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# Avulsed Teeth Among Children: Knowledge of its First Aid Management and Awareness of Its Prevention Among Melakan Parents.

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## *Abstract*

***Background:*** *The prognosis of avulsion injuries highly depends on the knowledge of non-professional people usually present at the site of accident prior to professional dental care and their ability to render quality first aid. As 41% of dental injuries occur at home, parents often need to provide such care. The present study assessed the knowledge of first aid management of tooth avulsion in children and awareness of its prevention among parents in Melaka, Malaysia.*

***Methods:*** *A cross-sectional study was conducted among 287 parents visiting the outpatient department of a dental school in Melaka, Malaysia. Purposive sampling was used. The knowledge and awareness level was tested using a simple questionnaire with mostly close-ended questions. Independent t-test and ANOVA were used to test the association of level of knowledge among the variables.*

***Results:*** *The minimum and maximum knowledge score was 1 and 10 respectively with a mean score of 4.8 (SD=1.7). Only one participant had high knowledge while majority (93.4%) had low knowledge.*

***Conclusion:*** *The overall knowledge of the parents on first aid for avulsed teeth was low and lacked association with the variables. The parents' awareness on prevention of dental trauma was seemingly low and can be studied further. Educational programs can be planned to increase their awareness on traumatic dental injuries and its first aid management thereby improving the prognosis of the avulsed but otherwise healthy permanent tooth and prevent its unnecessary loss.*


***Keywords:*** *knowledge, awareness, tooth avulsion, first aid, prevention, parents*

## Introduction

Tooth avulsions are a very painful and distressing consequence of accidents among children commonly affecting the permanent dentition of 8 to 12-year-old children. At this age, most teeth have loosely structured periodontal ligament, short, incomplete roots and resilient alveolar bone providing minimal resistance to extrusive forces (1). It has an incidence of 1% to 16% among all traumatic dental injuries (TDI) of the permanent dentition with the maxillary central incisor being the most commonly avulsed tooth (2).

The loss of an anterior tooth in a child leads to great psychological impact on the child as well as the parents. Anterior teeth are not only important aesthetically but also essential for phonetics, mastication, integrity of the supporting tissues and psychological well-being of children (3). The prognosis of tooth avulsion highly depends on prompt and appropriate first aid management. As 41% of TDI occur at home, the prognosis is subject to the first aid knowledge of parents/caregivers who usually are present at the site of accident prior to the initial professional dental care (4).

Parents, caregivers, teachers and school personnel (nurses, coaches, etc.) were studied in various countries to test their knowledge level on first aid management of avulsed teeth (5-11). However, in Malaysia, the knowledge of first aid measures for tooth avulsion was assessed only among general dentists and rugby players (12, 13). Literature review did not show any published data on the knowledge of Malaysian parents regarding this subject. Taking into consideration the crucial role of parents in the delivery of first aid measures to children with avulsed teeth, the present study aimed to assess the knowledge and awareness of parents hailing from Melaka, a southern state of Malaysia. Their knowledge on first aid management of TDI, avulsion in particular and their awareness with regard to its prevention were assessed along with the likely association of the level of knowledge with demographic variables.

## Materials and Methods

A cross-sectional observation study was done among parents of children aged 0-16 years who were residents of various parts of Melaka. Non-Malaysian citizens and non-residents of Melaka were excluded from the study. Ethical approval was obtained before the study was conducted. The knowledge of the parents on the first aid management of avulsed teeth and their awareness on its prevention were assessed using a questionnaire (Appendix 1) adapted from a previous study (8).

The questionnaire was divided into two parts: Part A contained questions on sociodemographic profile and Part B had close-ended questions that tested the knowledge on TDI, specifically on first aid management of avulsed teeth and the awareness regarding its prevention.

The questionnaire was distributed under the supervision of the authors to parents who attended the outpatient department of a dental school in Melaka. Consent form and printed instructions on how to answer the questionnaire were also given along with the questionnaire. Participation in the study was voluntary and kept completely confidential. Before distributing the questionnaire, a brief explanation about the objective of the study was given to each participant. The participants were not allowed to discuss or search internet resources while answering the questionnaire. The questionnaires were collected once the participants had completed answering all the questions. Incompletely answered questionnaires were discarded.

The sample size was calculated to be 288; including an anticipated 20% dropouts, keeping the study done by Ozer S et al. as the reference (7). Purposive sampling was done for the present study. The filled in questionnaires were collected and the data was entered into Microsoft Excel Worksheet 2016 using a personal computer. Each correct response was given a score of one and wrong answers/"don't know" responses were scored as zero. The total score was then calculated for each participant to assess the level of knowledge. The parents were classified into three groups based on the total score obtained as; high knowledge (>80%), moderate knowledge (60% to 80%) and low knowledge (<60%). Data collected from the questionnaires were coded and statistical analysis performed using the Epi Info Version 7.2 software for Windows. Categorical variables such as age group, gender, ethnicity, level of education, working status, type of occupation and level of income were expressed in frequency and percentage. Quantitative variables such as the knowledge score was expressed in mean and standard deviation. Independent t-test and One-way ANOVA were used to determine the association between the knowledge score and the different demographic variables, with the P-value threshold set at 0.05.

