**Title:**

Teachers’ Knowledge Concerning Dental Trauma and Its Management in Primary Schools in Riyadh, Saudi Arabia.

**Author Names:**

**ALSADHAN Salwa, BDS, MSc**

Head of Community Service Unit

Associate Professor, Department of Periodontics and Community Dentistry

College of Dentistry, King Saud University

Riyadh, Kingdom of Saudi Arabia

Email: Ssadhan@ksu.edu.sa

**ABUABAT Mashael, BDS**

GP, College of Dentistry, King Saud University

Riyadh, Kingdom of Saudi Arabia

Email: Mashael.fa@hotmail.com

**ALSAYARI Najla, BDS**

GP, College of Dentistry, King Saud University

Riyadh, Kingdom of Saudi Arabia

Email: najla.alsayari@outlook.com

**CORRESPONDING AUTHOR:**

Mashael Abuabat

College of Dentistry, King Saud University

Riyadh, Kingdom of Saudi Arabia

Email: Mashael.fa@hotmail.com

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**ABSTRACT:**

 **Aims:** The aim of this study is to assess the knowledge concerning dental traumatic injuries and its management among primary schools’ teachers in Riyadh, Saudi Arabia. The secondary objective is to evaluate the effect of gender, nationality, marital status, school type, geographic areas, age groups, level of education and years of experience on the teachers’ knowledge. **Methods:** Data was collected through a self-administered questionnaire from public and private primary schools for both males and females from the five geographic areas of Riyadh city. The total sample size is 1520 teachers. The data was entered using Statistical Package for the Social Sciences. Frequencies and percentages were calculated. Independent T-Test and One-Way ANOVA test were used. **Results:** The total score for the questions assessing the knowledge was calculated out of 9 and the highest score was 7 while the average score was 2.85. Over half of the sample stated that they did not know how to manage soft tissue injuries. Teachers within 41-50 years old and those with longer years of experience, had the highest level of knowledge (p=0.016 and 0.002). Schools’ teachers in the north area of Riyadh had higher knowledge than other areas (p=0.006). **Conclusion:** There was lack of knowledge among primary schools’ teachers in Riyadh concerning dental traumatic injuries and their management. Statistically significant differences were found among geographic areas, age groups and years of experience, while no statistically significant differences were found with regards to gender, nationality, marital status, level of education and school type (public/private).

**KEYWORDS:**

Child; Soft Tissue Injury; Tooth Avulsion; Traumatology

**INTRODUCTION:**

 Children spend minimum six hours a day in school. Younger children spend greater time in physical activities.(1) They have higher frequency of repeated traumatic injuries.(2) Around the age of 14 years, nearly 25% of the children had a previous injury involving the permanent teeth.(3) The percentage of dental trauma among Saudi school children was found to be 33% in boys and 31.4% in girls.(4,5) Immediate action taken at the site of the injury is essential for a better long-term prognosis. (6)

The objectives of managing dental traumatic injuries are to maintain esthetics, mastication, speech and preventing psychological and social effect since the maxillary central incisors are the most commonly effected.(7,8) One of the most important objectives is to preserve vitality of the pulp to continue the tooth development normally.(6)

The long-term prognosis of the injured tooth depends on action taken at the time of injury, site at which the injury occurred, nature of the trauma and type of injury. In case of avulsion of permanent teeth, it depends on duration out of the socket and storage medium used.(6)

Studies conducted in several countries concluded that there is lack of knowledge among primary school teachers in managing traumatic dental injuries especially tooth avulsion. (9-12) Only one study was conducted in Riyadh, which had a sample size of 277 from 24 schools.(13)

The aim of this study is to assess the knowledge concerning dental traumatic injuries and its management among primary schools’ teachers in Riyadh, Saudi Arabia. The secondary objective is to evaluate the effect of gender, nationality, marital status, school type, geographic areas, age groups, level of education and years of experience on the teachers’ knowledge.

