



## Effect of an Educational Pamphlet on Knowledge and Performance of Fitness Trainers about Traumatic Dental Injuries

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### ABSTRACT

**Objectives:** Traumatic dental injuries (TDIs) commonly occur in sport clubs. The knowledge and performance of fitness trainers play an important role in management of such injuries. This study sought to assess the effect of an educational pamphlet on knowledge level and performance of fitness trainers about TDIs in Tehran in 2018.

**Materials and Methods:** In this interventional study, a pamphlet was designed to enhance the knowledge level of fitness trainers. Ninety-five fitness trainers were randomly divided into two groups of intervention and control (n=49 in the control group and n=46 in the interventional group), and were requested to fill out a valid and reliable researcher-designed questionnaire about TDIs before and 1 month after pamphlet distribution. The questionnaire consisted of three domains of demographic information, knowledge questions, and performance questions. The results were analyzed using SPSS 25 via the Chi-square test and repeated measures ANOVA considering the intervention as the between-subject factor.

**Results:** The knowledge score of fitness trainers about TDIs was not adequately high in the intervention or the control group before the intervention. After the intervention, the performance of participants improved in both groups. This increase was significantly greater in the intervention group (P=0.035). There was no significant difference between the two groups in the knowledge domain (P=0.185).

**Conclusion:** Educational pamphlets can effectively enhance the knowledge level of fitness trainers about TDIs. However, the magnitude of this effect was not significant in our study. Future studies are recommended to compare the efficacy of educational pamphlets with other educational tools.

**Keywords:** Child; Injuries; Awareness; Fitness Centers

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### INTRODUCTION

Traumatic dental injuries (TDIs) are a common occurrence especially during the childhood, and can result in loss of all or part

of the tooth structure [1]. TDIs can have a wide range of socio-economic, physiological and psychological consequences in patients, their families, and the society. Schools and sport

clubs are among the places where TDIs are most likely to occur, and trainers and instructors are often the first persons on the scene to take action; thus, their awareness plays a significant role in success of treatment [2, 3]. TDIs begin with the first attempts of children to move, walk, and run, which are caused by inexperience and lack of coordination between their hands and feet. The incidence of TDIs increases with age with a peak during the adolescence period. TDIs more often occur in children when playing in the school yard or during sport activities [4].

According to a previous study, permanent tooth injuries are twice as common in boys than girls, which appear to be due to more active play and exercise as well as more violent games in boys compared with girls [4-6]. Other studies, however, pointed that this difference in prevalence of TDIs between girls and boys has decreased or disappeared in the recent years [7, 8]. A study reported that 34% of boys and 23% of girls experience TDIs at least once by the age of 14 [9]. This may be due to the change in traditional girls' attitudes and their greater participation in sport activities such as soccer and handball, as well as the changes in culture and the available sport facilities for girls [4, 9].

TDIs usually occur in the anterior region of the dental arch and have a major impact on patients' physical and mental health [4]. TDIs more commonly occur between 6- to 12 years of age [10]. In some injuries, early intervention greatly increases the chance of success of the final treatment.

Various studies have assessed the knowledge level of athletes, sport coaches, and other exposed groups about TDIs. According to these studies, the knowledge level of most target groups was inadequate. However, in most studies, the knowledge level improved after educational interventions [11-14].

Since fitness trainers as well as athletes themselves are the first to be exposed to TDIs, they should receive appropriate training to correctly manage emergency situations. This study sought to assess the effect of an educational pamphlet on the knowledge level and performance of fitness trainers about TDIs in Tehran in 2018.

## MATERIALS AND METHODS

This study was approved by the Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.DENTISTRY.REC.1396.4923). In this study, 16 selected sport clubs from five districts of Tehran (in the northern and southern parts) were evaluated. These sport clubs have high risk of TDIs since they offer sport activities such as martial arts, ball sports, swimming, etc., and are located in the eastern, western, and central areas of each district.

A total of 80 sport clubs for males and females were selected by cluster random sampling. In each region, eight sport clubs were selected as the experimental group and eight sport clubs as the control group using the four-block method. In sport clubs, 95 fitness trainers for adolescents volunteered to participate in the study. In the initial phase of the study conducted in November 2018, a questionnaire with 16 questions was designed for this purpose, and its validity and reliability were confirmed [14]. The questionnaire consisted of three domains of demographic information (gender, age, level of education, work experience), knowledge questions, and self-reported performance questions.

