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Knowledge of elementary school teachers in Tel-Aviv, Israel, regarding emergency care of dental injuries

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Abstract –*Background*: Immediate management of traumatized teeth is often critical to the prognosis of the teeth. Most of the traumatic dental injuries occur at home, followed by school. There is a high probability that first aid would be given by lay people such as parents, teachers, or coaches. Knowledge of those people regarding emergency management of dental trauma is crucial for better prognosis. *Aim*: To investigate: (i) the knowledge of elementary school teachers regarding traumatic dental injuries to permanent teeth and emergency treatment, (ii) their source of information, and (iii) the demand for more education in dental trauma. *Materials and methods*: A three-part questionnaire comprised of questions regarding demographic data, attitude, and knowledge about dental injuries was distributed to teachers in 12 elementary schools in the Tel-Aviv area, Israel. *Results*: The average knowledge score was 4.59 (in a scale of 0–10). Three individual predictors significantly improved the respondents' knowledge: being in the 35–49-year age group (P-value = 0.042), those who had children themselves (P-value = 0.002) and those who had previous experience with trauma (P-value = 0.049). There was no correlation between the demand for further education in dental trauma and knowledge score. *Conclusions*: The knowledge regarding management of traumatic dental injuries in a group of teachers in the Tel-Aviv area is inadequate. Educational programs as well as addition to the curriculum are necessary to improve their emergency management of traumatic dental injuries and provide better protection to the students.

The prevalence of traumatic dental injuries to children's teeth is high (1), 30% of the children sustained injuries to the primary dentition and 22% to the permanent dentition (2).

Severe traumatic dental injuries can damage the pulp and periodontal ligament and lead to tooth loss. Optimally, for long-term success, the management or treatment of traumatized teeth should be carried out as soon as possible (1). Immediate care is particularly important for the avulsed permanent tooth as the prognosis stays high as long as the replantation takes place within 30 min after avulsion (3–5).

Epidemiologic studies have demonstrated that the treatment needs of traumatic dental injuries are not properly met. In Finland only 25% (6) and in Britain only 10–15% of children who sustained traumatic dental injuries had received treatment (7). In Jordan, 43.1% of the children sought dental treatment when late complications were the presenting complaint. The time between the trauma episode and seeking dental treatment ranged between 2 h and 3 years (8).

Most of traumatic dental injuries occur at home, followed by school (8, 9). Hence, dental injuries occur from various unpreventable causes such as children's play or leisure activity. There is a high probability that first aid would be given by lay people such as parents, teachers, or coaches. Knowledge of these people regarding emergency management of dental trauma is crucial for better prognosis. The purpose of this study was to investigate: (i) the knowledge of elementary school teachers regarding traumatic dental injuries to permanent teeth and emergency treatment, (ii) their source of information, and (iii) the demand for more education in dental trauma.

Materials and methods

A questionnaire, modified from those used in Australia (10), Singapore (11), and England (12), consisted of three parts (Figs 1–3). Part I is comprised of questions on demographic information including gender, age, teaching experience, first aid training, and dental trauma experience. Part II is comprised of multiple-choice questions on subjective self-assessment of attitude and source of knowledge. Part III is comprised of multiple-choice questions about management of traumatized teeth.

The questionnaire was distributed to teachers in 12 elementary schools in the Tel-Aviv area. Some of them took part in health projects based on medical and dental

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1) Gender: M: 11(6.7)/F: 153(93.3)
2) Years of education: 14–15 years: 25(15.5), 16 years: 90(54.5), >16 years: 49(30)
3) Academic institute: Israeli university: 54(33), university abroad: 5(3), College: 88(53.7), Wingate institute: 13(7.9), Seminar: 4(2.4)
4) Age: 20–34 years: 49(29.9)/35–49 years: 83(50.6)/≥50 years: 32(19.5)
5) Teaching experience: 0–4 years: 24(14.6)/5–9 years: 36(22)/10–19 years: 56(34.1)/≥20 years: 48(29.3)
6) Subject of teaching: physical education: 18(11)/other: 146(89)
7) Do you have kids: yes: 138(84.1)/no: 26(15.9)
8) Have you had first aid training during your teaching training: yes: 126(76.8)/no: 38(23.2)
9) If you did, have it included dental trauma first aid: yes: 6(3.7)/no: 158(96.3)
10) Have you had first aid training in other frameworks: yes: 47(28.7)/no: 117(71.3)
If you did, which one:_____
11) If you did, have it included dental trauma first aid: yes: 5(3)/no: 42(25.6)
12) Did you have personal experience (yourself/your child/your student) in dental trauma: yes: 72(44)/no: 92(56)
13) Did you take part with your class in dental health projects: yes: 26(15.9)/no: 138(84.1)

Fig. 1. Part I of the questionnaire: demographic characteristics of the 164 teachers [no. (%)].

