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Traumatic dental injuries in children: experience during the Covid-19 pandemic and parents' knowledge about their management

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Abstract: The social isolation measures adopted during the critical phase of the COVID-19 pandemic led children to spend most of their time at home. Isolation may alter the pattern of traumatic dental injury occurrences, inasmuch as studies point out that most traumatic accidents occur at home. Considering this scenario and the influence of emergency management on the prognosis of the injury, the aim of this study was to evaluate the experience of traumatic dental injuries in children before and during the pandemic, and the knowledge of this topic by the children's guardians. This cross-sectional study was conducted with guardians of children aged 0 to 6 years, residing in Juiz de Fora, MG, Brazil. The guardians answered an online questionnaire addressing personal information, traumatic dental injury experience before and during the pandemic, and knowledge of this topic. Descriptive and statistical analyses were performed using Pearson's chi-square test at a 5% significance level. The total sample consisted of 343 volunteers. A total of 95 and 92 injuries were reported before and during the pandemic, respectively; the home was the place of greatest occurrence. Most volunteers (88.1%) agreed that traumatic dental injuries are emergency situations, and were aware that the tooth/fragment had to be taken to the dentist after a fracture or avulsion (97.4%). This study revealed that the traumatic dental injury experience was similar before and during the pandemic, and that the volunteers had satisfactory knowledge, especially in recognizing the importance of immediate attention for a more favorable prognosis of these injuries.

Keywords: Child; Knowledge; Attitudes and Practices in Health.

Introduction

The sudden appearance of several cases of an acute respiratory syndrome with similar symptoms and etiology was noted in late 2019, and was subsequently identified as being caused by a new form of the coronavirus, then named COVID-19.[1,2] The virus outbreak spread rapidly, and required adoption of a quarantine as a social isolation measure to prevent the disease from spreading among the population.[1,3]

To this end, one of the main measures taken was to close down schools and kindergartens, in addition to limiting social contact and leisure activities outside the home. Children and their families were exceptionally affected by this situation.[4,5] The behavioral pattern of individuals subjected to confinement during the COVID-19 pandemic proved how social distancing led to behavioral changes in people's lifestyles,[6,7] and how it may have changed the pattern of traumatic dental injuries (TDIs). The scientific community reports that the most frequent cause of a TDI is falling from a height.[8] Furthermore, since TDIs occur more often at or around the home,[9,10] children are at a higher risk of most traumatic accidents in this environment. Therefore, social isolation was unlikely to result in a decrease in the incidence of TDIs requiring treatment.[11]

TDIs are considered dental emergencies[9] responsible for a considerable portion of bodily injuries,[12] and occur in 25% of school-age children.[13] Traumas involving the dentoalveolar region can result in fracture, displacement, or loss of dental elements; bone crushing or fracture; and soft tissue injuries, such as bruises, abrasions, and lacerations, which can have a strong impact on a child's quality of life.[14-18] The resulting changes in physical appearance may be associated with feelings of shame when smiling, laughing, or showing one's teeth; difficulties in speech and social relationships; irritability; and difficulty in maintaining a healthy emotional state.[10,19] In addition to the psychological and emotional impacts, children with deciduous teeth, who are affected by a TDI, may also suffer damage to the underlying permanent dentition, such as hypoplasia, discoloration, delayed eruption time, and dental malformation.[20-23]

Apart from the epidemiological aspects of TDIs during the COVID-19 pandemic, appropriate emergency intervention had to be provided at the time of the accident to improve the prognosis of these injuries. These actions are commonly performed by parents/guardians, especially in a scenario with social isolation measures.[24,25] However, some studies reveal that this population lacks adequate knowledge and is unprepared to deal with a TDI, leading to a delay in treatment and an unfavorable long-term prognosis.[9,19] Therefore, the major concern is to understand the TDI experience in children, and the profile and degree of information of parents/guardians on the subject, in an effort to ensure effective guidance and correct conduct, and hence minimize the negative effects of TDI and improve the prognosis.[9,19,26]

As previously highlighted, the implications of the COVID-19 pandemic on the context of multifactorial TDI management involve its etiology, its treatment and the monitoring of sequelae. Notably, COVID-19 has impacted the acquisition of new findings and scientific contributions to TDI research.[11] To date, there are limited reports on the impact of COVID-19 on the pediatric population in regard to TDI perspectives. Moreover, although there was a strong correlation between appropriate early management and better outcomes for traumatized teeth in children, the literature has shown that parental knowledge of TDI management is insufficient. There is an urgency for parents to be educated on the appropriate diagnosis and management of TDI.[27]

The hypothesis of this study is that children from 0 to 6 years of age in the municipality of Juiz de Fora experienced some sort of dental trauma during the period of social isolation, and that parents and/or guardians have insufficient knowledge about the emergency procedures for dental trauma. Thus, the aim of this study was to evaluate the TDI experience in children before and during the COVID-19 pandemic, and the level of knowledge of their parents/guardians regarding the emergency procedures adopted.

