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Parental Knowledge and Attitude About the Emergency Management of Traumatic Dental Injuries and the Predictive Factors Affecting their Knowledge - A Cross Sectional Study in Makkah, Saudi Arabia

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ABSTRACT

Background: Traumatic dental injuries (TDIs) are common dental problems among children worldwide. Some of these injuries occur at home, where parents are considered responsible for reporting them and taking the first action, which directly can influence the prognosis. The present study aims to quantify the level of parents' knowledge and attitude towards emergency management of TDI and to predict the factors that affect their level of knowledge.
Subject and Methods: 269 questionnaires were completed by parents who live in Makkah, Saudi Arabia. The questionnaire was divided into three parts, including questions on demographic data, knowledge, and attitude about emergency management, and self-assessed knowledge and attitude toward further education on TDI emergency management.
Results: The average knowledge score was 2 out of 9 (SD±1.9). More than 78% of the participants were enthusiastic about further free education and believed that they don't have enough knowledge about TDI. A significant positive association has been predicted, using a multivariable Poisson model, between the parental knowledge score and their willingness to attend free lessons, having a previous idea about TDI, higher educational background, confidence, and higher socioeconomic class (SEC). However, the history of a previous TDI was predicted to have a significant negative influence on the knowledge score (p values <0.05).
Conclusion: Parents of children in Makkah city show a weak level of knowledge about TDI emergency management. A concerning attitude was shown as parents tend to proceed to manage TDIs against the recommended managements rather than seeking professional advice. A specific dental educational program targeting parents is essential.

1. Introduction

Traumatic dental injuries (TDIs) are common dental problems among children worldwide.[1] A recent meta-analysis has shown the world prevalence of TDI to be around 15% in permanent dentition and 23% in primary dentition.[2] There is scarce information to be found in the literature about the prevalence of TDIs in Saudi Arabia. Information about the prevalence of TDI in Saudi Arabia was sparse in the literature. No meta-analysis or systematic reviews that had accurately calculated the prevalence could be identified. However, a study conducted in 2001 estimated the prevalence of TDIs in Riyadh city to be 34%.[3]

Juneja and associates, have shown that 67% of the TDIs took place at home,[4] where children are dependent mostly on their parents to report the trauma and to take the first action, which might directly influence the prognosis of the traumatized teeth. [5]

Several reports found that the level of parental knowledge about traumatic dental emergencies is considered generally low.[6-10] Furthermore, worrying data were reported about the knowledge and management actions especially in case of permanent tooth avulsions,[11-19] which is considered one of the real dental emergencies with the best possible prognosis being highly contingent on the immediate appropriate management within the first 15 minutes at the place where the trauma occurs.[20] Consequently, the knowledge of the parents and their attitude towards the emergency management of TDI is deemed critical.

Many factors were suggested and investigated in the literature as risk indicators or factors for TDI in children and adolescents. These include, temperamental reactivity of the child, family environment, parents country of birth, family socioeconomic class (SEC), increased overjet and overbite, inadequate lip coverage, the gender of the child, caries activity, obesity, history of previous TDI, and children with special needs.[21-39]

On the other hand, less information was found about the factors that would affect the parental level of knowledge about TDI concerning their background, demographics, and attitude. Published reports suggested an association between parental age, sex, educational background, history of facing previous trauma, history of having a training course about TDI, recognizing the significance of the emergency management and the number of attended recall visits and their level of knowledge about TDI.[9, 10, 17, 19]

The literature shows, in general, scarce information about parental knowledge of TDI in Saudi Arabia, whereas the published studies mostly assessed the knowledge of school-teachers,[40, 41] emergency room personnel,[42] dental assistants,[43] dental students,[44] general practitioners and specialists.[45] However, no reports were found regarding parental knowledge about TDI in Makkah city. Therefore, this study aims to quantify the level of parents' knowledge and attitude regarding TDI emergency management, and predicting the factors affecting the parents' level of knowledge.

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2. Subjects and Methods

2.1. Study Design

This is a cross-sectional study in which contact information of the participants were randomly selected and collected from eight different primary public schools. Electronic forms of the questionnaire and the informed consent were sent to the parents and were returned electronically after completion.

2.2. Setting

This study was conducted in Makkah city, Saudi Arabia. The study was conducted between October 2019 and April 2020.

2.3. Participants

This was a random sample of parents having children in the age range of 2-12 years.

2.4. Variables

The knowledge score (the outcome measure) was evaluated using the Arabic version of the questionnaire that has been published earlier in 2016.[9] The score was calculated by counting all correct responses in case-related questions ranging from 0 to 9, the higher the score the better was the knowledge level.

