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Original Research Article

Knowledge about tooth avulsion and replantation among students from public schools

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Abstract

Introduction: Research on knowledge regarding tooth avulsion and replantation among children and adolescents is still scarce. **Objective:** This cross-sectional study aimed to evaluate the knowledge about tooth avulsion and replantation and their association with independent variables among 7th-grade students in public schools. **Material and methods:** Data collection on the knowledge regarding tooth avulsion and replantation (nine questions) and sociodemographic profile was performed through semi-structured and self-administered questionnaires. The presence of trauma in permanent incisors of students (n=251) was obtained in a clinical examination performed by a calibrated examiner in Sertaozinho, Sao Paulo, Brazil. After a descriptive data analysis, association and multiple logistic regression tests were applied at a significance level of 5%. **Results:** Most of the students were female (61.4%), were residents in suburban areas (89.6%) and did not present dental trauma (87.7%). Students answered correct 42.2% of the questions. The variable "last visit to the dentist" was the only one that showed a statistically significant association with knowledge about tooth avulsion and replantation in the bivariate analysis (p = 0.007) and the logistic regression (p = 0.031). **Conclusion:** The level of knowledge was low, and the students whose last visit to the dentist was two years or longer showed a greater chance of having less knowledge about tooth avulsion and replantation. Clinical Significance: During routine dental visits, the dental team should educate patients about the procedures to manage different situations of dental trauma.

Introduction

Tooth avulsion is characterized by the complete displacement of the dental element from its socket [4], which presents empty or filled with a blood clot, showing immediate rupture of the periodontal ligament and the neurovascular bundle [3]. The prevalence of this occurrence in children and adolescents of different countries varies from 0.6% to 20.8% [1, 10, 16, 17, 19, 22, 23].

The treatment of choice for avulsion is dental replantation, and its prognosis depends on factors such as extra-alveolar time, degree of rhizogenesis, and the medium in which the dental element was storaged [14].

Some of these factors are dependent on the knowledge of people who suffer or witness the trauma. In fact, knowledge about managing tooth avulsion is critical for the good prognosis of dental replantation. However, studies have shown that knowledge about tooth avulsion and replantation among adolescents is scarce [2, 5, 12, 15], especially in Brazil [7, 8]. Their results have also shown that this population group has little knowledge of this topic.

Since adolescents with knowledge of tooth avulsion and replantation may help a friend who suffers the trauma and the scarcity of studies with this populational group, the objective of this study was to evaluate the level of knowledge about dental avulsion and associated variables among 7th-grade students in public schools.

Material and methods

This study was carried out following the ethical recommendations of Resolution n. 466, December 12, 2012, of the National Health Council. The project was approved by the Institutional Research Ethics Committee (CAAE 06971118.8.0000.5416).

This is a population-based cross-sectional observational study (census) with two phases: a) filling in semi-structured and self-administered questionnaires; b) intra-oral clinical examination.

From a target population of 1812 students, 1,073 schoolchildren enrolled in the 7th grade (12 to 13-year-old) of public schools in Sertaozinho, Sao Paulo State, Brazil, were invited to participate in the study (one school did not allow participation of their students, and many students missed the day of study presentation/invitation to participate or the day of data collection).

The inclusion criteria were having a Signed Consent Form for students and their guardians, and the exclusion criteria were a) absence on the day of data collection; b) the presence of cognitive disorders according to information provided by teachers.

A total of 251 students composed the final sample, providing a response rate of 23.4%. Considering that this study it was also collected data on the prevalence of trauma, this sample size was sufficient when assuming an average prevalence of dental trauma of 18% [21], which would require a sample size of 227 individuals for estimating the expected proportion with 5% absolute precision and 95% confidence [11].