Methodology

This cross-sectional study was approved by the Human Research Ethics Committee of the Universidade Federal de Juiz de Fora, and conducted in the city of Juiz de Fora, Minas Gerais, Brazil. The sample was based on convenience and snowball sampling methods, and was composed of parents/guardians of children aged 0 to 6 years. Contact was made with parents/guardians of the children by email, telephone, and/or social networks (Instagram and WhatsApp) to present the research and the

informed consent form (ICF). Those who agreed to participate voluntarily in the study, and to the terms of the ICF, answered an online questionnaire through the Google Forms platform. Parents/guardians who did not fully complete the study were excluded.

The structured self-administered questionnaire was developed by researchers from previous studies[9,28], and tested in a pilot study with 40 parents/guardians of children who were not included in the sample. The final questionnaire consisted of 32 multiple-choice questions (Q) divided into three parts: Part I (Q1 to Q12), personal information and demographic characteristics of the children and their parents/guardians; Part II (Q13 to Q22), TDI experiences in children, and attitudes of parents/guardians during and prior to the period of social isolation; Part III (Q23 to Q32), knowledge/attitudes of parents/guardians toward TDIs in general.

The Statistical Package for the Social Sciences (SPSS, version 20, Chicago, IL, USA) was used to analyze the data. Data analysis included descriptive statistics using absolute and relative frequencies for categorical variables. The Pearson chi-square test was used to evaluate the association of the percentages of correct answers for parents'/guardians' knowledge/attitudes with the degree of education, length of professional experience, previous information on trauma, and TDI experience in children. A significance level of 5% ($p \leq 0.05$) was adopted.

Results

The power of the sample (n = 343) for this study was 98.63%, with a type β error of 0.05, a minimum effect of 0.30, and $\beta/\alpha = 1$. A total of 343 parents/guardians with a predominant age range between 30 and 39 years participated in the study, and answered the online questionnaire in the first semester of 2021. During this period, children in the region of the study were in total or partial social isolation without school activities. The mothers of the children were responsible for most of the completed questionnaires (88.9%). The demographic characteristics of the participants are shown in Table 1.

Table 1. Characterization of the sample (n = 343)

Variables	n	%
Parents' age (year)		
20–29	53	15.5
30–39	220	64.1
40–49	68	19.8
50 or older	2	0.6
Parents' gender		
Female	309	90.1
Male	34	9.9
Parents' education		
Incomplete elementary school	2	0.6
Complete elementary school	3	0.9
Incomplete high school	3	0.9
Complete high school	25	7.3
Incomplete college education	23	6.7
Complete college education	72	21.0
Incomplete graduate course	15	4.4
Complete graduate course	200	58.3
Children per family		
1 child	229	66.8
2 children	103	30.0
3 children	11	3.2
Family relationship		
Mother	305	88.9
Father	33	9.6
Other	5	1.5
Child's age (years)		
0–1	44	12.8
1–2	50	14.6
2–3	81	23.6
3–4	44	12.8
4–5	49	14.3
5–6	75	21.9
Child's gender		
Female	170	49.6
Male	173	50.4
Family income		
A	155	45.2
B1	75	21.9
B2	49	14.3
C1	38	11.1
C2	23	6.7
D	3	0.9
Type of domicile		
House	164	47.8
Apartment	179	52.2

The data are presented as integers and percentages.

When questioned about the social isolation adopted during the COVID-19 pandemic, 20.1% of the respondents said they were in total isolation, 28.3% said they were in partial isolation, and 48.7% said they had initially been in total isolation, but had changed over to partial isolation with time. Among the parents/guardians, 2.9% never adhered to the isolation measures. Most of the respondents (74.1%) stated that the leisure areas most commonly frequented by children were squares and parks in open areas, play areas and parks of condominiums, ranches and farms, while the remaining respondents (25.9%) stated that their children did not visit leisure areas during the social isolation period.

