Dental Traumatology

Dental Traumatology 2012; **28**: 101–107; doi: 10.1111/j.1600-9657.2011.01042.x

Knowledge level of primary school teachers regarding traumatic dental injuries and their emergency management before and after receiving an informative leaflet

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Accepted 8 June, 2011

Abstract – *Aim*: The aim of this study was to evaluate via a questionnaire the knowledge level of primary school teachers in Ankara, Turkey, regarding dental trauma; to inform them on the subject through a leaflet; and to evaluate the effectiveness of the leaflet by reapplying the questionnaire. *Materials and methods*: A questionnaire was distributed to 500 teachers in seven randomly selected primary schools. The questionnaire consisted of four different scenarios presented with photographs and a total of eight questions on crown fracture, lateral luxation, root fracture, and avulsion. After responding to the questionnaire, teachers were given a leaflet containing information about traumatic dental injuries and their emergency management. After 1 month, the same questionnaire was distributed, and the responses collected. *Results*: A total of 450 of 500 teachers responded to the questionnaire. Initial responses indicated the knowledge level of teachers to be quite low. Following the distribution of the information leaflet, the rate of correct answers increased for each of the individual questions, and the total scores for the questionnaire increased significantly ($P = 0.0001$). *Conclusion*: There is a clear need to inform teachers about traumatic dental injuries. The use of educational leaflets can be a successful and appropriate means of providing teachers with information.

Traumatic dental injuries remain a common problem worldwide, with more than 20% of school-aged children reported to have been affected by dental trauma (1–4). For some types of traumatic injuries, prognosis is highly dependent upon proper emergency management immediately after the traumatic incident as well as timely attention by a professional. Previous reports indicate that the majority of traumatic dental injuries occur at school (3–5) and highlight the importance of school staff, who are most often required to respond initially to the traumatic incident. However, recent reports have shown that teachers have little knowledge about dental trauma and its emergency management (6–15).

In Turkey, previous studies have reported that more than 30% of dental injuries occur in a school or on a school playground and that most patients do not visit a dentist in a timely manner following traumatic injury (16, 17). Despite the importance of the subject, only one published study (18) has been carried out in Turkey that examines teachers' knowledge about traumatic injuries and their emergency management. Therefore, this study aimed to evaluate via a questionnaire the knowledge level of school teachers in Ankara, Turkey, regarding dental trauma, to inform them about the subject through a leaflet, and to evaluate the effectiveness of the leaflet by implementing the questionnaire a second time.

