

Can parents prevent tooth loss related to dental avulsion? An assessment of knowledge related to permanent teeth

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Purpose: Dental avulsion injuries have a poor prognosis that largely depends on the immediate steps taken to manage the avulsed tooth. A lack of knowledge about the initial management can lead to tooth loss, with further adverse implications for esthetics, phonetics, and overall growth and function. Hence, the present study aimed to assess parents' knowledge regarding dental avulsion and the variables associated with their knowledge of avulsion injuries.

Methods: A series of closed-ended questions on parents' knowledge regarding avulsion, such as immediate management, storage media, handling, and urgency of visiting the dentist, was asked. Univariate associations between the outcomes were assessed using the Pearson chi-square test. The chi-square goodness-of-fit test was used to check whether the sample data were representative of the population.

Results: In total, 211 mothers and 149 fathers were included, of whom 46.7% had experienced dental trauma during their own childhood. Sixty-one percent of mothers believed that they knew everything necessary about tooth avulsion and its management. A significant number of participants who thought that they had a good level of knowledge about avulsion chose water, tissue, or paper wrap to transport the tooth, and preferred tap water, alcohol, or antiseptic to clean the avulsed tooth.

Conclusions: Both mothers and fathers had poor knowledge about tooth avulsion, indicating that there is an immediate need for educational programs focusing on this issue. Since a substantial proportion of participants believed incorrect information, it is vital to disseminate accurate information.

Keywords: Tooth dislocation; Tooth luxations; Tooth loss; Dental education

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INTRODUCTION

Dental avulsion accounts for approximately 0.5% to 16% of trau-

matic dental injuries. A recent meta-analysis identified avulsion as one of the most common causes of tooth loss in children, with a median age of 13.8 years. [1] According to International Asso-

ciation of Dental Traumatology (IADT), avulsion injuries have a poor prognosis that largely depends on the immediate steps taken to manage the avulsed tooth [1]. Parents, guardians, and primary educators who commonly witness avulsion injuries should have adequate knowledge regarding the initial management, how to handle the tooth, how to transport the tooth, and when to seek appropriate dental care to prevent unnecessary tooth loss. A lack of knowledge can lead to tooth loss, with further adverse implications on esthetics, phonetics, and overall growth and function. Despite the significance of the problem, parents' knowledge regarding dental avulsion and its management seems to be low in international cohorts [2–4].

Several earlier studies have identified parents' knowledge about traumatic dental injuries and their management [5–9]; however, few studies have reported comparative findings between mothers and fathers in relation to the variables associated with their knowledge about tooth avulsion [4,9–11]. In addition, no such studies have been conducted in Bahrain. Dental treatments in Bahrain are provided by the Ministry of Health primary care dental clinics that primarily focus on the management of dental emergencies. All dental consultations are free of charge and there are numerous dental outpatients who need to be addressed within a limited time period. There is also a considerable shortage of dental practitioners who can provide the best possible treatment for avulsed teeth within the limited time allocated for each patient. Considering this unique setting in Bahrain, the extrapolation of results from international studies may not be accurate. Adequate knowledge regarding dental avulsion and accurate initial management by parents can help dentists provide successful management of avulsed teeth within the limited time available in our setting. The data collected from this study will be used to establish future educational programs that can positively influence the quality of life of young patients by preventing tooth loss due to avulsion. Hence, the aim of the present study was to assess parents' knowledge regarding tooth avulsion and the variables associated with their knowledge about avulsion injuries.

METHODS

Ethical statements

The present study is reported according to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines [12] for the presentation of cross-sectional studies. The study protocol was approved by the Ministry of Health Primary Care Ethics Committee. Written informed consent was obtained from all the study participants

Study sample

The study was conducted at five primary care dental clinics, one from each of the five regions in Bahrain. The health centers were chosen based on convenience. In total, 360 mothers or fathers who had at least one child younger than 13 years of age were included. This age group was determined based on evidence that avulsion injuries are more common in this age group. The participants were selected through convenience sampling.

Questionnaire used in the study

A descriptive two-part questionnaire was prepared for the study. The first part consisted of questions on the demographic data of study participants such as age, education level, and sex, as well as any previous history of dealing with dental trauma. The second part of the questionnaire consisted of a case scenario of an avulsed permanent right central incisor with a clinical photograph. A series of closed-ended questions to understand respondents' knowledge regarding avulsion, such as immediate management, storage media, handling, and urgency of visiting the dentist, were asked. This questionnaire was validated by independent subject experts and pretested on 10 participants. Any ambiguities in the questions or responses were corrected before the actual study.