## Results

A total of 350 parents were surveyed but 63 questionnaires were either incomplete or not returned and only 287 were used for data analysis (response rate of 82%). Socio-demographic distribution of the respondents is given in Table 1.

Majority of the respondents (70.7%) agreed that they did not know the first aid measures to be taken for TDI (Question 1). During tooth avulsion (Question 2), 69.3% would calm the child/wash the injury/stop the bleeding but not search for the tooth and 9.4% did not know what to do or would be

frightened to do anything. Three-fourth (75.3%) of the parents did not know if an avulsed tooth could be saved (Question 3). Following tooth injury (Question 4), majority of parents (74.6%) would take the children to a dentist and some to a physician or paediatrician (13.2%). Some parents (16.4%) responded that the best moment to look for professional help following tooth injury (Question 5) would be the following day once the child calms down (Fig. 1).

At the time of avulsion (Question 7), only one participant (0.3%) stated that he/she would carefully wash and put the tooth back in its socket by himself/herself. The remaining respondents were either unaware of what should be done (10.1%), only arrest the bleeding but discard the tooth (26.5%) or they would prefer professional help in one way or the other (63.1%) as depicted in Figure 2.

Concerning transport media (Question 8), 49.1% respondents chose a wrong media such as handkerchief, empty container or piece of paper and 24.4% were unaware of any suitable media (Fig. 3). About 18.5% of them would use water and only 5.2% would use either isotonic saline or put the tooth in the child's mouth in contact with saliva. Half of them (50.5%) did not know how long the tooth could stay outside the mouth or socket without any harm (Question 9) as illustrated in Figure 4. When asked about the correct procedure to clean the tooth (Question 10), most of them (50.5%) chose tap water and only 15.0% chose the correct answer (Fig. 5).

Other questions that were used to test the knowledge of the parents are given in Table 2 along with the correct/best response and the total number of these responses obtained. The total score obtained by the participants was studied closely and it was seen that the maximum score was 10 and the minimum score was 1. The mean score (SD) was 4.8 (1.7). Only one participant (0.3%) had high knowledge while the majority (93.4%) had low knowledge. These findings are depicted in Table 3. The level of knowledge across each of the variables was compared statistically and within the limits of the present study, no significant association was seen (P-value > 0.05) as depicted in Table 1. Parents' responses related to prevention of dental trauma is depicted in Table 4 and was suggestive of low awareness.

| Variables | | n (%) | Knowledge Score Mean (SD) | *t/F*– statistic (df) | *P*-value |
|---|---|---|---|---|---|
| **Age** | 20 to 29 | 32 (11.1) | 5.1 (1.8) | 2.059 (3, 276) | 0.106[a] |
| | 30 to 39 | 98 (34.1) | 4.5 (1.8) | | |
| | 40 to 49 | 80 (27.9) | 5.1 (1.7) | | |
| | Above 50 | 77 (26.8) | 4.7 (1.4) | | |
| **Gender** | Male | 112 (39.0) | 4.9 (1.7) | -0.864 (278) | 0.388[b] |
| | Female | 175 (61.0) | 4.7 (1.6) | | |
| **Ethnicity** | Malay | 151 (52.6) | 4.8 (1.8) | 0.602 (2, 277) | 0.548[a] |
| | Chinese | 109 (38.0) | 4.8 (1.6) | | |
| | Indian | 27 (9.4) | 5.1 (1.5) | | |
| **Level of Education** | Level 1 | 6 (2.1) | 3.8 (0.9) | 0.786 (2, 277) | 0.425 [a] |
| | Level 2 | 118 (41.1) | 4.8 (1.7) | | |
| | Level 3 | 163 (56.8) | 4.9 (1.8) | | |
| **Working Status** | Working | 203 (70.7) | 4.8 (1.8) | -0.541 (278) | 0.589[b] |
| | Non-working | 84 (29.3) | 4.9 (1.5) | | |
| **Occupation** | Government | 71 (35.0) | 4.9 (1.8) | 0.557 (2, 197) | 0.574[a] |
| | Non-government | 47 (23.2) | 4.8 (1.7) | | |
| | Self-employed | 85 (41.9) | 4.6 (1.9) | | |
| **Level of Income** | < RM 1000 | 85 (29.6) | 4.9 (1.7) | 0.240 (2, 177) | 0.787[a] |
| | RM 1000 to RM 3000 | 93 (32.4) | 4.7 (1.7) | | |
| | > RM 3000 | 109 (38.0) | 4.8 (1.8) | | |

