

FIRST AID MANAGEMENT IN EMERGENCY CARE OF DENTAL INJURIES – KNOWLEDGE AMONG TEACHERS IN RIJEKA, CROATIA

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SUMMARY – The aim of the present cross-sectional study was to investigate the knowledge and attitude regarding emergency treatment of dental trauma among elementary school teachers in the city of Rijeka, Croatia. A total of 144 teachers answered a four-part questionnaire which comprised questions regarding demographic data, role and responsibility at the working place, knowledge about dental trauma, and motivation for further education on the topic. Nearly half of the participants (47.2%) reported having seen at least one dental trauma in their professional careers. They chose to contact the child's parent first (54.1%) and only 11.1% chose to contact a dentist instead. The majority of teachers (81.9%) were not aware of the meaning of the term *avulsio dentis*. As to treatment of avulsed tooth, 17.3% of teachers knew the appropriate management, while 14% of them would not even touch it. With regard to transport of avulsed tooth or fractured tooth fragments, only 2% responded correctly. The majority of the responders (87.5%) had never been educated about dental trauma, but were willing to be informed through lectures (53.4%), basic life support courses (15.2%) and brochures (9.7%). Planning teachers' education through advanced training on the topic is suggested to be part of teachers' lifetime education.

Key words: *Tooth injuries; Tooth avulsion; Schools; Child; Adolescent; Young adult; Health knowledge, attitudes, practice; Teaching; Emergency treatment – psychology; Croatia*

Introduction

Dental injuries have become an oral health issue due to their high prevalence and complex approach that may be required with respect to emergency management of traumatized teeth^{1,2}.

Dental trauma can occur at any age; however, a significantly high incidence of traumatized permanent teeth has been reported between the age of 7 and 12^{1,3}. The majority of children and young adults visiting the University Dental Clinic in Rijeka, Croatia due to dental trauma are aged 10 to 13 years, followed by children aged 6 to 9 years^{4,5}. A study conducted at the

University Dental Clinic in Zagreb, Croatia showed the highest frequency of dental trauma in permanent dentition at the age of nine⁶. Most dental injuries occur during day time between 11.00 am and 1.00 pm, as well as between 4.00 pm and 8.00 pm, when most of the children are at school supervised by their teachers^{7,8}. Since the prognosis of traumatized teeth depends highly on immediate and appropriate management of the teeth, teachers who witness such a trauma are expected to provide prompt and proper sequence of actions in order to minimize or possibly exclude certain functional, esthetic, psychological and economic side effects for the patient^{9,10}. In the past years, many studies have shown the teachers' knowledge regarding management of dental injuries to be quite poor and inadequate¹¹⁻¹⁶. No data are available to assess elementary school teachers' knowledge about managing den-

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tal injuries in Croatia. Therefore, the aim of this study was to investigate potential improvement of the teachers' knowledge related to the topic by accessing data from elementary schools in the city of Rijeka, Croatia. The aim was also to evaluate their attitudes to emergency management of dental injuries, to further evaluate the procedures that were undertaken among those who had had such experience, and to investigate to which extent they were motivated for further education on the matter. The results of this report could provide information that can assist in creating simple instructive guidelines for teachers as part of the following long-term educative approach in their training. The final goal is to reduce the possible complications associated with dental trauma among schoolchildren and adolescents at an early stage.

Materials and Methods

This cross-sectional study was carried out in 14 elementary schools in Rijeka, the third biggest city in Croatia. Prior to commencing the study, it was approved by the Ethics Committee of the School of Medicine, University of Rijeka, Croatia. Data were collected by distributing a questionnaire that comprised 25 questions divided in 4 parts. The first part consisted of 4 questions regarding personal information, including age, gender, level of graduation, number and age of their own children. The second part consisted of 6 questions referring to teachers' role in the school and their responsibilities and obligations in school activities. The third part consisted of 6 questions focused on teachers' knowledge and previous experience with dental injuries. Finally, the fourth part consisted of 6 questions evaluating their self-assessed education and motivation with respect to gaining additional knowledge about dental injuries.

