

Knowledge of Tooth Avulsion Management Among Emergency Room Physicians in Saudi Arabia

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ABSTRACT

Tooth avulsion is the displacement of an intact tooth out of the bony socket. This study evaluates the knowledge of Emergency Room physicians about tooth avulsion management, and determine the demographic factors associated with knowledge. A cross-sectional observational study was conducted on ER physicians. Major public hospitals were conveniently selected and used as clusters; test subjects were conveniently approached. Data were collected through a validated, self-administered questionnaire. Levels of knowledge were assessed in certain fields of avulsion management through selected questions. A total of 244 medical practitioners in emergency departments participated in the study. When asked about the importance of immediate management and critical extra-alveolar time of avulsed teeth, 35.4% of the respondents responded correctly. As for the importance of not replanting primary teeth, 46.3% of the respondents reported correctly. The majority of physicians knew the proper handling and proper cleaning technique of avulsed teeth with 78.5% and 79.3% correct responses respectively. The overall knowledge levels of physicians were poor in 61% and only 39% showed good knowledge. Results showed that ER physicians have demonstrated poor knowledge level regarding tooth avulsion management. Therefore, training programs would be helpful for timely dental referral of the patient presented with tooth avulsion in ER.

KEY WORDS: DENTAL TRAUMA, EMERGENCY, PHYSICIANS, TOOTH AVULSION.

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INTRODUCTION

Traumatic dental injuries (TDI) are an impact type of injuries that occur to teeth and/or the associated hard and soft tissues of the oral cavity. And it is well documented in the literature that traumatic dental injuries are the most common injuries of the orofacial region, and it varies from simple enamel chipping to complete loss of the tooth. Tooth avulsion can be defined as the displacement of an intact tooth out of the bony socket. It is a serious condition, the most serious among all traumatic dental injuries. In a systematic review of literature the findings were that the prevalence of TDI is high worldwide. In Riyadh, it was measured that the prevalence of dental trauma among Saudi boys aged 5-6 years was found to be 33% with tooth avulsion being the second most common cause of trauma, while among Saudi 12-14 year old boys the prevalence was 34% with tooth avulsion comprising 3% (Ai-Majed, Murray, et al., 2001, Holan and Shmueli, 2003, Andersson, et al., 2007, Glendor, 2008, Lam, 2016, Aren et al., 2018).

TDIs are the most common type of injuries among all facial injuries, with tooth avulsion ranging between 1-16% among all dental traumas (Flores, Andersson, et al., 2007). In a review by (Glendor, 2009), the possible etiologies and risk factors of traumatic dental injuries were presented as: oral related factor, intentional TDI or unintentional TDI, with the latter being the most common cause; and it included falls, collisions, struck by an object, sports and road traffic accidents (Glendor, 2009). According to the guidelines of the International Association of Dental Traumatology, better prognosis of the avulsed tooth can be achieved by appropriate emergency management and adherence to the recommended time of sixty minutes (Flores, Andersson, et al., 2007). Furthermore, the consequences encountered from an avulsion injury will have a negative impact on the patient's biology, psychology and emotions (Bendo, Paiva, et al., 2010, Glendor, 2008).

In a study that investigated the association between treating/non-treating TDIs and the impact on patient's quality of life, it was concluded that children who have experienced TDI are more likely to have an impact than those without TDI, and that treatment did not eliminate the impact, though it reduced it (De Souza Cortes, Marcenes, et al., 2002; Ramos-Jorge, Bosco, et al., 2007; Fakhruddin, Lawrence, et al., 2008; Bendo, Paiva, et al., 2010). From an economic point of view, tooth loss due to trauma would require prosthetic therapy to replace the tooth, such therapies imply a high cost (Borum and Andreasen, 2001 Aren et al., 2018).

Avulsion is considered a public health problem, as of its high frequency, occurrence at early age, high cost and long follow-up which usually persists for the rest of the patient's life (Glendor, 2008). It's a serious condition, with unfavorable, avoidable consequence (De Souza Cortes, Marcenes, et al., 2002; Flores, Andersson, et al., 2007; Ramos-Jorge, Bosco, et al., 2007; Fakhruddin, Lawrence, et al., 2008; Bendo, Paiva, et al., 2010). It's

prevalence have increased over the past decade, and it's continuing to increase (Glendor, 2008). Those injuries would require immediate medical attention (Flores, Andersson, et al., 2007) and often medical practitioners are the first to provide patients suffering from trauma with primary care. With that in mind, literature suggests that knowledge regarding avulsion and other traumatic dental injuries among medical practitioners is poor (Diaz, Bustos, et al., 2009; Subhashraj, 2009; Kumar, Sajjanar, et al., 2017; Aren, et al., 2018). The aim of this study was to determine the level of knowledge of medical practitioners in treatment of tooth avulsion in the city of Riyadh, Saudi Arabia.