[a]One-way ANOVA, [b] Independent t-test

**Table 01:** Socio-demographic distribution of the participants along with the mean knowledge score and its association within the variables (n=287)

| Questions | Correct Response | Correct Responses Obtained n (%) |
|---|---|---|
| 1. Do you know the first aid measures to be taken when there is dental trauma? | Yes | 84 (29.3) |
| 2. How would you respond if your child's tooth gets knocked out of its socket? | Calm down the child, stop the bleeding and look for the tooth | 61 (21.3) |
| 3. Can a tooth that has come out of its socket after a fall be saved? | Yes | 71 (24.7) |

| | | |
|---|---|---|
| 4. If your child has a tooth injury while playing, what would you do? | Visit a dentist | 214 (74.6) |
| 5. What do you think is the best moment to look for professional help? | Immediately after accident | 192 (66.9) |
| 6. Would you still seek professional advice even if your child does not have any pain after the fall? | Yes | 180 (62.7) |
| 7. What would you do if the tooth is completely out of the socket at the time of trauma? | Carefully wash and put the tooth back in its socket | 1 (0.3) |
| 8. In case you are carrying the tooth to a dentist, how would you do it? | Isotonic saline/ place in the child's mouth in contact with saliva | 15 (5.2) |
| 9. How long do you think the avulsed tooth can stay outside the socket without harm? | As little as possible | 59 (20.6) |
| 10. When you wash the tooth: | Use delicate water/ saline jets, holding the tooth crown strictly, not touching the root | 43 (15.0) |
| 11. If you don't find the tooth: | You wash the child's mouth, apply pressure to the wound and look for professional help | 182 (63.4) |
| 12. Is the follow-up of the child by a dentist important? | Yes | 275 (95.8) |

**Table 02:** Parents' perceived knowledge on tooth avulsion and its first aid management (n=287)

| Knowledge Level | n (%) |
|---|---|
| High | 1 (0.3) |
| Moderate | 18 (6.3) |
| Low | 268 (93.4) |
| | |
| Minimum Total Score | 1.0 |
| Maximum Total Score | 10.0 |
| Total Score Mean (SD) | 4.8 (1.7) |

**Table 03:** Knowledge of first aid management of tooth avulsion among the parents (n=287)

| Questions | n (%) |
|---|---|
| 13. Do you think that dental trauma in school can be prevented? | |
| a. No. It usually happens during child's normal activity | 122 (42.5) |
| b. All injuries can be prevented | 138 (48.1) |
| c. Only major injuries can be prevented | 27 (9.4) |
| 14. Have you heard of mouth guards to prevent injuries to teeth? | |
| a. Yes | 138 (48.1) |
| b. No | 149 (51.9) |
| 15. Would you recommend your children to wear mouth guards while playing games? | |
| a. Yes | 135 (47.0) |
| b. No | 152 (53.0) |

**Table 04:** Awareness of parents on prevention of dental trauma (n=287)

| DO's | DON'T's |
|---|---|
| Remain calm and try to reassure the child. | Do not panic. |
| Search for the tooth. Permanent teeth that have come out of its socket can be replanted and saved. | If you can locate the tooth, do not throw away the tooth even if it is dirty or fractured. |
| If you cannot locate the tooth, wash the child's mouth and try to control the bleeding. | Do not delay visiting a dentist. |
| Hold the tooth by its crown while picking it up. | Do not hold the tooth by its root. |
| Wash the tooth under running water. | Avoid brushing the tooth or using antiseptics or soaps for the cleaning the tooth. |
| Try to place the tooth gently back into its socket if you are sure it is a permanent tooth. | Do not attempt to replant a milk tooth. |
| If it is not possible to replant it yourself, then transfer it into a good storage medium that is easily available such as isotonic saline or cold milk | Do not store the tooth in a dry state but avoid using water or ice for storing the tooth. |
| Visit the dentist immediately even if the tooth is not found or the child does not have any pain. | Do not delay seeking professional advice even if the child does not have pain. |

