess the attitude and practices adopted by paediatric dentists from different regions of the world regarding parental guidance on dental trauma.

### Material & Methods

This was a cross-sectional survey carried out using a validated questionnaire emailed through Google form to approximately 2500 paediatric dentists in various regions of the world. Ethical approval was obtained by the University research ethics committee (D-H-F-2020-June -28). The study is reported based on the strengthening of the reporting of observational studies in epidemiology (STROBE) checklist [Knottnerus and Tugwell, 2008]. Informed consent was obtained through the first page of the survey. The participants were told about the time to complete the survey and data privacy. Only paediatric dentists with at least three years of experience after their post-graduation were included in the present study. Respondents who mentioned less than three years of experience after obtaining their qualification in the specialty of paediatric dentistry were removed from the study. This was done to minimise the biased responses from fresh graduates as their recently imparted knowledge may make them

follow what has been taught. However, the more experienced Paediatric Dentists will ascertain if they still observe the established guidelines. Non-paediatric dental specialists and GP dentists were also excluded from the sample. These exclusion criteria were followed to ensure the reliability of the data. Participants were recruited through national member societies of the International Association of Paediatric Dentistry (IAPD), personal contacts, and social media groups. Initial contact with the Presidents and chairs of national member societies (NMS) of the IAPD was made for this open survey through emails regarding this voluntary survey. They were informed about the objectives of the survey and requested to further encourage their members for active and maximum participation. The link to the finalised Google form was also forwarded to all NMS (n=72) along with the invitation and their support. The personal network of the authors was also utilised, and their acquaintances were contacted for participation (through social groups). The present study dealt with large homogenous groups consisting of paediatric dental associations, for which a sampling frame with contact details was available for respective associations. The sampling method used for the study was a list-based sampling frame followed by simple random sampling (used for samples of high-coverage populations). The questionnaire consisted of three domains; the first part collected demographic characteristics of paediatric dentists, having seven questions on age, gender, country of post-graduation qualification, years of experience, the number of patients seen per day, country, and place of practice. The second section gathered the attitude of paediatric dentists about parental education on dental trauma with questions in it. The third domain of the questionnaire evaluated their practices concerning parental education on dental trauma during the child's first and recalled dental visits with questions in it. The survey instrument had five pages that contained an introduction (page 1), participant declaration (page 2), and questions (pages 3-5). The number of questions on pages 3, 4, and 5 was 7, 3, and 5, respectively. A back button was available for the respondents to review/change their answers. Only completed questionnaires were taken up for data analysis. Others were not included in the study. No questions were asked to identify the participant, such as name or contact number. Personal data questions included gender, age category, country of post-graduation qualification, number of experience years, country of practice, place of practice (hospital or clinic or academia in general), and number of paediatric patients seen on a typical day. The prepared questionnaire was sent to ten experienced, qualified paediatric dentists (with at least 15 years of experience) twice with two weeks intervals in between to ensure its validity and reliability. Results from the two times were compared using Pearson's correlation coefficient (Pearson's  $r$ ) as a reliability test. Pearson's  $r$  between the two questionnaires' responses was referred to as the coefficient of stability. A more significant stability coefficient means more robust test-retest reliability. Cronbach's alpha equal to or more than 0.70 was considered in terms of internal consistency. The content validity of the questionnaire was assessed by distributing it to a panel of experts in paediatric dentistry who were asked to rate each item in the questionnaire on a four-point Likert scale in terms of relevance, clarity, simplicity, and ambiguity. The required changes were carried out in the questionnaire after receiving feedback at each stage. Participation in the study was voluntary and completely confidential. The nature of the study was explained at the beginning of the questionnaire, and consent was taken from each participant. The data were collected from June 17th, 2020, to August 12th, 2020. Two hundred eighty-six responses were received in the first week of mailing and posting the questionnaire link. Four participants declined to participate in



the survey. The second reminder was sent to all available contacts, and a request was made again to fill out the questionnaire if they did not participate so far. After the second intimation, another 233 participants responded but two of them declined, therefore a total of 513 respondents answered the questionnaire. Sixty-six respondents had work experience of fewer than three years and were removed from the study. Hence, the 447 responses constituted the final number of participants for the present study. Their responses were automatically filled in an Excel sheet using Google forms, and the participants were not offered any incentive (Figure 1). Power analysis was done based on the previous parameters and results mentioned by Wright and Casamassimo [2017]. The following formula was used to estimate the sample size:

$$n = \frac{(Z_{1-\alpha/2})^2 (p)(1-p)}{E^2}$$

where  $Z_{1-\alpha/2}$  is the critical value for the one-tailed alternative hypothesis at a significance level and desired power, respectively.  $p$  is the expected prevalence or based on previous research;  $n$  is the required sample size;  $E$  is the precision (or margin of error) with which a researcher is willing to measure the variables. The sample size was calculated based on the prevalence of willingness of paediatric dentists to offer information i.e 94% with 95% as the power of study and a margin of error of 2.236% was found to be 434. Data collected from the close-ended questionnaires were coded, and Statistical Package for Social Sciences (SPSS), version 27.0.1.0 (IBM Corp., Armonk, NY, USA) software for Windows was used for statistical analysis. The responses were summarised in form of frequencies and for further analysis, the Chi-Square test was used to evaluate a crosstabulation with 95% power and a significance level of  $\alpha = 0.05$ . Cross-tabulation presented the distributions of the responses of paediatric dentists of the respective regions about each categorical variable simultaneously. This test of independence assessed whether an association existed between the responses by comparing the observed pattern of responses in the cells to the pattern that would be expected if the variables were truly independent of each other.