MATERIAL AND METHODS

The current study is a cross-sectional observational study of emergency room physicians working in public hospitals. Ethical approval was obtained from the Institutional Review Board of King Abdullah International Medical Research Center (KAIMRC). Data was collected through a validated, self-administered questionnaire previously developed by (Abu-Dawoud, Al-Enezi, et al., 2007), the questionnaire consisted of sixteen close-ended questions and five open-ended ones regarding personal information; questions were divided into three parts. In the first part, personal information questions were included, in the second and third parts, questions to assess knowledge were included. An informed consent was obtained prior to participants' enrollment in the study, and confidentiality was strictly maintained as no identifiers were required. A representative sample size was estimated at 223 subjects based on an assumed prevalence of knowledge from previous research studies, a significance level of 5% and a precision of 5%. Six Major public Hospitals' Emergency Rooms in Riyadh were conveniently selected as clusters of samples, test subjects within each cluster were conveniently approached.

Males and females, Saudi and non-Saudi medical practitioners working in ER of hospitals in the public sector as residents, specialist, registrars and consultants were included. Analysis of results were done, and knowledge was evaluated by scoring the participants' knowledge level with a standardized method. Fields of knowledge that were assessed include: (1) importance of immediate management of avulsed teeth, (2) the importance of not replanting primary avulsed teeth, (3) knowledge regarding proper cleaning technique of grossly contaminated avulsed teeth, (4) knowledge regarding the proper handling technique and (5) knowledge regarding proper storage media. These knowledge fields were tested through nine questions. Each of the knowledge questions were given a score of one point, based on a score range of zero to nine points, zero being no knowledge and nine being full knowledge. Then, in between the two extremes, two levels existed, a poor knowledge score (0 - 5.9), and a good knowledge score (6.0 - 9.0); if all the nine questions were answered correctly, the participant would score a 9/9. The guidelines of the International Association of Dental Traumatology were used as a reference for correct answers (Andersson, Andreasen, et al., 2012; DiAngelis,

Andreasen, et al., 2012; Malmgren, Andreasen, et al., 2012). Statistical analysis was performed using SAS software, Version 9.4 of the SAS System for windows. Copyright (c) 2002-2012 by SAS Institute Inc., Cary, NC, USA. All variables were summarized as means, standard deviation and percentages. Factors associated with knowledge were tested using chi-square. Values were considered significant when $P < .05$.

RESULTS AND DISCUSSION

A total of 244 medical practitioners working in emergency departments gave their consent to participate in this study and filled the questionnaire, the mean age was 33.19 (8.18) of those 162 (66.7%) were males and 81(33.3%) were females. The study included 49.4% residents, 30% specialists and 20.6% consultants in hospital emergency rooms. The mean of years of experience was 6.82 (6.82). Among the participants, 66.5% have obtained their medical degree from Saudi Arabia, while 33.5% from other countries. The majority of the practitioners 69.5% reported that dental health education was not covered during medical school; in addition, 63.1% of physicians did not have any first aid course in the management of dental trauma. Whereas, 71.7% of physicians have received information on management of tooth avulsion in form of lectures, seminars, posters, from peers or personal reading (Table. 1).

Table 1. Participants Demographics and Characteristics

Variables	Sample (n=244)
Age mean (S.D.)	33.19 (8.18)
Gender n (%)	
Male	162 (66.67)
Female	81 (33.33)
Level of Education n (%)	
Resident	120 (49.38)
Specialist	73 (30.04)
Consultant	50 (20.58)
Years of Experience mean (S.D.)	6.82 (6.82)
Country of Graduation n (%)	
Saudi Arabia	157 (66.53)
Others	79 (33.47)
Dental health education during medical school n (%)	
Yes	73 (30.54)
No	166 (69.46)
First aid training in "Management of Dental Trauma" n (%)	
Yes	90 (36.89)
No	154 (63.11)
Received information on avulsion management n (%)	
Yes	175 (71.72)
No	69 (28.28)

In the questionnaire, the participants were asked about the importance of immediate management and critical extra-alveolar time of avulsed teeth, 35.4% of the respondents answered correctly (Fig. 1). As for the importance of not replanting primary teeth, 55.5% of the respondents reported correctly (Fig. 1). The majority of physicians knew the proper handling and proper cleaning technique of avulsed teeth with 78.5% and 79.3% correct responses respectively (Fig. 1).

