Original Article

# Knowledge of basic dental physiology among teachers can improve preliminary management of acute dental avulsion in school children

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## Abstract

**Background and Aim:** Acute dental injuries occur frequently in school going children. Teachers are often the first person to initiate emergency care before medical help is available. This study was carried out to evaluate the knowledge and attitude to emergency management of dental trauma among a group of school teachers in Pondicherry, India.

**Methods:** A structured questionnaire was administered to 60 teachers.

**Results:** Nearly 85% of teachers did not have any formal first-aid training during their career. Furthermore, 81% of teachers had never experienced an episode of acute dental injury in the school environment. Concerning knowledge, 50 participants favored an immediate/early management of acute dental injury. Control of bleeding seemed to be the primary concern in 37% of teachers. Knowledge of optimal storage media for avulsed permanent teeth was poor. Twelve teachers were unsure if they should be exposed to first-aid training. This may be due to reluctance to take up responsibilities in addition to their routine duties.

**Conclusion:** Teachers should be exposed to education programs in dental first-aid management. Knowledge of basic dental physiology and the physiological events following the repositioning of an avulsed tooth will help in better management of dental trauma.

**Key words:** Acute dental injury, school children, school teachers, tooth avulsion

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## INTRODUCTION

Dental trauma may vary from minor tooth fracture to extensive dento-alveolar damage that involves the supporting structures and tooth displacement or avulsion.[1] A significant number of school aged children experience trauma of some sort to primary or permanent dentition. Studies have shown that main cause of traumatic dental injuries among school children is from falls and sports activities with the maxillary incisors being most commonly involved.[2-4] In their study, Andreasen *et al*., suggest that the loosely structured periodontal ligament surrounding the erupting teeth and elasticity of alveolar bone favor complete avulsion.[5]

School teachers are immediate seniors for children in school and they are considered as the primary care takers for them. They are frequently required to deal with trauma in schools. Many studies indicated their deficient knowledge with regards to emergency management of dental trauma.[6-10]

Pondicherry is a union territory beside the state of Tamil Nadu in the south of India. This place is known for a large number of educational institutions and is considered an important educational hub. Although a few studies have been conducted in India to assess the knowledge and attitude of school teachers towards acute dental injuries, no studies are available from Tamil Nadu or Pondicherry region. The purpose of this study was to evaluate the knowledge of basic dental physiology and

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acute dental trauma management among a group of teachers in Pondicherry and its possible link to dental trauma management.

## MATERIALS AND METHODS

A questionnaire was designed to assess current knowledge and attitude to treat acute dental injuries. This was apparently based on questionnaires used in other studies.[6-8] Permission was obtained from the education department and school authorities to administer the questionnaire to the teachers. The questionnaire consisted of 3 parts [Table 1]. Part 1 contained questions on personal data that recorded age, sex, years of service, first-aid training and knowledge of both eruptions and experience with acute dental injuries in school. Part 2 had 5 questions on an imaginary case of acute dental trauma in a school environment. Part 3 consisted of 2 questions on perceived knowledge and attitude on acute dental trauma. All questions were given alternative choices to help the respondents to make quick decisions. The respondents were assured of confidentiality. The group of teachers ($n$ = 60) was a convenience sample of teachers working in Government/Private Schools in Pondicherry, India. The results to all the three parts were analyzed by Microsoft Excel Program, Microsoft Corporation, USA (2007 version) for frequency distribution and computed in percentages.

## RESULTS

Of the 60 teachers who were approached, 59 agreed to participate in the study and returned the completed questionnaires on the same day.

### Part 1

Around 73% of the respondents were female teachers ($n$ = 43). 50.8% ($n$ = 30) of teachers were within the ages 20-29 and 56% ($n$ = 33) of teachers had less than 5 years of service.

For question 1: While 85% ($n$ = 50) of the participants did not have any formal first-aid training, 7 teachers indicated exposure to some form of first-aid training. Two participants failed to mention this information in their completed questionnaire.

For question 2: Around 81% ($n$ = 48) of participants had never encountered an incident of tooth avulsion in a school environment.

For question 3: About 31 participants were unsure if an avulsed tooth could be saved and only 19% ($n$ = 11) were aware that avulsed teeth could be repositioned back.