## Results

This cross-sectional study initially comprised 447 responses from paediatric dentists from all over the world that reduced to 363 as a group of 84 participants was removed for further evaluation as they did not believe in parental education on dental trauma (Table 1). Demographic characteristics of 447 paediatric dentists showed that 68% were females while 31% were males (Table 1). More than two-thirds of contributors were in the age group of 30-50 years. Almost half of contributors in the present survey came from the paediatric dentists trained in dental schools located on the Asian continent (Fig 2). Similarly, more than half of the respondents (52%) practiced in Asian countries (Fig 3). The highest percentage of participants was from private practice (72.48%), followed by academia (45.41%). Most paediatric dentists who completed this survey saw more than five child patients in a day. When asked about work experience, 28% of respondents had more than 21 years of experience, while 36% were less than ten years, and the remaining 35% had work experience between 10-20 years. The corresponding demographic numbers for paediatric dentists ( $n=363$ ) who did not believe in parental education on dental trauma were almost like the original group of 447 participants for each variable except for the percentage of professionals who worked in private practice/clinic that increased to 81% in comparison to 72% for the whole group. Information given to parents during the child's first dental appointment and the most effective way to educate them showed significant association with the continent of practice ( $p < 0.001$ ) (Table 2). Most common information provided to the parents during the child's first dental appointment included oral hygiene instructions (96.19%), prevention-oriented interventions (95.52%), dietary counselling (87.47%), and the use of fluoride toothpaste (87.02%). Information regarding teething (52.12%) and finger-sucking habits (51.9%) were among the least discussed. Interestingly, when practices of paediatric dentists on the type of parental information delivered during their child's initial dental appointment were compared within the continents it was found that the figures were almost in a similar range and statistically non-significant for most instructions ( $p=0.96$ ). Proper

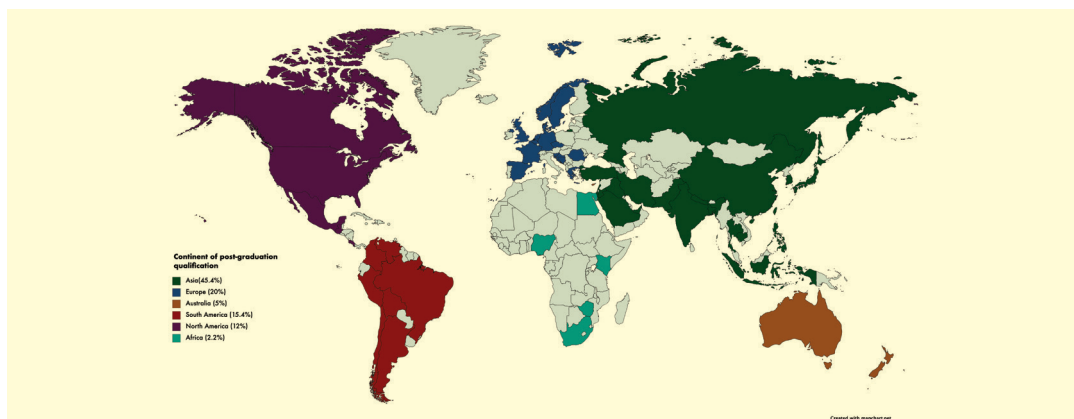


FIG. 2 Continent of post-graduation qualification.

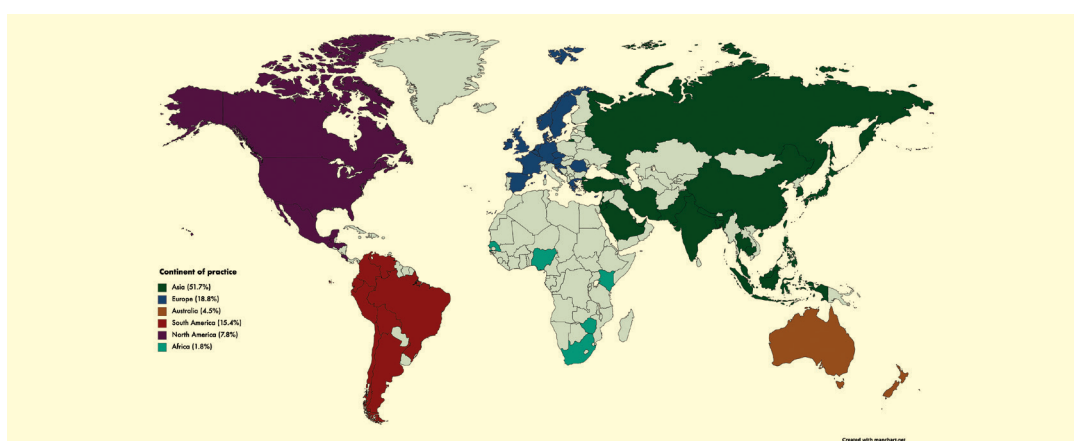


FIG. 3 Continent of practice.