The following variables were collected:
a) Sociodemographic profile: age, sex, neighborhood, type of residence, number of bedrooms in the house, family income.
b) Characteristics of the guardians: civil status, education level, occupation, perception of the child's oral health.
c) Child's access to dental services: last visit to the dentist, the reason for the visit, and the use of orthodontic appliances.
d) Knowledge about tooth avulsion and replantation: what to do when the tooth comes out of the mouth, what is dental trauma, risk situations for the tooth, identification of the portion of the tooth that we see when looking in the mirror, situations about the management of the avulsed tooth, storage medium, extra-alveolar abiding time and who can put the tooth back in place.
e) Oral health-related quality of life: the presence of bad breath and food residues on the teeth, difficulty biting or chewing and drinking or eating hot and cold food, upset and stress level, avoiding smiling/laughing, and arguing with children/family because of one's oral condition.
f) Clinical condition: the presence of trauma to the upper or lower incisors.

The questionnaires were filled out by the students and their guardians to obtain data on sociodemographic profiles and access to dental services [6]. Knowledge about tooth avulsion and replantation was collected using a questionnaire developed and validated for 12-year-old students based on Focus Group Theory and Item Response Theory [8]. Data on oral health-related quality of life (OHRQoL) were collected through the Brazilian Portuguese version of the Child Perceptions Questionnaire (CPQ$_{11-14}$ ISF: 8) short form [25]. The questionnaire encompasses four domains on oral symptoms, functional limitations, emotional and social well-being with a score ranging from 0 to 32 points according to the 5-point Likert scale: never = 0, once or twice = 2, sometimes = 3, often = 4, and every day or almost every day = 5; the higher

the score, the greater the impact. The answers were considered correct according to the study that developed the questionnaire used [8] and the recommendations of the International Association Dental Traumatology (IADT) guidelines [14].

Before the data collection, a pretest was conducted with 20 randomly drawn students from the 7th grade to test the study methodology and assess the difficulties in understanding the questions and alternative answers to the questionnaires. The questions that presented misunderstanding greater than or equal to 20% [24] were reviewed (n = 4). The data collected in the pretest were not included in the final analysis.

The questionnaire was applied in the classroom. For the clinical examination, an examiner (I.S.C) was properly trained and calibrated (test-retest; 96.4% agreement after one week), according to the methodology proposed by a national epidemiological survey [6]. The clinical exams were carried out at the school, under natural light and with a sterilized clinical mirror. Data on the presence of trauma to the permanent incisors were registered on a standardized form. The following pre-established criterion on dental trauma [6] was used to evaluate the permanent upper and lower incisors: 1. the absence of trauma; 2. enamel fracture; 3. enamel and dentin fracture without pulp exposure; 4. enamel and dentin fracture with pulp exposure, and 5. absence of the tooth due to trauma. Students with a fixed orthodontic appliance answered the questionnaire but did not receive a clinical exam (n = 47).

Descriptive statistical analysis was performed, and absolute and relative frequencies were presented for categorical variables. Mean, standard deviation, median, minimum, and maximum values were given for the quantitative variables. The response variable "level of knowledge about tooth avulsion and replantation", whose sum of correct answers totaled a maximum of 9 points, was dichotomized according to the median (≤4 or > 4 correct answers). The associations between the response and independent variables were tested using Chi-square and Fisher's Exact. Independent variables with $p<0.20$ were included in a multiple logistic regression model, with an estimate of odds ratios with the respective 95% confidence intervals, and a significance level of 5%. All the analyses were performed using SPSS (version 17.0, Chicago: SPSS Inc).

Results

The mean age of the students was 12.8 years (standard deviation = 0.8). Most of them were female (61.4%), had family income up to USD599.52 per month (61.0%), visited the dentist a year ago or less (52.2%) and were not undergoing orthodontic treatment (80.5%). Regarding the level of knowledge about tooth avulsion and replantation, the students had an average of 3.8 correct answers (standard deviation = 1.5), corresponding to 42.2% of questions answered correctly. The prevalence of dental trauma was 12.3%, and the mean score for the oral health-related quality of life was 8.8 (table I).