1) Self assessed knowledge in dental trauma management:
a-none: 31(18.9) b-little: 75(45.7) c-moderate: 45(27.4) d-high: 13(8)
2) Satisfaction with self assessed knowledge:
a-very low: 34(20.7) b-low: 47(28.7) c-moderate: 67(40.9) d-high: 16(9.7)
3) Enthusiasm for more education in the subject:
a-not interested: 8(4.8) b-little interested: 87(53) c-very interested: 69(42.2)
4) Main source of information in the subject:*
a-courses: 5(3) b-dentist: 90(54.9) c-friends: 11(6.7) d-books and articles: 19(11.6) e-other: 7(4.3) f-none: 2(1.2)

*Not all respondents answered this question

Fig. 2. Part II of the questionnaire: attitude, self–assessment, and sources of information [no. (%)].

1) In case of dental trauma, which would be the first place you would contact:
a-doctor b-hospital **c-dentist** d-I would give treatment in the site
2) During a lesson an 8-year-old girl fell and upper front tooth was broken. She was otherwise unhurt. Is the damaged front tooth likely to be primary or permanent? Primary/**permanent**

2(a)) Which of the following actions would you considered as the most appropriate?
a- in case of no bleeding or pains, nothing has to be done
b- tell the child not to eat for few hours
c- send her immediately to school nurse
d- contact her parents and get them to take her to the dentist

2(b)) A 13-year-old boy get hit in the mouth during a soccer game. His mouth is bleeding and an upper front tooth is missing. Which of the following would you do?
a- getting him to bite on a handkerchief to control the bleeding
b- look for the tooth, wash it and put it back in the socket
c- look for the tooth, put it in liquid and send the boy to the nearest dentist
d- look for the tooth, get the boy to hold it in his mouth and send him to the nearest dentist

3) Would you replant a tooth back into the socket yourself? **Yes, I would**/no, I would get professional help
4) How urgent do you think it is to seek professional help if a permanent tooth has been knocked out?
a- very urgent **b-within 30 min.** c-within few hours d-within the first day
5) How would you transport an avulsed tooth to the dentist?
a-in tap water **b-in milk** c-in alcohol d-in physiologic water(saline) e-in paper tissue f-in ice
6) Do you think that a primary tooth that has been knocked out should be replanted? Yes/**no**
7) Do you think that dental trauma in school can be prevented?
a- no, it usually happens during children normal activity
b- all of the injuries can be prevented by mouthguards
c- only major injuries can be prevented

*The correct answers are highlighted in bold text.

Fig. 3. Part III of the questionnaire: knowledge regarding management of traumatized permanent teeth.

students who volunteer to educate school children in general and dental preventive health.

All participants signed a consent form and the survey was approved by the 'Helsinki' ethical committee of Tel-Aviv University. The teachers and schools who agreed to take part in the study were assured of strict confidentiality.

The results to all three parts were analyzed by frequency distribution. In addition, *t*-test, ANOVA, and correlation test were used to evaluate teachers' knowledge according to each of the individual variables. Chi-square was employed to evaluate the answers for each question according to each of the background variables. The level of significance was set at $P = 0.05$. Teachers received a grade from 1 to 10 according to their answers on part III of the questionnaire. Every correct answer equaled 1 point. In part III, question 2(b), answer (b) equaled 2 points and answer (c) equaled 1 point. Statistics were analyzed by SPSS software (Chicago, IL, USA).

Results

A total of 240 questionnaires in 12 schools in the Tel-Aviv area were distributed to the teachers in the teachers' lounge during the break. Demographics of the respondents are shown in Fig. 1. One hundred and sixty-four teachers responded (68%). Of 126 (76.8%) teachers who remember receiving firs aid training during their teacher

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training, only six (3.7%) claimed that it included dental first aid. Forty-seven (28.7%) teachers got additional first aid training (in the army, Magen David Adom = Israeli equivalent of the Red Cross first aid organization, etc.), only five (3%) claimed that it included dental first aid. Seventy-two (44%) teachers had dental trauma experience, and 26 (15.9%) took part with their students in the dental health projects.