comparison for these variables cannot be drawn across the continents due to the mismatch in the number of paediatric dentists from each region. Nearly three-quarters (76.28%) of paediatric dentists considered social media the most effective way to deliver information to parents on prevention strategies and emergency care during dental trauma in young children. Paediatricians (71.58%), schoolteachers (69.35%), and childcare providers (61.07%) were the other preferences. Some respondents considered print media (37.36%) and emergency medical doctors (30.87%) efficient ways of parental education on dental trauma. A small proportion of the participants (26.17%) provided this information only on parental request. There was no significant association between the continent of practice and the opinion of paediatric dentists on the most effective way to educate parents as regards to dental trauma prevention strategies ( $p=0.56$ ). However, the difference was statistically significant for all variables in this section, when their responses were considered within the continents. The survey ended for 84 (18.79%) participants who responded that paediatric dentists should not inform parents about dental trauma during their child's first dental visit. Therefore, the total number of participants was reduced to 363 for the remaining responses. There was no significant association between the continent of practice and parental guidance provided by the paediatric dentist (Table 3). Practice to provide information to parents on the prevention and emergency management of dental trauma showed that only 34% provided this information to parents routinely. However, this difference was significant when considered between various continents ( $p=0.001$ ). Others (32%) did this only at the parental request or when the parent came with complaints of dental trauma (41.04%). Upon evaluation of figures within the continents,

more than half of the paediatric dentists from North America educated parents only if they requested. However, if parents attended with TDIs, then the corresponding percentage of these paediatric dentists increased to 65%. A small proportion (5.23%) of the dentists did not provide any such information to the parents at all (Table 3). When asked about general information they deliver to parents during their dental visit, more than two-thirds of respondents (73%) educate parents about primary prevention at home. However, the majority of paediatric dentists from the American region inform parents about primary prevention at home in comparison to 73% of Asian and only 64% for European counterparts. Other advice given to parents included first aid information on orofacial and dental trauma (57.02%), primary prevention in the sports environment (55.64%), and the impact of TDIs on the quality of life of young children (15.97%). The differences between these variables were non-significant when compared among continents ( $p=0.35$ ). However, when checked within the continent the difference was significant for all variables except for the impact of TDIs on the quality of life of young children. Regarding the specific information on dental trauma routinely provided to parents, 78.23% of paediatric dentists imparted education on emergency care or first aid in case of TDIs to primary teeth, while only 64.73% advised parents on dental trauma prevention in primary teeth. As seen earlier, a higher number of paediatric dentists working in the American continents delivered parental education on emergency management in comparison to Asian or European-based participants. Sixty-nine percent of the respondents also provided specific information regarding the emergency management of avulsed permanent teeth and 71% about fractured permanent teeth. Emergency care for soft-tissue injuries was imparted by a lesser

Variable	Total number of paediatric dentists who participated in the survey n=447 n(%)	Paediatric dentists who did not believe in parental education on dental trauma n=363 n(%)
<b>Gender</b>		
Male	140 (31)	100 (28)
Female	302 (68)	262 (72)
Prefer not to say	5 (1)	1 (0)
<b>Age</b>		
25–30	16 (4)	5 (1)
31–40	174 (39)	145 (40)
41–50	145 (32)	125 (34)
51–60	85 (19)	64 (18)
>60	27 (6)	24 (7)
<b>Continent of post-graduation qualification</b>		
Asia	203 (45)	172 (47)
Europe	89 (20)	70 (19)
Australia	22 (5)	17 (4)
South America	69 (16)	52 (14)
North America	54 (12)	43 (12)
Africa	10 (2)	9 (2)
<b>Continent of practice</b>		
Asia	231 (52)	195 (54)
Europe	84 (19)	70 (19)
Australia	20 (4)	18 (5)
South America	69 (15)	51 (14)
North America	35 (8)	23 (6)
Africa	8 (2)	6 (2)
<b>Area of practice</b>		
Private practice/ clinic	324 (72)	297 (81)
Hospital	162 (36)	148 (40)
Academia	203 (45)	182 (50)
<b>Number of patients seen daily</b>		
<5	72 (16)	40 (11)
5–10	190 (43)	166 (46)
>10	185 (41)	157 (43)
<b>Years of experience</b>		
3–10	164 (37)	124 (34)
11–20	156 (35)	132 (36)
>21	127 (28)	107 (30)

TABLE 1 Demographic details of respondents.

proportion of paediatric dentists (41.87%), while a few (1.37%) did not give any such information. Similar trends were also observed when the analysis was performed within the continents. Less number of European, Asian, and Australian-based paediatric dentists delivered the above-mentioned details to parents in comparison to the American respondents (Table 3). The difference was significant for the majority of variables on the type of specific information delivered to parents within all continents. Three-fourths (75%) of participating paediatric dentists maintained that they are more experienced in imparting information to parents on dental trauma which was statistically significant. ( $p < 0.001$ ). Similarly, 70.79% accepted that paediatric dentists provided more information on preventing and managing dental injuries. For this variable too, almost 100% of North and South American participants agreed that they can educate parents on TDIs while the corresponding figures were 67% for both Asian and European counterparts. At the same time, only 49.31% believed that parents routinely approach paediatric dentists for various oral health practices related to their child's dental health, and 68% believed that paediatric dentists could reinforce the information