The occurrence of TDIs during the period before the pandemic (27.7%) and during the social isolation period (26.8%) was considered. The types of TDI with involvement of the tooth structure most often reported by the participants were fracture and dental dislocation, in the period both before (28.4%; 7.4%, respectively) and during the pandemic (17.4%; 9.8%, respectively). In addition, when addressing where the trauma occurred before the implementation of isolation measures, 14.7% of the reported traumatic accidents were said to have occurred in schools, 75.8% at home, and 9.5% in recreational areas. Comparatively, the percentages of traumatic accidents occurring during the pandemic took place at home and in recreational areas: 92.4% and 7.6%, respectively. Prior to the social isolation period, 43.1% of the participants who reported a TDI experience sought dental care in person, and 25.3%, by telephone. During the pandemic, 26.1% searched for face-to-face care, and 52.2% sought care by telephone. Table 2 presents information on where the TDI occurred, whether participants sought dental care, the number of affected teeth, and the immediate consequences of TDI among those experiencing trauma before and during the social isolation period of the COVID-19 pandemic.

The knowledge of the parents/guardians of the children on this subject was evaluated regardless of any previous TDI experience. As observed, 87.8% of the respondents considered TDI as involving a broken/chipped tooth, 80.5% as a tooth displaced from its original position, 77% as a tooth removed from the mouth, and 64.1% as bleeding of the soft tissues even without injury to the affected tooth. In addition, when asked about the traumatic situations that would lead them to seek a health professional, most parents/guardians (67.3%) stated that they would seek specialized care regardless of the presence of pain. A large portion of the respondents agreed (45.5%) or completely agreed (42.6%) that TDI is an emergency situation, and most of the study participants disagreed (38.5%) or completely disagreed (21.3%) that urgent care after a TDI is the sole responsibility of the dental surgeon. In addition, most respondents agreed (36.4%) or completely agreed (54.8%) that immediate attention to TDI by guardians is important to prevent tooth loss (Table 3).

The majority (78.5%) of the guardians said that they did not know (44.6%) or that they thought an avulsed tooth was definitely not lost (33.9%) (Table 3), and a large percentage of respondents knew that the tooth or dental fragment had to be transported to the dentist (97.4%) after fracture or avulsion. When asked about what method they would use to store the tooth or fragment that would be taken to the dental office, 55.1% of the interviewees stated that they would wrap it in gauze or a napkin, 17.2% would transport it in a container with saline solution, 12% would transport it immersed in milk, 11.1% would transport it in a container with water, 2.6% would discard the tooth or dental fragment, and 2% would transport it inside the child's mouth.

When asked whether they had previously received some type of information about TDI, only 35.9% of the parents/guardians said yes. Among these, 19.2% reported that the guidelines had been given by a dental surgeon, and the others reported receiving information through pamphlets and the Internet. Nevertheless, a large portion (90.7%) of the participants stated that they were interested in receiving guidance on the subject.

Associations were observed among the variables of degree of training of parents/guardians, receiving prior information about TDI ($p < 0.001$), and knowing that an intervention is required after a TDI ($p < 0.001$). In addition, the parents'/guardians'

Table 2. TDI experience before vs. during the social isolation period (n = 343).

Variables	Before pandemic		During pandemic	
	n	%	n	%
TDI experience				
Yes	95	27.7	92	26.8
No	248	72.3	251	73.2
TDI place of occurrence				
Home	72	75.8	85	92.4
School	14	14.7	-	-
Leisure	9	9.5	7	7.6
Sought dental care?				
Sought assistance	41	43.1	24	26.1
Did not seek	30	31.6	20	21.7
By phone	24	25.3	48	52.2
Number of affected teeth				
None	41	43.1	55	59.8
1	46	48.4	26	28.3
2	8	8.5	11	11.9
TDI immediate consequences				
Broken/chipped tooth	27	28.4	16	17.4
Tooth out of original position	7	7.4	9	9.8
Tooth came out of the mouth	-	-	4	4.3
Only soft tissue affected	61	64.2	63	68.5

TDI: Traumatic dental injury.

Table 3. Description of questions on knowledge of TDI (n = 343).

Questions on knowledge	Completely agree	Agree	Don't know	Disagree	Completely disagree
	n (%)	n (%)	n (%)	n (%)	n (%)
Q26 – TDI is an emergency situation	146 (42.6)	156 (45.5)	35 (10.2)	6 (1.7)	0 (0)
Q27 – After a tooth has been knocked out of the mouth, it will definitely be lost	27 (7.9)	50 (14.6)	153 (44.6)	83 (25.2)	30 (8.7)
Q28 – Immediate care of TDI is a totally professional matter; therefore, it does not require the intervention of the parents	36 (10.5)	44 (12.8)	58 (16.9)	132 (38.5)	73 (21.3)
Q29 – Immediate attention to dental trauma by the parents is important to save the tooth	188 (54.8)	125 (36.4)	29 (8.5)	1 (0.3)	0 (0)

awareness that TDI is considered an emergency situation ($p = 0.002$) and their knowledge of having to look for the tooth or dental fragment after fracture or avulsion ($p < 0.001$) were factors associated with their having received prior information on the subject and having had experience with TDIs (Table 4). The instrument showed acceptable reliability. Cronbach's alpha coefficient was 0.54 for Part III of the questionnaire (knowledge/attitudes of parents/guardians about TDIs in general).[29,30]

Table 4. Correct answers regarding knowledge/attitudes, considering level of education, number of children under their responsibility, previous information on TDI, and having witnessed TDI before (n = 343).