The performance of the trainers was evaluated with three questions related to the appropriate action taken in tooth crown fracture, tooth avulsion, and tooth bleeding.

The knowledge of the trainers was evaluated with four questions with the titles of post-accident referral location, optimal time for referral, appropriate action in tooth avulsion, and suitable medium for an avulsed tooth. All questions were multiple choice. The questionnaires were then administered among the participants in both the experimental and control groups. They were requested to fill-out the questionnaires anonymously. The same questionnaires were also administered after the intervention, and the responses before and after the intervention were compared using four-digit codes allocated to each participant.

All questionnaires were completed on the same day, and each participant in the intervention group received an educational pamphlet containing information on how to

manage different types of dental trauma (tooth fracture, tooth avulsion, gingival laceration), the importance of time in taking the appropriate action, and the equipment needed to control the emergencies [4]. The participants were requested to study the pamphlet carefully.

The control group did not receive any educational pamphlet after filling out the questionnaire. This was done to assess the effect of time and other sources of information such as the media on the knowledge level of fitness trainers. After 1 month, the same questionnaires were administered again among both the intervention and control groups.

It should be noted that the fitness trainers in the intervention and control groups were not aware of the timing of the tests, and the researcher showed up with the questionnaires without prior notice (both the first and the second time). At the end of the study, educational pamphlets were given to the control group.

The knowledge and performance domains of the questionnaire were scored according to a previous study and the opinion of the faculty members of the Department of Pediatric Dentistry of Tehran University of Medical Sciences [14]. Score 1 was allocated to correct answers and score 0 was allocated to incorrect answers; then, the sum of scores was calculated. The knowledge score ranged from 0 to 4 and the self-reported performance score ranged from 0 to 3. The data were analyzed using SPSS version 25 via the Chi-square test and repeated measures ANOVA, considering the intervention as the between-subject factor. Statistical significance was considered at  $P < 0.05$ .

## RESULTS

Of 46 participants in the intervention group, 46.1% were females and 53.9% were males.

Of 49 participants in the control group, 33% were females and 67% were males. The mean age of the intervention and control groups was  $28 \pm 0.8$  and  $31 \pm 0.3$  years, respectively. The mean coaching experience of the participants was  $6 \pm 0.4$  years in the

intervention group and  $7 \pm 0.3$  years in the control group. According to the Pearson Chi-square test, there was no significant difference between the two groups regarding gender, age, or the coaching activity experience ( $P > 0.05$ ).

In the intervention group, 55.9% of participants stated that they had passed the first aid course; out of which, only 11.7% stated that this course covered dental trauma. Of those who had passed the first aid course, 31% mentioned participating in the course 1 to 5 years ago while 31% had passed the course less than 1 year ago. In the control group, 71.7% of the participants had passed the first aid course; out of which 24% mentioned that the course also covered TDIs. In this group, 39% of those who had passed the first aid course mentioned participating in the course 1 to 5 years ago. In the intervention group, 55.9% of the participants had never encountered TDIs. This rate was 37.7% in the control group.

Tables 1 and 2 compare the answers of participants in the control and intervention groups before and after the intervention. The mean knowledge score increased after the intervention from  $2.1 \pm 0.96$  to  $2.9 \pm 0.97$  in the control group and from  $1.7 \pm 0.96$  to  $2.2 \pm 1.08$  in the interventional group. The mean performance score increased after the intervention from  $1.2 \pm 1.12$  to  $1.6 \pm 0.97$  in the control group and from  $0.9 \pm 0.95$  to  $1.6 \pm 1$  in the intervention group.

Thus, the performance of both groups improved. The magnitude of this increase was 0.7 score in the intervention group and 0.4 score in the control group. The difference between the two groups was significant in this respect ( $P = 0.035$ ). Regarding the knowledge questions, knowledge enhancement was observed in both groups; however, the difference was not significant ( $P = 0.185$ ).