Participants were given a total of 14 possible storage media, among them are correct and incorrect options, and participants had the choice of choosing multiple options simultaneously. The correct answers have been selected 64.3% of the time, of which, "milk" had the highest score 66.80%, followed by "patient's mouth" with a score of 37.3%, and "saline" coming in third place with a 34% of overall storage media correct answers. The most selected incorrect answers were "tap water" 20.1%, followed by "gauze" with a score of 9.4%. Approximately 39.6% of the participants felt confident about replanting the tooth, while 27.9% felt that they lack the knowledge and training about replanting avulsed teeth (Table. 2).

Table 2. Responses to a Question Regarding Willingness to Replant an Avulsed tooth

If you were at a site where someone knocked out a tooth, you would	n (%)
Not take action because of lack of knowledge and training	67 (27.9)
Not take action because of medico-legal consequences	41 (17.1)
Be confident and replant the tooth	95 (39.6)
Not be confident but replant the tooth anyway	37 (15.4)

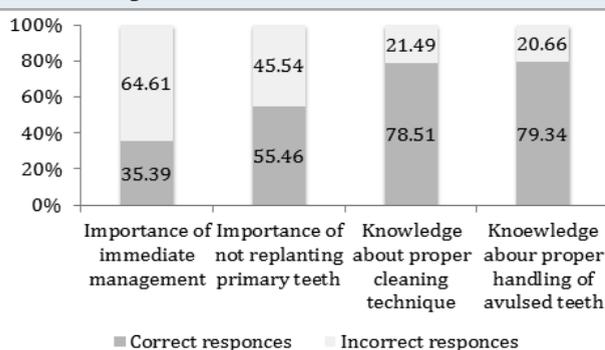
Table 3. Associated and Unassociated Factors with Levels of Knowledge

Age	0036*
Gender	.1138
Level of experience	.0014*
Years of experience	.0196*
Country of graduation	.8763
'First Aid' course covering 'Management of Dental Trauma'	.3801
Receiving information on management	<.0001*
Dental health educational course during medical school	.0696

*Statistically significant

Based on the analyzed data, the overall knowledge levels of physicians were poor in 61%, while 39% showed good knowledge. To compare knowledge levels across individual's demographics, we implemented a chi-square test, and factors were considered significant when ($P < .05$), all factors analyzed are shown in (Table. 3). Variables such as age ($P = .0036$), level of experience ($P = .0014$), years of experience ($P = .0196$) and "received information on what to do if a tooth is knocked-out" ($P < .0001$) were found to be statistically significant factors. Other participants' characteristics including gender, country of graduation, "first aid course in dental trauma management" and "covering dental health education in medical school" were found to be insignificant ($P > .05$).

Figure 1. Participants Overall Scores of the Tested Fields of Knowledge



Literature revealed that the number of children visiting the emergency departments due to orofacial trauma is high (Aren, Sepet, et al., 2013). In the study of (Al-Malik, 2009) who studied the types of oral injuries attending a hospital in Jeddah, Saudi Arabia, the prevalence of avulsion to permanent teeth was found to be 16%, on the other hand, it was found that the prevalence of avulsed primary teeth was 3%. Similarly, (Aren, et al., 2018) reported that in the age group of 6 - 10 years, the prevalence of orofacial trauma was 23.7% and 18.9% for age group 11 - 18 years. In the present study, the prevalence of emergency room physicians who encountered an avulsion type of dental trauma was found to be 18.4%. Ergo, due to the high prevalence of orofacial trauma, tooth avulsion in particular, this study aimed to evaluate the level of knowledge of emergency department (ED) physicians of proper management of tooth avulsion. Díaz, Bustos, et al., (2009) reported that 90.2% of participants have not had any formal training on treatment of dental injuries, and that the majority of the participants had poor knowledge on the matter. In a study by (Trivedy, Kodate, et al., 2012), they concluded that among the participants lack of confidence in managing dental trauma was found, and that among all dental emergencies, the lowest confidence observed was for tooth avulsion.

Other studies by (Ulusoy, Onder, et al., 2012) and (Aren, Erdem, et al., 2018) revealed that the participants' perceived knowledge of dental emergencies treatment was insufficient and that the majority were willing to

undergo training on the subject. Similarly, (Abu-Dawoud, Al-Enezi, et al., 2007) reported in their study which compared dentists and physicians that the knowledge level of physicians was low in 26.6% and average in 73.3%. In our study, our findings presents better results than that of (Abu-Dawoud, Al-Enezi, et al., 2007) who showed that none of the physicians have showed good knowledge, while, more than one third of the participants in our study have demonstrated good knowledge, the reason for that may be the sample of their study, in which, they included young physicians who have only graduated recently. Thus, the experience and the amount of exposure to such cases could be the controlling factor in the observed differences of knowledge.