2.5. Data Sources and Measurements

The questionnaire was partially adapted from a previous study by Al Haj Ali.[9] It was translated to Arabic, tested for validation in a pilot study of 100 participants, then tabulated. Afterwards, the study was continued and the pilot responses were included to the final sample.

The questionnaire was divided into three parts in which each part was dedicated to gathering different information as follows:

Part I:

This part included multiple-choice questions on demographic information, open- and close-ended questions to quantify the socioeconomic status of the participants and the history of previous TDIs to their children. The socioeconomic status of the participants was determined using annual household income and the level of education of both parents.

Part II:

This part contained nine multiple-choice questions. Three scenarios of different TDIs were given and illustrated with clinical pictures that have been collected following informed consent for use in research and educational purposes. The first case was a tooth fracture in a permanent central incisor of a nine years-old child, the second was an avulsed permanent central incisor of a twelve years old child, while the last case was an extrusive displacement of a permanent central incisor of a ten years-old child. This part of the questionnaire aimed to assess their knowledge of the emergency management of these cases.

Part III:

This part included multiple-choice questions to investigate the subjective self-reported knowledge, attitude towards further education on dental trauma emergency management, the likelihood of dental trauma prevention, and their knowledge about emergency services' priorities in cases of dental trauma.

2.6. Bias

Information bias is common as the questionnaires were self-administered. To reduce bias a simple background and study procedure was written in the first page of the questionnaire to explain the importance of accurate reporting and a pilot study was conducted before the continuation of the full sample size.

2.7. Study Size

For a two-sided test of the null hypothesis H_0: RR = 1.000 vs the alternative Ha: RR ≠ 1.000 were made using the MLE statistical test. Samples of 106 subjects in group 1 and 106 subjects in group 2 (with total sample size of 212) achieved 90.248% power to detect an event rate ratio (RRa) of 0.600 when the event rate in group 1 (λ1) is 1.00 and the significance level (alpha) is 0.05.[46, 47]

2.8. Statistical Methods

Data were collected, revised, tabulated and statistically analyzed. For multivariable analysis, a Poisson model was used to predict knowledge score and to examine the simultaneous association of independent and outcome variables. Since the goal of the model was exploratory, therefore, to determine which predictor(s) to include in the final model, backward stepwise selection was used with probability of removal of 0.25 and probability of entry of 0.1.

All statistics were computed using STATA software (version14.1; Stata, College Station, TX). All statistical tests were two-tailed and interpreted at the 0.05 significance level.

3. Results

3.1. Demographics and history

The response rate was 67.25% as four hundred questionnaires were sent, but only 269 parents responded. Table 1 shows the demographic data of the sample and their history with TDIs.

Table 1: Descriptive data of the participating parents (Part I of the survey).

Variables	No.	%
Parents' age		
20-29 year	25	9.3%
30-39 year	82	30.5%
40-49 year	119	44.2%
50 or older	43	16%
Parents' education		
High school	71	26.4%
Diploma	46	17.1%
Bachelor	120	44.6%
Master or higher	32	11.9%
Income of household/month		
Less than 10K SR	128	47.6%
10k-20K SR	115	42.8%
More than 20K SR	26	9.6%
Number of dental injuries experienced with children		
None	123	45.7%
1 to 2	90	33.5%
3 to 4	35	13%
5 or more	21	7.8%
The age of the child when experienced dental trauma		
0 to 3	14	5.2%
4 to 6	55	20.4%
7 to 9	43	16%
10 to 12	34	12.6%

Almost 75% of the participating parents were between 30-49 years old. Around 45% of them had a Bachelor's degree.

Forty eight percent of the participants had a low SEC, and 42% had a middle SEC as their income ranged from 10K to 20K Saudi Riyals "SR" (approximately 3K- 6K USD per month), while 10% had high SEC (monthly income > 20K SR, which is >6K USD).

Only 19% of the parents reported that they had first aid training in which 5.2% of them reported that their first aid training included dental trauma first aid. Around 54% reported that their children experienced a TDI at least once of which tooth fracture was the most common type (22%).

3.2. Knowledge through the cases

Regarding parents' knowledge (part II of the survey), table 2 summarizes the number and percentages of parents who answered correctly for every question. The knowledge score was calculated by giving a point for every correct answer from a range of (0 to 9). The

final total knowledge score of the participants was 2 (maximum 9) (SD±1.9).

Table 2: Traumatic dental injuries case scenarios and the percentages of correct parental answers (Part II of the survey).