While 106 (64.6%) teachers claimed they have no or a little knowledge of the subject, only 69 (42.2%) were interested to learn more. Half of the teachers were highly or moderately satisfied with their knowledge (Fig. 2). There was a correlation between self-assessed knowledge and knowledge score ($P = 0.000$) and between the satisfaction with self-assessed knowledge and knowledge score ($P = 0.000$). There was no correlation between demand for further education in dental trauma and the knowledge score ($P = 0.954$). The main source for information was a dentist. Only five teachers indicated getting information in formal courses. Two teachers indicated they never got any information in dental trauma (Fig. 2).

Part III of the questionnaire (Fig. 3) asked about management of traumatized teeth. The average score for all respondents was 4.59 (of 10). Three individual predictors significantly improved the respondents' knowledge: being parents to children ($P = 0.002$), having previous experience with trauma ($P = 0.049$), and being in the 35–49-year-old age group ($P = 0.042$).

For question one, 89% knew that in case of dental trauma, first place of contact is a dentist. For question two, 73.8% recognized that the upper incisor is a permanent tooth in an 8-year-old girl. For case 2(a), 60.4% would contact her parents and get them to take her to the dentist. For case 2(b), 5.5% would look for the tooth and put it back into the socket, 55.5% would get the boy to hold the tooth in liquid and take him to the nearest dentist. Being a male and a physical education (PE) teacher were significantly associated with giving the correct answers. For question three, only 4.3% felt able to replant the tooth by themselves. Teachers who had additional first aid training were significantly associated with giving the correct answers. For question four, only 65.2% were aware of the desirability of professional management within 30 min. For question five, 16.5% gave the correct choice of milk. The only factor that was significantly associated with giving the correct answer was teachers who received first aid training that included emergency dental trauma management. For question six, 81.1% answered that replantation of primary teeth is not recommended. For question seven, 38.4% thought correctly that dental trauma can not be prevented in school.

Discussion

The level of knowledge of dental trauma and emergency management as found in this survey was low, average score being 4.59 of 10. In addition, only 42.2% were interested in additional training to manage dental trauma. These results indicate the lack of awareness among teachers to the importance of early and optimally treatment of dental injuries.

Teachers who were parents had better knowledge of the subject. It can be assumed that parenthood made them more aware of children's health and motivated to seek information on children's health issues. Better knowledge was also found among teachers who were 35–49 years old. It is possible that this age group got more updated training than the more mature age group and had more experience than the younger age group. Dental trauma experience was also found to be a contributing factor to better knowledge on the subject, as it included seeking information or professional help and learning from personal experience.

This survey found that 89% of the respondents would contact a dentist in case of dental trauma. This percentage is very high in comparison with other studies: teachers in England – 53.8% (13), teachers in Hong-Kong – 48.8% (14), teachers in Brazil – 60.6% (15). A possible reason for this difference could be the fact that those studies gave the option to contact a dental hospital or a school dental service clinic. In Israel, there are no school dental service clinics.

In this survey, 60.4% of the teachers would contact parents in case of a broken tooth and get them to go to a dentist. Report to the parents is important because of medico-legal issues and especially because it is important to refer them to a dentist. Only a dentist can diagnose correctly the damage to a traumatized tooth. A correct answer was significantly related to teachers who took part in the health projects. These projects are based on medical and dental students who volunteer to educate the pupils in general and dental health. Taking part in these lessons increased knowledge and awareness of dental health.

In this survey, 5.5% of teachers answered that an avulsed tooth should be put back into the socket immediately. This is the treatment of choice with the best long term prognosis (1, 3–5). Sending the child to the dentist with the avulsed tooth in liquid is the second best option, which was chosen by 55.5% of the teachers. Sae-Lim et al. (16) found better results, 71% of teachers in Singapore knew the treatment of avulsion. Among PE teachers in Hong-Kong, only 17.5% were able to indicate the appropriate management for an avulsed tooth (14) and among health teachers in Jordan, only 18.9% (17).

While 5.5% indicated that an avulsed tooth should be put back into the socket immediately, only 4.3% of respondents would actually do it themselves. Chan et al. (14) found similar results, 5.4%, among PE teachers. Hamilton et al. (13) and Pacheco et al. (18) found higher percentage, 18.3%. In the study by Blakytny et al. (19), 25.5% of respondents would replant the tooth themselves, 74.5% stated that they would not be confident enough to do that. In the study by McIntyre et al. (20), 72% reported they would not replant the tooth or would not be comfortable to do so. The explanations cited for not replanting the tooth were lack of sufficient training and expertise, concern that they would frighten the child or inflict pain, fear of acquiring a blood-borne infection during replantation, fear that the tooth or the socket might become infected, and concern about being sued for replanting the tooth incorrectly (13, 19). Raphael et al.

