

Knowledge of Dental Trauma and Avulsion Management among Senior Year University Students

Üniversite Son Sınıf Öğrencilerinde Diş Travması ve Avülsiyon Yönetimi Bilgisi

Seçil ÇALIŞKAN¹

<https://orcid.org/0000-0002-8099-584X>

Ebru DELİKAN²

<https://orcid.org/0000-0003-1624-3392>

Sena AYYILDIZ¹

<https://orcid.org/0000-0003-3067-3452>

Ebru ŞENYİĞİT³

<https://orcid.org/0000-0003-0468-588X>

¹Eskişehir Osmangazi Üniversitesi, Diş Hekimliği Fakültesi, Pedodonti Anabilim Dalı

²Nuh Naci Yazgan Üniversitesi, Diş Hekimliği Fakültesi, Pedodonti Anabilim Dalı

³Erciyes Üniversitesi, Diş Hekimliği Fakültesi, Pedodonti Anabilim Dalı

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ABSTRACT

Introduction: Dental trauma is an important and common oral health problem, the prognosis of which varies, depending on the time elapsing. This study was carried out to evaluate levels of knowledge of dental trauma and avulsion management among senior students in different faculties.

Methods: The sample size was determined using G*Power software. A 21-item questionnaire was sent to senior students via e-mail or social media. A standardized scoring method was used to assess the knowledge level. Descriptive statistics, and the chi square and Kruskal–Wallis tests were used for data evaluation.

Results: Three hundred thirty seven senior university students (106 dentistry, 122 medicine and 109 education) were enrolled in the study. The response rate was 76%. Most of the participants stated that dental injuries constitute an emergency condition (93.2%). In terms of median knowledge scores, the university students in the four groups were ranked as dentistry> medicine> education. The primary tooth was identified at a higher rate than the permanent tooth in cases of avulsion.

Discussion and Conclusion: In general, senior university students' knowledge concerning avulsion emergencies is not at the desired level. Awareness of trauma management in the undergraduate curriculum needs to be improved as a matter of urgency.

Keywords: Avulsion, Dental trauma, Knowledge, Senior University Student

ÖZ

Giriş ve Amaç: Diş travması, prognozu geçen zamana bağlı olarak değişen önemli ve yaygın bir ağız sağlığı sorunudur. Bu çalışma, farklı fakültelerdeki üniversite son sınıf öğrencilerinin diş travması ve avülsiyon yönetimi konusundaki bilgi düzeylerini değerlendirmek amacıyla yapılmıştır.

Yöntem ve Gereçler: Çalışmada örneklem büyüklüğü, G * Power yazılımı kullanılarak belirlendi. Üniversite son sınıf öğrencilerine e-posta veya sosyal medya aracılığıyla 21 maddelik bir anket gönderildi. Bilgi düzeyini değerlendirmek için standart bir puanlama yöntemi kullanıldı. Verilerin değerlendirilmesinde tanımlayıcı istatistikler, ki kare ve Kruskal-Wallis testleri kullanıldı.

Bulgular: Çalışmaya üç yüz otuz yedi son sınıf öğrencisi (106 diş hekimliği, 122 tıp ve 109 eğitim) dahil edildi. Yanıt oranı % 76 idi. Katılımcıların çoğu diş yaralanmalarının acil bir durum oluşturduğunu belirtmiştir (% 93,2). Medyan bilgi puanları açısından değerlendirildiğinde, dört gruptaki öğrenciler diş hekimliği> tıp> eğitim olarak sıralanmıştır. Avülsiyon vakalarında süt dişleri daimi dişlere göre daha yüksek oranda doğru olarak tanımlanmıştır.

Tartışma ve Sonuç: Genel olarak, üniversite son sınıf öğrencilerinin avülsiyonla ilgili acil durumlara ilişkin bilgileri istenen düzeyde değildir. Lisans müfredatındaki travma yönetimi farkındalığının acil olarak geliştirilmesi gerekmektedir.

Anahtar Kelimeler: Avülsiyon, Bilgi, Diş travması, Son Sınıf Üniversite Öğrencisi

Sorumlu yazar/Corresponding author*: sclctn@hotmail.com

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INTRODUCTION

Dental trauma is an important and common oral health problem that can cause pain and distress and that can range from enamel-level fractures to extensive dentoalveolar damage, including damage to supporting tissues, displacement of teeth, or avulsion. Nearly one in three children is exposed to various forms of dental trauma, the incisors being the most frequently affected. The frequency of avulsion in permanent and primary teeth ranges from 0.5% to 3% and from 7% to 13%, respectively^{1,2}. These injuries may result in severe physiological, psychological, and financial problems.

Prognosis in traumatic injuries varies depending on the time elapsed. Immediate and appropriate management of traumatically avulsed teeth is critical for the long-term success of treatment³. The prognosis of the avulsed tooth depends on the viability of the periodontal ligament remaining on the root surface. Technical knowledge and clinical experience on the part of the physician are also important factors in the success of treatment⁴.