Statistical analyses

Descriptive statistics were used to analyze the demographic data. Considering a proportion of at least 30% of the population that would fit the inclusion criteria and visit the included primary care dental clinics, at a 95% confidence interval and 5% margin of error, a total sample of 323 was the minimum necessary. Hence, 360 participants were included. Univariate associations between the categorical outcomes and the variables assessed in this study were evaluated using the Pearson chi-square test. The chi-square goodness-of-fit test was used to check whether the sample data were representative of the population. All statistical tests were performed using GraphPad InStat ver. 3.1 (GraphPad Software, San Diego, CA, USA).

RESULTS

Demographic data of the study participants

In total, 211 mothers and 149 fathers were included in this study. The mean \pm standard deviation age of study participants was 34.5 ± 1.23 years. Most of the mothers (64.9%) were under 30 years of age. The majority of the study participants had a higher secondary or graduate level of education. Furthermore, 46.7% of

the participants had experienced dental trauma during their own childhood, and 61% of the mothers thought they knew everything necessary about tooth avulsion and its management. Other demographic data are presented in [Table 1](#).

Responses to case scenario

In total, 275 participants correctly identified and named the avulsed tooth from the clinical photograph, of whom 60% were mothers. Although 69.1% of the study participants thought that the avulsed tooth could be saved, only 10% of the participants believed that they would be able to replant the teeth back into the socket. The others would seek the help of a dentist to replant the tooth. As a material to store the avulsed tooth, 23.8% chose water and 25.8% chose paper or tissue wrap. Slightly fewer than half of the participants (45.8%) believed that they should seek help from a dentist within 30 minutes following tooth avulsion. Furthermore, 44.1% preferred antiseptic or alcohol and 36.6% preferred tap water to rinse the avulsed tooth before transport. Detailed responses to the case scenario are presented in [Table 2](#).

Association between the variables assessed in the study

Three variables (the choice of storage medium, method of handling an avulsed tooth, and urgency of undertaking a dental intervention) were assessed for goodness-of-fit using the chi-square test. The P-value was statistically significant, showing that the sample data adequately represented the population that was studied ([Table 3](#)). Mothers were significantly more likely than fathers to report correct answers for identification of the tooth, saving an avulsed tooth, and the ability to replant an avulsed tooth. Participants who previously experienced dental trauma were significantly more likely to believe that they would be able to replant a tooth back into the socket. Participants with a higher education or a graduate degree were significantly more likely to think that they knew everything necessary about avulsed teeth, to be able to correctly identify the avulsed tooth, and to think that a dental intervention is mandatory within 30 minutes following avulsion. However, a significant number of participants who thought that they had a good level of knowledge about avulsion were willing to save the tooth, chose water, tissue, or paper wrap to store and transport the tooth, and preferred tap water, alcohol, or antiseptic to clean the avulsed tooth. The P-values for the associations between the variables are presented in [Table 4](#).

DISCUSSION

The present study aimed to assess the variables associated with

Table 1. Variables assessed in this study

Variable	No. of participants (%)
Sex	
Mother	211 (58.6)
Father	149 (41.3)
Age (yr)	
>30	243 (67.5)
≤30	117 (32.5)
Mother	76 (64.9)
Father	41 (35.0)
Education degree	
Graduate/college	120 (33.3)
Higher secondary school	194 (53.8)
Elementary school	46 (12.7)
No. of children ≤13 yr	
Mean	2.27
Standard deviation	1.33
Standard error of mean	0.07
Had previous experience with any dental trauma	152 (42.2)
Mother	88 (57.9)
Father	64 (42.1)
Own dental trauma during childhood	71 (46.7)
Dental trauma of one of their children	68 (44.7)
Dental trauma of other family members or friends	63 (41.4)
Thought they had good knowledge about teeth avulsion	254 (70.6)
Mother	155 (61.0)
Father	99 (38.0)

the knowledge of Bahraini mothers and fathers regarding tooth avulsion. In total, 211 mothers and 149 fathers participated in the study. The questionnaire that was provided was simple, with multiple closed-ended questions based on a case scenario and clinical photograph.