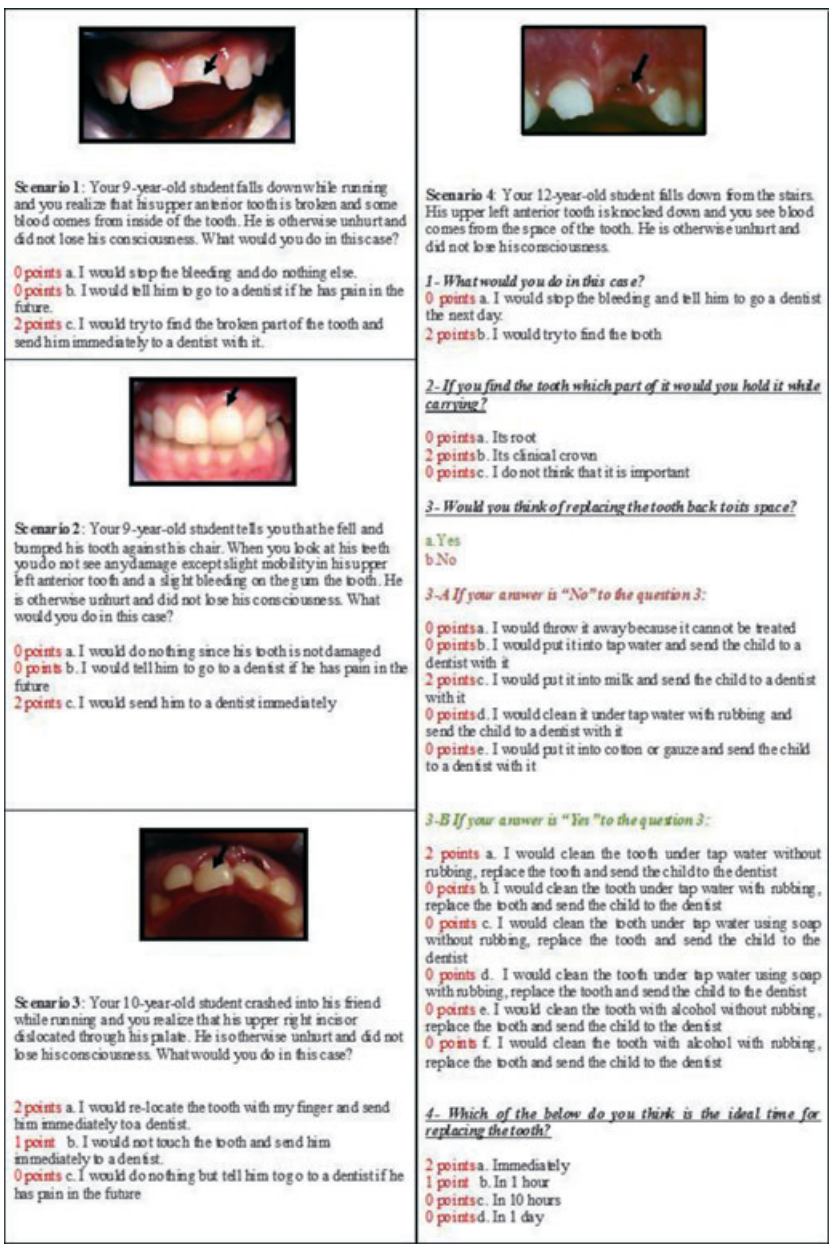
Materials and methods

Three municipalities with different socioeconomic characteristics (high, average, and low) were selected at the beginning of the study. From each of these municipalities, two schools were selected using simple random sampling. Because the number of teachers at the schools from the low socioeconomic group (Altındağ) was far lower (71 teachers) than the number of teachers at the schools from the high (162 teachers) and the average (172 teachers) socioeconomic groups, a third school from the low socioeconomic group was included in the study. Accordingly, the study population consisted of all teachers ($n = 500$) in seven primary schools from three different municipalities (Çankaya, Yenimahalle, and Altındağ) with different socioeconomic characteristics in Ankara, Turkey. Teachers were asked to respond to a two-part questionnaire, part one of which consisted of demographic information and part two of which consisted of four scenarios and a total of eight questions on crown fracture (one question), lateral luxation (one

question), root fracture (one question), and avulsion (five questions). Photographs accompanied each of the scenarios to make them easier to understand. Questions were scored as follows: 'Ideal response': 2 points; 'Acceptable response': 1 point; 'Incorrect response': 0 points. Figure 1 shows the questions, ideal answers, and scores for each answer on an English translation of part two of the questionnaire.

After receiving the completed questionnaires, a leaflet prepared and printed by Ankara University containing photographs and information about lateral luxations, crown fractures, root fractures, and avulsions of permanent teeth and their emergency management was distributed to teachers (Fig. 2a,b). One month later, the original questionnaire was again implemented with the same teachers.

Wilcoxon's signed-rank test was used to compare the total scores before and after distribution of the leaflets, and the chi-square test was used to compare the percentage of correct answers before and after the leaflet for individual questions. As the questionnaire data did not follow a normal distribution, Mann–Whitney *U* tests were used to identify correlations between questionnaire scores and sex as well as questionnaire scores and previous experience with traumatic dental injury, whereas Kruskal–Wallis *H* tests were used to identify correlations between scores and age and work experience.



Scenario 1: Your 9-year-old student falls down while running and you realize that his upper anterior tooth is broken and some blood comes from inside of the tooth. He is otherwise unhurt and did not lose his consciousness. What would you do in this case?

0 points a. I would stop the bleeding and do nothing else.
0 points b. I would tell him to go to a dentist if he has pain in the future.
2 points c. I would try to find the broken part of the tooth and send him immediately to a dentist with it.

Scenario 2: Your 9-year-old student tells you that he fell and bumped his tooth against his chair. When you look at his teeth you do not see any damage except slight mobility in his upper left anterior tooth and a slight bleeding on the gum the tooth. He is otherwise unhurt and did not lose his consciousness. What would you do in this case?

0 points a. I would do nothing since his tooth is not damaged
0 points b. I would tell him to go to a dentist if he has pain in the future
2 points c. I would send him to a dentist immediately

Scenario 3: Your 10-year-old student crashed into his friend while running and you realize that his upper right incisor dislocated through his palate. He is otherwise unhurt and did not lose his consciousness. What would you do in this case?