Questions on knowledge	Academic qualification			Children per family			Previous information			Trauma experience		
	With graduate schooling (n = 143)	Without graduate schooling (n = 200)	p-value	1 (n = 229)	2 or + (n = 114)	p-value	Yes (n = 123)	No (n = 220)	p-value	Yes (n = 187)	No (n = 156)	p-value
	n (%)	n (%)		n (%)	n (%)		n (%)	n (%)		n (%)	n (%)	
Q26	121 (84.6)	181 (90.5)	0.976	201 (87.7)	101 (88.6)	0.824	117 (95.1)	185 (84.1)	0.002	154 (82.3)	145 (93)	0.003
Q27	36 (25.2)	41 (20.5)	0.306	51 (22.3)	26 (22.8)	0.910	22 (17.9)	55 (-25)	0.129	46 (24.6)	33 (21.1)	0.450
Q28	69 (48.2)	136 (-68)	0.0002**	133 (58.1)	72 (63.1)	0.366	89 (72.3)	116 (52.7)	0.0003	123 (65.7)	88 (56.4)	0.075
Q29	128 (89.%)	185	0.334	207 (90.4)	106 (-93)	0.423	117 (95.1)	196 (89.1)	0.057	166 (88.7)	145 (-93)	0.185
Q30	52 (36.3)	86 (-43)	0.216	98 (42.8)	40 (35.1)	0.170	76 (61.8)	62 (28.2)	0.0000**	69 (36.9)	65 (41.6)	0.367

* = $p < 0.05$; ** = $p < 0.001$%. Source = Authors.

Discussion

This study provides insight into the TDI experience in Brazilian children and adolescents during the COVID-19 pandemic, and parents'/guardians' knowledge about TDI management. Our results revealed similarities in the TDI experience in the periods before and during the COVID-19 pandemic, and also reinforced the importance of improving the parents'/guardians' level of knowledge about dental traumas to ensure appropriate TDI diagnosis and management.

The results revealed a similar prevalence of the TDI experience before and during the COVID-19 pandemic by children and their guardians. However, this comparison between the two periods should be made cautiously, because the interval corresponding to the period prior to the pandemic, in most cases, extends for a greater number of months in the child's life than the period of social isolation (approximately 12 to 15 months after the beginning of the pandemic). A study by Pederielli et al.,[10] conducted with individuals of all ages during the pandemic, showed a decrease in the frequency of TDI cases during the social isolation period, compared with the months before and after the pandemic. The authors suggested that the risk of TDI was reduced by indoor life during this period.

Although the prevalence of TDI was maintained during the pandemic, differences were found in relation to where the trauma occurred. Most traumatic accidents occurred in the child's home, and the prevalence of household accidents increased after social isolation was implemented and schools were closed. Other studies have found similar results, and point out that most traumatic accidents occur in the child's home.[10,23,28] According to Pederielli et al.,[10] preschool children are more prone to falls at home or close to the home, since they have limited motor coordination when walking and running at this age.

The types of TDI most commonly reported by parents/guardians before and during the pandemic were dental fracture (28.4%; 17.4%, respectively) and dislocation (7.4%; 9.8%, respectively). This variation between the prevalence rates for dental fracture and dislocation can be explained, in some cases, by the fact that dislocations present minimal symptoms[31] and may be more difficult to diagnose clinically by those responsible for treating the injuries that affect the dental structures themselves. However, when questioned, the majority of parents/guardians

identified the different situations presented to them as dental trauma (fracture, dislocation, avulsion, and soft tissue injury).

Considering that the behavior of the child at the time of the trauma directly affects the prognosis of TDI, the knowledge of the parents/guardians regarding TDIs can determine the success or failure of treating these injuries.[25,28] However, the information in the current literature is scarce regarding the knowledge of this population in situations that require emergency care.[9,25]

The present study revealed relatively adequate knowledge of parents/guardians that dental trauma should be considered an emergency situation, that immediate care by guardians is important to save the tooth, and that immediate care for a dental trauma is not the sole responsibility of the dental surgeon, but rather, requires the intervention of those responsible for the child in these cases. This result diverged from that of other studies[9,25,28], which reported insufficient knowledge on the part of guardians. This divergence may have arisen because the present sample included mostly caregivers with a high educational level and socioeconomic status.