**Table 1:** Questionnaire for assessing dental trauma care knowledge among school teachers

| Parts | Data and question | Response |
|---|---|---|
| 1 | Age | |
| | Sex | |
| | Years of service | |
| | Have you ever had formal first-aid training? | Yes<br>No |
| | Have you ever encountered an accident in school where a child has had a tooth "knocked" out? | Yes<br>No |
| | Do you think it is possible to save a tooth which was knocked out and can be put back in the mouth? | Yes<br>No<br>Not sure |
| 2 | A 12-year-old boy was hit on the face with a cricket ball. His upper front teeth were "knocked "out | |
| | These teeth likely to be | |
| | Permanent teeth | |
| | Milk teeth | |
| | Not sure | |
| | What would you do to manage this situation? | |
| | Send the boy back to class once bleeding is controlled | |
| | Collect the tooth and send the boy to a medical doctor | |
| | Collect the tooth and send the boy to a dentist immediately | |
| | Not sure | |
| | What would you do if the "knocked out" tooth was covered with dirt? | |
| | Would do nothing | |
| | Rinse with tap water | |
| | Scrub with a soap and brush to remove dirt | |
| | Scrub the tooth with dettol | |
| | Not sure | |
| | How early should you visit the dentist if you want to save this tooth? | |
| | Immediately | |
| | Within 30 min | |
| | Within few hours | |
| | Before next day | |
| | Not sure | |
| | How would you keep the tooth till you reached the dentist? | |
| | In a paper or kerchief | |
| | In your/child's hand | |
| | In a glass with cold water | |
| | In a glass of cold milk | |
| | In child's mouth | |
| | In a cotton swab | |
| | Not sure | |
| 3 | Are you satisfied with your knowledge on emergency management of acute dental trauma? | Yes<br>No |
| | Do you think it is necessary for school teachers to have some training in first-aid management of acute dental trauma? | Yes<br>No |

### Part 2

For question 1: An overwhelming majority of 90% ($n$ = 53) correctly indicated that the avulsed anterior tooth in a 12 year old boy is most likely to be a permanent tooth.

For question 2: Around 37% ($n$ = 22) indicated that control of bleeding would be their primary concern, whereas a near equal number ($n$ = 23) suggested the collection of the tooth and referral of the boy to a dentist.

For question 3: A total of 50 participants were convinced that dirt on a knocked out tooth had to be cleaned before further treatment. While 34% ($n$ = 20) preferred rinsing the tooth with tap water, 30 participants suggested the use of soap and brush or antiseptic solutions [Figure 1].

For question 4: Urgent treatment for an avulsed tooth was the choice of nearly 50 participants. Most suggested immediate ($n$ = 34) or urgent (within 30 min; $n$ = 15) consultation with the dentist following an incident of avulsion injury of a tooth.

For question 5: Equal number of participants ($n$ = 18) preferred to use either a wet kerchief or cold water to transport the tooth to the dentist. Carrying the tooth in the child's mouth did not elicit a response from even a single teacher [Figure 2].

**Part 3**

For question 1 and 2: Around 94% ($n$ = 55) were not satisfied with their current level of knowledge in management of acute dental trauma. 12 teachers were unsure whether teachers should be exposed to some training in the first-aid management of acute dental trauma.

Following the completion of the questionnaire, a presentation on management of acute dental trauma (based on IADT guidelines) was given in the schools which elicited interest among the teachers for such programs at regular intervals.

