

# Assessment of Physical Education course coordinators and undergraduates' knowledge about dental trauma first aid in Maringá/PR

Gabriela Machado de Oliveira **TERRA**<sup>1</sup>

Marcos Sergio **ENDO**<sup>2</sup>

Larissa Colepicolo **CERON**<sup>3</sup>

Carla Thais Rosada **PERUCHI**<sup>4</sup>

Nair Narumi Orita **PAVAN**<sup>5</sup>

doi: <http://dx.doi.org/10.14436/2178-3713.5.1.040-047>

## ABSTRACT

**Objective:** The aim of this study was to evaluate coordinators and undergraduates' knowledge in Physical Education from Maringá, Paraná, Brazil, concerning dental trauma first aid (DT) and suggest a proposal for education and prevention of DTs which can cause physical, psychological and social sequelae. **Material and methods:** The sample comprised coordinators (n = 2) and undergraduates (n = 106) in Physical Education. A questionnaire was applied to coordinators not only for qualitative assessment, but also to investigate their proposals. As for undergraduates, a questionnaire was applied to assess frequency and statistical analysis by means of *t* test ( $p < 0.05$ ) for two independent samples. **Results:** Results revealed that the coordinators had limited knowledge on the

topic and suggested an action of integrated education. Undergraduates showed insufficient knowledge, with no differences between qualifications ( $p = 0.061$ ), but with a significant difference between undergraduates who attended or not first aid classes for dental trauma ( $p = 0.034$ ). **Conclusion:** This study revealed that coordinators and undergraduates have poor knowledge about dental trauma first aid. Intervention is suggested by means of an integration program between undergraduates and professors of Dentistry and Physical Education, so that coordinators are prepared to introduce the subject in the academic curriculum and training of Physical Education undergraduates.

**Keywords:** Dental trauma. Questionnaire. Knowledge. Endodontics.

**How to cite this article:** Terra GMO, Endo MS, Ceron LC, Peruchi CTR, Pavan NNO. Assessment of Physical Education course coordinators and undergraduates' knowledge about dental trauma first aid in Maringá/PR. *Dental Press Endod.* 2015 Jan-Apr;5(1):40-7. DOI: <http://dx.doi.org/10.14436/2178-3713.5.1.040-047>

<sup>1</sup>Resident in Pediatric Dentistry, Universidade Estadual de Maringá (UEM), Maringá, Paraná, Brazil.

<sup>2</sup>PhD in Clinical Dentistry, Universidade Estadual de Campinas (UNICAMP), Campinas, São Paulo, Brazil.

<sup>3</sup>Undergraduate in Dentistry, Universidade Estadual de Maringá (UEM), Maringá, Paraná, Brazil.

<sup>4</sup>MSc student in Integrated Dentistry, Universidade Estadual de Maringá (UEM), Maringá, Paraná, Brazil.

<sup>5</sup>Adjunct professor, Universidade Estadual de Maringá (UEM), Maringá, Paraná, Brazil.

» The authors report no commercial, proprietary or financial interest in the products or companies described in this article.

Submitted: August 18, 2014. Revised and accepted: January 30, 2015.

Contact address: Gabriela Terra  
E-mail: [gabrielaterra09@gmail.com](mailto:gabrielaterra09@gmail.com)

## Introduction

The International Association of Dental Traumatology reports that players of contact sports have a 10% chance of suffering orofacial injuries.<sup>1</sup> This type of activity is responsible for 19% of assaults on the head and face, with 33% involving the teeth.<sup>2</sup> Dental trauma (DT) is considered a public health problem,<sup>3</sup> mainly affecting children and young people,<sup>4</sup> and may exceed tooth decay and periodontal disease depending on one's socioeconomic conditions.<sup>5</sup>