**Table 05:** Guidelines for educating parents about tooth avulsion and its first aid management

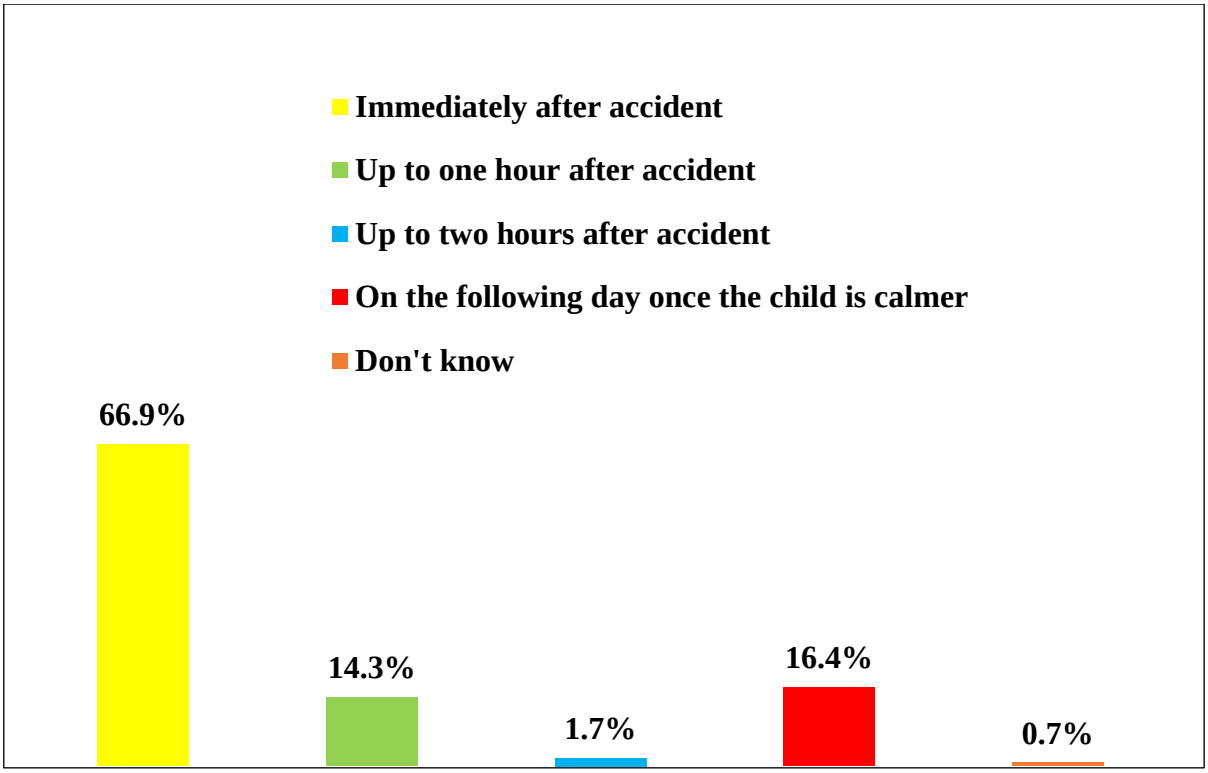


**Figure 1:** Responses obtained for best moment to look for professional help (Question 5).

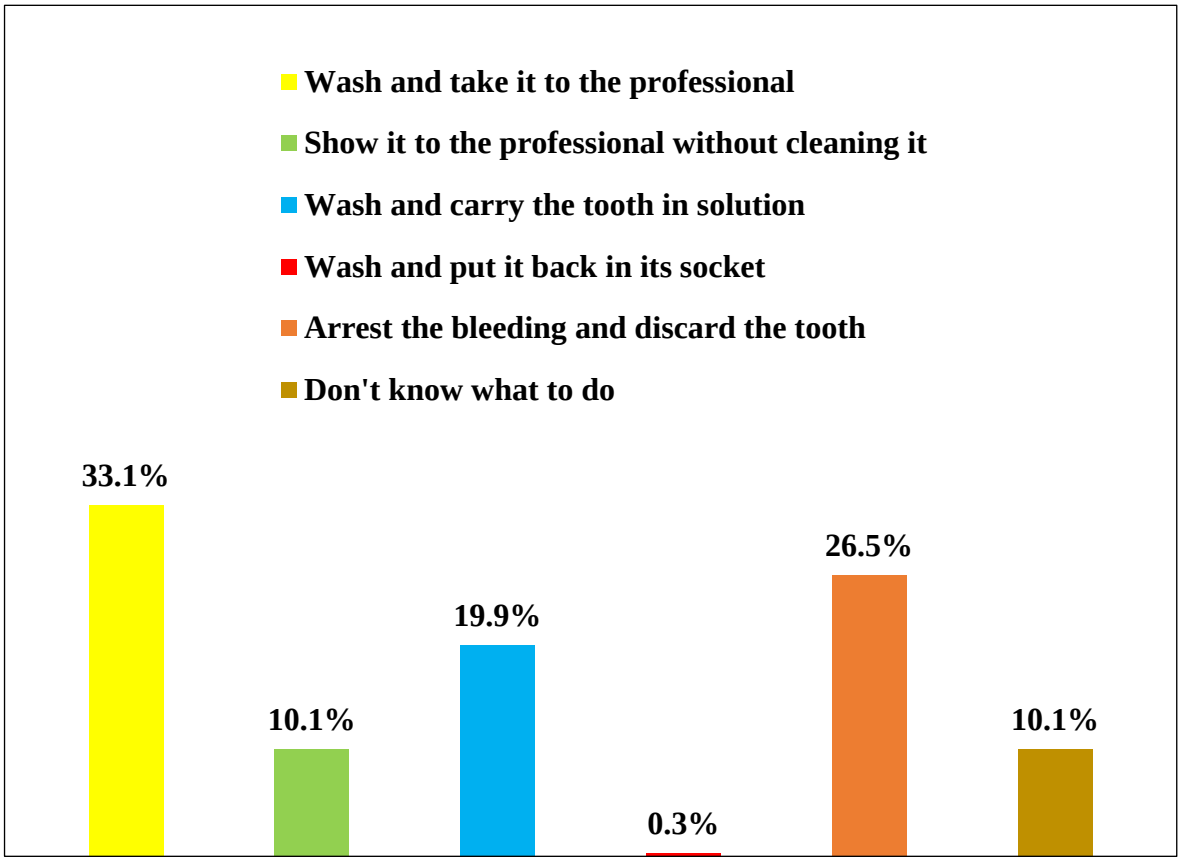


**Figure 2:** Parents' response during avulsion (Question 7).

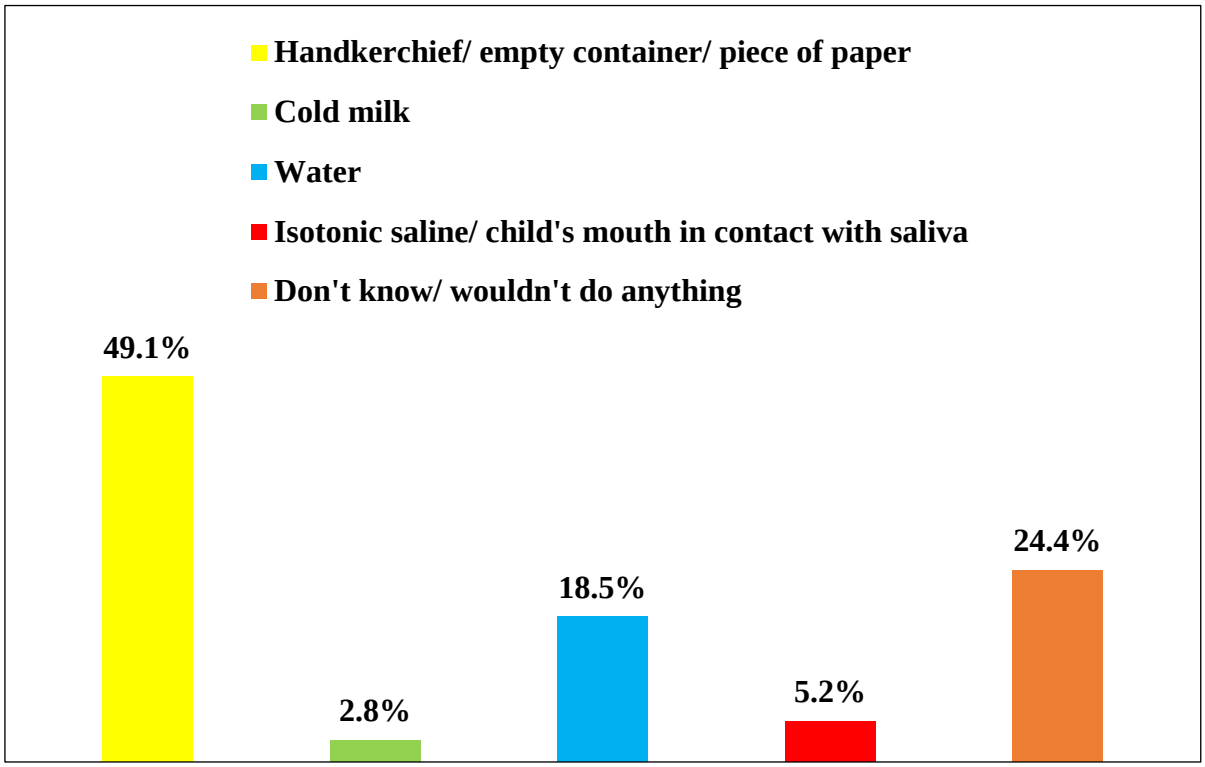


**Figure 3:** Choice of transport medium (Question 8).

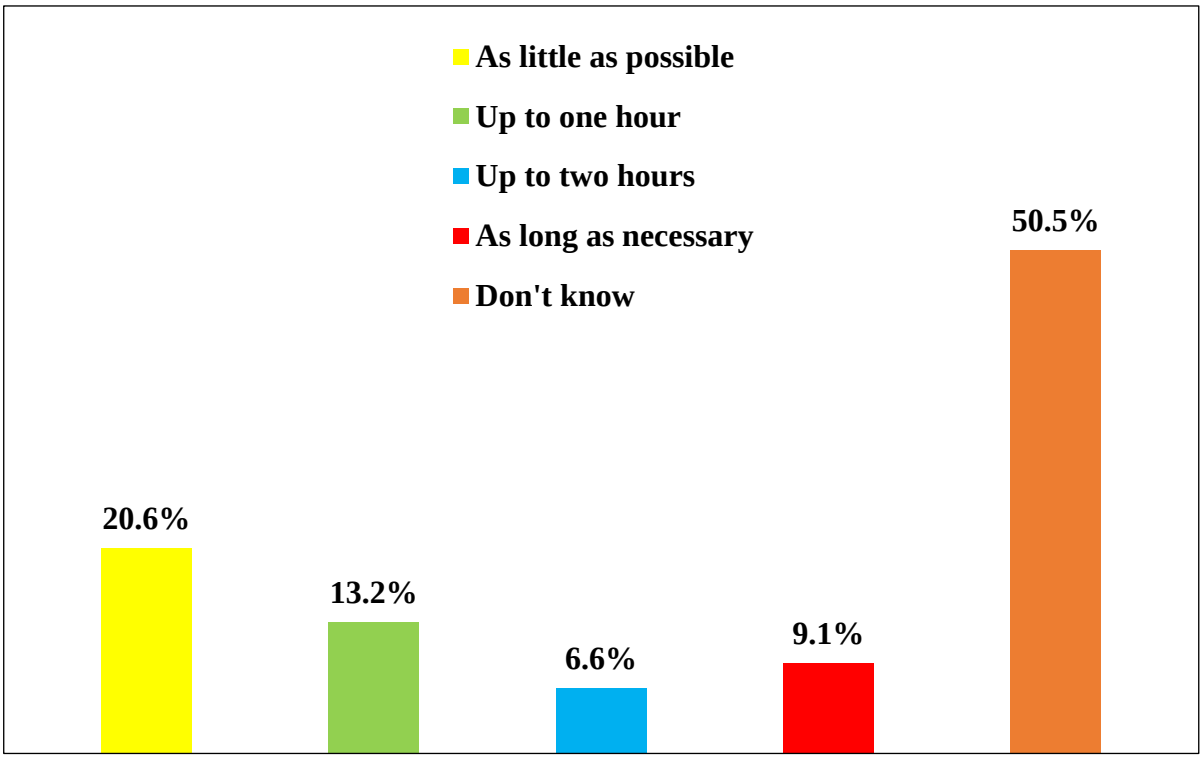