**MATERIALS AND METHODS:**

 The required data was collected through a self-administered questionnaire, which was developed in English then translated into the teachers’ mother language, Arabic. To check validity of the questionnaire, the content was checked by experts in the field to ascertain that it is comprehensive enough in order to collect all the information needed to address the objectives of the study. To assess the relationship between the level of measurement and the appropriateness of data analysis, the questionnaire was checked by statistician and to make sure that it is appropriate for the sample’s level, a pilot study was conducted on teachers who were not included in the sample and their feedback was obtained. Questionnaire modifications were made accordingly. To check reliability of the questionnaire, test-retest was conducted on 20 teachers who were not included in the sample with duration of 2 weeks in between. Paired T-test was used. A positive correlation between the two tests was found (0.6) and there was no statistically significant difference (P=0.309). Also Cronbach’s alpha coefficient was used to estimate the reliability of the questionnaire ($α$= 0.74). The first page of the questionnaire included a consent to participate, introduction about the study, importance and benefits of participation and a statement insuring the confidentiality that the information will be used for scientific purposes only. The questionnaire included three parts of multiple-choice questions. The first part included questions regarding demographic data and experience. The second part included questions regarding background, satisfaction about their current knowledge regarding management of dental trauma and the desire to improve it. While the last part included questions designed to assess teachers’ knowledge concerning dental trauma and its management (Appendix).

 In order to obtain a representative sample, we collected data from 71 public and private primary schools for both males and females from the five geographic areas of Riyadh city. Statistics were obtained from Ministry of Education of Riyadh region to determine the sample size. According to that statistics, number of teachers of boys’ primary schools is 10913 for the public and 5072 for the private with a ratio of 2:1. While the number of teachers of girls’ primary schools is 14950 for the public and 4814 for the private with a ratio of 3:1.(14) The selected sample size was 1550 teachers and the power of the sample was 0.83, 750 obtained from teachers of boys’ primary schools and 800 from teachers of girls’ primary schools. Based on the number of teachers in public to private ratio in Riyadh, 550 were taken from the public boys’ primary schools and 250 from the private. While for the girls’ primary schools, 600 were taken from the public and 200 from the private. The sample was taken equally from all the five geographic areas. The sampling technique for the public schools was systematic random sample, and simple random sample for the private, since the number of private schools’ teachers is half that of the public schools. Participants who did not answer all the questions were excluded from the study.

The data was entered using the Statistical Package for Social Sciences (SPSS, version 20). Frequencies and percentages were calculated. The total score for the questions assessing the knowledge was calculated out of nine, with higher scores indicating higher level of knowledge. According to the median split method, teachers with a total score of less than 4.5 (median) were considered as having inadequate knowledge regarding dental trauma and its management and teachers with scores of more than 4.5 were considered as having adequate knowledge. Independent T-test was used to assess the difference between the two level variables (gender, nationality, school type, and marital status) and One-Way ANOVA test was used to assess the difference between the three or more level variables (geographic area, age group, level of education and years of experience).

**RESULTS:**

 All the distributed questionnaires (1550) were returned giving a response rate of 100%. Incomplete questionnaires were excluded resulting in 1520 complete surveys (98%). The demographic part of the questionnaire included eight variables, which are presented in (Table 1). The male teachers constituted 48.1% of the total sample while female teachers constituted 51.9%. Nearly 85% of the participants were Saudis, 70.4% were from public schools and 84.9% were married. The survey was distributed evenly among the five geographic areas of Riyadh city. The age of the sample ranged between 20 to <60 years with the highest percentage (37.1%) within the age of 31 - 40 years. The majority of the participants (71.3%) had a university education. With regards to the years of experience, 25.3% of the respondents had 21- 30 years of experience whereas only 4.1% had over 30 years of experience.

Each question was given one mark except the question of the suitable storage medium of an avulsed permanent tooth, which carries two marks since it had two correct answers. The total score for the questions assessing the knowledge concerning dental trauma and its management was calculated out of nine. The highest score was seven, which was attained by only six teachers (0.4%) and 6% scored zero. The highest percentage of teachers (32.2%) scored three and the average score was 2.85 (Table 2).