In Brazil, studies have shown a prevalence of trauma in permanent dentition ranging from 10.6% to 58.6% among school children at the age of 12.<sup>1,6</sup> The most commonly affected teeth are maxillary central incisors,<sup>1</sup> which can have a negative impact on children's quality of life, thereby causing psychological and social damage including low self-esteem as well as difficulty speaking, smiling and relating to other people.<sup>7,8</sup> During childhood, accidents normally occur at home or at school.<sup>1</sup> School is one of the places with the highest prevalence of DTs.<sup>1</sup> Fall, collision, traffic accident, violence and sports activity are the most prevalent etiological factors.<sup>1</sup> Teachers are usually present at the time of DT occurring during school activities; however, they lack knowledge on how to act in these situations.<sup>9</sup>

A relationship has been established between the frequency of participation in sports and the occurrence of crown fractures, present in 14% of cases.<sup>10</sup> Other post-traumatic complications can occur, such as discoloration of the crown, cervical root fracture, ankylosis, root resorption or even tooth loss.<sup>11</sup> Treatment success and maintenance of teeth depend on immediate attention drawn from a well-informed group of people.<sup>12</sup> Knowledge on DT emergency management is essential.<sup>13</sup> Immediate care is particularly important for the avulsed permanent tooth, since good prognosis depends on proper management.<sup>14</sup>

In addition to dentists, the professional segments that may be directly involved with DT and need to be informed as to the immediate conduct include parents, teachers, doctors, nurses, athletes, sport coaches, community health care workers and Physical Education teachers.<sup>16,17</sup> Most DT cases occur during Physical Education classes, but professionals and undergraduates' knowledge on the proper conduct to be adopted was considered insufficient or inappropriate.<sup>9,16</sup>

Therefore, this study aimed at assessing the knowledge of coordinators and undergraduates in Physical

Education from Maringá, Paraná, Brazil, particularly concerning dental trauma first aid. It also aimed to suggest a proposal for education, prevention and health promotion that complements professional training.

## Material and methods

First, the coordinators were informed about the research and signed an informed consent form (IC). According to the availability of the higher education institutions (HEI), data collection and intervention were scheduled. Two questionnaires on DTs were developed to be later applied to the coordinators and undergraduates in Physical Education. This was a cross-sectional study.

Questionnaire A was applied to the coordinators. The sample comprised Physical Education coordinators, both at bachelor and licentiate degrees, from Maringá, Paraná, Brazil. This questionnaire comprised three (3) essay questions investigating the coordinators' knowledge, as well as the importance and suggestions they gave to improve students' access to information on dental trauma first aid. Response time was proposed to be of seven (7) days. Assessment was qualitative and results were analyzed by four (4) researchers.

Questionnaire B, aimed at undergraduates, comprised twelve (12) questions. The first seven (7) were multiple-choice questions investigating their qualification (whether bachelor or licentiate degree) and experience. The other five (5) were multiple-choice questions referring to emergency procedures to be taken regarding coronal fracture, tooth avulsion and the importance of immediate referral to the dentist.

Questionnaire B sample comprised undergraduate students who had attended at least 60% of total credit hours, third grade (sixth period) and fourth grade (seventh and eighth period). All classes meeting this criterion were invited, except for the fifth grade, since not all HEIs in Maringá/PR have a five-year curriculum.

Data were collected during First Aid classes, with two credit hours.

The following activities were carried out:

- 1) Clarification on the research objectives, IC reading and questionnaires application.
- 2) Educational lecture on first aid concerning DTs.
- 3) Collective discussion on the topic so as to answer potential questions.

After the questionnaires were applied and recollected, the educational lecture was held in two steps: the first

used multimedia resources with educational material directed to the target audience, emphasizing the visual aspect with two (2) videos. The first video showed high level sports competitions in which DTs occurred, while the second video displayed an interview with a dentist discussing about DTs in daily life.

There was also a Microsoft Power Point (2010) slide presentation about the main types of DTs and first aid measures. The material studied was the DT guide published in 2012<sup>20</sup> and the first aid guide available at the International Association of Dental Traumatology (IADT) website aimed to patients.