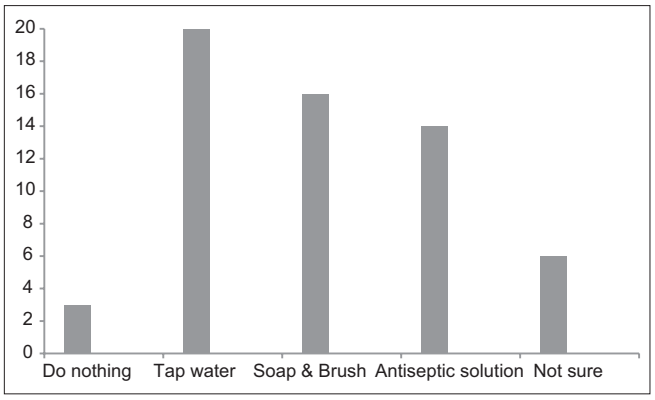


**Figure 1:** Removal of dirt on avulsed teeth

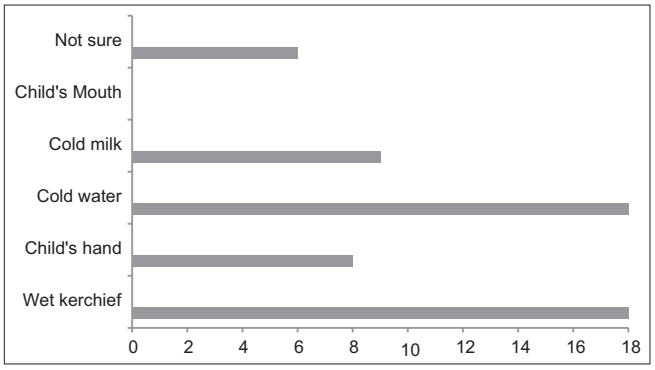


**Figure 2:** Transport media

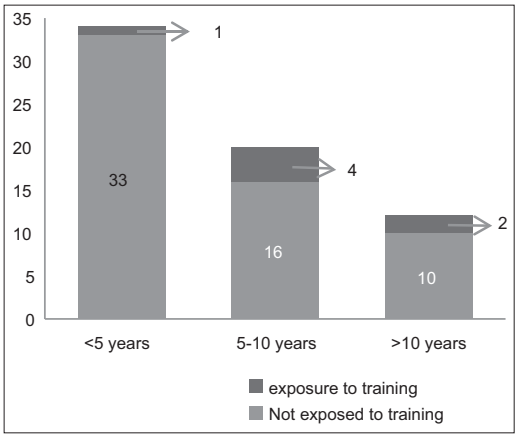


**Figure 3:** Relationship of duration of teaching experience with the exposure to trauma care training

## DISCUSSION

A good number of teachers who participated in this study had less than 5 years of service. This relative inexperience could explain the finding that hardly few teachers had seen an episode of dental avulsion. Teachers with few years of service would have completed their training in the recent past and with improving general health awareness, are more likely to be exposed to first-aid training as a part of their curriculum. Unfortunately, the results belie this assumption and a significant number (85%) did not appear to have any exposure to first-aid training [Figure 3]. This is in contrast to the good results (70%) obtained in Hong Kong study, which can be explained by the availability of a planned teachers training program with regular updates to their first-aid knowledge.[11] Conversely, a study by Sea-Lim *et al*. found that teaching experience showed a direct correlation with the self-assessed knowledge of physical education teachers regarding the emergency management of dental trauma.[8] Thus, knowledge of dental eruption and basic dental physiology will help improve dental trauma management in the school before they are referred to dental clinic.

Dental injuries are common in school going children during the school hours. Dental avulsion is the severe most among the dental injuries that requires immediate management. Avulsion is defined as total displacement of

the tooth out of its alveolar socket. The maxillary incisors, especially in childhood, are the most commonly affected teeth due to the relative instability of the periodontal ligament during the progressive eruption of these teeth.[1] The resilient alveolar bone offers only a token resistance to the disruptive forces. During the avulsion of a tooth, the periodontal ligament fibers are ruptured leaving behind remnants on both the cemental surface of the root and the walls of the alveolar socket. Pulpal vessels are violently torn off at the apical foramen.[5]

In reimplantation of an avulsed tooth, the early establishment of periodontal ligament cellular physiology is the primary goal. Treatment of avulsions is directed at avoiding or minimizing the complications of attachment damage and pulpal infection. Three types of healing can occur depending upon the severity of injury to the periodontal ligament. While "functional healing," i.e. regeneration of the periodontal ligament is most desirable, often, "healing with inflammatory resorption" with gradual loosening of teeth and "healing with replacement resorption" with fusion of bone and root surface (ankylosis) are the more common outcomes.

Dental trauma remains an important oral health problem in childhood causing much pain and distress. As children spend a significant portion of the day in the school and are more likely to receive dental injuries during sport activities in school, teachers are frequently required to deal with such injuries until expert care is available. Oral factors (increased overjet with protrusion), environmental determinants and human behavior were found to increase the risk for traumatic dental injuries.[12] The prognosis of some of the dental injuries depends upon correct and prompt emergency management and proper advice. School teachers should have knowledge of basic dental physiology and the treatment protocol for such injuries.

A correct identification that the avulsed tooth in a 12 year old boy is a permanent tooth would indicate a more than adequate general dental knowledge of the study group, unlike as emphasized in other reports.[13] Studies that have evaluated the dental knowledge of mothers, report a satisfactory recognition of the avulsed tooth in a particular age group.[14-16] This could be attributed to women being more caring, attentive and aware of their childrens' development.[17,18] With a majority of teachers in this study being women, a similar explanation appears to be reasonable. Further, participants seemed to pay more attention to control bleeding mostly because, bleeding is perceived by most people as life-threatening. Usually not much attention is paid to the tooth at this time which results in delay in replantation of the teeth, which affects the overall prognosis of the tooth.

Participants also felt that dental trauma should ideally be managed by a dentist and appreciated the need for timely urgency of treatment. The degree of damage is one of the most important prognostic factors in the replantation of an avulsed tooth.[12] The prognosis of healing depends on appropriate emergency management immediately after the avulsion trauma.[16] The tooth needs to be placed back in its socket as soon as possible to avoid further damage to the periodontal membrane. The prognosis is still determined in the first 15-30 min after trauma.[19] The prognosis is related to the injury of the periodontal membrane during the time the tooth is out of its socket. Dry storage of the tooth will result in an irreversible injury to the periodontal membrane, with the result that the replanted tooth will be lost over time.[20] To prevent dehydration of the root surface during transportation, the storage medium must be of correct osmolality and pH; milk fulfils this requirement and is considered as an excellent medium.[21] Saliva is also considered to be an excellent and easily available transport media.[22] Storing the tooth in water is not recommended as the osmolality of water is too low, which results in destruction of the cells. Most participants chose cold water and wet kerchief as transport media and the use of saliva was not considered by even a single participant.

## CONCLUSION

Immediate replantation of avulsed permanent incisors is the mainstay of acute dental trauma management. An absence of knowledge will result in avulsed teeth not being replanted, improperly cleaned, or handled or stored in an inadequate medium prior to replantation, which will severely affect the prognosis for the compromised tooth. Teachers appear to be shouldering significant responsibilities if they provide initial care in acute dental trauma. It is encouraging to note that 95% of the teachers in our study were aware of their limited knowledge of emergency management of dental trauma. These individuals are more likely to appreciate and incorporate the additional knowledge gained in acute dental trauma emergencies in the school environment. Education programs that assess the knowledge level before intervention and the outcome of the intervention can be performed by comparing pre and post intervention knowledge levels.

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