to parents at every recall visit. When the age of paediatric dentists was compared to evaluate the type of parental information delivered at the first dental appointment it was found that dentists aged 50 years or below more frequently provided routine oral health preventive advice to them in comparison to older paediatric dentists aged 50 years and above. This association with their age was statistically significant at  $p < 0.001$ . Interestingly, a greater number of younger participants thought social media to be an effective method to deliver information on TDIs. There was not much difference between the years of experience and practice of paediatric dentists on the type of information given to parents during their child's first dental appointment except guidance on bottle-fed caries, where it was seen that dentists with experience of less than 10 years or more than 21 years were lower in number than participants having work experience of 10–120 years. Only 47% of paediatric dentists with experience of fewer than 10 years believed that childcare providers are the most effective method to educate parents on TDIs in comparison to 71% of respondents with experience of 10–20 years. Paediatric dentists in all age groups and with different years of work experience agreed that social media is an effective method than print media to provide parental education. There was not much difference in the percentage of paediatric dentists as per workplace and their opinion on the most effective way to deliver parental information but statistically significant at  $p < 0.001$  (Table 4). Less than half of paediatric dentists were providing information to parents on the prevention and emergency management of dental trauma only if they came with dental trauma. This was true and statistically significant irrespective of their age, experience, and workplace (Table 5). Interestingly greater number of participants in the age group of 30–50 years educated parents about primary prevention, first aid, and the impact of TDIs on quality of life in comparison to the younger and older groups. However, not much difference in the percentage was noted between the different age groups of paediatric dentists in terms of their role and delivery of specific information to parents on TDIs. Another interesting finding was that hospital-based participants were the least in number in comparison to their counterparts working in academic institutions or private practice when their practice to educate parents on general as well as specific information on the management of dental trauma in children was evaluated. Overall, the higher number of paediatric dentists in teaching-based hospitals imparted parental knowledge on TDIs in contrast to those attached to a hospital or in private dental offices and significant at  $p < 0.001$ . This was true across all variables including on the role of paediatric dentists towards parental guidance on dental trauma.

## Discussion

To the best of the author's knowledge, this is the first report on attitudes and practices adopted by paediatric dentists regarding parental guidance on traumatic dental injuries (TDIs). This cross-sectional study comprised 447 responses from paediatric dentists from all over the world. The major finding of this survey was an unexpected one, almost 19% of participants answered that paediatric dentists should not inform parents about dental trauma during their child's first dental visit. Adequate knowledge about the management and consequences of dental trauma in children on the part of parents is imperative. Insufficient knowledge can lead to long-term functional deficits and aesthetic defects [Sigurdsson, 2013]. Many parents are unaware of this significance and the steps to be taken in dental trauma among children. In the present survey, only 32.23% of paediatric dental specialists out of 363 participants provided information to parents on the

Variables	Class	Continents						Significance (Across the Continent)		Significance (Across the study parameters)	
		Asia (n=231) n (%)	Europe (n=84) n (%)	Australia (n=20) n (%)	South America (n=69) n (%)	North America (n=35) n (%)	Africa (n=8) n (%)	Test Statistics	P value	Chi Square	P value
Area of Practice	Private practice/office/clinic n=324 (72%)	158(68)	61(73)	14(70)	58(84)	29(83)	4(50)	289.000	<0.001	82.710	<0.001
	Hospital n=162 (36%)	92(40)	25(30)	8(40)	23(33)	8(23)	6(75)	161.213	<0.001		
	Academia n=203 (45%)	104(45)	33(39)	5(25)	37(54)	20(57)	4(50)	202.000	<0.001		
Information given to parents during child's first dental appointment	Prevention oriented interventions n=427 (95%)	217(94)	81(96)	19(95)	67(97)	35(100)	8(100)	0.667	0.955	14.555	0.986
	Dietary counselling n=391 (87%)	197(85)	67(80)	19(95)	66(96)	34(97)	8(100)	0.001	1.000		
	Fluoride toothpaste use n=389 (87%)	196(85)	68(81)	17(85)	66(96)	34(97)	8(100)	0.653	0.957		
	OHI n=430 (96%)	227(98)	72(86)	20(100)	69(100)	34(97)	8(100)	2.001	0.572		
	Primary teeth role n=296 (66%)	140(61)	54(64)	13(65)	55(80)	27(77)	7(88)	11.188	0.048		
	Bottle fed caries n=328 (73%)	164(71)	62(74)	16(80)	53(77)	25(71)	8(100)	68.062	<0.001		
	Infant feeding practices n=270 (60%)	134(58)	42(50)	7(35)	54(78)	25(71)	8(100)	39.847	<0.001		
	Teething n=233 (52%)	119(52)	38(45)	7(35)	41(52)	24(69)	4(50)	83.281	<0.001		
	Finger-sucking habits n=235 (52%)	113(49)	40(48)	7(35)	42(61)	24(69)	6(75)	19.742	<0.001		
Most effective way to educate parents	Social media n=34 (76%)	183(79)	64(76)	11(55)	50(72)	25(71)	8(100)	14.113	0.015	37.908	0.565
	Print media n=167 (37%)	101(44)	21(25)	3(15)	22(32)	16(46)	4(50)	26.472	<0.001		
	Childcare providers n=273 (61%)	144(62)	51(61)	6(30)	42(61)	22(63)	8(100)	68.583	<0.001		
	School teachers n=310 (69%)	161(70)	64(76)	7(35)	43(62)	27(77)	8(100)	32.486	<0.001		
	Educational campaigns n=249 (55%)	135(58)	41(49)	6(30)	40(58)	22(63)	5(63)	85.684	<0.001		
	Paediatricians n=320 (72%)	173(75)	53(63)	18(90)	56(81)	16(46)	4(50)	22.719	<0.001		
	General dentists n=227 (51%)	119(52)	39(46)	2(10)	38(55)	23(66)	6(75)	49.803	<0.001		
	Emergency medical doctors n=138 (31%)	62(27)	18(21)	2(10)	17(25)	14(40)	5(63)	54.774	<0.001		
	Only on parental request n=117 (27%)	59(26)	22(26)	2(10)	18(26)	13(37)	3(38)	57.785	<0.001		