In the second phase, illustrated printed material published by the Brazilian Association of Dental Traumatology was used. In addition, macro models and wax life-size teeth were used to explore basic anatomy concepts and highlight the importance of fragments and care regarding proper handling of avulsed teeth.

## Data analysis

Questionnaire data were tabulated and assessed by Bioestat 5.0 software.

Primary analysis considered questions 8 to 12 of questionnaire B to assign grades. Each one of these questions received a score 20, which enabled a scale from 0 to 100 to be established according to the correct answers. For question Q8, only letter B was considered correct; for question Q9, letter A; and for question Q12, letter D. For questions regarding coronary fracture, Q10; and avulsion, Q11; two alternatives were taken as correct: for Q10, letter C, with a score of 20 (best conduct) and letter A, with a score of 10 (acceptable conduct); Q11, letter A, with a score of 20 (best conduct) and letter B, with a score of 10 (acceptable conduct).

Knowledge was considered insufficient when the sum amounted a score below 70; fair, for score equal to 70; and sufficient, for score equal to or higher than 80. A score equal to 70 implies correct answers for questions Q8, Q9, Q12 (type of fracture and need for referral) and acceptable conduct for one of the situations of Q10 or Q11, involving the coronal fracture or avulsion.

In addition to a descriptive assessment of frequencies, BioEstat 5.0 software was used to check for differences between undergraduates' knowledge (scores 0 - 100), according to their experience. Also, the hypothesis of finding potential differences between the level of knowledge of licentiate and bachelor degree students; between the

groups attending or not first aid classes; and between undergraduates who were present or not at the time of a DT, was also investigated. For this analysis, t test for independent samples was applied ( $p < 0.05$ ).

After analyses, qualitative data retrieved from the questionnaire applied to coordinators were related to the results of quantitative data retrieved from the questionnaire applied to undergraduates.

## Results

### Questionnaire A

Two out of four Physical Education coordinators agreed to participate in the research (Table 1), and showed qualitatively insufficient knowledge about dental trauma first aid.

### Questionnaire B (Q1 to Q7)

For questionnaire B data analysis, only 106 participants were considered, since out of the 117 questionnaires collected, 11 had erasures or were not completely filled, thus being excluded from the sample.

Of the students surveyed, 67% were attending the bachelor qualification whereas 33% were attending the licentiate degree. When they were asked about internship, 73.6% stated having participated in internship with children at school age. Regarding their future work, 47.2% intended to work professionally with children while 36.8% did not know whether they would work with children.

As for undergraduates' experience with first aid instructions, 84.5% reported having attended first aid classes or training programs while only 10.4% stated that guidance or training included instructions on the right conduct for DTs first aid.

Of the total, 87.7% of students considered that sports practice at school represents a risk of DTs while 20.8% had witnessed DTs in children or adolescents. Of the 22 students who witnessed an oral traumatic injury, only four had received information on how to proceed.

### Questionnaire B (Q8 to Q12)

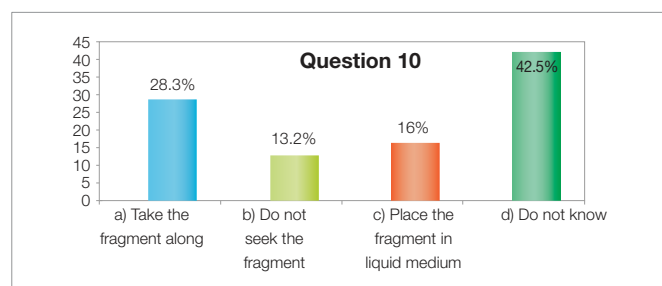
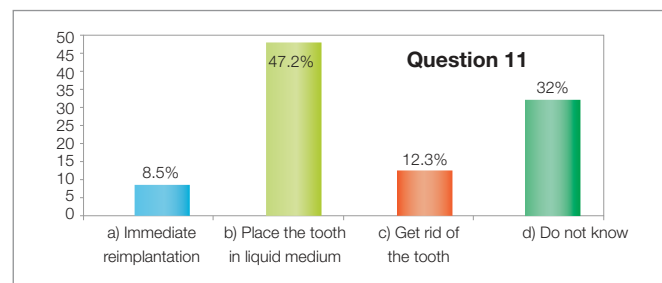
Table 2 lists the answers of questions Q8 to Q12 about the conduct concerning DTs, showing the two most frequently chosen alternatives for each question, in addition to the correct alternative.