Cases and Questions	Correct Answer	
	N	(%)
Case1: (Broken permanent incisor of a 9 years old child)		
Q1- The broken tooth is likely to be: Correct answer: A permanent tooth.	92	(34.2)
Q2- Your immediate emergency management of the case would be: Correct answer: Looking for the broken piece and take it to the dentist.	24	(8.9)
Q3- Do you think carrying the fractured segment of the tooth to the dentist is beneficial? Correct answer: Yes.	86	(32.0)
Q4- If blood is coming out from inside the broken tooth and the child is otherwise ok, what would you first do? Correct answer: Find the broken part and go immediately to a dentist	63	(23.4)
Case2 (Avulsion of a permanent central incisor)		
Q5- The immediate emergency action you would take is: Correct answer: Replant the tooth gently and go immediately to a dentist.	39	(14.5)
Q6- In case you are carrying the tooth to a dentist, how/where are you going to store it until you arrive to the dental clinic? Correct answer: In a glass of milk	36	(13.4)
Q7- If you find the tooth, which part of it would be the best part to hold from while carrying it? Correct answer: Clinical crown.	76	(28.3)
Q8- Would you think of immediately replacing the tooth back to its space? Correct answer: Yes.	38	(14.1)
Case 3: (Extrusion and palatal displacement of the permanent central incisors)		
Q9- Which of the following would you do? Correct answer: Trying to replace the tooth gently and go immediately to the dentist.	47	(17.5)

3.3. Attitude and knowledge self-assessment

In the third part of the questionnaire, as summarized in table 3, it was found that 86% of the participants did not think they had enough knowledge about dental trauma. The majority believed that the emergency management of TDI is important and 90% of them felt they need to know more about it. Almost 80% of them expressed the interest to attend free courses.

Table 3: Self-assessment of participants' knowledge.

Question	N	%
Do you think you have enough knowledge about dental trauma?		
No	231	(85.9)
Yes	38	(14.1)
Do you feel that you need further education about the management of dental trauma?		
No	27	(10.0)
Yes	242	(90.0)
Are you capable of providing proper action when needed?		
No	140	(52.0)
Yes	129	(48.0)
Do you think that Emergency management of dental trauma is important?		
No	31	(11.5)
Yes	238	(88.5)
If there is a free- lessons offered to you about TDI, are you willing to attend		
No	58	(21.6)
Yes	211	(78.4)

3.4. Predictive variables affecting the knowledge score

The detailed findings of multivariable Poisson model are summarized in table 4 and graph 1. While adjusting the rest of the variables, the model estimates that five variables significantly and positively affected the knowledge score. These variables were 'willingness to attend free educational courses', having a 'previous idea about TDI', 'level of parent's education', 'capability of parents to provide a proper management' and 'high family income (high SEC)'. Also, the model was able to predict that the history of experiencing TDI was the only variable to significantly negatively affecting the knowledge score.

The model was not able to predict an effect for parental age, middle and low SEC, history of attending TDI training courses on their knowledge score.

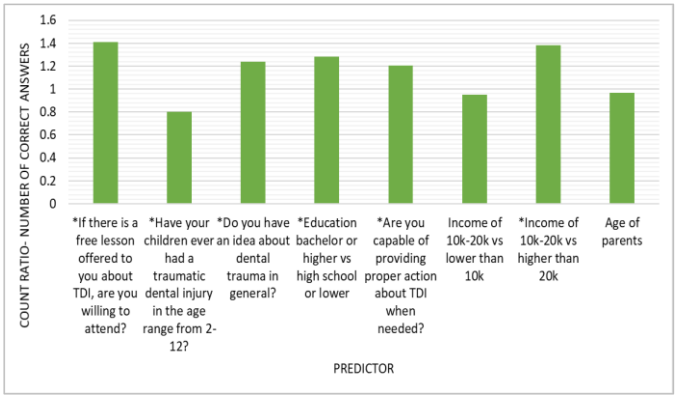
Table 4: Predictive factors showing an association with the number of correct answers using Poisson regression.

