



Effect of Two Educational Interventions Regarding the Management of Traumatic Dental Injuries on Mothers of 8-Year-Old Children

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ABSTRACT

Objectives: This study evaluated the effect of two educational interventions on knowledge and self-reported practice of mothers of 8-year-old children regarding emergency management of traumatic dental injuries (TDIs).

Materials and Methods: Six public elementary schools (girls and boys) in Tehran were randomly selected. The mothers of 8-year-old students at each school were randomly assigned to three groups: intervention by poster, intervention by pamphlet, and control. An anonymous valid and reliable questionnaire, including demographics, previous experience on TDIs, mothers' knowledge, and self-reported practice about emergency management of TDIs was provided to the mothers. After collecting the questionnaires, educational interventions by poster and pamphlet with similar contents regarding step-by-step emergency management of TDIs were performed for the target groups. Three months after the interventions, the same questionnaire was completed by the mothers. The results of pre-test and post-test were compared.

Results: Totally, 201 mothers participated in this study. The mean knowledge score significantly increased in the pamphlet group ($P < 0.05$) after the intervention, while this change was not significant in the poster and control groups ($P > 0.05$). The mean knowledge score was significantly higher in the pamphlet than the poster group ($P = 0.009$). The mean self-reported practice score significantly increased after the intervention in both intervention groups ($P < 0.05$) but not in the control group. There was no significant difference in the mean self-reported practice score between the two intervention groups ($P > 0.05$).

Conclusion: Both pamphlet and poster were equally effective in improving the self-reported practice of mothers regarding TDIs, which highlights the significance of educating mothers.

Keywords: Wounds and Injuries; Knowledge; Tooth; Child; Education

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INTRODUCTION

Facial trauma occurs frequently, and

accounts for 5% of all injuries for which individuals seek treatment. Among all facial

injuries, traumatic dental injuries (TDIs) are the most common [1,2]. These types of injuries are more prevalent in high-risk populations, including children [3]. Studies have shown that about 20% of elementary school children have a history of TDIs [4,5]. Facial trauma leading to fracture, displacement or loss of teeth can cause significant negative physiological, esthetic, and psychological impacts on children [1,4-7]. About 16% of TDIs lead to tooth loss, causing changes in the child's facial development and leading to emotional and psychological consequences and other complications [5]. Therefore, TDIs are one of the major public health concerns that can affect daily performance and quality of life of children [8-10].

If the community is well aware of prompt emergency care in case of a TDI, the prognosis would be more favorable. The best treatment outcomes are achieved when the damaged teeth are immediately and appropriately examined and treated [4,5,9,11]. Therefore, proper timely management of TDIs is related to the knowledge of laypeople that are usually present at the scene [3,5,11].

Various studies have shown inadequate knowledge about proper management of TDIs in different population groups such as parents [4,12], elementary school teachers [13,14], and physical education teachers [15,16]. For instance, Hegde et al. [4] found that knowledge of mothers in Mangalore, India, regarding TDIs was poor. Similarly, in Brazil, Cosme-Silva et al. [12] showed that parents of public school students had limited and insufficient knowledge about the proper management of dental trauma. Moreover, two different studies conducted in Greece [13] and Saudi Arabia [14] on schoolteachers found unsatisfactory knowledge level about the management of TDIs. Furthermore, studies from Southampton, UK [15], and Hong Kong [16] showed similar results on management of TDIs among physical education teachers. All these studies emphasize on supervision of children, and education of parents and caregivers. The abovementioned studies also highlight the

need for education regarding proper and timely management of TDIs for the people who are commonly present at the site of accidents and those responsible for the care of children, such as parents and teachers [4,6,17,18]. According to a 12-year review on the epidemiology of TDIs by Glendor [10], a large part of the educational process of professionals and lay caregivers on management of TDI was unsuccessful; he called for further investigations in this educational field. Since about 41% of TDIs in children occur at home, and parents are the primary available source for prompt management, the final prognosis of a damaged tooth mainly depends on the knowledge level of the parents, especially mothers due to their important role in children's life [5,7-9,19]. However, various studies have shown that the knowledge of lay people, including parents, about dental injuries is inadequate [7,9,10]. Previous studies in Iran have also shown similar findings [20,21].