2 points a. I would re-locate the tooth with my finger and send him immediately to a dentist.
1 point b. I would not touch the tooth and send him immediately to a dentist.
0 points c. I would do nothing but tell him to go to a dentist if he has pain in the future

Scenario 4: Your 12-year-old student falls down from the stairs. His upper left anterior tooth is knocked down and you see blood comes from the space of the tooth. He is otherwise unhurt and did not lose his consciousness.

1- What would you do in this case?
0 points a. I would stop the bleeding and tell him to go a dentist the next day.
2 points b. I would try to find the tooth

2- If you find the tooth which part of it would you hold it while carrying?

0 points a. Its root
2 points b. Its clinical crown
0 points c. I do not think that it is important

3- Would you think of replacing the tooth back to its space?

a. Yes
b. No

3-A If your answer is "No" to the question 3:

0 points a. I would throw it away because it cannot be treated
0 points b. I would put it into tap water and send the child to a dentist with it
2 points c. I would put it into milk and send the child to a dentist with it
0 points d. I would clean it under tap water with rubbing and send the child to a dentist with it
0 points e. I would put it into cotton or gauze and send the child to a dentist with it

3-B If your answer is "Yes" to the question 3:

2 points a. I would clean the tooth under tap water without rubbing, replace the tooth and send the child to the dentist
0 points b. I would clean the tooth under tap water with rubbing, replace the tooth and send the child to the dentist
0 points c. I would clean the tooth under tap water using soap without rubbing, replace the tooth and send the child to the dentist
0 points d. I would clean the tooth under tap water using soap with rubbing, replace the tooth and send the child to the dentist
0 points e. I would clean the tooth with alcohol without rubbing, replace the tooth and send the child to the dentist
0 points f. I would clean the tooth with alcohol with rubbing, replace the tooth and send the child to the dentist

4- Which of the below do you think is the ideal time for replacing the tooth?

2 points a. Immediately
1 point b. In 1 hour
0 points c. In 10 hours
0 points d. In 1 day

Fig. 1. The questions, ideal answers, and scores given for the answers of the second part as translated into English.

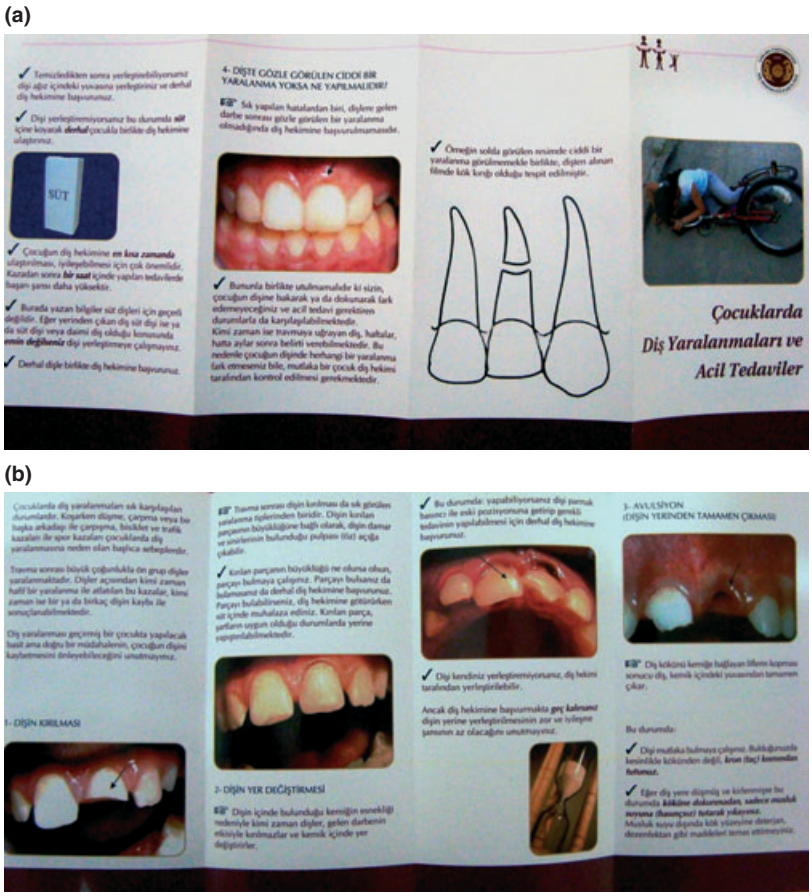


Fig. 2. (a) A sample of the leaflet that was given to the teachers (A side). (b) B side of the leaflet that was given to the teachers.