Accidents causing dental traumas in children are frequently encountered at home and at school. According to a study from Australia reported that one-third of dental injuries occurred in or around school⁵. The role of teachers in the prevention and immediate treatment of traumatic dental injuries has therefore received considerable attention in recent years⁵. Dental injuries are also a component of head and neck trauma. In these situations, individuals without medical training (such as parents and teachers) usually take the children involved to the emergency department first. Unfortunately, dentists are not available in such facilities. Therefore, in order to ensure proper and immediate intervention, it is important for physicians to possess adequate knowledge concerning avulsion management⁶. However, many avulsed teeth are lost due to a lack of knowledge of the proper first aid procedures that need to be followed. Dental trauma management training in medical education can reduce tooth loss in such cases⁷.

Apart from dentists, teachers, kindergarten teachers, and physicians may be among the first individuals to intervene in dental trauma. Knowledge of dental trauma in these different sections of the community is important for early and correct intervention in cases of avulsion^{8,9}.

The purpose of this study was to evaluate levels of knowledge of dental trauma and avulsion management among senior university students attending different faculties (dentistry, medicine and education).

MATERIAL and METHOD

The study was approved by Research and Ethical Committee of the Eskişehir Osmangazi University, Turkey (25403353-050.99-E.73817), and was conducted in line with the ethical standards set out the Declaration of Helsinki. The number of participants was estimated

via power analysis using G*Power software with a power of 95% and an assumed effect size of 0.3, a type-I error (alpha) of 0.05, and 5 degrees of freedom. The minimum sample size for this study was calculated at 100 participants for each group (senior students at the faculties of dentistry, medicine and education).

An electronic questionnaire (Google Forms©) was developed specifically for this study. The questions employed were modified from previous questionnaire validated by Bahamman⁶. A pilot study was conducted with 20 university students in order to test the methods before the main study, and a few modifications were applied to evaluate intelligibility.

The questionnaire, in which all questions were closed-ended (multiple choice), consisted of three parts. The first section investigated the university students' personal and professional profiles, including age, gender, education level, first aid training, and experience of dental trauma. The second section included 11 questions evaluating university students' attitudes to two different hypothetical avulsion cases involving primary and permanent teeth. The final section consisted of two questions involving self-assessment. The internet link to the 21-item questionnaire was sent to the university students via e-mail or social media (WhatsApp©). For reasons of privacy, no names or other personal information were recorded. Returning the completed questionnaire was interpreted as indicating willingness to participate in the study. Participants who agreed to participate in the research of their own volition and were attending their first universities were included.

University students' knowledge levels were assessed using a standardized scoring method modified from Abu-Dawoud et al.⁷. Eleven questions in the second part of the questionnaire were used for this purpose. A score of 8 indicated full knowledge, while a score of 0 indicated no knowledge. Other mean scores were formulated as 6-8 points indicating high knowledge, 3-5 points moderate knowledge, and 0-2 points low knowledge.

Statistical analysis was performed on IBM SPSS 22 (IBM Corp, Armonk, NY, USA) software. Descriptive statistics, and the chi square and Kruskal-Wallis tests were used for data evaluation. Statistical significance was set at $p < 0.05$ for all tests.

RESULTS

The questionnaire was e-mailed to 444 university students, of whom 337 completed and returned it (76% participation rate). Participants' demographic characteristics and training status (receipt of medical or dental emergency first aid training) are shown in Table 1. Kruskal-Wallis test results based on knowledge scores and descriptive statics of knowledge levels are given in Table 2. In terms of median knowledge scores, senior university students were ranked dentistry > medicine > education. When knowledge levels of university students

were evaluated in terms of faculties, almost all the dentistry students and one-third of the medical students exhibited high knowledge levels concerning traumatic

dental injuries. Education faculty students had significantly lower knowledge scores than the other two groups.

Table 1: Participants' demographic characteristics and emergency first aid training status

Faculty	Gender (n/%)	Age groups (n)	Emergency first aid training (n/%)	Dental trauma training provided outside the faculty (n/%)
Dentistry	Male: 47 (44%)	18-30: 106	Yes: 83 (79.2%)	Yes: 50 (47.2%)
	Female: 59 (55.7%)	30-40: 0 >40 : 0	No: 22 (21.0%)	No: 56 (52.8%)
Medicine	Male: 53 (74.8%)	18-30: 121	Yes: 117 (95.9%)	Yes: 8 (6.6%)
	Female: 69 (25.2%)	30-40: 1 >40 : 0	No: 5 (4.1%)	No: 114 (93.4%)
Education	Male: 25 (22.9%)	18-30: 106	Yes: 41 (37.6%)	Yes: 5 (4.6%)
	Female: 84 (77.1%)	30-40: 2 >40 : 1	No: 68 (62.4%)	No: 104 (95.4%)
Total	Male:125 (37.1%)	18-30: 333	Yes: 241 (71.5%)	Yes: 63 (18.7%)
	Female: 212 (62.9%)	30-40: 3 >40: 1	No: 96 (28.5%)	No: 274 (81.3%)

Table 2. Dental trauma knowledge scores and levels of the participants by different faculties

Faculty	Knowledge Scores		Knowledge level		
	Median (Min/Max)	High (%)	Moderate (%)	Low (%)	
Dentistry	7.27 ^a (3.64/8.0)	97.2	2.8	-	
Medicine	5.1 ^b (0.73/7.27)	33.6	63.9	2.5	
Education	2.9 ^c (0.73/7.27)	6.4	67.0	26.6	

The Kruskal-Wallis test and descriptive statics were used to evaluate participants' knowledge scores and knowledge levels. The different uppercase letters represent statistically significant differences between the groups.