Knowledge about the immediate management of TDIs is valuable to improve the prognosis of traumatized teeth. Educational interventions by means of health education media have been used to raise awareness and change the attitude and behavior of the public [22]. Pamphlets and posters, as printed materials in education and health promotion programs, provide information on different levels of health prevention and can raise attention to the subject. The print media are easy to use and useful in many locations. Also, they can be easily prepared. The effectiveness of different print media, such as pamphlet and poster, has been investigated and it was found that they would be valuable tools to convey important basic information on TDIs [3,17,21,23]. However, there has been no comparison between different types of print media in terms of their impacts on different target groups. The aim of this study was to evaluate the effect of two types of educational interventions, pamphlet and poster as two different types of print media, on the knowledge and self-reported practice of mothers of children aged 8 years regarding emergency management of TDIs.

MATERIALS AND METHODS

Ethics:

Ethical approval was obtained from the Research Ethics Committee of Tehran University of Medical Sciences (code 92-01-69-21055-90353). This longitudinal interventional study was performed on volunteered mothers, and their responses were used anonymously. All the participants were informed about the objectives and protocol of the study, and signed written informed consent forms.

Sampling:

The present interventional study was conducted in public elementary schools of Tehran Municipality District 11. Since the peak incidence of TDIs in permanent dentition is at 8-10 years of age [1, 9, 10] and considering the importance of prevention at an early age, the target group consisted of the mothers of students aged 8 years (second graders).

The sample size was calculated to be 77 participants in each interventional group using Minitab software (Minitab Inc., PA, USA) with a minimum significant difference=1, mean standard deviation=2.1 for knowledge score [3], $\alpha=0.05$, $\beta=0.2$, and a loss to follow-up of 20%.

From a list provided by the Department of Education, we omitted the schools with student number smaller than the required sample size. Then, three girl schools and three boy schools were selected by simple randomization. After contacting the selected schools, the purpose of the study was explained to the authorities and in case of their disagreement for cooperation, the school was replaced with the next one.

The mothers of 8-year-old students at each girl/boy school were assigned to three groups by simple randomization: pamphlet group, poster group, and control group. The intervention was implemented using pamphlet in the first group, and poster in the second group. The third group was considered as the control group. All mothers of the second graders ($n=284$), entered the study by census sampling.

Study methodology and interventions:

After coordination with the authorities of the

elementary schools, a self-administrated valid and reliable questionnaire was provided to the mothers and collected after 1 week.

In the second stage, interventions, including poster and pamphlet with similar contents designed based on the "Save Your Tooth" poster (International Association for Dental Traumatology: IADT 2011) and the latest scientific evidence, were used in the target groups [24,25]. Both the poster and the pamphlet contained information about tooth fracture, luxation, and avulsion, explaining appropriate steps for the management of traumatized teeth.

These materials were written in Farsi and had colorful pictures as well as proper instructional design. In the pamphlet group, a letter explaining the study was attached to the pamphlet for the mothers. Students took both the pamphlet and an attached letter to their mothers at home. In the poster group, a meeting was held, and a brief explanation was provided about the purpose of the study and the need for mothers' attention to the poster. After the end of the session, the poster was placed at the entrance and exit of the elementary school for 1 month in a way that it could be seen by the mothers. Three months after the intervention, the same questionnaire was completed by the mothers. The control group did not receive any intervention during the 3-month period; however, at the end of the 3 months, they received an educational pamphlet about dental trauma management. After assessing the answers to knowledge and self-reported practice questions, the answers were scored, and the data were statistically analyzed to compare the results of pre-test and post-test.

Questionnaire:

The mothers were requested to fill out an anonymous questionnaire before and 3 months after the intervention. In addition to demographic data (age, educational level, and occupational status of both parents, mother's age, child's gender, and two questions about the financial status) and previous history of TDIs, the questionnaire included the following items:

Knowledge

The mothers were asked to answer eight questions regarding the emergency management of TDIs using multiple-choice, or “yes”, “no”, and “I do not know” answers. One question had two correct answers. A score of 0 was given to false or “I do not know” answers and each correct answer was scored 1. By summing up the scores of eight questions, the knowledge score of each mother was calculated (range: 0 to 9).

Self-reported practice:

In this part, four paper cases of TDIs were presented to the mothers. Each case represented a patient with a certain TDI. The cases were almost similar to the content of the pamphlet and poster. One question had three correct answers. Based on the mothers’ answers, the score of self-reported practice (could range from 0 to 7) was calculated as described above. The mothers were requested to write a unique code on the top of their both questionnaires. This code was used to assess the changes after the intervention, compared with before.