TABLE 2 Association between the continent of practice and various study parameters (n=447).

prevention and emergency management of dental trauma. If another 84 responses are added for whom the survey was ended once they answered that paediatric dentists should not inform parents about dental trauma during their child's first dental visit, then this percentage is further reduced to only 26.84%. In a study done in Brazil, the majority of the parents of 12 to 36 months old toddlers could not identify dental trauma in their children. It also found that the effect of oral health status on quality of life and caregiver's schooling was also associated with parents' identification of dental trauma in these toddlers [Ramos-Jorge et

al., 2013]. Even highly educated parents had negligent information about managing a case of dental trauma. It is also essential to repeat and reinforce the concepts of preventive strategies in a tailored manner over a shorter period for better results [Kulkarni, 2013]. Social media was found to be the most effective way by two-third of participating dentists to deliver information on TDIs than print media to deliver this message in the present study. Most apps available focus on permanent teeth and addressed several TDI in the English language only on applications related to TDIs as per recent critical appraisal done by Loureiro et al., [2022]. On

Variables	Class	Continents						Significance (Across the Continent)		Significance (Across the study parameters)	
		Asia (n=195) n (%)	Europe (n=70) n (%)	Australia (n=18) n (%)	South America (n=51) n (%)	North America (n=23) n (%)	Africa (n=6) n (%)	Test Statistics	P value	Chi-Square	P value
Practice to provide information to parents on prevention and emergency management of dental trauma	Yes (n=120; 34%)	62 (32)	24(34)	1(6)	22(43)	10(43)	1(17)	<b>108.701</b>	<b>&lt;0.001</b>	<b>5.026</b>	<b>0.992</b>
	No (n=19; 5%)	11 (6)	4(6)	0(0)	3(6)	1(4)	0(0)	<b>0.500</b>	<b>0.779</b>		
	Only on parental request (n=117; 32%)	59 (30)	22(31)	2(11)	18(35)	13(57)	3(50)	<b>8.909</b>	<b>0.003</b>		
	Only if parent comes with complaint of dental trauma (n=149; 41%)	73 (37)	27 (39)	3 (17)	26 (51)	15(65)	5 (83)	<b>55.137</b>	<b>&lt;0.001</b>		
General information given to parents on dental trauma	Primary prevention at home (n=266;73%)	143(73)	45 (64)	5 (28)	47 (92)	22(96)	4 (67)	<b>42.543</b>	<b>&lt;0.001</b>	<b>21.827</b>	<b>0.350</b>
	Primary prevention at sport environment (n=202; 56%)	108(55)	37 (53)	4 (22)	32 (63)	17(74)	4 (67)	<b>15.800</b>	<b>&lt;0.001</b>		
	First aid in orofacial and dental trauma (n=207; 57%)	110(56)	44 (63)	8 (44)	30 (59)	13(57)	2 (33)	<b>12.231</b>	<b>0.032</b>		
	Impact of traumatic dental injuries on quality of life of young children (n=58; 16%)	32 (16)	12 (17)	0 (0)	8 (16)	6(26)	0 (0)	<b>4.560</b>	<b>0.102</b>		
	I do not give (Other) (n=82; 23%)	41 (21)	11 (16)	1 (6)	12 (24)	16 (70)	1 (17)	<b>99.169</b>	<b>&lt;0.001</b>		
Specific information routinely given to parents on dental traumatic injuries in children	Emergency care or first aid in cases of traumatic dental injuries to primary teeth (n=284; 78.23%)	156(80)	50 (71)	5 (28)	47 (92)	23(100)	3 (50)	<b>52.002</b>	<b>&lt;0.001</b>	<b>15.663</b>	<b>0.924</b>
	Prevention of dental trauma in primary teeth (n=235; 65%)	123(63)	45 (64)	8 (44)	46 (90)	19 (83)	4 (67)	<b>16.274</b>	<b>&lt;0.001</b>		
	Emergency care in cases of fractured and loose permanent teeth (n=259; 71%)	132(68)	47 (67)	8 (44)	46 (90)	20 (87)	6 (100)	<b>22.872</b>	<b>&lt;0.001</b>		
	Emergency management of avulsed permanent teeth (n=249; 68%)	135(69)	46 (66)	4 (22)	39 (76)	19 (83)	6 (100)	<b>48.809</b>	<b>&lt;0.001</b>		
	Emergency care of soft tissue injuries (n=152; 41.87%)	86 (44)	23 (33)	4 (22)	25 (49)	11(48)	3 (50)	<b>15.317</b>	<b>0.009</b>		
	I do not give (Other) (n=5; 1.37%)	3 (1)	0 (0)	0 (0)	0 (0)	2 (9)	0 (0)	<b>1.923</b>	<b>0.166</b>		
Role of paediatric dentists towards parental guidance on dental trauma	More experienced in imparting information to parents (n=271; 75%)	151(77)	48 (69)	5 (28)	41 (80)	23 (100)	3 (50)	<b>54.969</b>	<b>&lt;0.001</b>	<b>35.543</b>	<b>0.078</b>
	More information on prevention and management of dental injuries (n=257; 71%)	126(67)	47 (67)	8 (44)	48 (94)	23 (100)	5 (83)	<b>46.318</b>	<b>&lt;0.001</b>		
	Parents routinely approach paediatric dentists for information (n=179; 49%)	89 (46)	29 (41)	11 (61)	25 (49)	21 (91)	4 (67)	<b>23.896</b>	<b>&lt;0.001</b>		
	Paediatric dentists can reinforce the information to parents at every recall visit (n=246; 67%)	133(68)	45 (64)	4 (22)	39 (76)	19 (83)	6 (100)	<b>48.894</b>	<b>&lt;0.001</b>		
	Parents tend to trust paediatric dentists more (n=222; 61%)	134(69)	33 (47)	4 (22)	32 (63)	15 (65)	4 (67)	<b>29.407</b>	<b>&lt;0.001</b>		

#: The survey ended for 84 participants out of 447 who responded that paediatric dentists should not inform parents about dental trauma during their child's first dental visit.