Results

A total of 450 of 500 teachers (90%) responded to the questionnaire. The majority of these (82.6%) had been teaching for more than 10 years. Also, 39.1% of teachers had encountered dental trauma before, and of these, more than half (53.4%) had encountered dental trauma among their students. However, only 7.6% had previously received information about dental trauma (Table 1).

Questionnaire scores for teachers after distribution of the information leaflet increased significantly ($P = 0.0001$) (Table 2). Scores did not differ significantly according to years of teaching experience ($P = 0.181$). Prior to distribution of the leaflet, male teachers scored significantly lower than female teachers ($P = 0.008$); however, following distribution of the leaflet, a significant difference between male and female teachers was no longer observable ($P = 0.403$) (Table 3). Similarly, although teachers who had previously encountered traumatic dental injuries had significantly higher scores than those who had not ($P < 0.0001$) before distribution of the leaflet, this difference disappeared after the distribution of the leaflet ($P = 0.786$) (Table 4).

Table 1. Results of the first part of the questionnaire, showing the demographic characteristics and previous trauma experience of the teachers

	n	%
Gender		
Male	164	36.4
Female	286	63.6
Total	450	100.0
How many years have you been working as a teacher?		
<10	78	17.3
10–15	110	24.4
>15	262	58.2
Total	450	100.0
Have you ever received information about dental trauma?		
Yes	34	7.6
No	416	92.4
Total	450	100.0
Have you ever encountered a dental trauma in a child?		
Yes	176	39.1
No	274	60.9
Total	450	100.0
If yes, the injured child was		
Your son/daughter	49	27.8
Neighbor	8	4.5
Your student	94	53.4
Other	25	14.2
Total	176	100.0

Scenario 1: Complicated crown fracture in a 9-year-old student

When asked how they would respond to the injury presented in Scenario 1, the percent of teachers who

Table 2. The scores of the teachers before and after the leaflet

					Wilcoxon signed-rank test	
	n	Mean	Minimum	Maximum	Standard deviation	*Z*	*P*
Scores (before)	450	5.8	0.0	13.0	3.3	−17.01	0.0001
Scores (after)	450	10.3	3.0	14.0	2.3		

Table 3. The difference between males and females before and after receiving the leaflet

				Mann–Whitney *U*	
Gender	*n*	Mean	SD	*U*	*P*
Scores before the leaflet					
Male	164	5.3	3.3	19 947	0.008
Female	286	6.1	3.3		
Scores after the leaflet					
Male	164	10.2	2.2	22 353	0.403
Female	286	10.3	2.4		

stated they would try to find the broken part of the tooth and send the child to a dentist immediately (the only correct option among the answers) increased significantly from 55.3% before the leaflet distribution to 73.6% after the leaflet distribution ($P < 0.0001$).

Scenario 2: Injury in a 9-year-old student

When asked how they would respond to the injury presented in Scenario 2, the percent of teachers who stated they would send the child to a dentist immediately (the only correct option among the answers) increased significantly from 54.7% before the leaflet distribution to 70.7% after the leaflet distribution ($P < 0.0001$).

Scenario 3: Lateral luxation in a 10-year-old student

There were two correct answers for this question. 'I would re-locate the tooth with my finger and send him immediately to a dentist' was the ideal answer; however, answer 'b', which was 'I would not touch the tooth and send him immediately to a dentist', was also considered a correct answer. However, these two choices had different result during the calculation of the total score, as seen in the Fig. 1. The percentage of the ideal answers (choice a) increased to 55.6% after the leaflet, while it was only 7.6% before the leaflet. The difference was statistically significant ($P < 0.0001$).

Scenario 4: Avulsion in a 12-year-old student

This scenario included five questions about avulsion. (Participants provided responses to four of the five questions, skipping to Question 3-A or 3-B, depending upon their response to Question 2.) When asked how they would respond to the situation presented in the scenario, before the leaflet distribution, 37.1% of teachers stated they would try to find the missing tooth (the only correct option among the answers). Following leaflet distribution, the percentage of correct answers rose significantly to 80% ($P < 0.0001$). When asked how they would retrieve the missing tooth if it were found, before the leaflet distribution, 53.8% of teachers stated that they would pick up the tooth by its crown (the only correct option among the answers). Following leaflet distribution, the percentage of correct answers rose significantly to 82.4% ($P < 0.0001$).