In terms of face and content validity of the questionnaire, valid reference books [1,26,27], and similar previous studies [3,23] were used to design the questions. After forward and backward translation by a bilingual expert, two experts in the community oral health, one expert in pediatric dentistry, and one epidemiologist assessed the face and content validity of the questionnaire. The reliability of the questionnaire was evaluated and approved through test-retest on 20 mothers of patients referred to the School of Dentistry, Tehran University of Medical Sciences, with an interval of 10 days. The kappa coefficient was above 70% for all questions.

Statistical analysis:

The data were analyzed with SPSS version 22 for Windows (SPSS Inc., Chicago, IL, USA). A linear regression model (backward method) was used for multivariate assessment to control for the effect of confounders by a stepwise method applying automatic selection of independent variables. Repeated measures ANOVA was applied for statistical analysis. In the test, knowledge and self-reported practice before and after the intervention were considered as repeated factors and the type of

intervention as a between-subject factor. Modification of the confounding factors was also carried out as the covariates of the above formula. P values less than 0.05 were considered significant.

RESULTS

Of 284 mothers that were enrolled in the study (poster=84, pamphlet=114, control=86), a total of 201 filled out and returned the questionnaires after 3 months (poster=59, pamphlet=83, control=59).

Demographics:

The mean age of students, mothers, and fathers was 8.1 ± 0.5 , 35.4 ± 5.3 , and 40.9 ± 5.5 years, respectively. Twenty-four percent of the mothers and 96.1% of the fathers were employees. Moreover, 66.7% of the mothers considered their financial status to be good, and others said they had poor financial status or had no opinion. Also, 44.1% of the mothers and 53.5% of the fathers had academic education, and 50% of the respondents owned a house. In addition, 17.6% of the mothers reported a history of dental trauma in their children. Posters and pamphlets were used by 59 mothers (27% from girl schools, mean maternal age: 35.8 ± 5.7 years), and 83 mothers (46% from girl schools, mean maternal age: 35.6 ± 5.4 years), respectively. There were 59 mothers in the control group (44% from girl schools, mean maternal age: 34.3 ± 5.3 years). As for the correlation between the maternal knowledge score and demographic variables, the results of linear regression analysis revealed that it was associated with the mother’s age ($P=0.04$, $ES=-0.15$) and home ownership status ($P=0.02$, $ES=0.17$). Moreover, the linear regression model showed that the mothers’ scores of self-reported practice regarding the emergency management of TDIs was associated with the maternal educational level ($P=0.01$, $ES=0.21$), and home ownership ($P=0.02$, $ES=-0.17$).

Outcome of interventions:

Table 1 presents the percentage of favorable answers to knowledge questions before and after the intervention in the three groups. The greatest change in knowledge was related to two questions: “the possibility of re-

attachment of broken segment of a fractured tooth" (8% in the poster group and 33% in the pamphlet group), and "the necessity of replantation of an avulsed permanent tooth" (8% in the poster group and 33% in the pamphlet group) (Table 1). The percentage of favorable answers to self-reported practice questions before and after the interventions in the three groups is shown in Table 2.

The greatest change in self-reported practice was related to "proper action in case of tooth avulsion" (12%) in the pamphlet group and "proper action in case of crown fracture" (8%) in the poster group (Table 2).

Table 3 demonstrates the mean knowledge

and self-reported practice scores of the study groups with 95% confidence interval. The mean knowledge score significantly increased after the intervention in the pamphlet group. However, the change in the knowledge score was not significant in the poster and control groups. After the intervention, the mean score of knowledge was significantly higher in the pamphlet group than the poster group ($P=0.009$) and control group ($P=0.000$). There was no significant difference between the poster and control groups in this regard ($P=0.62$). Knowledge change in the pamphlet group was significantly correlated with the maternal age ($P=0.04$, $\beta=-0.27$).