The management of avulsed teeth differ between primary and permanent teeth (Andersson, Andreasen, et al., 2012; Malmgren, Andreasen, et al., 2012). In a survey by (Ulusoy, Onder, et al., 2012), participants were asked about their opinion on replantation of primary avulsed teeth, only about one third opted not to replant the tooth under any circumstances, while, about two thirds of them had no opinion or would replant the tooth in specific situations; their findings suggest that knowledge about avulsion management in case of primary teeth is insufficient. Similarly, these findings are consistent with that of (Erdem, et al., 2018) in which, they revealed that physicians' knowledge of traumatic dental injuries to permanent teeth were higher than that of primary teeth. On the other hand, (Needleman, Forbes, et al., 2012) found that there were no differences in the responses regarding primary and permanent teeth avulsion management, although, a significant difference were found for the luxation and uncomplicated fractures injuries. In the present study, a little more than half of the respondents had answered questions regarding knowledge of avulsion management in primary teeth correctly, and participants' knowledge were higher when compared to the previously cited literature. This could be explained by the fact that most of the emergency departments of the hospitals visited had a separate pediatric ER department.

The prognosis of avulsed teeth depends on several factors, extra-alveolar time, proper storage and transportation media, and care in handling and cleaning to preserve vitality of the periodontal ligament. The guidelines of the IADT recommends an extra-alveolar time of 60 minutes (Andersson, Andreasen, et al., 2012), beyond this, the prognosis of replantation decreases greatly as the cells of the periodontal ligament are non-viable. Thus, immediate management within this time period would increase chances of survival of the avulsed tooth up to 90%. In our study, such knowledge was lacking among the majority of the participants 64.6%, most of them chose "within few hours" and "before 24 hours have elapsed".

Similar to extra-alveolar time, handling of the avulsed tooth and appropriate initial procedures prior to re implantation is a critical factor in prognosis of the treatment provided. In the present study, our results indicate that three thirds of the physicians have a

good knowledge regarding the proper cleaning and handling of avulsed teeth. Nearby results were obtained by (Kumar, Sajjanar, et al., 2017), they found that 78% of the respondents preferred the appropriate cleaning technique, and that 48.7% would handle the avulsed tooth appropriately. Most of the previously cited studies obtained conflicting results, (Holan and Shmueli, 2003) found that only 4% of physicians would have appropriately provided initial treatment, in their study, only those who have answered all questions regarding the initial steps correctly would be included in the list of those who provided appropriate initial treatment.

Similarly, in a study by (Aren, Erdem, et al., 2018) about 10% of physicians chose the appropriate management technique. Midway results were found by (Ulusoy, Onder, et al., 2012) that about half of the physicians had no knowledge of the appropriate steps of replanting avulsed teeth. The reason for these conflicting results could be the tools used in each study or response bias of the participants, where they could be tempted to select certain answers. Therefore, further investigations should be performed to accurately determine knowledge levels of handling and cleaning techniques. Storing the tooth in a proper media would preserve the vitality of the periodontal ligament and increase prognosis. In the present study, 66.8% of the physicians chose milk as the proper transport medium. Contrary to the results of (Aren, Erdem, et al., 2018) where only 4% thought that milk is an appropriate medium. Also, in our study, 37.3% of participants recognized that intraoral transportation of avulsed teeth is appropriate.

While, Aren et al., (2018) found that 8.7% deemed intraoral transportation as the best transport medium. Similarly, in the study of (Lin, Levin, et al., 2006) 13.2% of the respondents chose saliva as the best transport medium. In our study, almost one third 27.9% of the respondents felt that they lacked sufficient training and knowledge about replanting an avulsed tooth, and 17.1% would not replant the tooth because of medicolegal consequences. Similarly, (Aren, Erdem, et al., 2018) showed that 44.4% thought that their knowledge were insufficient, and that 27.8% of emergency room physicians would not replant an avulsed tooth because of medicolegal issues. Reports by (Hamilton, Hill, et al., 1997) and (Addo, Parekh, et al., 2007) highlighted that physicians were frightened of possibly hurting the child and of legal implications. Therefore, establishing guidelines on management of tooth avulsions would be of great benefit. In conclusion, first aid management of traumatic dental injuries are usually provided by medical professionals, the results of this study suggest that emergency room physicians' knowledge is poor. Therefore, further education and training in management of dental trauma should be emphasized in both undergraduate and postgraduate studies.

Conflict of Interest: There are no conflicts of interest to declare.

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