## DISCUSSION

TDIs are highly common in sport clubs. Fitness trainers commonly encounter such injuries, and are the first to take action in such cases. As a result, they need to understand the

**Table 1.** Correct answer percentage in response to knowledge questions in the intervention (n=46) and control (n=49) groups before and after the intervention

Question	Before intervention		After intervention		P-value
	Intervention	Control	Intervention	Control	
<b>Post-accident referral location</b> (pediatric dentist and dental school)	44.1	77	72.7	88.5	NS
<b>Optimal time for referral</b> (immediately, or within 2 h)	82.4	90.2	85.3	98.3	NS
<b>Appropriate action in tooth avulsion</b> (gently wash and then place back in the socket)	15.6	23	36.4	60	P=0.03
<b>Suitable medium for an avulsed tooth</b> (milk and saline)	53.2	45	61.8	72.2	NS

NS: Not significant

**Table 2.** Correct answer percentage in response to performance questions in the intervention (n=46) and control (n=49) groups before and after the intervention (P>0.05 for all questions)

Question	Before intervention		After intervention	
	Intervention	Control	Intervention	Control
<b>Appropriate action in tooth crown fracture</b> (Finding fragment and referring to a dentist)	27.3	36.1	38.2	36.1
<b>Appropriate action in tooth avulsion</b> (replantation in the socket and immersion in a storage medium)	28.1	44.3	61.7	72.1
<b>Appropriate action in tooth bleeding</b> (immediate referral to a dentist)	26.7	41	67.7	52.5

importance of a timely correct action in such cases. Although TDI is a commonly researched topic, studies on the knowledge level of fitness trainers about correct management of such cases are limited. Thus, this study assessed the effect of an educational pamphlet on the knowledge level and performance of fitness trainers in sport clubs of Tehran.

Our study showed no significant correlation between the level of knowledge and gender, age, or work experience of fitness trainers in the two groups (P>0.05). This was in line with the results of other studies [14-16].

In our study, 55.7% of all participants had encountered TDIs. This rate was 28.3% in a study conducted in Hong Kong on school physical education coaches [17], and 5.6% in a cross-sectional study on female martial art coaches [18]. Thus, the fitness trainers in the present study had more commonly encountered TDIs compared with similar studies [17, 18].

In our study, 36.1% of the control group and 27.3% of the intervention group picked the

right answer choice regarding management of tooth crown fracture. However, 11.5% of the control group and 21.2% of the intervention group mentioned that they would take the child to a dentist after contacting the parents, which could delay the treatment. This indicates that fitness trainers have inadequate knowledge about the possibility of restoring a chipped or broken tooth and the significance of time in this respect. After the intervention, we noticed an improvement in knowledge level of the intervention group. However, the difference in this respect was not significant between the intervention and control groups. In a similar study conducted in Hong Kong on physical education teachers in schools, 71.7% of elementary school teachers took the correct action in case of tooth fracture [17]. Also, in a study conducted in Brazil on primary school teachers' knowledge, 86.1% of the individuals contacted the child's parents [11]. This controversy is due to the fact that sport teachers evaluated in their study had been trained regarding management of dental

trauma during their course of education; while, fitness trainers in our study had not received serious training about management of dental injuries.

In the present study, 6.6% of the control group opted for replantation of the avulsed tooth and 37.7% opted for immersion of the avulsed tooth in a storage medium. In the intervention group, 25% opted for immersion of the avulsed tooth in a storage medium and 3.1% opted for replantation of the avulsed tooth. This suggests that most individuals in both groups preferred placing the avulsed tooth in a medium and having a dentist replant it back in the socket. Of the participants in this study, 30.5% prior to the intervention believed that putting a gauze over the bleeding site would suffice to control bleeding in case of tooth avulsion. Bleeding control is a priority in the first aid trainings; however, bleeding control is often not helpful in TDIs. In dental injuries, delayed replantation of the avulsed tooth adversely affects the prognosis of treatment. After the intervention, both groups showed enhanced knowledge. The improvement was greater in the intervention group, indicating the optimal effect of education on knowledge level. However, the difference between the intervention and control groups was not significant ( $P>0.05$ ). In a study by Lang et al, [19] on the knowledge of handball coaches and athletes in Germany, 78% of coaches and 52% of athletes were aware that avulsed teeth could be replanted. Ghadimi et al. [14] used posters for knowledge enhancement in elementary school health teachers and observed improvement only in the intervention group. This difference may be attributed to the higher level of education of the control group trainers in this study as well as the difference in the percentage of trainers who passed the first aid course in the control group compared with the intervention group in our study. One possible explanation might be that the high number of trainers in the control group who had passed the first aid course noticed their lack of knowledge about TDIs after filling out the first questionnaire and decided to enhance their knowledge via other available sources.