**Figure 4:** Responses on how long a tooth can stay out of the socket without harm (Question 9).

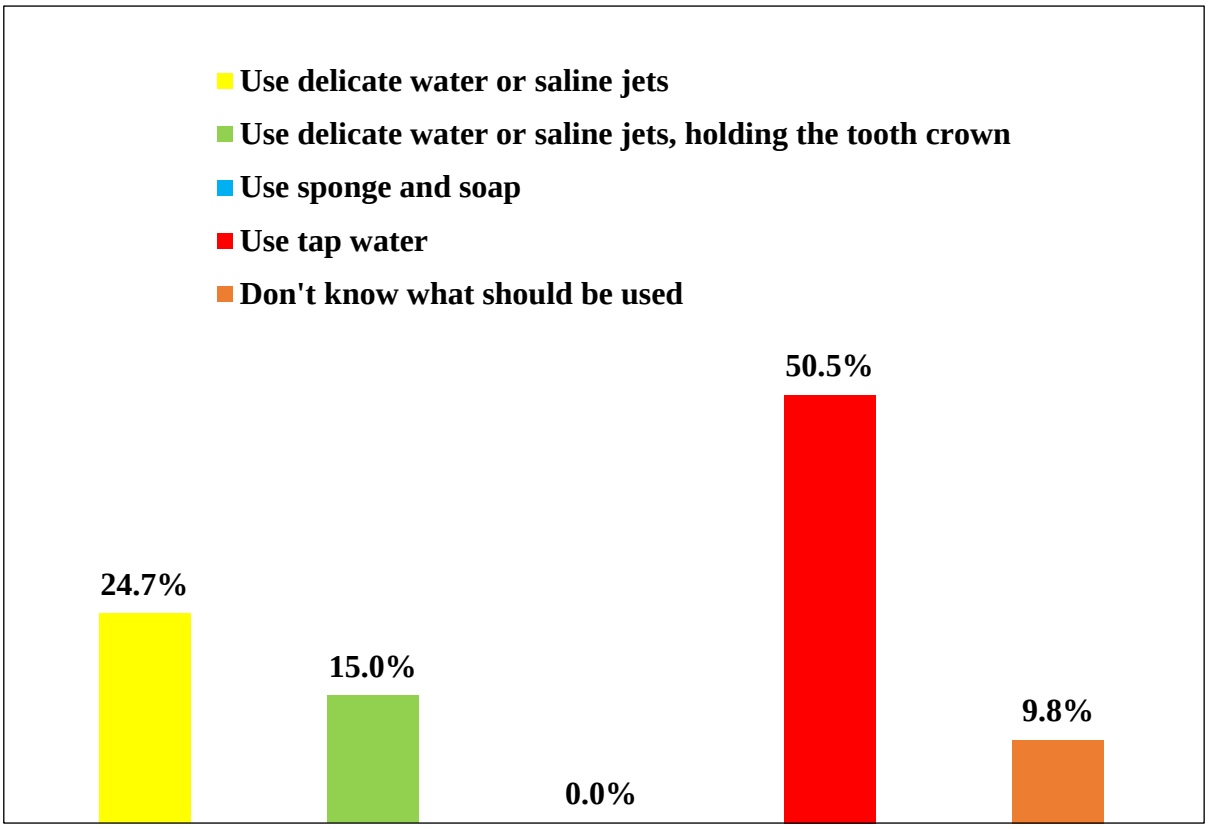


**Figure 5:** Responses on method of cleaning the avulsed tooth (Question 10).

## Discussion

Most TDI occur at home or school where parents or teachers are present and their knowledge can therefore be critical in deciding the prognosis of avulsed permanent teeth and hence preventing its unnecessary loss. In Malaysia, only general dental practitioners (12) and rugby players (13) have been assessed in this regard and no published data was found regarding the knowledge of Malaysian parents on first aid management of avulsion. Therefore, the present study aimed to assess the knowledge of Melakan parents regarding the first aid management of avulsion and their awareness of its prevention.