The questionnaire was developed by the authors of the study as part of the graduate thesis at the University of Rijeka, School of Medicine, Department of Pediatric Dentistry. All the participants initially approached gave their consent to participate in the study. To ensure the participants' self-approach in answering the questions and exclude any side intervention and consultation in the course of filling out the questionnaire forms, the investigators were individually present in schools to distribute the surveys and stayed there until the teachers completed the questionnaires. To

ensure anonymity, no names, other personal information or names of the schools were recorded. All of the 148 questionnaires were distributed during a 2-month period, starting from January 2014 through March 2014. A total of 144 questionnaires were properly filled out, whereas 4 questionnaires were excluded due to incomplete answers. Three of the authors reviewed the questionnaires and no disagreement was reported among them.

Descriptive statistical analysis was performed by using STATISTICA for Windows Release 5.5 A* and SPSS for Windows, Release 7.5**.

Results

The questionnaire was completed correctly by 144 of 148 (97.3%) teachers, their age range 25–62 years, mean age 41 (SD ± 9.39) years. The study included mostly female teachers (94.5%) and only four (5.5%) males. The majority of teachers had their own children (81.1%); 53.3% had one child, 45% had two children, and 1.7% had three children.

The average teaching experience was 10 years. The majority of teachers included in the study (87.8%) approved supervising children during sports activities, while 94.6% of them were doing that even in recess

Table 1. Knowledge and experience with dental injuries (N=144)

Question	Answer	n (%)
Experience with dental injuries	Yes	38 (26.38)
	No	106 (73.61)
Witnessing dental injuries	Yes, once	14 (9.72)
	Yes, several times	54 (37.5)
	No	76 (52.78)
How did dental injuries occur	Sports activities	18 (12.5)
	Walking	16 (11.11)
	Playing	90 (62.5)
	Physical contact	4 (2.7)
	Other situation	16 (11.11)
What would you do in case of dental injuries	Contact the child's parents	78 (54.16)
	Contact the dentist	16 (11.11)
	Contact the headmaster	38 (26.38)
	Hold the child at school	12 (8.33)

Table 2. Management of dental injuries (N=144)

Question	Answer	n (%)
Familiarity with the term of <i>avulsio dentis</i>	Yes	26 (18.05)
	No	118 (81.94)
What would you do in case of a completely extruded tooth from its socket	Throw the tooth away	3 (2.08)
	Scrub the tooth	9 (6.25)
	Wash the tooth with tap water	3 (2.08)
	Wrap the tooth in a dry clean gauze or handkerchief	110 (76.38)
	Place the tooth in milk	3 (2.08)
	Place the tooth in physiological solution	5 (3.47)
	Place the tooth in disinfectant solution	11 (7.63)
How would you hold a completely extruded tooth	By the crown	25 (17.36)
	By the root	38 (26.38)
	By the whole tooth	60 (41.6)
	Would not touch it	21 (14.6)
Would you look after a missing tooth fragment	Yes	39 (27.08)
	No	105 (72.9)
Do you think that a fractured fragment could be reattached to the traumatized tooth	Yes	26 (18)
	No	118 (82)

time. Teachers were responsible for one classroom at a time with the mean number of 20 pupils (SD ± 4.56).

Table 1 shows the responders' knowledge about and experience with dental injuries. Nearly one-third of the responding teachers (26.38%) reported having self-experience with dental trauma and nearly half of them (47.22%) reported having seen at least one trauma during their teaching careers, mostly during children's play (62.5%). Only 11.11% of the responding teachers approved contacting a dentist first after having witnessed the accident, while the majority (54.16%) would call the child's parents instead.

Table 2 shows the teachers' knowledge about emergency measures with injured teeth. The majority of the responding teachers (81.94%) were not aware of the meaning of the term *avulsio dentis*. When presented

Table 3. Education about dental injuries (N=144)

Question	Answer	n (%)
Have you ever been educated about dental injuries	Yes	9 (6.25)
	No	135 (93.75)
In which way you got informed about dental injuries	Consulting an expert	28 (19.45)
	Consulting colleagues	46 (32)
	Dental literature	14 (9.72)
	Lectures	1 (0.7)
	Specialized TV/ radio shows	4 (9.72)
	Online education	6 (4.16)
	Newspapers	1 (0.7)
	Didn't need such information	28 (19.4)
Are you interested in being educated about dental injuries	Yes	126 (87.5)
	No	18 (12.5)
The best way to be educated about dental injuries	Basic life support courses	22 (15.2)
	Seminars	7 (4.86)
	Lectures by dentists at school	77 (53.4)
	Brochures	14 (9.72)
	Online education	10 (7)
	Not interested	14 (9.72)

with a scenario in which they find an avulsed tooth or a tooth fragment, 14.6% of the teachers would not touch it. Only 17.36% of them would hold a completely extruded tooth for the crown and 2% knew that an avulsed tooth should be transported to a dental office in milk. The majority (76.38%) would wrap it in clean and dry gauze.