**Table 1.** Coordinators' answers to questionnaire A.

	Coordinator X	Coordinator Y
<b>Question 1: "What do you know about dental trauma?"</b>		
They are common in sports practice		x
I know nothing about its prevalence	x	
I know nothing about the types of dental trauma	x	x
They are common in our daily life	x	x
They can lead to tooth loss		x
<b>Question 2: "How important is dental trauma knowledge to undergraduates?"</b>		
Awareness is important for their education	x	
It is important to develop professional activities		x
It is important to provide one's aid		x
<b>Question 3: "What do you suggest to improve undergraduates' access to DT first aid knowledge?"</b>		
Integration with Dentistry	x	x
Lecturers and courses		x
Educational leaflets		x

**Table 2.** The two most frequently chosen alternatives and the correct alternative for each question about the conduct concerning dental trauma.

Questions	Alternatives		
	1 <sup>st</sup>	2 <sup>nd</sup>	Correct
<b>Question 8</b>	b (77.4%)	a (12.3%)	b (77.4%)
<b>Question 9</b>	a (81.1%)	b (18.9%)	a (81.1%)
<b>Question 10</b>	d (42.5%)	a (28.3%)	c (16%)
<b>Question 11</b>	b (47.2%)	d (32.1%)	a (8.5%)
<b>Question 12</b>	d (92.5%)	b (3.8%)	d (92.5%)

**Figure 1.** Conduct concerning crown fracture. In green, the best conduct; in blue, the acceptable conduct.**Figure 2.** Conduct concerning avulsion. In green, the best conduct; in blue, the acceptable conduct.

The most common DT in permanent dentition and the need for immediate referral to the dentist in all cases was answered correctly by most students: Q8 (77.4%), Q9 (81.1%) and Q12 (92.5%) (Table 2).

For question Q10 (Fig 1), the most frequent answer was letter D (do not know) (42.5%, n = 45). Importantly, 13.2% (n = 14) considered not seeking the fragment, believing its presence does not interfere in treatment.

The most frequent answer for question Q11 was letter B (place the avulsed tooth in liquid medium and refer the child to the dentist immediately) (47.2%, n = 50), which is the acceptable conduct. Nevertheless, the best conduct, letter A (place the avulsed tooth back to its position and send the child to the dentist immediately) was the least chosen (8.5%, n = 9) (Fig 2).

### Undergraduates and their qualification (Bachelor X Licentiate degree)

The mean score assigned by the questionnaire for the licentiate degree was 66.3, whereas for the bachelor degree it was 59.2. Both were below 70, thereby indicating insufficient knowledge. The overall average was 61.2. T test indicated no significant difference ( $p = 0.061$ ) between scores for the different qualifications.

### Undergraduates who witnessed a dental trauma

The average number of students who witnessed a case of DT was higher (65.7) when compared to the average number of students who did not (59.3); however,

there was no significant difference between the two groups ( $p = 0.14$ ).

### Undergraduates who had access to dental trauma first aid

T test for independent samples checked for differences in undergraduates' knowledge about dental trauma first aid, whether they had attended first aid classes or not. There was significant difference ( $p = 0.004$ ) between these two groups, with a higher average (63.5) found for students who had attended first aid classes in comparison to the group that had not (53.6).

As between groups attending first aid classes in which proper conduct towards DT was included or not, the average of the group that received instructions was higher (67.7) in comparison to the group that had not been instructed (63). T test for independent samples revealed differences between these two groups ( $p = 0.034$ ).