Predictors	Count Ratio Knowledge Score (outcome)
If there is a free lesson offered to you about TDI, are you willing to attend?	1.41
S.E.	(0.17)
95% C.I.	1.12 - 1.79
P-Value	(0.004)*
Have your children ever had a traumatic dental injury in the age range from 2-12?	0.80
S.E.	(0.07)
95% C.I.	0.67 - 0.96
P-Value	(0.02)*
Do you have an idea about dental trauma in general?	1.24
S.E.	(0.11)
95% C.I.	1.04 - 1.48
P-Value	(0.02)*
Education bachelor or higher vs high school or lower	1.29
S.E.	(0.14)
95% C.I.	1.03 - 1.59
P-Value	(0.03)*
Are you capable of providing proper action about TDI when needed?	1.21
S.E.	(0.11)
95% C.I.	1.01 - 1.44
P-Value	(0.04)*
Income of 10k-20k vs lower than 10k	0.95
S.E.	(0.09)
95% C.I.	0.78 - 1.15
P-Value	(0.61)
Income of 10k-20k vs higher than 20k	1.38
S.E.	(0.11)
95% C.I.	1.05 - 1.82
P-Value	(0.02)*
Age of parents	0.97
S.E.	(0.05)
95% C.I.	0.88 - 1.07
P-Value	(0.41)
Observations	269

Standard Errors and P-values in parentheses

*Indicates statistical significance at the p<0.05 level

Figure 1: Visual representation of table 4. Asterisk (*) shows significant prediction to the relation between the variables and the knowledge score.



4. Discussion:

Among the 400 distributed questionnaires, only 300 of the parents responded, however, 31 of them didn't answer all the questions. So, only 269 fully completed surveys were included, which accounts for a response rate of 67.25%. The recall and information bias is considered a common limitation for survey-based studies. This was minimized by increasing the sample size in this study, formulating an interview-based survey, or writing notes and hints in the instructions page of the survey as has been done in this study. However, recall/information

bias cannot be completely avoided and is considered a limitation related to the type of study design influencing the level of evidence of the study.

To our knowledge this study is the first to report on the knowledge of the parents on TDIs in Makkah city, Saudi Arabia. The level of knowledge of the emergency management of TDI among parents in Makkah appeared to be low, which is consistent with the majority of published reports concerning parental knowledge worldwide. [5, 9-11, 14, 19, 48-50]

The lack of knowledge about the proper management of TDI can be inferred from the low percentages of correct answers that are shown in table 2. In the first case, which was a broken permanent central incisor, only 34.2% of the parents recognized that the broken tooth was a permanent one at the given age which was nine years old. This finding is relatively lower than the finding among the mothers who participated in a similar study where 46.7% of the mothers were able to recognize the tooth correctly.[9] However, these findings show the urgency to educate the parents with the basics of dental chronology as TDI management modalities would differ between permanent and primary teeth.

Only 8.9% of parents participating in the present study would look for the broken segment of the tooth and bring it to the dentist, while most of the participating parents (68%) did not think that carrying the fractured segment of the tooth to the dentist is beneficial at all, not realizing the fact that it would decrease the cost of the treatment, reduce the time of the emergency visit, eliminate the uncertainty of inhaling or swallowing the broken piece and decrease the number of x-ray exposures.

Moreover, 67% of parental responses to question 4, which was about a complicated tooth fracture, was just to stop the bleeding and go to the dentist the day after or if the pain persisted. This response is considered risky, as it would increase the chances of compromising the pulpal status of the tooth and would complicate the management options.

Regarding the second case, the proper first aid treatment of an avulsed tooth is immediate re-implantation of the tooth, as any delay in the procedure would negatively affect the long term prognosis according to the International Association of Dental Traumatology guidelines (IADT).[20] It was found that only 14% of the parents would think about re-implantation of the avulsed tooth. This finding is consistent with other published studies.[9, 11, 14, 48] This reflects an inadequate level of knowledge about dealing with an avulsed permanent tooth and this would undoubtedly compromise the long-term prognosis of the tooth and dentation.

Regarding the storage media of an avulsed tooth, only 13.4% of the parents chose milk, which was the best option in the survey choices. With the majority (53.6%) of participants selecting tap water and paper tissue, which were not recommended by the IADT management guidelines.[20] Variable practices have been reported in different published studies, all pointing to the low level of parental knowledge about the best recommended storage media.[9, 13-15, 50, 51] Moreover, a considerable percentage (32.7%) of the parents opted to throw the avulsed tooth away rather than bringing it to the dentist for re-implantation, which was another concerning finding. Also, 66.5% thought that it wasn't important how to hold the avulsed tooth, with only 5.2% attempting to hold it from the root. These results clearly show that parent's actions would negatively affect the prognosis of an avulsed tooth.[20]

In the self-assessment part of the study, it was shown that 86% of parents admitted that their knowledge is deficient regarding management of dental trauma. Also, 90% were eager to learn more about TDI management. This highlights the enthusiasm of the parents to have more knowledge about TDI and their emergency management which is in accordance with what has been reported earlier.[8, 48, 52] Surprisingly, almost half of the participating parents (48%) claimed they were able to provide a proper action when trauma occurs, which might be a risky attitude in conjunction with their actual level of knowledge about TDI emergency management according to the results.