Table I – Descriptive analysis of the sample of 7th grade students from the public schools in Sertaozinho, SP, 2019

Variable	N (%) or MCTD†
Gender	
Male	97 (38.6)
Female	154 (61.4)
Neighborhood	
Downtown	15 (6.0)
Suburb	225 (89.6)
No information	11 (4.4)
Education level of the guardian	
Elementary school	44 (17.5)
Middle school	68 (27.1)
High school	99 (39.4)
Higher education	25 (10.0)
Never went to school	2 (0.8)
No information	13 (5.2)
Paid work of the guardian	
Not	125 (49.8)
Yes	110 (43.8)
No information	16 (6.4)
Type of residence	
Own settled	65 (25.9)
Own financed	57 (22.7)
Rented residence	83 (33.1)
Provided by parents	37 (14.7)
In Exchange for work	2 (0.8)
Ceded (homeless)	2 (0.8)
No information	5 (2.0)

To be continued...

Continuation of table I

Variable	N (%) or MCTD†
Number of bedrooms in the residence	
1	11 (4.4)
2	108 (43.0)
3	51 (20.3)
4	50 (19.9)
More than four	24 (9.6)
No information	7 (2.8)
Family income (USD)§	
Up to 59,95	5 (2.0)
60.19 to 119.90	20 (8.0)
120.14 to 359.71	62 (24.7)
359.95 to 599.52	66 (26.3)
599.76 to 1,079.13	27 (10.8)
1,079.37 to 2,278.17	9 (3.6)
More than 2,278.17	1 (0.4)
No information	61 (24.3)
Child's last visit to the dentist	
1 year ago or less	131 (52.2)
It's been 2 years	28 (11.2)
Between 3 and 5 years	22 (8.8)
Over 5 years	8 (3.2)
Never went to the dentist	18 (7.2)
No information	44 (17.5)
Reason for visiting the dentist	
Prevention or routine	100 (39.8)
Treatment	117 (46.6)
Never went to the dentist	24 (9.6)
No information	10 (4.0)
Child under orthodontic treatment	
No	202 (80.5)
Yes	45 (17.9)
No information	4 (1.6)
Guardian's perception of the child's oral health	
Excellent	24 (9.6)
Very good	29 (11.5)

Variable	N (%) or MCTD†
Good	63 (25.1)
Regular	79 (31.5)
Bad	27 (10.8)
No information	29 (11.5)
Presence of dental trauma‡	
No	179 (87.7)
Yes	25 (12.3)
Level of knowledge about avulsion and dental replantation (0 to 9)	Average = 3.8 SD = 1.5 Median = 4 Minimum = 0 Maximum = 7
Total score CPQ_{11-14} (0 to 32)	Average = 8.8 SD = 4.8 Median = 8.0 Minimum = 0 Maximum = 24

† MCTD: measures of central tendency and dispersion

‡ Data from 47 students who used an orthodontic appliance were not included

§ 1 USD= 4.17 BRL at the time of the data collection (October 1, 2019)

Table II shows the answers to each question about knowledge of dental trauma. The majority of the students have mentioned fights as the situation of greatest risk for tooth trauma (53.8%), 72.9% would pick the tooth up and look for a dentist immediately, and 83.7% thought that the dentist would be the only person to be able to put the tooth back in place. Regarding the ideal time for the tooth to remain out of the mouth before being replanted, only 17.1% knew that the tooth should be replanted immediately. Only 0.4% of students would keep the permanent tooth in milk until they reached the dentist or in saline solution (15.5%), and 37.1% did not know the best storage medium or would place it in an unfavorable location (41.1%). A total of 40.2% considered trauma a violent knock on the teeth, and 42.2% knew that the part of the tooth they see when looking in the mirror was called "crown".

Table II – Frequency [n (%)] of answers to each of the 9 questions that assess the level of knowledge about dental avulsion/replantation among 7th-grade students in public schools, Sertaozinho, SP, 2019