Eight questions were designed to assess teachers’ knowledge concerning dental trauma and its management (Table 3). About 10% of the respondents selected the correct answer regarding the management of soft tissue injuries whereas, over half of the sample stated that they did not know how to manage it. Immediate management of the dental injury was selected by more than half of the sample as a response to the question regarding the proper time for the treatment of a dental injury. Nearly 42% of the respondents selected the correct answer regarding the dental injury that needed urgent treatment. About 15% of the respondents selected the correct answer regarding the management of fractured teeth whereas, 38.8% believed that the fractured part is useless. Going to the dentist was selected by more than two thirds of the sample as a response to the question regarding the proper management of a displaced tooth. Only 6.2% of the respondents selected the correct answer regarding the management of an avulsed permanent tooth whereas, 38.8% of the sample stated that there is no benefit of keeping the permanent tooth. More than 60% of the sample knew that there is no benefit of an avulsed primary tooth. For the question regarding the suitable storage medium of an avulsed tooth, the teachers were allowed to choose more than one answer from the seven choices provided and only 19.7% chose milk and 3.2% chose the injured person’s saliva (Fig. 1).

More than half of the teachers (55.1%) encountered a dental injury and 55.7% could not differentiate between primary and permanent teeth. Nearly 30% of the respondents received first-aid training, 38.2% read or heard about management of dental injuries and only 20.1% stated that they received training about it previously. Only 14.1% of the surveyed sample stated that they were satisfied with their current knowledge regarding management of dental trauma and the majority (76.3%) were interested in receiving training on how to manage dental trauma (Fig. 2).

No statistically significant differences were found between the surveyed sample with regards to gender (p=0.101), nationality (p=0.620), marital status (p=0.327), level of education (p=0.083) and school type (p=0.161). Statistically significant differences were found among teachers from different geographic areas (p=0.006) where the north area, had the highest level of knowledge (Fig. 3). Statistically significant differences were also found among participants of different age groups (p=0.016) where the age group, which lied between 41-50 years, had the highest level of knowledge (Fig. 4). Teachers with longer years of experience, which lied between 21-30 years, had higher level of knowledge and this was found to be statistically significant (p=0.002) (Fig. 5).

**DISCUSSION:**

 This study was conducted to assess the knowledge concerning dental trauma and its management among primary schools’ teachers in Riyadh city. Teacher’s average knowledge score was 2.85/9, which indicated a very low level of knowledge concerning management of dental traumatic injuries in schools. This result is consistent with the findings from other local and international studies.(15-18)

Over half of the sample stated that they did not know the appropriate management of soft tissue injuries and only 10% of the respondents selected the correct answer regarding the management of these injuries. Previous study found that soft tissue injuries were among the most common traumatic craniofacial injuries encountered by emergency department personnel in hospitals.(19) Regarding management of fractured teeth, 38.8% believed that the fractured part is useless, although according to a study conducted in 2013, bonding of the tooth fragment was found to be more cost effective, esthetic, conservative, than resin based composite and less time consuming.(20)

Most of the teachers were not aware of the appropriate management of an avulsed permanent tooth and 38.8% of the sample stated that there was no benefit of keeping an avulsed permanent tooth, whereas only 6.2% of the respondents stated that they will try to re-implant the tooth in its position. This is consistent with the finding of a previous study conducted in Abha (6%), and in northern Saudi Arabia (5%) and less than the findings of a study conducted in the Emirate of Ajman (19.3%).(9,15,21) The results showed that it was well known among teachers that there was no benefit of an avulsed primary tooth. Over three quarters of the teachers did not select the correct suitable storage medium of an avulsed tooth, whereas 19.7% chose milk and 3.2% chose the injured person’s saliva, which are the recommended physiologic storage medias according to the dental trauma guide.(22)

The majority of the surveyed sample stated that they were not satisfied with their current knowledge regarding management of dental trauma and more than half of them encountered an incident of dental injury, which was higher than the incident found in a previous study conducted in Riyadh.(13) Since dental trauma is frequently encountered in schools, teachers should be trained to deal with it properly. Over three quarters of the teachers were interested in receiving training on how to manage dental trauma, however first aid training courses that are usually provided do not offer training in this topic.