TABLE 3 Association between the continent of practice and parental guidance.

Variables	Age			Chi-square	P value	Experience			Chi-square	P value	Area of practice			Chi-square	P value
	Less than 30 years (n-16) n (%)	30–50 years (n-319) n (%)	More than 50 years (n-112) n (%)			Less than 10 years (n-164) n (%)	10–20 years (n-156) n (%)	More than 21 years (n-127) n (%)			Private practice (n-324) n (%)	Hospital (n-162) n (%)	Academia (n-203) n (%)		
<b>Information given to parents during child's first dental appointment</b>															
1.Prevention oriented interventions	8 (50%)	203(64%)	58 (52%)	<b>1746.798</b>	<b>&lt;0.001</b>	152 (93%)	148 (95%)	111 (87%)	<b>47.782</b>	<b>&lt;0.001</b>	303 (94%)	142 (87%)	194 (96%)	<b>481.062</b>	<b>&lt;0.001</b>
2.Dietary counseling	14 (87%)	275 (86%)	89 (79%)			137 (84%)	136 (87%)	105 (83%)			281 (87%)	133 (82%)	154 (76%)		
3.Fluoride toothpaste use	9 (56%)	178 (56%)	47 (42%)			114 (70%)	134 (86%)	98 (77%)			276 (85%)	134 (83%)	175 (86%)		
4.OHI	10 (62%)	204 (64%)	59 (53%)			150 (91%)	151 (97%)	112 (88%)			298 (92%)	142 (88%)	199 (98%)		
5.Primary teeth role	4 (2%)	114 (36%)	27 (24%)			105 (64%)	110 (71%)	73 (57%)			221 (68%)	105 (65%)	139 (68%)		
6.Bottle fed caries	2 (1%)	121 (38%)	35 (31%)			97 (59%)	125 (80%)	87 (69%)			238 (73%)	107 (66%)	155 (76%)		
7.Infant feeding practices	8 (50%)	190 (60%)	68 (61%)			83 (51%)	106 (68%)	76 (60%)			199 (61%)	90 (55%)	134 (66%)		
8.Teething	10 (62%)	167 (52%)	52 (46%)			81 (49%)	83 (53%)	61 (48%)			181 (56%)	79 (49%)	109 (54%)		
9.Finger-sucking habits	13 (81%)	162 (51%)	49 (44%)			78 (47%)	84 (54%)	62 (49%)			177 (55%)	65 (40%)	101 (50%)		
<b>Most effective way to educate parents</b>															
1.Social media	13 (81%)	242 (76%)	77 (69%)	<b>1441.867</b>	<b>&lt;0.001</b>	126 (77%)	122 (78%)	84 (66%)	<b>31.410</b>	<b>&lt;0.001</b>	242 (75%)	112 (69%)	153 (75%)	<b>31.410</b>	<b>&lt;0.001</b>
2.Print media	8 (50%)	119 (37%)	39 (35%)			51 (31%)	66 (42%)	49 (39%)			121 (37%)	58 (36%)	92 (45%)		
3.Childcare providers	8 (50%)	196 (61%)	62 (55%)			77 (47%)	110 (71%)	78 (61%)			193 (60%)	85 (52%)	129 (64%)		
4.School teachers	14 (87%)	226 (71%)	64 (57%)			110 (67%)	115 (74%)	79 (62%)			221 (68%)	107 (66%)	162 (80%)		
5.Educational campaigns	7 (43%)	175 (55%)	60 (54%)			83 (51%)	93 (60%)	66 (52%)			174 (54%)	78 (48%)	127 (66%)		
6.Paediatricians	15 (94%)	224 (70%)	69 (62%)			118 (72%)	104 (67%)	86 (68%)			228 (70%)	97 (60%)	156 (77%)		
7.General dentists	9 (56%)	164 (51%)	47 (42%)			80 (49%)	78 (50%)	62 (49%)			154 (48%)	74 (46%)	112 (55%)		
8.Emergency medical doctors	4 (2%)	47 (15%)	27 (24%)			35 (21%)	50 (32%)	31 (24%)			80 (27%)	43 (26%)	59 (29%)		
9.Only on parental request	0 (0%)	0 (0%)	0 (0%)			0 (0%)	0 (0%)	0 (0%)			0 (0%)	0 (0%)	0 (0%)		

Total number of Participants – 447

**TABLE 4** Association between type and effective way to deliver parental information and age, experience of practice areas of paediatric dentists (n=447).