The present study found that most participants resorted to the assistance of a professional despite the pandemic, even only by telephone, contrary to the findings of a study by Pasiga.[32] The cited author explained that the reason why the number of parents/guardians who sought dental care after a dental trauma episode involving their children during the pandemic was so small could be attributed to the fear of contracting COVID-19 in a dental office environment.[32]

Other studies have also found that most caregivers consider taking an affected child to the dentist to seek qualified professional service.[9,19,24,28,33,34] These results demonstrate that the overall population is concerned with quality care, and is aware of the importance of taking a TDI-affected child to a specialized service, because most consider TDI as an emergency situation, and first care as crucial to the good progression and successful treatment of TDI.[9]

Most participants in the present study did not know how to answer (44.6%) the question regarding an avulsed tooth, or else thought that it would not be lost definitively (33.9%). This question should be evaluated with caution. It is noteworthy to mention that this study addressed parents of children aged 0 to 6 years, and mostly in their primary dentition. According to the International Association of Dental Traumatology (IADT),[35] an avulsed primary tooth should not be reimplanted, and should be considered as completely lost. Attention should focus on carefully monitoring the development and eruption of the permanent tooth.

Nevertheless, a search should be performed for the avulsed tooth or the dental fragment, in the case of coronary fracture, to avert the risk that it may have entered the soft tissues of the lip, cheek, or tongue, or that it may have been pushed into the nose, ingested, or aspirated, thereby causing a medical emergency.[35] The knowledge of parents/guardians regarding this issue was satisfactory, because the vast majority were aware that they had to transport the tooth or dental fragment to the dental surgeon after fracture or avulsion.

Although the guardians were aware of the recommendation not to perform primary tooth reimplantation, their knowledge was deficient with regard to the storage medium of the dental fragment. The alternative most often selected by the respondents was storage in gauze or a napkin, while dry storage was the medium with the worst prognosis for TDI.[36]

This study emphasized the importance of providing parents/guardians with knowledge about TDI, because those who had received prior information were more aware of what actions had to be taken at the time of the accident. In addition, guardians who had previously received guidance, and those who had previously experienced an episode of TDI with their children were more aware of the urgency of the situation.

Considering that the questionnaire addressed previous experiences of the participants, whether recent or not, the memory bias of the guardians can be considered a limitation of this study. In addition, the snowball sampling method of the study led participants to disseminate the research among groups from their own social environment. This process led to the enrollment of a greater number of participants from the same socioeconomic class (class A) and with a high degree of education, thus leading to more satisfactory results regarding the knowledge of parents/guardians.

This study suggested that parents/guardians had satisfactory knowledge of the emergency management of TDIs, especially in regard to recognizing their role in these situations. Additionally, those who had previous information/experience, as well as those with a higher level of education, also had a higher level of knowledge. Considering that the child's home is described as the place of greatest occurrence of traumatic accidents[9,10], the guardian is highly likely to be present at that time. Thus, this population must be made aware of the main emergency procedures advised in these situations, and their importance in improving the prognosis of the injury. In addition, the vast majority of respondents were interested in receiving more information on the subject, thus suggesting the importance of developing informative material that can be disseminated by social networks (Instagram and WhatsApp), and of promoting actions at schools, aimed at providing knowledge to this specific audience.

Conclusion

This study revealed that the TDI experience in the periods before and during the COVID-19 pandemic was similar. In addition, the parents'/guardians' knowledge about TDI was satisfactory, especially in recognizing TDI as an emergency situation requiring their immediate attention, and the action of a dental surgeon after the injury.

To the best of our knowledge, the results of our study have helped to answer questions such as the influence of factors associated with the COVID-19 pandemic on the prevalence of TDI in groups of children and adolescents; the possible changes in the etiological profile and risk factors related to the different types of dental trauma and their sequelae; and the effects of the COVID-19 pandemic on the physical health of children and adolescents affected by TDI. These are important issues that should be addressed by TDI researchers.

In addition, it was shown that the parents/guardians who received prior guidance and those who had previous experience with a child affected by a TDI were more aware of the urgency of the situation, and of the actions to be taken at the time of the accident. These results emphasize the relevant role of multidisciplinary approaches to improve parents'/guardians' knowledge and emergency management of TDIs.

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