Before the informative leaflet, only 10% of teachers correctly identified the appropriate storage media (milk), whereas 56.4% chose cotton or gauze, and 20% said they would throw the tooth away because they did not think it could be treated. Following leaflet distribution, 86.6% of teachers were able to identify milk as the appropriate storage media, and the percentage of teachers who thought the tooth should be thrown away decreased to 1.4%.

Whereas 92.4% of teachers initially said they would not replace the tooth in its socket, this percentage rose to 96% after the leaflet was distributed. When asked about the ideal time to replace the tooth, before the leaflet, 26.2% of teachers said 'immediately' (the ideal answer) and 14.7% said '1 hour later' (an acceptable answer). Both of the answers were considered correct; however, the score given for the first answer was higher (Fig. 1). Following leaflet distribution, the percentage of ideal answers rose to 47.1%, whereas the percentage of acceptable answers decreased to 13.6%.

Discussion

The prognosis of injured teeth in a traumatic event may in some cases depend upon proper emergency management and immediate professional treatment. The prog-

Table 4. The difference between teachers before and after receiving leaflet

				Mann–Whitney *U*	
Have you ever received information about dental trauma?	*n*	Mean score	SD	*U*	*P*
Scores before the leaflet					
Yes	34	8.1	3.2	4111	0.0001
No	416	5.6	3.2		
Scores after the leaflet					
Yes	34	11.0	2.5	5573.5	0.038
No	416	10.2	2.3		

nosis of avulsive injury, for instance, depends upon immediate replantation of the tooth in the alveolar socket or storage of the tooth in an appropriate medium and rapid transportation of the child and the tooth to a dentist (19–21). Failure to employ proper emergency management or seek professional assistance in a timely manner can result in undesirable consequences such as more time-consuming and costly treatment and the loss of one or more teeth. Not only can the loss of a tooth affect a child's dental development (22), it can also have a negative psychosocial effect on the child, especially because teeth lost because of trauma are usually anterior teeth (23). To ensure proper management of trauma cases and minimize complications, it is of utmost importance that those individuals who are most likely to be near the site of a traumatic injury and have primary responsibility for caring for the injured child (i.e. teachers and parents) are informed about appropriate emergency management of traumatic dental injuries.

A number of studies have evaluated the knowledge level of schoolteachers with respect to dental trauma and its emergency management (6–15, 24–27). These studies indicate that teachers have a very low level of knowledge about such cases. Only one study on this subject has been conducted with Turkish schoolteachers, namely a study comparing the knowledge of teachers in Istanbul and Porto (Portugal) regarding traumatic dental injury (18); therefore, this study aimed to further evaluate both the level of knowledge of teachers in Turkey and the effectiveness of an informative leaflet designed to increase this level of knowledge.

The results of this study showed that the knowledge level of primary school teachers in Ankara is quite low, which is in line with previous studies carried out in other countries (6–15, 24–27).

The response rate to the questionnaire was high (90%). Most of the respondents were experienced teachers with more than 10 years of teaching experience (82.6%), and approximately 20% of all respondents stated that they had previously encountered traumatic dental injuries among their students.

Before the distribution of the leaflet, teachers who had experience with traumatic dental injuries had significantly higher scores than those who had no experience with such injuries. This finding may be due to an increase in awareness after having encountered such an incident. Although this study did not investigate how teachers managed previous trauma cases, it is likely that during their first encounter with a traumatic experience, their actions were also inappropriate, considering the low scores of their colleagues who had no experience with a traumatic injury. These low total scores are unsurprising, given that only 7.6% of teachers reported having received information about emergency management of dental trauma prior to the distribution of the leaflet in the present study (Table 5). Moreover, after the distribution of the leaflet, the difference in total scores between teachers who had encountered a traumatic dental injury and those who had not was eliminated, indicating the importance of informing the public about such injuries (Table 4).

The findings of this study clearly indicate that further effort is needed to raise the level of awareness among teachers regarding the emergency management of traumatic dental injuries. A number of methods can be used for this purpose, including posters, leaflets, and lectures. In addition, the Internet, which is rapidly becoming a common source of information, may represent another promising avenue for enlightening both teachers and parents about dental trauma. (One good source accessible through the Internet is the web site belonging to the International Association of Dental Traumatology, http://www.iadt-dentaltrauma.org.)