Table 1. Distribution of favorable answers to knowledge questions before and after the intervention in the three groups of poster, pamphlet, and control (n=201)

	Before the intervention N (%)			After the intervention N (%)		
	Poster (N=59)	Pamphlet (N=83)	Control (N=59)	Poster (N=59)	Pamphlet (N=83)	Control (N=59)
If a tooth is broken, can the broken part be reattached? <i>Answer: Yes</i>	12 (20.3)	14 (16.9)	17 (28.8)	20 (33.9)	47 (56.6)	14 (23.7)
Can a knocked out primary tooth be replaced? <i>Answer: No</i>	35 (59.3)	49 (59.0)	35 (59.3)	23 (39.0)	36 (43.4)	30 (50.8)
Can a knocked out permanent tooth be replaced? <i>Answer: Yes</i>	18 (30.5)	27 (32.5)	20 (33.9)	26 (44.1)	59 (71.1)	21 (35.6)
Where is the first place you would take your child after dental trauma? <i>Answer: Dental office</i>	42 (71.2)	72 (86.7)	51 (86.4)	42 (71.2)	71 (85.5)	52 (88.1)
When is the best time for replantation of a knocked out tooth? <i>Answer: Less than 30 min</i>	22 (37.3)	32 (38.5)	20 (33.9)	28 (47.5)	55 (41.0)	21 (35.6)
What is the best way to clean a knocked-out tooth before replanting it? <i>Answer: By using water</i>	9 (51.3)	5 (6.0)	2 (3.4)	8 (13.6)	7 (8.4)	2 (3.4)
How would you carry the knocked out tooth to a dentist? <i>Answer: In milk/Child's mouth</i>	13 (22.0)	16 (19.3)	14 (23.7)	19 (32.2)	43 (51.8)	14 (23.7)
What would you do if the tooth is displaced from its position in the mouth? <i>Answer: I would replace the tooth</i>	13 (22.0)	19 (22.9)	13 (22.0)	20 (33.9)	33 (39.8)	15 (25.4)

Table 2. Distribution of favorable answers to self-reported practice questions before and after the interventions in the three groups of poster, pamphlet, and control (n=201)

	Before the intervention N (%)			After the intervention N (%)		
	Poster (N=59)	Pamphlet (N=83)	Control (N=59)	Poster (N=59)	Pamphlet (N=83)	Control (N=59)
<p>Case 1: Your 9-year-old daughter falls on the ground while playing and her upper incisor is fractured. There are no other injuries. What is the first thing that you would do?</p> <p>Answer: I will find the fragment and immediately take the child to a dentist</p>	39 (66.1)	65 (78.3)	47 (79.7)	47 (79.7)	72 (86.7)	47 (79.7)
<p>Case 2: Your 12-year-old son fall on the ground while playing football. His mouth is covered with blood and his upper incisor is missing. He has no other injuries. What is the best action that you would take?</p> <p>Answer: I will find the tooth immediately, I will wash the tooth and replant it in the bone and take the child to a dentist/I will find the tooth immediately, store it in a fluid and take the child to the nearest dentist/I will find the tooth and give it to the child to store it in his mouth and take him to the nearest dentist</p>	41 (69.5)	61 (73.5)	36 (61.0)	47 (79.7)	73 (88.0)	34 (57.6)
<p>Case 3: A 10-year-old child falls on the ground while playing and loses his consciousness. What is the first action that you would take in this condition?</p> <p>Answer: I will take the child to a hospital immediately</p>	53 (89.8)	79 (95.2)	49 (83.1)	52 (88.1)	76 (91.6)	52 (88.1)
<p>Case 4: Your 10-year-old child is hit by another child while playing and when you look into his mouth you understand that one of his incisors is displaced inward. He has no other injuries. What would you do in this condition?</p> <p>Answer: I won't touch the tooth and I would take him to a dentist immediately</p>	47 (79.7)	61 (73.5)	42 (71.2)	37 (62.7)	37 (62.7)	41 (69.5)

The mean score of self-reported practice in both pamphlet and poster groups significantly increased after the intervention, compared with the control group ($P < 0.05$); however, the difference between the intervention groups was not significant ($P > 0.05$). There was no significant relationship between

the self-reported practice changes and demographic variables in the study groups ($P > 0.05$). The Pearson's correlation coefficient showed a significant positive association between the knowledge and self-reported practice in emergency management of TDIs ($P < 0.001$).