## Discussion

Knowledge of first aid for DTs is very important for professionals who deal with sports in their daily routine, as it allows them to provide schoolchildren with a safe environment.<sup>21</sup> Assessing knowledge about DTs by means of a questionnaire has proven effective in studies encompassing educators, teachers and undergraduates in Physical Education.<sup>16,17,19,21</sup>

Different from studies considering students only, the present research assessed the degree of knowledge of Physical Education coordinators, so as to investigate the proposals made by them, professionals considered as opinion leaders. Thus, the essay questions allowed a qualitative analysis of responses. Such data are key, as coordinators follow students' training and can thus identify potential supplementary needs. When asked about DTs, coordinators gave brief responses and demonstrated that DTs are common in everyday activities. Moreover, they reported lack of knowledge on the subject, particularly with regard to its prevalence and classification. When their contribution was requested in order to improve undergraduates' access to knowledge, the coordinators identified the need for an integrated action with Dentistry. The need for integrating dental knowledge into other areas was also suggested by Jorge et al,<sup>17</sup> who suggested the inclusion of collaborative activities

between Physical Education and Dentistry so as to develop ongoing educational programs.

A low level of knowledge is shared by teachers at work, as reported by studies assessing groups of teachers in general.<sup>13,19</sup> The low frequency of contact with first aid instructions for DTs was also found in the present study, only 10.4% ( $n = 11$ ) of undergraduates had been instructed, which is considered low, as reported by Fux-Noy et al<sup>13</sup> (3.7%). The findings of the present study are similar to those yielded by Bayrak et al<sup>22</sup> who found insufficient knowledge about dental trauma first aid. In their study, 54% of teachers reported receiving training in first aid, but only 4.4% stated that training included DTs. However, Vergotine and Govoni<sup>18</sup> compared the level of knowledge about DTs shared by high school teachers and sport coaches, and registered a low level of knowledge for both. There were significant differences between the two groups as to the need for emergency treatment of crown fractures. Coaches had lower knowledge than teachers. In case of avulsion, only 7% of coaches would reimplant the tooth, while 12% of teachers would follow this conduct.

Additionally, the present study sought to have an overview of students' experience and knowledge on emergency conduct upon dental trauma, particularly with regard to first aids that could determine a good or poor prognosis. In accordance with studies published in Brazil and around the world,<sup>16,18,21</sup> the present study emphasized the need for referral to the dentist, in addition to investigating the conduct students would have in two different situations: crown fracture and avulsion.

In this sense, by analyzing the scores, the overall average (61.2) was below 70, which is considered insufficient. This can be explained by the absence of the topic in Physical Education curriculum.<sup>17</sup> Most undergraduates (84.5%) had attended class or training in first aid, but only 10.4% had access to classes concerning dental trauma first aid. The limited contact of students with dental trauma first aid was also found in other studies.<sup>16,17,21</sup> Of the students interviewed in Maringá, Paraná, Brazil, 20.8% had witnessed a DT in children or adolescents.

As regards undergraduates' perception, 87.7% of them felt that sports practice in school represents a risk of DT, which allows First Aid classes to be



favorably supplemented; as in this study, since there is a concern in this community. The coordinators of the Physical Education course were receptive to the present intervention.