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(10) found that 62.1% of the respondents would replant an avulsed tooth themselves, but this high compliance does not ensure better prognosis because further questioning revealed they did not know the correct procedures involved. Some of them will scrub the tooth that was dirty before replanting it, unaware they would be severely decreasing the success of the procedure (1, 3–5). Almost one-third would replant primary tooth not realizing that this could cause severe damage to the permanent successor (1).

Two-thirds of the respondents in this survey were aware of the urgency of seeking professional help, within 30 min. Other studies found similar results (10, 14, 16, 19). Stokes et al. (21) also found that most of the lay people were aware of the urgency of the matter. The majority of them would seek professional help immediately, but would also put the tooth in undesirable storage media, which would lower the prognosis.

While 52.5% choose to put the avulsed tooth in liquid (question 5, options a–d), only 16.5% knew that the appropriate transport medium is milk. Giving a correct answer was significantly related to being trained in first aid that included dental trauma management. Similar results were found in other studies among teachers (13, 14, 16, 21). A study by Blakytny et al. (19) found an improvement in this knowledge, 45.6% chose milk as the most suitable medium. In a study by McIntyre et al. (20), 34% chose milk and 32% chose HBSS. The wrong answers included dry storage such as paper tissue, plastic wrap, and kitchen foil, which compromise tissue repair after replantation. The most popular liquid was tap water. Other liquids chosen were saliva, saline, ice water, alcohol, and antiseptic solutions (13, 14, 19, 21).

In our study, PE teachers claimed that mouthguards can prevent dental trauma, which shows higher awareness among PE teacher compared to the other teachers. High awareness of dental injuries and prevention among athletes and coaches was also demonstrated in other studies (22, 23). The use of mouthguard is recommended in various contact sports (1, 24). In fact, prevention of dental trauma at school is very hard as it happens during children normal activity.

This survey and others showed that personal experience contributes to the knowledge of dental trauma management. Sae-Lim et al. (11) reported a correlation between parents' knowledge and dental trauma experience. Respondents with dental trauma experience had correct knowledge on replantation of permanent teeth 2.38 times more often than those without experience. Other studies did not find this correlation (13, 14, 16, 19).

As the majority of teachers lack experience, there is a need to educate them. This survey showed that in some subjects, such as storage medium for an avulsed tooth, first-aid training improved the knowledge. Some advantage was also seen among teachers who participated with their class in educational health programs. Hamilton et al. (13) investigated PE teachers, school nurses, and secretaries' knowledge of the management of avulsion. There was evidence that public dental health education can be effective. Significantly higher knowledge scores were obtained by lay people who had received advice on what to do if a permanent tooth was knocked out. This information was obtained via a variety of sources, including posters at a dental surgery or health center, articles in newspapers or professional journals and by word of mouth. Al-Asfour et al. (25) observed improvement in teachers' knowledge after an informative 30-min lecture about tooth avulsion and replantation. McIntyre et al. (26) assessed the knowledge of elementary school staff members regarding management of traumatic dental injuries before and after educational intervention. They found that pamphlets or combination of lectures and pamphlets significantly improved the knowledge among staff, and the difference persisted over time.

There are several ways to increase public and teachers' awareness: teacher training should include first-aid courses which includes emergency dental trauma management, posters at school and playgrounds, TV and newspaper commercials.

There was no correlation between the demand for further education in dental trauma and the actual knowledge, 64.6% claimed that they lack any information on the subject, but only 42.2% showed great interest for more information. This lack of interest suggests lack of awareness to the importance of the subject. Teachers must understand that in many occasions they will be the first to treat an injured child, and their treatment will determine the success and the prognosis of further treatment by a dentist. Teachers also have responsibility to report to parents about every dental injury and get them to take the child to a dentist. This knowledge should be part of their curriculum and update courses.

In addition to higher awareness, teachers need to be more motivated to prevent injuries as much as possible. Better playground supervision, safe equipment, and improved environmental conditions could contribute to fewer dental accidents, notice any potential accident hazards and report these hazards to the proper authorities. PE teachers have to encourage athletes to use mouthguards.

One limitation of the study design is the fact that teachers could choose not to participate if they felt they have no knowledge in the subject and that can bias the results. On the other hand, the questionnaire was anonymous, and some of the teachers felt free to express their lack of interest and knowledge in the subject.

Conclusions

Knowledge of elementary school teachers in Tel-Aviv area regarding traumatic dental injuries and emergency treatment is unsatisfying, and sources of information are random. It is advisable to add the subject to the curriculum of teacher training and reinforced it by additional periodic training and updating. Elementary school teachers must be aware of the importance of the matter and motivated to seek more information of their own.

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