There was no effect of gender on teachers’ knowledge, which was consistent with the results found in previous studies.(11,21) while different result was found in Brazil where females had higher level of knowledge compared to the males.(12) The school type had no effect on the teachers’ knowledge which is similar to what was found in a study conducted in Hong Kong.(11) Level of education of the participants had no effect on the knowledge which is in agreement with a study conducted in Brazil.(12) In this study, nationality and marital status showed no effect on the knowledge, however, other previous local studies did not include these two variables.(13,15,21)

Among the five geographic areas of Riyadh, teachers from the north area, had the highest level of knowledge, which could be attributed to their higher socioeconomic status as a previous study found that socioeconomic status had a strong direct effect on knowledge.(23)

Both age and years of experience were found to have an effect on the level of knowledge concerning dental trauma and its management. Teachers who were above 40 years of age had higher levels of knowledge compared to teachers who were under the age of 40 years. The age group, which lied between 41-50 years, had higher knowledge than the older age groups. Teachers who had over 20 years of experience had higher level of knowledge than teachers who had less years of experience, which could be related to more exposure to dental traumatic injuries in schools.

**CONCLUSION:**

 Knowledge concerning dental traumatic injuries and their management among primary schools’ teachers in Riyadh was found to be inadequate. Teachers’ age, years of experience and geographic location of the school were found to be statistically associated with teachers’ knowledge regarding the management of dental traumatic injuries in schools. However, no relation was found between this knowledge and the teachers’ gender, nationality, marital status, level of education and school type.

**RECOMMENDATION:**

 The findings of this study indicates that the cooperation between ministry of health and ministry of education is essential for formulating educational and training programs to increase teachers’ knowledge concerning management of dental traumatic injuries in schools. It is also advocated to have direct collaboration between a local dentist or a dental clinic and the schools for proper and immediate management of dental emergencies. Providing the teachers with educational leaflets regarding the proper ways of managing dental trauma could also be effective as a study conducted in Turkey found that educational leaflets were successful and appropriate means of providing teachers with information about management of dental injuries.(24) Another recommendation is to provide an educational website regarding this topic such as dentaltraumaguide.org in the local language.(22)

**CONFLICTS OF INTEREST STATEMENT:**

 The authors declare no conflict of interest associated with this publication.

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**TABLES**

|  |  |  |
| --- | --- | --- |
| Variable | Frequency | % |
| Gender | Male | 731 | 48.1 |
| Female | 789 | 51.9 |
| Nationality | Saudi | 1287 | 84.7 |
| Non-Saudi | 233 | 15.3 |
| School Type | Public | 1070 | 70.4 |
| Private | 450 | 29.6 |
| Geographic Area | North | 296 | 19.5 |
| South | 322 | 21.2 |
| East | 310 | 20.4 |
| West | 282 | 18.6 |
| Center | 310 | 20.4 |
| Age Group | 20 - 30 | 336 | 22.1 |
| 31 - 40 | 564 | 37.1 |
| 41 - 50 | 536 | 35.3 |
| 51 - 60 | 78 | 5.1 |
| <60 | 6 | 0.4 |
| Marital Status | Single | 229 | 15.1 |
| Married | 1291 | 84.9 |
| Level of Education | Diploma | 326 | 21.4 |
| University | 1084 | 71.3 |
| Higher | 110 | 7.2 |
| Years of Experience | 1 - 5 | 321 | 21.1 |
| 6 - 10 | 198 | 13 |
| 11 - 15 | 271 | 17.8 |
| 16 - 20 | 280 | 18.4 |
| 21 - 30 | 385 | 25.3 |
| <30 | 63 | 4.1 |

Table 1. Demographic variables of the surveyed sample

|  |  |  |
| --- | --- | --- |
| Total score out of 9 | Frequency | % |
| 0 | 91 | 6 |
| 1 | 159 | 10.5 |
| 2 | 311 | 20.5 |
| 3 | 490 | 32.2 |
| 4 | 306 | 20.1 |
| 5 | 127 | 8.4 |
| 6 | 30 | 2 |
| 7 | 6 | 0.4 |
| 8 | 0 | 0 |
| 9 | 0 | 0 |
| Total | 1520 | 100 |

Table 2. Teachers’ total score out of 9 for the questions
assessing their knowledge

|  |  |  |
| --- | --- | --- |
| Total score out of 9 | Frequency | % |
| 0 | 91 | 6 |
| 1 | 159 | 10.5 |
| 2 | 311 | 20.5 |
| 3 | 490 | 32.2 |
| 4 | 306 | 20.1 |
| 5 | 127 | 8.4 |
| 6 | 30 | 2 |
| 7 | 6 | 0.4 |
| 8 | 0 | 0 |
| 9 | 0 | 0 |
| Total | 1520 | 100 |