Table 3. Mean±standard deviation (SD) knowledge score of the study groups (pamphlet, poster, and control) with 95% confidence interval (poster and pamphlet) and the control group

		Before	After	Difference	95% Confidence Interval for Mean	
		(Mean±SD)	(Mean±SD)	(Mean±SD)	Lower Bound	Upper Bound
Knowledge	Pamphlet	2.8±1.5	4.2±1.8	1.4±2.1	0.95	1.9
	Poster	2.8±1.8	3.1±1.9	0.3±2.1	-0.2	0.9
	Control	2.9±1.9	2.8±1.7	-0.05±1.5	-0.4	0.3
Self-reported practice	Pamphlet	4.3±0.9	4.4±1.0	0.16±1.2	-0.1	0.4
	Poster	3.9±1.3	4.2±1.2	0.3±1.2	-0.02	0.6
	Control	3.8±1.3	3.9±1.1	0.0±1.0	-0.2	0.2

DISCUSSION

In this interventional study, we evaluated the effect of two educational interventions on the knowledge and self-reported practice of mothers of 8-year-old children regarding emergency management of TDIs. The results showed that a simple pamphlet significantly improved the mothers' knowledge more than a poster. Moreover, both interventional methods increased self-reported practice of the mothers at the 3-month follow-up when compared with the control group. However, there was no significant difference in the self-reported practice between the two intervention groups. There are numerous educational methods, and each one has a recognized impact on a certain area of knowledge, attitude and practice. The results of the present study showed that pamphlet had a higher efficacy for knowledge enhancement than poster. Al-Asfour and Andersson [3] reported improved parental knowledge about dental avulsion and replantation after receiving an informative leaflet in Kuwait. They introduced the leaflet as a valuable tool for delivering important basic information and enhancing knowledge and practice of the parents about tooth avulsion. In another study, Iskander et al. [23] investigated the effectiveness of the IADT poster and IADT first-aid mobile application as tools for delivering information on TDIs. They reported that both tools were effective in improving dental trauma information [23]. The results of the present study indicated the positive effect of the pamphlet on improving the knowledge of mothers about emergency management of TDIs and confirmed the effectiveness of these media as educational tools for providing information for the

community. The information provided through pamphlets should be visually attractive. Furthermore, in terms of educational content, it should be brief and concise and include basic information. Using pamphlets and posters would be effective methods to convey information to the community. Although the educational content of the poster was completely consistent with the pamphlet, it did not improve the mothers' knowledge about TDIs, which may be due to accessibility and repeatability of the pamphlet. To ensure that all mothers viewed the poster, we thought of some solutions such as installing the poster at a meeting with mothers, asking mothers to read the poster at the beginning of the session, and installing the poster inside the school after the session where mothers could see it. Furthermore, it should be mentioned that in the present study, although the knowledge of the mothers significantly improved in the pamphlet group, it was still far from a sufficient level.

In this study, we assessed the self-reported practice of mothers in managing four TDI scenarios. Both the poster and pamphlet improved the mothers' practice as compared with the control group, and there was no significant difference between the two interventional groups. Since one of the main criteria in designing an effective pamphlet in health education is to provide a practical guide for the subject [22], this goal was achieved through both interventions in this study. Decisions on the use of different types of print media may also be related to the context and facilities available as well as budget which seems to be higher when applying a pamphlet as an educational tool. However, posters and

pamphlets, as educational tools, do not provide detailed information, only the most basic [22]. TDIs are not perceived as a disease and are not considered as life threatening conditions. Additionally, people are simply too anxious to treat TDIs even if they know what to do [28]. All these reasons lead to the fact that education alone cannot provide a satisfactory level of experience in dealing with dental trauma for caregivers [28]. In a study by de Lourdes Vieira Frujeri and Costa [29], although there was a significant increase in the knowledge level of the study groups after lecture intervention, a relatively high proportion of participants stated that they were not able to replant avulsed teeth. Therefore, the researchers emphasized on the need for providing continuous training courses to strengthen the technical skills of the participants in this field. The data collection tool in the present study was a questionnaire that was adopted from previously designed valid and reliable questionnaires [3,17], and valid reference books [1,25,27]. The questionnaire was tested for validity and reliability. The content of some knowledge and self-reported practice questions was similar, but the proportion of correct answers in knowledge questions was lower. This calls for further refinement of the questionnaire in future studies. Moreover, self-administered questionnaires are an easy way to collect data, and all questionnaires were sent to mothers in a closed package and received in the same way. However, as a limitation of the study, a limited number of participants failed to answer some questions. Finally, it is necessary to note that in the present study, we assessed the self-reported practice of the mothers, which may not reflect the actual performance of a person in managing real TDIs. Therefore, it is suggested to use other evaluation methods for more accurate evaluation of practice.

CONCLUSION

The results of this study showed that pamphlets are a useful tool for enhancing the mothers' knowledge level about the management of TDIs. However, both pamphlets and posters equally improved the

mothers' self-reported practice in emergency management of TDIs.

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CONFLICT OF INTEREST STATEMENT

None declared.

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