The results from the present study indicate that although 254 of the participants (70.5%) believed that they had a good level of knowledge about tooth avulsion and its initial management, their knowledge regarding the storage medium and how to handle an avulsed tooth was inaccurate. It is critical to have accurate knowledge about these important parameters, which substantially affect the prognosis of avulsed teeth. This finding is similar to the results obtained from previous studies on the knowledge of parents, caregivers, primary educators, and other personnel dealing with children [4–6,10,11]. This information is vital, and it is important that future training programs for parents and those dealing with children should specifically focus on how to handle

Table 2. Responses to the case scenario

Case scenario	No. of participants (%)		
	Total (n=360)	Mother (n=211)	Father (n=149)
Able to correctly identify and name the avulsed permanent central incisor from the clinical photograph	275 (75.4)	165 (60.0)	110 (40.0)
Attitude towards avulsed tooth			
Discard	111 (30.8)	51 (45.9)	60 (54.0)
Save	249 (69.1)	160 (64.2)	89 (35.7)
Ability to replant teeth in case of avulsion			
Can replace teeth back into the socket	36 (10.0)	30 (83.3)	6 (16.6)
Cannot replant, seek help from the dentist	324 (90.0)	181 (55.8)	143 (44.1)
Storage medium of choice			
Water	86 (23.8)	49 (56.9)	37 (43.0)
Milk	45 (12.5)	30 (66.6)	15 (33.3)
Saliva	16 (4.4)	9 (56.2)	7 (43.7)
Wrapped in tissue or paper	93 (25.8)	54 (58.0)	39 (41.9)
Cloth wrapping	50 (13.8)	30 (60.0)	20 (40.0)
Carry it in a sandwich bag or any plastic bag	70 (19.4)	54 (77.1)	16 (22.8)
Urgency to visit a dentist after avulsion			
Within 30 min	165 (45.8)	99 (60.0)	66 (40.0)
Within 1 hr	56 (15.5)	35 (62.5)	21 (37.5)
The following day	18 (5.0)	4 (22.2)	14 (77.7)
Only when there is pain	74 (20.5)	26 (35.1)	48 (64.8)
Not sure of any specific time limit	47 (13.0)	12 (25.5)	35 (74.4)
First place to contact following avulsion			
General hospital	120 (33.3)	102 (85.0)	18 (15.0)
Dental clinic	240 (66.6)	109 (45.4)	131 (54.5)
Handling avulsed tooth			
Scrub the tooth gently with toothbrush	55 (15.2)	32 (58.1)	23 (41.8)
Rinse tooth under tap water	132 (36.6)	84 (63.6)	48 (36.3)
Do not touch the tooth	14 (3.8)	9 (64.2)	5 (35.7)
Wash with alcohol or antiseptic	159 (44.1)	87 (54.7)	72 (45.2)
Follow-up appointment with the dentist (yes)	360 (100)	211 (100)	149 (100)

Table 3. Chi-square goodness-of-fit test for the categorical outcomes assessed in this study (n=360)

Variable	Observed	Test proportion	Expected	Contribution to chi-square	Difference	Chi-square	P-value
Choice of storage medium					5	68.16	<0.001*
Water	86	0.16	60	11.26			
Milk	48	0.16	60	2.40			
Saliva	15	0.16	60	33.75			
Tissue or paper wrap	92	0.16	60	17.06			
Cloth wrap	49	0.16	60	2.01			
Plastic bag	70	0.16	60	1.66			
Urgency to visit a dentist following avulsion					4	172.91	<0.001*
Within 30 min	165	0.20	72	120.12			
Within 1 hr	56	0.20	72	3.55			
Only in pain	74	0.20	72	0.05			
Following day	18	0.20	72	40.50			
Not sure of the time	47	0.20	72	8.68			
Handling avulsed tooth					3	150.28	<0.001*
Scrub the tooth gently with toothbrush	55	0.25	90	13.61			
Rinse tooth under tap water	132	0.25	90	19.60			
Do not directly touch the tooth with hand	14	0.25	90	64.17			
Wash with alcohol or antiseptic	159	0.25	90	52.90			

*P≤0.05.