Most parents (70.7%) in the current study perceived that they did not know the first aid measures for TDI. Actual low knowledge or self-perception of low knowledge in this regard were also seen in studies done in various countries (7-9, 14). Such low knowledge is probably because the subjects never received any information on TDI. However, in the present study, previous educational or training experience with regard to TDI and first aid measures were not evaluated through the questionnaire. Contrary to this, a study done in Mangalore, India showed 68.5% mothers who felt that they have sufficient knowledge on TDI and its first aid measures (5).

During tooth avulsion, most parents (69.3%) in this study showed concern about the child's well-being and would try to calm the child, wash the injury and stop the bleeding. Bringing psychological comfort to the child seemed to be the main instinct of the concerned parent. Most parents would be familiar with such measures, as they would have done it for injuries elsewhere on the body. Majority of the parents (78.7%) would not look for the tooth probably because they thought it would be dirty and could act as a source of infection or that it could not be saved. Contrary to this, few studies showed higher percentage of parents (43% to 76.4%) who would attempt to retrieve the tooth (3, 6). Searching for the avulsed tooth is very important and hence encouraged irrespective of the possibility for replantation. This ensures that the child has not swallowed or aspirated the tooth (15). Three-fourth (75.3%) of the parents in the current study did not know if an avulsed tooth could be saved. Such lack of knowledge affects the prognosis of the tooth or even misleads the parents to discard it.

One positive finding in this study is that most of the parents (74.6%) felt the need to seek professional help from a dentist following tooth injury. However, few interesting findings can be noted from previous studies. Only as low as 36% Jordanian mothers would take the child to a dentist in the study done by Al-Jundi et al. (16). Shashikiran et al. (17) found that parents hailing from rural areas would take the child to a doctor (44.2%) or nearby hospital (35.7%) due to lack of access to dental clinics in rural areas while 81.8% parents from urban areas would take their child to a dentist. Loo et al. (18) showed that most parents who would take their child to a dentist were from a higher educational background.

A notable 66.9% of the parents in the present study realised the importance of seeking professional help immediately after accident though they had very limited knowledge on first aid measures, cleaning/storing the tooth or a suitable transport medium. This finding is similar to the one reported by Raphael and Gregory (19) which showed 92% parents who considered seeking professional help as "very urgent" but the subsequent emergency care knowledge was very limited. Contrary to this, only one-third of the parents surveyed by Loo et al. (18) would take their children to the dentist immediately. Some parents (16.4%) in the present study would even wait for a day to seek professional help; however, this was because they wanted the child to calm down first.

Pain can be one of the driving reasons for seeking professional help. Most respondents (62.7%) in this study would still seek professional advice even if the child had no pain. This is encouraging since the child has better chances of being taken to a clinician for evaluation, thereby improving the prognosis. In contrast, 67.5% parents surveyed by Namdev et al. (3) did not feel the need to see a doctor if the child had no pain.

Only one respondent in the current study would attempt to replant the tooth back in its socket. Majority (63.1%) were not confident to replant and would take the avulsed tooth to a professional with/without washing or use of a storage medium. Other studies showed the number of parents who would attempt replantation by themselves to be as low as less than 1% (16), 2% (17), 9.3% (7) and 10% (6). An alarming finding was that a quarter of the participants (26.5%) in the present study would just discard the tooth. The inability/unwillingness to replant the tooth could be attributed to the lack of knowledge, fear of hurting the child or extreme concern about the bleeding from the injured site (6, 16, 17). Some feared the tooth or socket becoming infected, acquiring blood-borne diseases or ending up in medico-legal issues due to incorrect replanting of the tooth (20, 21). However, few studies reported more than two-thirds of the parents who would attempt replantation of the tooth or place it in a solution and report to the dentist (5, 19).

Storing the avulsed tooth in a solution compatible with cell viability as soon as possible until replantation is a critical procedure so that the cells in the periodontal ligament and cementum will survive and play a role in regeneration (22, 23). About half of the respondents (49.1%) in this study favoured dry storage media such as handkerchief, empty container or piece of paper which causes desiccation and damage of the periodontal cells leading to loss of replanted teeth. Such actions would prejudice the normal healing process as other sequelae such as pulp necrosis and root resorption may present later. Water was chosen by 18.5% of the respondents, which must be discouraged since water being hypotonic would enter into the cells and cause lysis. Only 8% parents were aware that cold milk, isotonic saline or patients' mouth might function at its best as storage medium.

Minimal extra-alveolar dry time is one of the most decisive factors for desirable prognosis of avulsed teeth. Longer the time elapsed between tooth avulsion and replantation, greater will be the risk for inflammatory root resorption (24). Andreasen and Hjorting-Hansen (25) stated that teeth replanted within 30 minutes can have a success rate of 90% but those replanted after two hours would only have 5% chances of long term retention. It is not encouraging to state that half of the parents in the present study did not know how long an avulsed tooth could stay outside the oral cavity without any harm.