Table 3 shows the responders' self-assessed knowledge and motivation for education. The majority (93.75%) reported they had never been educated about dental injuries, 58.1% found their knowledge on dental injuries be insufficient, whereas the majority (87.7%) thought that further education on the subject was required. As to the manner of gaining additional knowledge, the majority would prefer lectures in schools (53.4%), courses of basic life support (15.2%) and brochures (9.2%).

Table 4. Protocol for emergency management of dental trauma

All dental traumas should be treated as emergencies. So please, when you witness a facial trauma:

1) ask the child to show you his/her teeth; 2) contact the child's parents; 3) visit a dentist as soon as possible

1. All teeth are present

Clinical finding	Management
No Displacement of the tooth with/without bleeding around the tooth – normal biting	Contact the child's parents and visit a dentist as soon as possible
The tooth is loosened or pushed out of position with bleeding around the tooth – unable to bite	Try to replace the tooth gently in the right position and visit a dentist as soon as possible

2. Chipped or broken tooth

Clinical finding	Management
Missing tooth crown fragment	Recover and store the missing fragment in cold milk until arrival to dental office It can be reattached! Visit a dentist as soon as possible
	Cannot find the missing fragment? Visit a dentist as soon as possible anyway

3. Missing tooth

Clinical finding	Management
The tooth socket is empty: it means that the tooth was completely displaced from its socket	A. REPLANTATION Find the tooth and pick it up for the crown Do not touch the root! Rinse it with tap water for 10 s Ask the child to rinse the mouth with water Replace the tooth gently into the empty socket Use the adjacent tooth for comparison of right position and rotation Ask the child to bite on a handkerchief to hold the tooth in position Seek emergency dental treatment immediately B. NO REPLANTATION If replantation is not possible place the tooth in appropriate storage medium: – cold milk – saliva Best: special storage media for teeth Avoid water Never leave the tooth in a dry gauze or handkerchief
The tooth socket seems empty but the tooth is displaced axially into the bone and usually only part of the tooth crown is visible (white)	Seek emergency dental treatment immediately

Discussion

Schools and schoolyards are one of the locations with the greatest prevalence of the occurrence of dental trauma in children¹. Therefore, promoting awareness of emergency management modalities among

teachers and other school staff is mandatory^{1,17,18}. Prompt and appropriate actions that can be undertaken immediately after dental injuries can increase survival rates of injured tooth, particularly in complicated cases such as avulsion. Immediate reaction to dental injury can also reduce the level of children's and their

parents' anxiety with respect to subsequent dental treatment¹⁹. In the last decades, many studies evaluated the knowledge of dentists, teachers, primary care providers, coaches and other lay people regarding emergency dental trauma measures²⁰⁻²³. The results of this study are much in accordance with the existing data from similar studies conducted in Turkey, Czech Republic and Brazil enouncing the role of teachers in the provision of primary care following dentoalveolar injuries^{13,14,24}. More specifically, the majority of the investigated teachers showed rather poor level of knowledge, stating they would contact the child's parents (54.16%) after dental injury and hold the child at school until their parents' arrival (8.3%). Contacting a dentist to manage the fractured tooth was considered by only 11.11% of the responders. Late and inappropriate interventions may complicate and prolong therapy of the injured tooth with unsuccessful long-term outcomes. In particular, permanent incisors with incomplete root development, which are known to be most affected by trauma, may suffer from the consequences of such inadequate treatment approach^{1,25,26}. Consequently, prolonged therapy requires more dental appointments, which also affects school activities. In case of tooth avulsion, the time elapsed between the accident and the patient's arrival to dental office, as well as appropriate storage and transportation media are crucial for favorable prognosis of tooth survival in the jaw²⁷. Conversely, incorrect handling of the avulsed tooth and prolonged extraoral dry time may result in damage to periodontal ligament, root inflammatory resorption or ankylosis, which can lead to tooth loss²⁸. Immediate replantation after tooth complete extrusion from its socket was not considered because previous studies have shown teachers' aversion to this procedure^{29,30}. As to manage a completely extruded tooth, the majority of teachers (68%) would hold the tooth incorrectly and wrap it in a dry gauze (76.38%), thus causing permanent damage to periodontal tissue. This finding is similar to those observed in studies conducted in other countries^{14,24}. Only a lower percentage of teachers (2.08%) would place the tooth in milk, which was available in all 14 schools included in this study. Milk can be used as a storage medium before tooth replantation because it can preserve vitality of the remaining cells on the root surface. Because of its neutral pH, physiological osmolality, content of growth factors and essential nutrients for cells, and no bacterial con-