The correct answer was the most frequently chosen for questions Q8, Q9 and Q12 (Table 2), thereby suggesting that students would refer the patient to the dentist immediately. Importantly, this measure would be taken in all cases regardless of bleeding; only two participants would refer patients only in case of bleeding. Crown fracture was identified as the most common type of trauma by 77.4% ( $n = 82$ ), which corroborates the literature.<sup>1,23</sup> The correct answer was not the most frequently chosen for questions Q10 (letter C,  $n = 17$ ) and Q11 (letter A,  $n = 9$ ) (Table 2). The answer "do not know" was common for Q10, about crown fracture (42.5%,  $n = 45$ ), as well as for Q11, about avulsion (32%,  $n = 34$ ). Lack of knowledge during these situations was also detected among professionals working at schools.<sup>13,19,21,24</sup> Importantly, for Q11, letter A (place the avulsed tooth back to its position and refer the child to the dentist immediately) was the least chosen alternative by undergraduates. Undergraduates shared lack of knowledge about the best conduct concerning tooth avulsion and benefits for prognosis when the tooth is immediately reimplanted.<sup>14,19</sup> Besides this immediate conduct, dental reimplantation success depends on proper and careful management of the tooth. When the tooth is to be reimplanted by the dentist, it is required to be immediately transported within 30 minutes, in addition to being stored in a suitable medium for avulsed teeth in an attempt to preserve viability of the periodontal ligament cells.<sup>25,26,27</sup>

A low frequency of correct answers on immediate reimplantation was also found by Jorge et al<sup>17</sup> in Belo Horizonte, Minas Gerais, Brazil. The answer "immediate reimplantation" was chosen by 5.9% of participants only, with no significant differences between knowledge shared by Physical Education teachers and undergraduates. Among the undergraduates participating in this research, the majority of them was attending the bachelor course ( $n = 71$ ). There was no significant difference when undergraduates in bachelor or licentiate qualifications were compared ( $n = 35$ ) ( $p = 0.061$ ). Although licentiate qualification has a greater focus on the school environment and the average of

undergraduates of such qualification was greater, no significant difference was found. Both groups had insufficient knowledge, which agrees with the studies previously cited, which do not distinguish students or professionals according to their qualification.

Moreover, no difference was found between knowledge shared by students who witnessed or not a DT ( $p = 0.14$ ). Although other studies have detected such difference,<sup>28</sup> in this research, the absence of discrepancies can be related to the fact that among the 22 undergraduates who witnessed dental trauma, only four had contact with first aid instructions concerning DTs.

Students who attended first aid classes had better knowledge ( $p = 0.004$ ). This finding has been observed in other studies and suggests that trained teachers are better qualified to act in case of trauma.<sup>21,28</sup> When the group of students who attended first aid classes or training that included DT care was compared with those who had not had this experience, there was an increase of 4.7 points in the average, with significant difference ( $p = 0.034$ ). Another study reported an increase in the level of knowledge shared by teachers who participated in health educational programs. Additionally, there is evidence that oral health public education can be effective.<sup>13</sup>

In this context, educational programs and inclusion of tooth avulsion first aid in the curriculum of Physical Education courses are needed to improve management of traumatic dental injuries emergencies and thus provide better protection for school children.<sup>13,17,29</sup> Professionals involved with people vulnerable to accidents associated with tooth avulsion can also prevent this type of trauma by recommending the use of a mouthpiece during contact sports.<sup>30</sup> Thus, undergraduates' training should be broader in terms of emergency approach towards DTs, while course coordinators should be facilitators in terms of implementation of new content.

As suggested by the coordinators, interaction between Dentistry and Physical Education can be an effective means to achieve better results. This study is cross-sectional and presents certain limitations, since it occurred at a single point in time. Along with this study, an intervention was performed with the display of videos, lectures, macro models and leaflets. Similar methods were applied by McIntyre et al<sup>9</sup> who

assessed a group of teachers before and after an educational activity. The authors found that the use of leaflets or the combination of leaflets and lectures improved teachers' knowledge and the difference persisted over time. Holan et al<sup>31</sup> performed an intervention by means of lectures combined with an explanatory work conducted with Physical Education teachers. The authors also obtained satisfactory results. Emerich et al<sup>30</sup> compared the effectiveness of an educational lecture and subsequent educational sessions, and observed insufficient knowledge, thereby corroborating the present study. However, a combination between a 30-minute lecture and an educational task achieved significant improvements. Even after a year, the level of knowledge proved favorable for appropriate conducts concerning DT.