the other hand, some parents preferred written information from the dentist and had various concerns regarding dental trauma [Bamashmous et al., 2020]. The free dental trauma first aid app called "Tooth SOS" by IADT is an excellent source of information on steps to be taken on the spot in case of dental trauma for both primary and permanent teeth [Khehra et al., 2021] and is being used in many regions such as Europe, the United States, Canada, Asia, Latin America and the Caribbean, and Africa, the Middle East, and India. In the present study, parents were educated during the first visit on TDIs only at their request by one-third of participating paediatric dentists. As per the best practices guidelines recommended by AAPD, practitioners should provide age-appropriate injury prevention counseling for orofacial trauma [2018]. Caregivers have reported that much of the time they had difficulty in access to emergency care even if their child had a dental home [Meyer et al., 2017]. Dental fear of the parents also often acts as a barrier to availing of proper dental treatment [Olak et al., 2013]. Hence the paediatric dentist must take an empathetic and child-centered approach in providing regular and appropriate information about dental trauma and its emergency management. The Italian Ministry of Health put forward guidelines that include strategies for preventing and managing dental trauma in children. Educating parents regarding the prevention of dental trauma is one of them [Cagetti et al., 2019]. Implementing these preventive measures depend on accurate information disseminated between dental professionals and parents [Cagetti et al., 2019]. Toddlers who are just starting to walk, young and obese subjects, and children with increased overjet have an increased risk of typical "face-first" falls. Hence, secondary and tertiary prevention measures can also be given to the parents, so they understand the wide range of treatment

options available to reduce adverse effects and complications by correct treatment of the dental trauma [Born, 2019]. The results of this study are based on the responses of paediatric dentists from different parts of the world. Their attitudes and practices responses could have been influenced by various factors such as socio-economic, cultural, and educational. Almost half of the respondents were from Asian countries which may have led to sampling bias resulting in reduced external validity of the findings as there may be inter-continental differences in practices. This can be considered one of the limitations of the study, although it could not be controlled. In a detailed study on different curricula globally [Dabaghi-Tabriz et al., 2019], it was found that while certain western universities empathised with preparing paediatric dentists to lead the responsibility of children's preventive dentistry in public health and private practice while universities in the middle east and Asian dental schools stress more on comprehensive goals such as the ability to carry out public health training and management of children's oral problems. The anticipatory guidance put forward by AAPD [2018] includes parental education on TDIs. These TDIs can occur at different age groups throughout childhood, and facial trauma causes damage to teeth to have adverse functional, esthetic, and psychological effects on the children [Lee and Divaris, 2019]. Therefore, there is a need for paediatric dentists to provide dental trauma prevention counseling based on the child's age. It could include suggestions regarding appropriate play objects, pacifiers, the use of athletic mouthguards for sporting activities, etc. The information provided by paediatric dentists should address the importance of the individual mouthguard as well. Tripodi et al., 2021 concluded that the custom-made mouthguards are not only essential for the dental trauma prevention but also for oral