Concerning the performance questions, before the intervention, the majority of trainers believed that in case of tooth mobility with bleeding, placing a gauze on the bleeding site would be sufficient to control bleeding, which is not true, and highlights the inadequate knowledge of trainers and their poor performance in this respect. Obviously, education is required to enhance knowledge and subsequently improve performance. Comparing the knowledge level of the two groups before and after the intervention showed that this increase was greater in the intervention group.

In the knowledge domain of the questionnaire, one question asked for referral of patients with TDIs. Most trainers in both groups reported referring the injured patient to a pediatric dentist or a general dentist (with lower frequency). After the intervention, the responses significantly changed in the intervention group while the change in the control group was not significant. The difference between the two groups was not significant either ( $P=0.34$ ). This finding was inconsistent with the results of Ghadimi et al [14]. They reported no increase in knowledge about this question in either group. Studies on school teachers asking the same question reported that 83.1% in Kerman, Iran [20] and 96.7% in Brazil [11] would refer the child to a dentist. In Hong Kong, 48.8% reported referring the pediatric athletes to a dentist, 29.5% to hospitals, and 6.6% to dental schools [17]. In Istanbul, 56.4% and in Porto, 53.9%, mentioned the correct answer for referral of injured patients [21]. This indicates that teachers often have higher level of knowledge than fitness trainers about this topic.

Regarding the appropriate time for referral of an injured child to a dentist, there was a significant difference in the level of knowledge of the intervention group compared with the control group. This indicates that the educational pamphlet had a good effect on increasing the knowledge of fitness trainers in this regard. However, Ghadimi et al. [14] reported that despite 23% increase in knowledge score of the intervention group versus 0% increase in the control group, this

difference was not significant ( $P=0.16$ ). The baseline knowledge level of trainers in our study was different from that in the study by Moieni et al [18]. In our study, the baseline knowledge level of instructors was relatively high (90.2% in the control group and 82.4% in the intervention group). However, in their study, only 20.5% of instructors were aware of the appropriate time for replantation, and 34.8% of the study population believed that time was not important in this process [18].

In a study by Vahhabi and Khoshsar [22] 15.2% of the trainers were aware that emergency actions should be taken within 30 min. This rate was 40% in a study by Sae-Lim and Lim [23] in Singapore. In Tabriz, 21% of teachers said they had to wait for half an hour after the accident to replant the tooth [24]. As a result, the knowledge of fitness trainers in Tehran appears to be higher than the rate reported in most other studies. This may be due to a greater focus placed on training in Tehran. Concerning the most suitable storage medium for avulsed teeth, the frequency of correct answer (milk and saline) increased in the intervention group from 53.2% to 61.8%. The increase in school health teachers' awareness in this field in the study by Ghadimi et al. [14] was from 56.6% to 100% after reading the posters. Comparison of change in the knowledge level of the two studies shows that poster is more effective than pamphlet in raising awareness; although the target groups were also different in the two studies. Comparing the results of this study with those of Ghadimi et al, [14] and McIntyre et al, [25] on the efficacy of pamphlet and lecture-based educational interventions to raise awareness, it seems that posters and pamphlets can both raise awareness and enhance the knowledge of teachers and fitness trainers, but posters can play a more effective role in raising awareness than pamphlets. In the study by Ghadimi et al, [14] on the impact of educational posters, 38.33% increase in knowledge about TDIs was reported. But in the study by McIntyre et al, [25] in the United States, pamphlet enhanced the knowledge of participants by 11.46%. In our study, no significant improvement was noted in the knowledge level of the intervention group.

This may be because of the fact that posters are mounted on the wall and are constantly viewed, but pamphlets and leaflets may remain unread or be missed. Higher educational level and number of fitness trainers who had passed a first aid course in the control group (compared with the intervention group) were the confounding factors that could have affected the results of this study.

## CONCLUSION

Educational pamphlets may be effective in raising awareness about TDIs among fitness trainers. However, according to the results of this study, the magnitude of this effect was not significant. It is suggested to compare the efficacy of educational pamphlets with other educational tools.

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## CONFLICT OF INTEREST STATEMENT

None declared.

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