THE EFFECT OF EDUCATION ON GENERAL DENTISTS' KNOWLEDGE OF DENTAL TRAUMA MANAGEMENT

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Abstract. Background: The complexity of dentoalveolar trauma needs proper knowledge and skills by dentist to treat them appropriately. There is evidence in the literature that general dentists do not have sufficient level of knowledge in this regard. **Objective**: To assess the effect of training by distance education via cell phone text messaging as well as showing posters on the knowledge of general dentists with regard to management of dental traumas in Zahedan, Iran in 2014. **Methods:** In this experimental study, 86 general dentists were included.. Firstly, the particpants' knowledge of dental trauma management was determined using a standard questionnaire. The questionnaire responses was based on the 2013 Dental Trauma Guide with scoring system (with total score range of 0 to 29). Then, educational intervention was started and explanations with correct answers to the items covered in the questionnaire were presented to the particpants via showing posters or sending text messages by cell phones every 48 hours for 2 weeks. Once more, post-test with the questionnaire was done. **Results**: Before education, older dentists (> 41 years old) had significantly lower mean (SD) knowledge score (14.86 ± 3.48) vs. younger dentists (19.63 ± 4.17 in 31-40 years and 17.51± 4.85 in 25-30 years groups); P= 0.004. Mean (±SD) knowledge score before the education was 17.79 (±4.67) which increased to 24.2 (±2.93) after the education (P< 0.001). **Conclusion**: Education about dental trauma for general dentists via showing posters and sendings message texts by cell phone was an effective method with significant results.

Keywords: Dental; trauma; knowledge; education; cell phone; distance education.

1. Introduction

The nature and complexity of dentoalveolar trauma vary significantly. General dentists are in the front line of managing dental traumas. It is expected that they have basic knowledge of standard and uptodate methods in diagnosis and treatment of such injuries (1). In most cases, proper and immediate treatment provided by general dentists can greatly affect the prognosis of the injury. Moreover, such treatment can reduce patients' anxiety and psychological stress (2, 3).

Dentoalveolar traumatic injuries can result in fractured, displaced, or lost anterior teeth and this could have significant functional, aesthetic, and psychological effects with consequent adverse effects on quality of life (4, 5). Therefore, dentists should be aware of the injuries involving the teeth and their supporting tissues to manage the emergency situations and choose the most appropriate treatment protocols. Inappropriate initial treatment of dental traumas leads to malocclusion and loss of some or all of the dental tissues, patient discomfort, and increased expense of further treatments as well as cosmetic and functional problems (6, 7). Additionally, complications such as necrosis of the pulp, external root resorption, and even tooth loss are significant if not suitable initial treatment is privided to patients (8).

The issue of correct managmenet of dental traumas by general dentists is of so paramount importance that the International Association of Dental Traumatology (IADT) has, through its board of directors, developed a series of guidelines for treatment of all types of traumatic injuries affecting primary and permanent teeth. The Dental Trauma Guide is a non-profit website dedicated to optimising worldwide treatment of dental trauma (9).

Generally, the level of knowledge and skills seen in general dentists stem from education and training they receive at dental schools (usually by traditional educational methods) (10) or in the form of continued medical education programs after graduation. One of the promising technologies in recent decades is cell phone technology. This is one of the aspects of information and communication technology and like other communication technologies could change traditional ways of training. This technology plays special role in training due to special features including transmission technology, a miniature of the possibility of accumulation and receive, display and control, flexibility of time and place, decentralized and asynchronous (11-13).

There are limiuted number of research studies have investigated the role of cell phone technology in education of dentists. In addition, no previous study has been done so far in the current research location, Zahedan, Iran, which is a large city in the southeastern part of Iran with over half a million population. Therefore we decided to assess general dentists' knowledge of dental traumas and investigate the possible effect that education via cell phone technology can have in this regard.

2. Materials and Methods

2.1. Study population and recruitement

The study population consisted of all registered general dentists practicing in the city of Zahedan, Iran I 2014.

Inclusion criteria were membership of the Medical Council and holding work permit and involving in dental practice at the time of the study. Those who were registered dentists but were not practicing at the time of the study and those who were not willing to participate were not included. For inclusion of the dentists, census method was used. Based on the data provided by Zahedan Medical Counsil, the total number of general dentists practicing in public or private dentistry clinics was 150 subjects. They were contacted and were invited to particptae in the study. Finally, 86 dentists agreed to participate.