 Table 3. Teachers’ total score out of 9 for the questions
assessing their knowledge

|  |  |  |  |
| --- | --- | --- | --- |
| The Question | Correct answer | N | % |
| Management of soft tissue injury | Wipe the wound | 151 | 9.9 |
| Time of treatment of dental injury | Immediately | 794 | 52.2 |
| Dental injury that needs urgent treatment | Exposed pulp | 636 | 41.8 |
| Management of fractured teeth | Store it in a suitable liquid medium and go immediately to the dentist  | 223 | 14.7 |
| Management of a displaced tooth | Go to the dentist | 1041 | 68.5 |
| Management of an avulsed permanent tooth | Try to re-implant the tooth in its position | 94 | 6.2 |
| Management of an avulsed primary tooth | There is no benefit of keeping the tooth | 934 | 61.4 |
| Suitable storage of an avulsed tooth\* | Milk | 300 | 19.7 |
| Injured person’s saliva | 49 | 3.2 |

Table 3. Teachers’ responses regarding questions designed to assess their knowledge concerning dental trauma and its management

\* More than one answer allowed

**APPENDIX**

|  |
| --- |
| Part 1. Demographic data and experience:  |
| 1. Gender: □ Male □ Female
 |
| 1. Nationality: □ Saudi □ Non-Saudi
 |
| 1. School type: □ Public □ Private
 |
| 1. School location in Riyadh: □ North □ South □East □ West □ Center
 |
| 1. Age group (years): □ 20-30 □ 31-40 □41-50 □ 51-60 □ <60
 |
| 1. Marital Status: □ Single □ Married
 |
| 1. Level of education: □ Diploma □ University □ Higher education
 |
| 1. Years of teaching: □ 1-5 □ 6-10 □ 11-15 □ 16-20 □ 21-30 □ < 30
 |
| Part 2. Background, satisfaction and desire to improve: |
| 1. Have you ever received first-aid training? □ Yes □ No
 |
| 1. Have you ever learned about management of dental injuries? □ Yes □ No
 |
| 1. Have you ever read or heard about management of dental injuries? □ Yes □ No
 |
| 1. Do you think your knowledge about management of dental trauma is satisfactory? □ Yes □ No
 |
| 1. Would you like to receive training on how to manage dental trauma? □ Yes □ No
 |
| 1. Can you differentiate between types of teeth (primary/permanent)? □ Yes □ No
 |
| 1. Have you ever encountered a dental injury? □ Yes □ No
 |
| Part 3. knowledge concerning dental trauma and its management: |
| 1. In case of soft tissue injury, the most appropriate management is:

 □ Wipe the wound □ Apply disinfectant □ Go to the dentist □ I don’t know |
| 1. In case of dental injury, the time for treatment should be:

 □ Immediately □ Within 24 hours □ Within 48 hours □ I don’t know |
| 1. Which of the following dental injuries needs immediate urgent treatment:

 □ Fractured enamel □ Exposed pulp □ Displaced tooth after trauma □ I don’t know |
| 1. In case of fractured teeth, the most appropriate management is:

 □ Try to find it, put it in suitable liquid medium and go immediately to the dentist  □ Try to find it, wrap it in tissue and go immediately to the dentist  □ The fractured part is useless, ignore it □ I don’t know |
| 1. If the tooth displaced due to trauma, the most appropriate management is:

 □ Leave it in its position □ Try to return it into its original position □ Go to the dentist □ I don’t know |
| 1. In case of avulsion of permanent teeth, the most appropriate management is:

 □ Wrap the tooth in tissue or gauze and go immediately to the dentist □ Try Re-implant the tooth in its position □ There is no benefit of keeping the tooth once it is out of the socket, just let the child bites on a gauze □ I don’t know |
| 1. In case of avulsion of primary teeth, the most appropriate management is:

 □ Wrap the tooth in tissue or gauze and go immediately to the dentist  □ Try Re-implant the tooth in its position □ There is no benefit of keeping the tooth once it is out of the socket, just let the child bites on a gauze □ I don’t know |
| 1. The suitable medium for storing the avulsed teeth: (more than one answer is possible)

□ Gauze or tissue □ Empty container or plastic bag □ Disinfectant solution □ Water □ Milk □ Injured person’s saliva □ I don’t know |

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