Poisson model (table 4) revealed statistically significant relations between six variables of parental attitude, self-assessment and demographics while adjusting for other variables. The model estimated that parents who were willing to take free lessons about TDI to have a count that is 1.4 times greater for correct answers compared to parents who were not willing (p= 0.004). This result suggests that the parents who are not keen to learn more about TDIs, would be significantly unable to properly manage them in comparison with parents who are enthusiastic to attend lessons. A similar association could not be found in the literature. However, an association between parental knowledge about TDI and the history of attending TDI training courses has been reported in the literature.[9]

Parents who reported having an idea about TDI were found to have a count 1.24 times greater for correct answers compared to parents having no idea about TDI (p= 0.018). This supports the findings of Alyahya and associates [16] who showed that having previous information on emergency management of dental avulsion was a significant predictor of better parental knowledge. This suggests that educating parents about the proper management of TDI's through campaigns, courses, during the regular follow up visits, establishing an effective dental home and guiding them with the anticipatory guidance should be considered as important as operative treatment for the children and would help in increasing the level of parental knowledge and readiness to face TDI. [10, 53]

In respect of level of parents' education, it was found that parents with Bachelor education or higher had a count that is 1.28 times greater for correct answers compared to parents with only high school education or lower (p=0.025), while adjusting for other variables. The effect of parent's education on their knowledge about the correct management and actions regarding TDIs has been reported and discussed in previous studies [6, 19, 54, 55] however, other investigations did not find such a relation. [9, 10, 15, 17] The present study revealed that the higher educated the parents were, the more correct decisions they would make, with regards to the emergency management of TDIs.

Also, it was estimated that parents who reported that they were capable of managing TDI had a knowledge count that is 1.21 times greater for correct answers compared to parents who didn't feel confident to manage TDI (p=0.037), while adjusting for other variables. This finding suggests that the more the parents were confident about their ability to manage the emergency, the higher the chances that they would actually manage the situation properly. This can be explained by the fact that the confidence about a specific decision is closely related to the level of knowledge and information that the person possesses,[56] which again emphasizes the importance of increasing parents' awareness of managing TDI.

Regarding the effect of household income, it was found that parents with income of 20k or higher have a count that is 1.38 times greater for correct answers compared to parents with 10k or lower income (p=0.037), while adjusting for other variables. This predicts that the high socioeconomic class families are having more appropriate responses to TDI in comparison with the lower SEC families. This result supports the findings of Silva et al, who found also a significant positive association between family income and knowledge score.[50] While other reports could not show a relation between neither SEC nor family income and the level of TDI's knowledge.[9, 11]

Also, it was observed that parents of children with a history of TDI had a count that is 0.8 times lower for correct answers compared to parents of children with no history of TDI (p=0.015) while adjusting for other variables. It can be thus assumed that parents who had experienced TDI were under stress during the incident and were not able to understand the dentist's instructions or they were confused with the negative experience itself, which in turns may negatively affect their responses to any future TDIs. Also, focusing on the consequences of the incident and not paying enough attention to what they should have alternatively done, could be a valid argument for these findings. This result was against what has been published by Quaranta and associates,[57] who were able to find better parental behavior in association with a previous history of TDI. However, a similar result has been reported by Murali et al, [58] who found that mothers who had a history of TDI would discard the avulsed tooth significantly more than mothers who had no previous history of TDI. While others,[9, 10] could not find any effect on the history of the previous TDI on the knowledge score.

It is worth mentioning that all the previously discussed predictions were estimated with a low number of correct responses. Therefore, although they were statistically significant, they should be considered with caution. As their clinical relevance was not tested in this study and it could be considered a potential for further investigations.

5. Conclusion

Within the limitations of this study, the parents of Makkah city show a weak level of knowledge about TDIs and their management modalities. The majority of participating parents tend to manage TDIs incorrectly, which would negatively influence the prognosis of traumatized teeth.

More attention to the importance of the emergency management of TDI should be encouraged, to reduce the cost of the rehabilitation treatments and to improve the prognosis. Specific dental educational programs targeting parents is thus recommended.

6. Ethical Considerations

All participating parents have signed an informed consent form, and they were assured of strict confidentiality. This study was approved by the Institute Review Board (IRB) at Umm Al Qura University, Faculty of Dentistry, Makkah, Saudi Arabia.

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