2.2. Study design

This research was an experimental study with pre- and post-test design. First, their knowledge of dental trauma management was assessed by a 2-part questionnaire. The questionnaires were delivered to the partipants and they were asked to fill out them in 48 hours. Then, a two-week educational method was implemented. During this period, educational notes regarding the items covered in the questionnaire were prepared in the form of posters as well as texts. The texts were sent by cell phone messaging texts every 48 hours. The notes contained explanations for each item in the questionnaire as well as their correct responses. Once again, after completing the education their knowledge was assessed. Some individuals were excluded from the study for reasons such as non-delivery of message texts, non-willingness to read the texts, or non-willingness to continue participation. Two authors reviewed each questionnaire. There was no disagreement between the questionnaire reviewers.

2.3. Study instrument

A questionnaire with two parts was used to collect the required data. First part of the questionnaire included demographic information such as age, sex, year of graduation, the last time scientific information about dentak traumas was received (including participation in congresses, training courses, books, Internet, etc) and their tendency to treat dental traumas.

Second part of the questionnaire consisted of eleven categories of treatment considerations in five issues such as concussion, subluxation, extrusion, lateral luxation and intrusion except for avulsion)14). These were the necessity of performing radiographic exam, thooth repositioning, orthodontic or surgery extrusion, watchful waiting for spontaneous re-eruption, splinting and it's time, occlusal adjustment, antibiotic therapy, endodontic treatment, follow-up, and willingness to treatment.

The responses to questions were revised according to the 2013 Dental Trauma Guide (9). At the beginning of the questionnaire, each of the issues was explained by simplified language and with a schematic figure and the respondents specified the responses by selecting each of eleven cases for each item. Treatment planning was divided into two categories

based on correct and incorrect answers. Correct answeres were given one score. The wrong answers did not receive any score. The range of the total score was zero to 29. Scores ranging from 0 to 15 was regarded as low knowledge, 16 to 25 as moderate knowledge, and 26 to 29 was considered as high knowledge.

2.4. Statistical analysis

Descriptive indices including statistics frequency, percentage, mean (standard deviation, SD) were used to express data. The normal distribution of the data was determined using the Kolmogorov-Smirnov test. For inferential analyses, one-way analysis of variance (ANOVA), paired sample t test, chi-squared test, and Fischer's exact test were used. All analyses were done by the SPSS software for Windows (ver. 20.0). A P value of less than 0.05 was set as statistically significant.

2.5. Research ethics

The research protocol was approved by the local Research Ethics Committee of Zahedan University of Medical Sciences, Zahedan, Iran. The participation in the study was on voluntary basis and the questionaires were ananymous. All data were kept confidential solely for scientific purposes.

3. Results

A total of 86 general dentists were studied (51 (59.3%) women and 35 (40.7%) men) . The average age of the sample was 32.6 years (range, 25-49 years). . Regarding the graduation time, 54.7% graduated in less than the past 5 years, 31.4% 5-10 years earlier, and in 14% graduation time was over 10 years ago. Average time elapsed from the last time that the participants received/studied about dental trauma was 31 months (range, 1 week to 120 months).

Information resources of dental trauma management in 69.8 percent of dentists were through reading, 14% attending scientific gatherings, and 16.3% through the Internet. One percent of the sample stated other sources as their mean to improve their knowledge about dental trauma management. About 98.8% of the sample stated that they are interested in improving their knowkedge about management of dental trauma.

Knowledge regarding providing treatment for concussion was the best (77.9%) and about intrusion the worst (3%). Regarding having correct knowledge about splinting, endodontic therapy and antbiotic therapy, te results showed that 10.4%, 33.6% and 25.5% had such knowledge,, respectively.

The Kolmogorov-Smirnov test results indicated that the significant level was higher than 0.05 and data distribution was normal. Therefore, parametric tests were used for the analyses.

Table 1 summarizes scores of knowledge based on the studied variables before education. As seen, theer was only a significant difference between knowledge scores based on the dentists' age. Older dentists had lower scores.

		No.	Mean (±SD)	One-way ANOVA	
				F value	P value
Time elapsed since graduation, year	< 5	47	17.85 (±4.44)	2.16	0.12
	5-10	27	18.74 (±5.31)		
	> 5	12	15.41 (±3.31)		
Time elapsed from the last time scientific information of dental trauma received	< 1	35	19.25 (±3.84)	2.45	0.06
	2	16	17.81 (±4.16)		
	3	15	16.53 (±5.24)		
	> 3	20	16.15 (±5.40)		
Methof of receiving scientific information about dental trauma	Book	60	17.66 (±4.96)	0.87	0.42
	CME, scientific gathering	12	19.33 (±4.31)		
	Internet	14	17 (±3.48)		
Age group	25-30	41	17.51 (±4.86)	5.96	0.004
	31-40	30	19.63 (±4.17)		
	> 41	15	14.86 (±3.48)		

Abbreviation: CME= continued medical education; No.= frequency; ANOVA= analysis of variance

Mean (±SD) score of knowledge before the education was 17.79 (±4.67) which increased to 24.2 (±2.93) after the education (P< 0.001). Table 2 shows knowledge category of the sample before and after the education. As seen, there was a significant difference and higher number of dentists had high knowledge. Before the educational intervention, only 17.4% was interested in gaining information about dental trauma. After the education, this figure rose to 81.4% (P< 0.001).