Question	n (%)	Frequency [n(%)] of students who answered the question correctly
What would you do if you fell down and hit your mouth and one of your permanent teeth fell out? You would:		
Go back home crying	20 (8.0)	
Pick up the tooth and take it home	28 (11.2)	
Pick up the tooth, look for a tap, wash it, put in its place in your mouth, and go back home	1 (0.4)	199 (79.3)
Pick up the tooth, look for a tap, wash it, put it in its place in your mouth and look for a dentist*	16 (6.4)	
Pick up the tooth and look for a dentist immediately*	183 (72.9)	
No information	3 (1.2)	
What do you mean by trauma in teeth?		
Carie in the tooth	45 (17.9)	
Is a violent knock on the teeth*	101 (40.2)	
Toothache	35 (13.9)	
Unit in the tooth	3 (1.2)	101 (40.2)
Finger sucking	6 (2.4)	
Go to the dentist	3 (1.2)	
I do not know	51 (20.3)	
No information	7 (2.8)	
Choose the alternatives which are the risk to your permanent tooth†		
Sleeping	10 (4.0)	
Car, motorcycle, bicycle accidents*	133 (53.0)	
Eating	35 (13.9)	
Walking	3 (1.2)	
Running*	55 (21.9)	323 (83.2)
Fighting*	135 (53.8)	
Swimming	3 (1.2)	
None of the above	13 (5.2)	
No information	1 (0.4)	
What is the part of the tooth you can see in the mirror?		
Crown*	106 (42.2)	
Root	44 (17.5)	
I don't know	99 (39.4)	106 (42.2)
No information	2 (0.8)	

To be continued...

Continuation of table II

Question	n (%)	Frequency [n(%)] of students who answered the question correctly
Once the permanent tooth is out of the mouth, what should we do with it? We should:		
Throw it away as it is useless	40 (15.9)	
Wash it and put it in its place*	5 (2.0)	
Give it to my mother to keep it	47 (18.7)	
Take it to the nearest dentist*	124 (49.4)	129 (51.4)
Take it to the dental school	6 (2.4)	
I do nothing	27 (10.8)	
No information	2 (0.8)	
What do you do if the permanent tooth falls on the dirty ground? Which answers are correct?ɫ		
Throw it away because it is useless	43 (17.1)	
Wash it and put it in its place*	19 (7.6)	
Brush the tooth	49 (19.5)	181 (60.9)
Look for a dentist*	162 (64.5)	
I don't know	24 (9.6)	
Where should keep the permanent tooth in case it was not put in its place?		
Wrapped in paper	73 (29.1)	
In a container with some tap water	8 (3.2)	
In a container with saline solution	39 (15.5)	
In the pocket	1 (0.4)	
In a container with milk*	1 (0.4)	1 (0.4)
In a container whit alcohol	21 (8.4)	
I don't know	93 (37.1)	
No information	15 (6.0)	
In your opinion, what is the ideal time for a permanent tooth to be out of the mouth before being put in its place?		
It must be placed immediately*	43 (17.1)	
30 minutes	21 (8.4)	
1 hour	18 (7.2)	
6 hours	15 (6.0)	43 (17.1)
24 hours	13 (5.2)	
I don't know	139 (55.4)	
No information	2 (0.8)	

To be continued...

Continuation of table II

Question	n (%)	Frequency [n(%)] of students who answered the question correctly
In a stroke, if the permanent tooth comes out of your mouth, who can immediately put it in the same place:		
The dentist only	210 (83.7)	
Anyone*	4 (1.6)	4 (1.6)
Nobody because the tooth is useless	36 (14.3)	
No information	1 (0.4)	

† Question with more than one answer option
* Answer options considered correct according to Castilho *et al.* [8] and Fouad *et al.* [14] (IADT)

Table III reveals the association between knowledge about tooth avulsion and replantation and independent variables. The variable "time interval since the last visit to the dentist" was the only independent variable that showed a significant association with the level of knowledge of the students (p = 0.007) in the bivariate analysis. This variable was the only one that remained in the final model of the multiple logistic regression analysis. Students who visited the dentist two years ago or longer presented a higher probability of having less knowledge about tooth avulsion and replantation (OR = 0.413; p = 0.031).

Table III – Association between dental avulsion/replantation knowledge and independent variables and multiple logistic regression analysis among 7th-grade students in public schools, Sertaozinho, SP, 2019

Variable	n (%†)	Level of knowledge‡ ≤ 4 correct answers n (%§)	Level of knowledge > 4 correct answers n (%§)	X² or Fisher's exact	p-value	Odds Ratio	CI 95%	p-value
Gender								
Male	97 (38.6)	67 (69.1)	30 (30.9)	0.291	0.590			
Female	154 (61.4)	100 (64.9)	54 (35.1)					
Neighborhood								
Downtown	15 (6.0)	7 (46.7)	8 (53.3)	2.115	0.146	1.000		0.235
Suburb	225 (89.6)	154 (68.4)	71 (31.6)			0.438	0.112 – 1.710	
No information	11 (4.4)							
Education level of the guardian								
Never studied and elementary school	46 (18.3)	34 (73.9)	12 (26.1)	1.060	0.303			
Middle school, high school and higher education	192 (76.5)	124 (64.6)	68 (35.4)					

To be continued...