Concerning cleaning of an avulsed tooth, half of the parents stated that they would use tap water but only 15% knew the importance of holding the tooth by its crown. It is good to note that none of the parents would use sponge to scrub the tooth, whereas other studies showed higher number of parents who would scrub the teeth with a brush, sponge or use antiseptic solutions (6, 7, 17, 19). This should be discouraged as it can compromise the integrity of the remaining periodontal cells and thereby the prognosis of the replanted tooth on the long run.

Appropriate use of mouth guards can prevent dento-alveolar injuries like tooth avulsion by reducing impacts to the face (26). However, cost-risk factor, discomfort, peer pressure and difficulty in breathing may be reasons why parents did not recommend the use of mouth guards among children (27). Three questions were used to check the awareness of the parents on the prevention of TDI. However, extensive statistical analysis was not performed because the authors felt that three questions may not be sufficient to truly assess the awareness levels. Hence, these questions were analysed purely on a descriptive aspect. Based on the results, 42.5% of the parents felt that TDI in school cannot be prevented since it usually happens during normal activities of the child and 9.4% felt only major injuries can be prevented. Around half of the participants (51.9%) never heard of mouth guards. A notable 53% would not recommend its use for their children while playing probably because they were not familiar with its use. These findings were suggestive that the participants not only lacked the knowledge of first aid management of avulsed teeth but also were unaware of its prevention. However, future studies may be planned for detailed evaluation of the awareness of parents on prevention of TDI.

Out of the twelve questions on knowledge of dental injuries and first aid measures for avulsed teeth, most of the parents were not able to answer half of the questions correctly. More than 90% of the parents in our study exhibited low knowledge and only one parent had high knowledge. Within its limitations, the results did not show any strong association between the knowledge level and any of the variables like age group, gender, ethnicity, level of education, working status, type of occupation or level of income. Descriptive analysis of the responses obtained on awareness was suggestive of low awareness of parents with regard to TDI prevention.

Lack of knowledge can result in the avulsed tooth either being replanted with much delay or not being replanted altogether. The tooth, if chosen to be replanted, may not be cleaned, handled or stored appropriately and thus, can heavily compromise the prognosis and ultimately result in loss of an otherwise healthy permanent tooth. Since most TDI occur at home or school, the mainstay in reducing morbidity and ensuring better prognosis in dental avulsion situation is to have parents/caretakers, school teachers or the children themselves trained in delivering quality first aid. Such training should include replantation of the avulsed tooth into its socket or at least cleaning and placing the tooth into a suitable transport medium until professional assistance can be obtained. This can be possible only through intervention programmes to increase their knowledge and awareness on this matter by means of role-plays, skits, lectures etc. The general health care providers and dentists can also contribute to improving parents' knowledge by sharing such information with them personally as well as distributing booklets or pamphlets during their regular clinic visits. Various sources like health

magazines/journals/books, health shows on television, reliable internet sources can be beneficial in creating awareness. For school teachers, first aid courses including emergency care for dental trauma can be included in their teacher-training programme. As for children, the school education department may incorporate it as a part of their curriculum. Posters may be mounted in playgrounds and school premises to increase the awareness of the children.

In the current study, it was noted that many parents did not know if an avulsed tooth could be saved, would simply discard it if dirty/fractured or they may not even search for the tooth. Most parents also chose wrong methods to handle as well as store the tooth. Based on these observations, certain guidelines are recommended by the authors of this study in educating the parents with equal emphasis on steps that must be done as well as avoided (Table 5).

Although the present study addressed the lacunae of knowledge level of parents in Melaka, Malaysia with regard to first aid for tooth avulsion, the findings of this study cannot be generalized to the rest of Malaysia since it was done only in one state. Future direction to conduct similar studies at multiple centres across the country can be more beneficial. Another limitation of the present study was that only three questions were used to test the awareness level and hence the results were used only for descriptive purposes but not for extensive statistical analysis. Thus, further studies to assess their awareness more closely may be planned in future. The study would have been more interesting with the use of open-ended questions as well as encompassing a larger sample size.

## Conclusion

Literature review showed no published data on the knowledge of Malaysian parents with regard to first aid management of avulsed teeth and hence, the present study was conducted. Within the limitations of the present study, it can be concluded that the overall knowledge level of parents in Melaka, Malaysia with regard to first aid management of avulsed teeth was low and showed similar trends with other countries. However, responses obtained for individual questions displayed variations from other studies conducted previously. There was also a lack of association of knowledge level with variables such as age group, gender, ethnicity, level of education, working status, type of occupation as well as the level of income. The awareness of the parents with regard to prevention of TDI, based on the responses obtained, was seemingly low and need to be studied further. Hence, regardless of these findings, educational programmes must be planned to improve their knowledge in this regard. The parents can be trained how to handle, clean as well as store the avulsed tooth appropriately and thus, improve the prognosis of the avulsed but otherwise healthy permanent tooth and prevent its

unnecessary loss. With improved knowledge, situations such as delayed replantation or the tooth not being replanted altogether can also be avoided.

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