Table 2. Comparison of knowledge category (low, moderate, high) before and after the education

	Before	After	P value
Low	23 (26.7%)	0	< 0.001
Moderate	62 (72.1%)	50 (58.1%)	
High	1 (1.2%)	36 (41.9%)	

4. Discussion

According to the obtained findings, the educational method studied here had a significant effect in improving the knowledge of the studied general dentists regarding dental trauma management. At the beginning of the study, the average knowledge score was 17.45 which is a moderate level. The level of knowledge in the studies of Hamilton (15), Akhlaghi (16), Krastl (17), Yeng (18), Jackson (19), Kostopoulou (20), Seraj (21) and Stockes (22) were respectively 53%, 21%, 40%, 61%, 74%, 71%, 64% and 35%. These differences in knowledge level can be different because of the trauma in different locations or due to differences in methods of training and educational courses.

On the other hand, there was no significant correlation between graduation year and knowledge score. This contradicts reports of Hamilton (15) and Kostopoulou (20). The reason for this contradiction could be insufficient seminars and training courses related to the dental trauma management.

And also the lack of adequate training for dentists at dental colleges has led to

insufficient knowledge about the management of dental trauma in newly graduated dentists.

There was no relationship between last time that the dentists received/studied scientific information about dental trauma and knowledge score. The dentists whose graduation time was shorter did not have higher knowledge score. This shows that recent graduation was not a major factor in dental trauma knowledge. Also, there was no relationship between methods of studying/receiving scientific information and knowledge score. The main factor contributing to low level effectiveness of continued education programs resides in the traditional nature of their presention through one-way lectures where the audience is addressed passively.

Some of the important factors in the successful treatment of dentoalveolar trauma are time of last incident, type and time of splinting, presence of bacterial infection and pulp necrosis, performing the correct of endodontic treatment according to clinical and radiographic status, tooth maturation and associated bone fractures. When the tooth is exposed to mobility or reposition, dental splint should be done. Splinting time is an important issue in dentoalveolar trauma. By decreasing the time, the possibility to lack of recoverty and damage to periodontal tissues are increased. When the time to start treatment lengthens, the possibility of damage to periodontal tissues and ankylosis and root resorption is increased (14). Root canal treatment for traumatic tooth with pulp necrosis has to be done. Cementum is damaged in most of the teeth. If the pulp becomes infected, the bacteria in the pulp irritate the external removal. To stop any

removal, it is important to take sufficient efforts to disinfect the root canal treatment in canal system (23, 24). Accordingly, antibiotics therapy and root canal treatment are important in the dental trauma.

A great number of the respondents had full knowledge for concussion treatment. But the knowledge of other types of trauma was very low. This difference may indicate that less complex trauma requires simple treatment plans compared to more complex traumas (14).

The findings of this study indicated that in general, level of dentists' knowledge about the study in relation to the management of dentoalveolar trauma was low. These findings are consistent with those found in literature (25).

Also the level of willingness of the dentists to treat injuries caused by dentoalveolar trauma was increased after the education. This would represent a significant importance of dentists' training which led to incrased self-confidence and their willingness to learn more about dentoalveolar trauma treatment.

Cost and time is saved and knowledge transfer is also increased using new technologies such as message texting via cell phones. Education through cell phones due to their special characteristics is a subsidiary of e-learning that has demonstrated excellence in education (11), while this method has limitations such as non-cooperation of dentists, lack of interest to get content via message texts, lack of educational opportunity and interest to study or wanting to receive message texts via advertising systems.

After training, the knowledge level of the dentists was increased to an acceptable level. Therefore, holding training courses by groups associated with dentoalveolar trauma, based on clinical protocols is necessary for dentists to keep knowledge about this important issue.

There is a low incidence of dentoalveolar traumas in clinical practice and, as a result, there is little experience on this subject and a low level of knowledge, thus hindering consolidation of this knowledge (19). Therefore, periodical educational wih more time campaigns communicating research-based clinical protocols are essential to keep dentists updated on this important matter.

5. Conclusion

Education about dental trauma for general dentists via showing posters and sendings message texts by cell phone was an effective method with significant results.

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