Continuation of table III

Variable	n (%†)	Level of knowledge‡ ≤ 4 correct answers	Level of knowledge > 4 correct answers	X² or Fisher's exact	p-value	Odds Ratio	CI 95%	p-value
		n (%§)	n (%§)					
No information	13 (5.2)							
Paid work of the guardian								
Not	125 (49.8)	77 (61.6)	48 (38.4)	2.299	0.129	1.454	0.746 – 2.834	0.272
Yes	110 (43.8)	79 (71.8)	31 (28.2)			1.000		
No information	16 (6.4)							
Residence								
Own settled, own financed	122 (48.6)	81 (66.4)	41 (33.6)	0.002	0.966			
Rented, provided by parents, in exchange for work, ceded (homeless)	124 (49.4)	81 (65.3)	43 (34.7)					
No information	5 (2.0)							
Bedrooms								
1, 2 or 3	170 (67.7)	110 (64.7)	60 (35.3)	0.242	0.623			
4 or more	74 (29.5)	51 (68.9)	23 (31.1)					
No information	7 (2.8)							
Family income¶								
Up to 59.95 to 599.52	153 (61.0)	104 (68.0)	49 (32.0)	0.623	0.430			
Up to 599.76 up to over 2,278.17	37 (14.7)	22 (59.5)	15 (40.5)					
No information	61 (24.3)							
Last visit to the dentist								
1 year ago or less	131 (52.2)	78 (59.5)	53 (40.5)	7.300	0.007[a]	1.000		0.031[a]

To be continued...

Continuation of table III

Variable	n (%†)	Level of knowledge‡ ≤ 4 correct answers	Level of knowledge > 4 correct answers	X² or Fisher's exact	p-value	Odds Ratio	CI 95%	p-value
		n (%§)	n (%§)					
Between 2 years to more than 5 years and never went to the dentist	76 (30.3)	60 (78.9)	16 (21.1)			0.413	0.185 – 0.920	
No information	44 (17.5)							
Reason for visiting the dentist								
Treatment	117 (46.6)	79 (67.5)	38 (32.5)	3.088	0.214			
Never went to the dentist	24 (9.6)	19 (79.2)	5 (20.8)					
Prevention or routine	100 (39.8)	61 (61.0)	39 (39.0)					
No information	10 (4.0)							
Orthodontic treatment								
Not	202 (80.5)	137 (67.8)	65 (32.2)	1.237	0.266			
Yes	45 (17.9)	26 (57.8)	19 (42.2)					
No information	4 (1.6)							
Children's oral health								
Excellent, very good and good	116 (46.2)	69 (59.5)	47 (40.5)	3.129	0.077	1.000		0.673
Regular or bad	106 (42.2)	76 (71.7)	30 (28.3)			0.858	0.420 – 1.750	
No information	29 (11.6)							
Presence of dental trauma								
Not	179 (87.7)	120 (67.0)	59 (33.0)	0.451	0.502			
Yes	25 (12.3)	19 (76.0)	6 (24.0)					
Total score CPQ_{11-14} (0 to 32)								
≤8	137 (54.6)	85 (62.0)	52 (38.0)	2.305	0.129	1.000		0.248
>8	114 (45.4)	82 (71.9)	32 (28.1)			0.666	0.334 – 1.327	

† Percentage in the column; ‡ Total correct answers=9 (dichotomized by the median); § Percentage in the line; [a] Statistical significance

¶1 USD= 4.17 BRL at the time of the data collection (October 1, 2019)

Discussion

This study aimed to evaluate the level of knowledge about tooth avulsion and replantation among 7th-grade students. There is a lack of research on this topic among adolescents in Brazil [7, 8], and our study brings valuable data that can improve educational materials to be used by dental health providers and schools.