Previous studies have employed various informative tools, including posters, leaflets, and lectures with brief discussion sessions (7, 10, 26); however, no ideal method for disseminating information has been identified, and no study has been designed to compare the success of these different methods. The present study utilized leaflets as a fast and inexpensive means of informing large numbers of people about a subject. The difference observed in questionnaire scores before and after distribution of the leaflet indicates this method to be successful. However, a long-term study is required to evaluate the long-term effectiveness of this method.

Increases in the rates of correct responses for all questions indicate that teacher knowledge improved on all the topics covered in the questionnaire following distribution of the leaflet (Figs 3 and 4). In Scenario 2, for example, the significant increase in correct responses after receiving the leaflet indicated that more teachers had become aware of the need for immediate dental attention following a traumatic incident, regardless of whether or not a serious dental injury is apparent. (It should be noted that teachers were not expected to recognize mobility and bleeding inside the gingival pocket as indicative of a root fracture or a subluxation injury, because this can only be diagnosed through radiographic examination by a dental professional.)

Table 5. The difference between teachers with and without previous trauma information, before and after the leaflet

				Mann–Whitney *U*	
Have you ever encountered a dental trauma in a child?	*n*	Mean	SD	*U*	*P*
Scores before the leaflet					
Yes	176	6.6	3.4	18 759.5	0.0001
No	274	5.3	3.1		
Scores after the leaflet					
Yes	176	10.3	2.3	23 749.5	0.786
No	274	10.3	2.3		

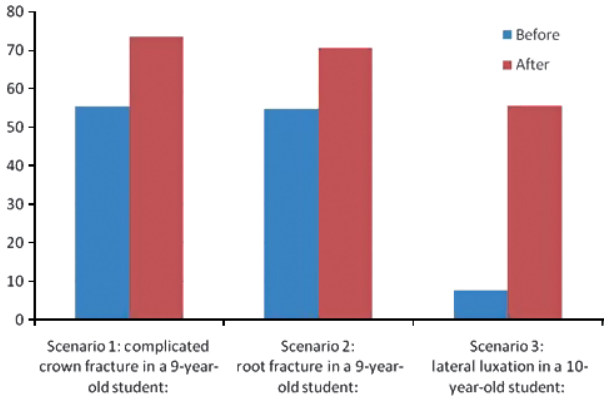


Fig. 3. Percentage of the ideal answers for the first three scenarios before and after the leaflet.

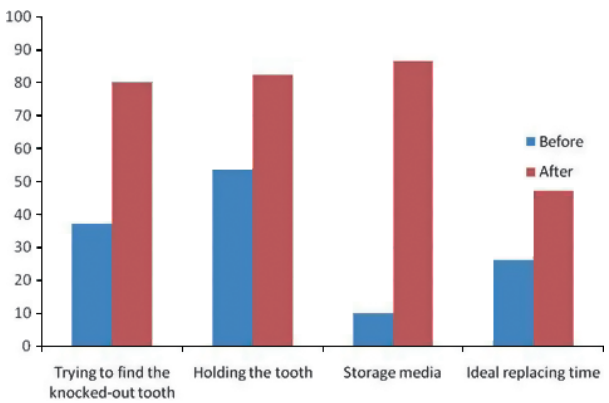


Fig. 4. Percentage of the ideal answers for avulsions before and after the leaflet.

The questionnaire was also designed with the understanding that a non-professional might be hesitant to relocate a luxated or avulsed tooth; therefore, Scenario 3 included more than one correct response among the answers, and Scenario 4 included skip options based on the participant's response to an earlier question. The appropriateness of this design was affirmed by the study findings that showed that even after receiving information on the emergency management of traumatic dental injuries, while 55.6% of teachers said they would reposition a laterally luxated tooth, 39.8% said they would send the child to a dentist without touching the tooth. Similarly, 96% said they would not replant an avulsed tooth; rather, most would choose to store the tooth in the proper media and send the child to a dentist.

Given the damage that may result from the replantation of a primary tooth, it is important that efforts to raise awareness about management of traumatic dental injury include a clear description of the difference between permanent and primary dentition. Our leaflet stressed that the information it provided was intended for use with permanent dentition only and that in cases where it was unclear whether an injured tooth was permanent or primary, the appropriate response was to place the tooth in a storage medium without any other intervention and refer the child to a dentist immediately.

Conclusion

Primary school teachers in Ankara, Turkey, have a low level of knowledge regarding traumatic dental injuries and need to be more informed on this topic. Our study found educational leaflets to be a successful and appropriate way of informing teachers about traumatic dental injuries; however, further studies are needed to evaluate the long-term effectiveness of such leaflets.

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