Table 4. Associations between the variables assessed in the study

Variable	P-value ^{a)}
Sex	
Able to correctly identify and name the avulsed permanent central incisor from the clinical photograph	0.049*
Previous dental trauma experience	0.814
Thought they had good knowledge regarding avulsion	0.152
Saving avulsed teeth	0.001*
Choice of storage medium	0.978
Ability to replant teeth	0.002*
Urgency to undertake dental intervention following avulsion	0.503
Handling avulsed tooth	0.496
Any previous dental trauma experience	
Able to correctly identify and name the avulsed permanent central incisor from the clinical photograph	0.139
Thought they had good knowledge regarding avulsion	0.379
Saving avulsed teeth	0.666
Choice of storage medium	0.993
Ability to replant teeth	0.016*
Urgency to undertake dental intervention following avulsion	0.116
Handling avulsed tooth	0.173
Education level	
Able to correctly identify and name the avulsed permanent central incisor from the clinical photograph	<0.001*
Thought they had good knowledge regarding avulsion	0.036*
Saving avulsed teeth	0.547
Choice of storage medium	0.564
Ability to replant teeth	0.479
Urgency to undertake dental intervention following avulsion	0.024*
Handling avulsed tooth	0.232
Thought they had good knowledge regarding avulsion	
Able to correctly identify and name the avulsed permanent central incisor from the clinical photograph	0.176
Saving avulsed teeth	0.001*
Choice of storage medium	<0.001*
Ability to replant teeth	0.316
Urgency to undertake dental intervention following avulsion	0.914
Handling avulsed tooth	0.038*

^{a)}Pearson chi-square test for association.

*P≤0.05.

avulsed teeth, including the ideal storage medium. Our study identified that parents believed incorrect information, for which reason it is vital to disseminate the correct information to parents to prevent tooth loss due to avulsion. According to the IADT trauma guidelines, avulsed permanent teeth should be picked up by the crown, rinsed gently in milk, saline, or saliva and immediately replanted back into the socket. An avulsed primary tooth must never be replanted due to the possibility of damaging the permanent tooth germ [1]. This underscores the importance of parents' ability to differentiate between permanent and primary teeth. This knowledge is extremely important in order to prevent

damage to the permanent tooth in cases of primary tooth avulsion, which is why this topic was included in our questionnaire.

The mothers in this study had significantly better knowledge than fathers regarding tooth identification and had a positive attitude towards saving the avulsed tooth. A significant number of mothers believed that they would be able to replant the tooth back into the socket. These results are similar to previous studies showing that mothers displayed better knowledge than fathers [4–6]. However, incorrect knowledge and beliefs regarding the storage medium and handling avulsed teeth were identified in the present study, which would be detrimental to the overall

prognosis. The majority of the parents chose tissue or paper wrap to transport an avulsed tooth, although leaving the tooth dry by wrapping it in a tissue or paper is extremely detrimental to the prognosis. The periodontal ligament becomes necrotic with limited or no ability to regenerate, leading to replacement resorption as a sequela [1].

Another crucial determinant of the prognosis of an avulsed tooth is the extraoral time. An extraoral time of greater than 60 minutes is associated with a considerably poorer prognosis according to the IADT trauma guidelines [1]. Ninety percent of the parents believed that they would not be able to replant the tooth back into the socket and indicated that they would let the dentist perform the replantation. This would increase the extraoral time, and if the tooth is not properly handled and stored in an appropriate storage medium, the prognosis is extremely poor.

Considering the amount of time that is available for dentists in the primary care dental clinic setting in Bahrain, it is crucial for parents to have thorough knowledge about the initial management of avulsed teeth. The results from the present study indicate that this knowledge is poor among both mothers and fathers, indicating that there is an immediate need for education programs that focus on this issue. A dentist will be unable to save the tooth if the initial management is inappropriate. The proposed education program uses the IADT "Save a Tooth" poster [13], which will be used to educate mothers and fathers. The effect of using these posters on their knowledge will be tested in our future study. The present study is limited by the fact that we did not evaluate the potential impact of any previous dental avulsion education on parents, although this could have potentially influenced the study results.

NOTES

Ethical statements

The study protocol was approved by the Ministry of Health Primary Care Ethics Committee. Written informed consent was obtained from all the study participants.

Conflicts of interest

The authors have no conflicts of interest to declare.

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None.

Author contributions

Conceptualization: all authors; Data curation: all authors; Formal

analysis: all authors; Methodology: all authors; Project administration: all authors; Visualization: GS, DA, AAS; Writing—original draft: GS; Writing—review & editing: all authors. All authors read and approved the final manuscript.

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