Given the insufficient knowledge shared by Physical Education undergraduates, and confronting the studies in the literature with the suggestions given by the coordinators, this research suggests a collaborative action by means of an integrated program established between Dentistry and Physical Education, which will create opportunities for these future professionals to include dental trauma first aid as a topic in training,<sup>19</sup> until the coordinators of the subject of

first aid may be able to address the issue within available hours. A lecture associated with other resources, such as leaflets or additional tasks, and students' active participation in the teaching-learning process, is a promising alternative for intervention and provides a possibility of monitoring in longitudinal studies.

## Conclusions

Coordinators participating in the present study showed limited knowledge about DTs, but considered it a relevant subject and were receptive about intervention.

Undergraduates' knowledge proved insufficient to provide dental trauma first aid. There was no significant difference between bachelor and licentiate degrees, or between undergraduates who had witnessed DTs or not. Nevertheless, a greater level of knowledge was shared among students who had attended first aid classes related to DTs.

It is suggested that intervention be performed by means of educational lectures and activities, in an integration program in which undergraduates and professors of Dentistry contribute to Physical Education students training, until coordinators are prepared to introduce this topic in the curriculum.

## References

1. Traevert J, Peres MA, Blank V, Böell RDAS, Pietruza JA. Prevalence of traumatic dental injury and associated factors among 12-year-old school children in Florianópolis, Brazil. *Dent Traumatol* 2003; 19(1):15-18.
2. Glendor U. Has the education of professional caregivers and lay people in dental trauma care failed? *Dent Traumatol*. 2009;25(1):12-8.
3. Livny A, Sgan-Cohen HD, Junadi S, Marcenes W. Traumatic dental injuries and related factors among sixth grade schoolchildren in four Palestinian towns. *Dent Traumatol*. 2010;26(5):422-6.
4. Andreasen JO, Ravn JJ. Epidemiology of traumatic dental injuries to primary and permanent teeth in a Danish population sample. *Int J Oral Surg*. 1972;1(5):235-9.
5. Changing patterns of oral health and implications for oral health manpower. I. Report of a working group convened joined by the Federation Dentaire Internationale and the World Health Organization. *Int Dent J*. 1985;35(3):235-51.
6. Marcenes W, Alessi ON, Traevert J. Causes and prevalence of traumatic injuries to the permanent incisors of school children aged 12 years in Jaraguá do Sul, Brazil. *Int Dent J*. 2000;50(2):87-92.
7. Cortes MI, Marcenes W, Sheiham A. Impact of traumatic injuries to the permanent teeth on the oral health-related quality of life in 12-14-year-old children. *Community Dent Oral Epidemiol*. 2002;30(3):193-8.
8. Andersson L, Al-Asfour A, Al-Jame Q. Knowledge of first-aid measures of avulsion and replantation of teeth: an interview of 221 Kuwaiti schoolchildren. *Dent Traumatol* 2006; 22:57-65
9. McIntyre JD, Lee JY, Trope M, Vann WF. Effectiveness of dental trauma education for elementary school staff. *Dent Traumatol*. 2006;22(2):57-65.
10. Cetinbas T, Yildirim G, Sönmez H. The relationship between sports activities and permanent incisor crown fractures in a group of school children aged 7-9 and 11-13 in Ankara, Turkey. *Dent Traumatol*. 2008;24(5):532-6.
11. Pohl Y, Filippi A, Kirschner H. Results after replantation of avulsed permanent teeth. I. Endodontic considerations. *Dent Traumatol*. 2005;21(2):80-92.