Our results showed that the minority of students (12%) had dental trauma, a lower prevalence than that found in a recent Brazilian review (21%) [26] and a meta-analysis (18.1%) [21]. Such differences might be due to the sample profile since, in our study, female students were in greater number and dental trauma is more prevalent in males.

Regarding the level of knowledge in the present study, 12 to 13-year-old schoolchildren got an average of 3.8 out of 9 questions correct (42.2% of correct answers), indicating low knowledge about the topic, a result also observed in other studies [2, 5, 7, 8, 12, 15]. At this age, most schoolchildren play sports frequently, an activity listed as a risk factor for trauma [18]. The present study's findings and previous research indicate little knowledge on this subject. School managers should consider the inclusion of this topic on students' school curricula as a way to increase their knowledge.

Regarding the question of what to do if they fall and a permanent tooth comes out of the mouth completely, most of the volunteers answered that they would pick the tooth up and see a dentist immediately (72.9%, table II), in agreement with the previous study that showed 61.7% [8]. However, the recommended action would be to wash the tooth quickly in milk without touching the root and to replace it immediately in the socket, preferably at the place of the accident [14].

In this study, most participants believed that only the dentist could put an avulsed tooth back in place (83.7%, table II), in agreement with a previous study [8]. However, according to the Guidelines of the International Dental Traumatology Association [14], dental replantations can be done by anyone at the place of the accident, by the patient himself, or by anyone who is with him, as long as the person who lost the tooth is fine and the person performing the replantation has some knowledge and feels secure to proceed.

The ideal extra-alveolar time and the medium of storage of the dental element influence the treatment of an avulsed tooth. For a favorable prognosis, the ideal time for dental replantation is immediately after an avulsion, and the best storage medium for the tooth is milk [20]. However, most of the students in this study did not know the ideal extra-alveolar time for dental replantation, and only 17.1% (table II) were aware that the tooth must be replanted immediately, similar to previous studies [8, 15].

In the present study, only 0.4% of students knew that the avulsed tooth should be placed in a container with milk, a percentage inferior to that of Castilho *et al.* [8]. Nevertheless, almost half of the participants (49.4%) replied that they would take it to the nearest dentist, which indicates the understanding that the tooth can be replanted. Surprisingly, 17.1% of students answered that they would throw the tooth away because they believed it was useless, showing a lack of knowledge, information, and access to dental services. This lack of knowledge about the best medium of storage of the dental element, along with the possibility of dental replantation, is critical and can lead to an unsatisfactory prognosis for the vitality of the periodontal ligament cells [20].

The regression model showed that students who visited the dentist two years ago or longer presented a higher probability of having less knowledge about tooth avulsion and replantation. This indicates the vital role of oral health care providers in promoting health and prevention of caries and periodontal diseases and in the proper guidance for accidents that can lead to tooth avulsion, especially among adolescents. Likewise, some authors associate the lack of knowledge about tooth avulsion and replantation with the lack of information and guidance on the subject, which could be provided through public health education measures [2, 5, 8, 12, 15]. It is also important to emphasize the role of school teachers in constructing students' knowledge of health issues.

Oral health-related quality of life (OHRQoL) was low and not significantly associated with knowledge of dental trauma. Although this study assessed only dental trauma, we can speculate that the students´ oral health was not poor. In the same sample, the OHRQoL was not statistically different among those with or without dental trauma [9].

As limitations of the present study, we can list the cross-sectional nature, which makes it uncertain to establish a causal relationship, and the low response rate, especially when compared with other studies [2, 5, 7, 8, 12, 15]. The strengths include the fact that the study was a census type, offering all students in the 7th grade in the public schools the possibility to participate in the research, along with using validated questionnaires.

Conclusion

The presented results pointed out that the students who participated in the study had a low level of knowledge about tooth avulsion and replantation, especially regarding the actions to be taken immediately after the tooth avulsion, the ideal time for the tooth to be replanted, and the storage medium. Additionally, the level of knowledge was associated with the time elapsed since the last visit to the dentist.

Acknowledgements

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