Variables	Age			Chi-square	P value	Experience			Chi-square	P value	Area of practice			Chi-square	P value
	Less than 30 years (n-5) n (%)	30-50 years (n-270) n (%)	More than 50 years (n-88) n (%)			Less than 10 years (n-124) n (%)	10-20 years (n-132) n (%)	More than 21 years (n-107) n (%)			Private practice (n-297) n (%)	Hospital (n-148) n (%)	Academia (n-182) n (%)		
<b>Practice to provide information to parents on prevention and emergency management of dental trauma</b>															
1. Yes	4 (80%)	91 (34%)	30 (34%)	<b>320.199</b>	<b>&lt;0.001</b>	46 (37%)	44 (33%)	37 (35%)	<b>4.243</b>	<b>0.120</b>	100 (34%)	38 (26%)	72 (40%)	<b>5.431</b>	<b>0.066</b>
2. No	2 (40%)	41 (15%)	19 (22%)			31 (25%)	13 (1%)	19 (18%)			47 (16%)	22 (15%)	33 (18%)		
3. Only on parental request	5 (100%)	82 (30%)	25 (28%)			47 (38%)	39 (30%)	29 (27%)			88 (30%)	35 (24%)	50 (27%)		
4. Only if parent comes with dental trauma	5 (100%)	107 (40%)	42 (48%)			53 (43%)	55 (42%)	37 (35%)			103 (35%)	49 (33%)	63 (35%)		
<b>General information given to parents on dental trauma</b>															
1. Primary prevention at home	3 (60%)	196 (73%)	57 (65%)	<b>232.367</b>	<b>&lt;0.001</b>	98 (79%)	98 (74%)	69 (64%)	<b>7.642</b>	<b>0.022</b>	196 (66%)	93 (63%)	130 (71%)	<b>38.983</b>	<b>&lt;0.001</b>
2. Primary prevention at sport environment	1 (20%)	150 (56%)	39 (44%)			69 (56%)	83 (63%)	48 (45%)			143 (48%)	67 (45%)	100 (55%)		
3. First aid in orofacial and dental trauma	1 (20%)	156 (58%)	40 (45%)			67 (54%)	83 (63%)	51 (48%)			148 (50%)	65 (44%)	106 (58%)		
4. Impact of dental injuries on quality of life of young children	1 (20%)	106 (39%)	18 (20%)			49 (40%)	55 (42%)	26 (24%)			98 (33%)	43 (29%)	61 (34%)		
5. I do not give (Other)	0 (0%)	2 (0%)	1 (0%)			1 (0%)	3 (0%)	0 (0%)			1 (0%)	1 (0%)	1 (0%)		
<b>Specific information routinely given to parents on dental traumatic injuries in children</b>															
1. Emergency care or first aid in cases of traumatic dental injuries to primary teeth	2 (40%)	202 (74%)	63 (72%)	<b>26.591</b>	<b>&lt;0.001</b>	102 (82%)	100 (76%)	73 (68%)	<b>5.724</b>	<b>0.057</b>	204 (69%)	93 (63%)	137 (75%)	<b>190.013</b>	<b>&lt;0.001</b>
2. Prevention of dental trauma in primary teeth	2 (40%)	173 (64%)	54 (61%)			84 (68%)	88 (67%)	67 (62%)			180 (61%)	77 (52%)	121 (66%)		
3. Emergency care in cases of fractured and loose permanent teeth	3 (60%)	180 (67%)	57 (65%)			91 (73%)	87 (66%)	72 (67%)			187 (63%)	79 (53%)	126 (69%)		
4. Emergency management of avulsed permanent teeth	1 (20%)	172 (64%)	57 (65%)			86 (69%)	86 (65%)	71 (66%)			181 (61%)	80 (54%)	125 (69%)		
5. Emergency care of soft tissue injuries	1 (20%)	116 (43%)	26 (30%)			57 (46%)	59 (45%)	59 (55%)			107 (36%)	51 (34%)	67 (37%)		
6. I do not give (Other)	0 (0%)	2 (0%)	0 (0%)			0 (0%)	1 (0%)	0 (0%)			0 (0%)	2 (0%)	0 (0%)		
<b>Role of paediatric dentists towards parental guidance on dental trauma</b>															
1. More experienced in imparting information to parents	5 (100%)	189 (70%)	63 (72%)	<b>6.975</b>	<b>0.031</b>	98 (79%)	93 (70%)	76 (71%)	<b>0.538</b>	<b>0.764</b>	199 (67%)	90 (61%)	138 (76%)	<b>13.368</b>	<b>&lt;0.001</b>
2. More information on prevention and management of dental injuries	1 (20%)	187 (69%)	53 (60%)			88 (71%)	95 (72%)	68 (64%)			175 (59%)	91 (61%)	124 (68%)		
3. Parents routinely approach paediatric dentists for information	3 (60%)	124 (46%)	43 (49%)			58 (47%)	66 (50%)	54 (50%)			133 (45%)	58 (39%)	89 (49%)		
4. Paediatric dentists can reinforce the information to parents at every recall visit	5 (100%)	172 (64%)	57 (65%)			90 (73%)	85 (64%)	68 (64%)			176 (59%)	87 (59%)	121 (66%)		
5. Parents tend to trust paediatric dentists more when it comes to their children's oral health advise	1 (20%)	158 (59%)	51 (60%)			76 (61%)	82 (62%)	62 (58%)			159 (54%)	73 (49%)	111 (61%)		

Total number of Participants – 363

**TABLE 5** Association between role and practice of paediatric dentists to deliver dental trauma related parental information as per their age, experience of practice areas (n=363 out of 447).

health in general as they provide reservoir of substances which are protective for the oral ecosystem. The outcomes of TDIs can be improved by increasing public awareness of emergency steps to be taken and with better access to emergency care around the clock [Cagetti et al., 2019]. Longitudinal studies should be planned to assess if paediatric dentists provide parental guidance on the use of individual mouthguards and personal protective equipment such as helmets, child seats, safety belts. Furthermore, future research should investigate whether these instructions can result in improved outcomes in the prevention of TDIs and possible complications in the primary teeth and permanent successors. It would also be interesting to evaluate if differences exist

in the knowledge and practices of paediatric dentists working in private practice and academia or public hospitals. Academicians are more in touch with reading and learning and so maybe are better than non-academics. However, paediatric dentists in private practice may have more time to deliver such advice than in public service.

**Recommendations**

As paediatric dentists are more experienced in managing TDI among paediatric patients, they should educate parents on emergency care at the first visit itself. It should be reinforced regularly using videos, brochures, and /or manuals. In the case

of children with increased overjet, the paediatric dentist should discuss the risk of dental trauma caused by face falls with the parents, and orthodontic consultation should be arranged. Sterile saline solution vials should be included in the first-aid kits to use in case of avulsed teeth. If a tooth injury has happened, parents should also be asked to look out for crown discoloration and fistula formation. Participation in continuing dental education programs is imperative for paediatric dentists to keep abreast of the latest information in Dentistry. Smartphone applications such as “Dental Trauma App” are also useful ways to educate parents regarding the timely management of tooth avulsion [Al-Musawi et al., 2019]. Furthermore, digital media must be incorporated to deliver information to parents in an effective way. Parents should be given this information even if not asked for it. Longitudinal studies are needed to establish the effectiveness of these strategies.

### Conclusions

It can be concluded that the attitude and practice of paediatric dentists toward parental education on traumatic dental injuries were not satisfactory. Many paediatric dentists do not impart education on emergency care and dental trauma prevention in primary teeth. Inter-continental differences in practices may have led to the observed differences. Parents should be informed about oral hygiene instructions and prevention-oriented interventions during the first visit and about managing TDIs.

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**Author contribution** All authors have made substantial contributions and approved the final version of the manuscript.

TW contributed to the conception of the manuscript, data analysis and manuscript writing. OTSO collected the data. RMS performed validation and interpretation of data prepared.

**Ethical approval** The study protocol was approved by the University research ethics committee. Informed consent was obtained from the participating paediatric dentists guaranteeing complete confidentiality of the data.

**Data availability statement** The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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