12. Flores MT, Andersson L, Andreasen JO, Bakland LK, Malmgren B, Barnett F, et al. Guidelines for the management of traumatic dental injuries. I. Fractures and luxations of permanent teeth. *Dent Traumatol*. 2007;23:66-71.
13. Fux-Noy A, Sarnat H, Amir E. Knowledge of elementary school teachers in Tel-Aviv, Israel, regarding emergency care of dental injuries. *Dent Traumatol*. 2011;27(4):252-6.
14. Flores MT, Andersson L, Andreasen JO, Bakland LK, Malmgren B, Barnett F, et al. Guidelines for the management of traumatic dental injuries. II. Avulsion of permanent teeth. *Dent Traumatol*. 2007;23:130-6.
15. Costa FW, Oliveira EH, Bezerra MF, Nogueira AS, Soares EC, Pereira KM. Dental trauma: knowledge and attitudes of community health workers. *J Craniofac Surg*. 2014;25(5):e490-5.
16. Panzarini SR, Pedrini D, Brandini DA, Poi WR, Santos MF, Correa JP, et al. Physical education undergraduates and dental trauma knowledge. *Dent Traumatol*. 2005;21(6):324-8.
17. Jorge KO, Ramos-Jorge ML, Toledo FF, Alves LC, Paiva SM, Zarzar PM. Knowledge of teachers and students in physical education's faculties regarding first-aid measures for tooth avulsion and replantation. *Dent Traumatol*. 2009;25(5):494-9.
18. Vergotine RJ, Govoni R. Public school educator's knowledge of initial management of dental trauma. *Dent Traumatol*. 2010;26:133-6.
19. Chan AWK, Wong TKS, Cheung GSP. Lay knowledge of physical education teachers about the emergency management of dental trauma in Hong Kong. *Dent Traumatol*. 2001;17:77-85.
20. Andreasen JO, Lauridsen E, Gerds TA, Ahrensburg SS. Dental trauma guide: a source of evidence-based treatment guidelines for dental trauma. *Dent Traumatol*. 2012;28:142-7.
21. Feldens EG, Feldens CA, Kramer PF, Silva KG, Munari CC, Brei VA. Understanding school teacher's knowledge regarding dental trauma: a basis for future interventions. *Dent Traumatol*. 2010;26(2):158-63.
22. Bayrak S, Tunc ES, Sari E. Evaluation of elementary school teachers' knowledge and attitudes about immediate emergency management of traumatic dental injuries. *Oral Health Prev Dent*. 2012;10(3):253-8.
23. Caldas AF, Burgos ME. A retrospective study of traumatic dental injuries in a Brazilian dental trauma clinic. *Dent Traumatol*. 2001;17:250-3.
24. Caglar E, Ferreira LP, Kargul B. Dental trauma management knowledge among a group of teachers in two south European cities. *Dent Traumatol*. 2005;21:258-62.
25. Robson F, Ramos-Jorge ML, Bendo CB, Vale MP, Paiva SM, Pordeus IA. Prevalence and determining factors of traumatic injuries to primary teeth in preschool children. *Dent Traumatol*. 2009;25:118-22.
26. Andreasen JO. Effects of extra-alveolar period and storage media upon periodontal and pulpal healing after replantation of mature permanent incisors in monkeys. *Int J Oral Surg*. 1981;10(1):43-53.
27. Qazi SR, Nasir KS. First-aid knowledge about tooth avulsion among dentists, doctors and lay people. *Dent Traumatol*. 2009;25(3):295-9.
28. Al-Jundi SH, Al-Waeili H, Khairallah K. Knowledge and attitude of Jordanian school health teachers with regards to emergency management of dental trauma. *Dent Traumatol*. 2005;21:183-7.
29. Loo TJ, Gurunathan D1, Somasundaram S. Knowledge and attitude of parents with regard to avulsed permanent tooth of their children and their emergency management--Chennai. *J Indian Soc Pedod Prev Dent*. 2006;24(3):116-21.
30. Emerich K, Włodarczyk P, Ziolkowski A. Education of Sport University students regarding first-aid procedures after dental trauma. *Eur J Paediatr Dent*. 2013;14(1):37-41.
31. Holan G, Cohenca N, Brin I, Sgan-Cohen H. An oral health promotion program for the prevention of complications following avulsion: the effect on knowledge of physical education teachers. *Dent Traumatol*. 2006;22(6):323-7.