tent, milk is recommended by the International Association of Dental Traumatology as a temporary storage medium for avulsed teeth³¹.

Fractured tooth fragment can be reattached to traumatized tooth by dentist in order to preserve tooth vitality and for esthetic reasons. When presented with a scenario of tooth crown fracture with loss of tooth substance, 105 (72.9%) teachers would not look after the missing pieces and 82% thought that fragment reattachment to the tooth was not possible. Çaglar *et al.* report similar results in a study investigating teachers' awareness of proper management of traumatized teeth¹³. Nearly 50% of the teachers witnessed at least one dental accident and the majority expressed interest in further education on the topic, preferring lectures given by dentists at school, basic life support courses, brochures or online learning. A written protocol with simple guidelines for emergency management of dental trauma could be useful and easily delivered in all elementary schools, as shown in Table 4.

Several studies though showed an increased level of knowledge about dental trauma among teachers who had attended education and suggested a combination of brochures and lectures as the best way to promote first aid procedures in case of dental injuries^{32,33}.

This study had some limitations as participants' responses were self-reported and caution with generalization must be considered. However, the 97.3% response rate was excellent. For better results, it would be advisable to include in the study teachers from all elementary schools in Rijeka.

Conclusion

The knowledge about first aid management of dental injuries is poor and inadequate among elementary school teachers in the city of Rijeka, Croatia. Since they have shown interest in future education on the topic, training and educational programs are advisable to become part of their lifetime education.

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Sažetak

POSTUPCI PRVE POMOĆI U HITNOM ZBRINJAVANJU OZLJEDA ZUBA – ZNANJE MEĐU UČITELJIMA U GRADU RIJECI, HRVATSKA

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Cilj ovoga istraživanja bio je procijeniti znanje i stav prema hitnom zbrinjavanju ozljede zuba među učiteljima osnovnih škola u gradu Rijeci, Hrvatska. Ukupno 144 učitelja ispunilo je upitnik podijeljen u 4 dijela, koji se odnosio na opće podatke, vrstu i odgovornost radnog mjesta, stečeno znanje o dentalnim traumama i želju za daljnjom izobrazbom o tom pitanju. Gotovo polovica ispitanika (47,2%) susrela se s barem jednom ozljedom zuba tijekom svog radnog staža. U trenutku nezgode 54,1% ispitanika pozvalo je prvo roditelje djeteta, a samo 11,1% učitelja kontaktiralo je doktora dentalne medicine. Većina (81,9%) ispitanika nije nikada čula za termin *avulsio dentis*. U slučaju potpunog izbijanja zuba 17,3% učitelja primjereno bi zbrinulo zub, dok 14% njih ne bi ni dotakli zub. U vezi transporta izbijenog zuba ili slomljenog fragmenta samo 2% ispitanika odgovorilo je točno. Većina ispitanika (87,5%) nisu nikad prošli nikakvu izobrazbu o ozljedama zuba, ali su izrazili želju za izobrazbom putem predavanja (53,4%), tečajeva o hitnim postupcima (15,2%) i letaka (9,7%). Planiranje izobrazbe učitelja o dentalnim ozljedama putem tečajeva trajnog usavršavanja predlaže se kao dio njihovog cjeloživotnog obrazovanja.

Ključne riječi: *Zub, ozljede; Zub, avulzija; Škole; Dijete; Adolescent; Mlada osoba; Zdravstveno znanje, stavovi, primjena; Poučavanje; Hitno zbrinjavanje – psihologija; Hrvatska*