The majority of participants from all three faculties (93.4% from the dentistry faculty, 94.3% from medicine and 91.7% from education) described injuries to the mouth, teeth and surrounding tissues as an emergency situation.

In the first hypothetical tooth avulsion case (permanent tooth avulsion), a significant difference was observed in correct identification of the tooth type ($p < 0.001$). Approximately 96% of dentistry students, 57.4% of medical students and 35.8% of education students were able to identify the tooth accurately. With the exception of the dentistry students (9.4%), most participants (77.9% of medical students and 93.6% of education students) did not suggest replantation. Almost all the dentistry students (98.1%) stated that the avulsed tooth should be held without touching the root. However, students from medical and education faculties reported having no information on the subject (41.8% and 72.5%, respectively). With the exception of the education faculty students (34.9%), the great majority of the participants (80.2% dentistry and 79.5% medical) stated that the tooth should be cleaned before replantation. The most popular method for that purpose was to clean it under tap water (49.3%). In case the avulsed tooth could not be replanted, dentistry students described milk as the optimal storage

medium (69.8%), followed by saliva (13.2%). However, most of the education (45.0%) faculty students had no knowledge concerning the ideal storage medium. The most popular storage medium among the medical students was water (31.1%). With the exception of dentistry students, almost half the participants failed to correctly answer the question about the timing of replantation of the avulsed tooth, which is very important for prognosis.

In the second hypothetical tooth avulsion case (primary tooth avulsion), there were rates of correct identification of the tooth differed significantly ($p < 0.001$). Approximately 99% of dentistry students, 93.4% of medical students and 67.9% of education students identifying it correctly. Most participants (91.5% of dentistry students, 82.8% of medical students and 91.7% of education students) did not suggest replantation.

While dentistry (90.6%) and medical (78.7%) students considered that tetanus vaccination was necessary, more than half of the education faculty students believed that this was not required.

In case of pediatric traumatic dental injuries, almost half the dentistry and education faculty students stated

that they would first present to a pediatric dentist (56.6% and 40.4% respectively). However, most students from the medicine faculty stated that they would present to a general dentist (57.2%).

In the final part of the survey, university students were asked whether they would intervene in an avulsed tooth, and 76.2% of medical students and 83.5% of education students reported that they would not.

Almost all (82.5%) senior university students reported a need for more training concerning dental trauma and the management thereof.

DISCUSSION

Correct and rapid emergency intervention in the traumatized tooth significantly affects the prognosis. Otherwise, treatment may be more difficult and expensive¹⁰. It is therefore important that individuals from all relevant professions be well-informed about dental trauma^{8,9}. Accordingly, the purpose of this study was to evaluate dental trauma knowledge levels of senior university students who had not yet embarked on their professional careers.

The participants were included in the study in the light of the possibility of their becoming parents in the near future. The first healthcare institution applied after trauma is usually the emergency department. However, teachers are particularly likely to encounter trauma cases, since the majority of cases occur in school settings. Physicians, dentists, and teachers were included in the study in view of the possibility of encountering such situations both in their professional life and in parental roles.

Abu Dawoud et al.¹¹ investigated knowledge of management of avulsed teeth among dentists and physicians. Those authors reported that 78.5% of dentists had a high level of knowledge, while 73.3% of physicians possessed only moderate knowledge¹¹. Another study evaluating the knowledge levels of elementary school teachers, physical education professionals, bank employees, dentists, and pediatricians reported teachers exhibited the lowest level of knowledge about the management of dental emergencies¹². Similarly, in the present study, education faculty students also exhibited the lowest level of knowledge.

In two studies from Japan and Saudi Arabia, the majority of senior dentistry students (95.6% and 93.4%, respectively) correctly identified the avulsed tooth type^{13,14}. Fifty-nine percent of participants in a medical study correctly identified permanent teeth¹⁵. The results for dentistry and medical students in the present study were consistent with the previous literature. Educational subject matter related to trauma follows the literature in order to achieve similar standards worldwide in institutions providing health education. However, this situation is not same in non-health related faculties. This

may also explain low level of knowledge determined among education faculty students compared to the previous literature¹⁶.

The rate of correct identification of traumatized primary or permanent teeth on the part of education faculty students or graduates varies from country to country^{16,17}. In addition, the percentages determined in present study for the faculty of education students were quite low. This confirms the idea that traumatic emergencies frequently encountered in children are not included in the education provided by these faculties. Studies involving dentistry students in literature have reported that students decide on immediate reimplantation at rates ranging from 40% to 65%. The corresponding figure in the present study was more than 90%, higher than in the general literature. This may be associated with a high emphasis on immediate reimplantation in lectures on trauma in Turkey and improving students' ability to perform emergency interventions in cases of trauma^{13,14}. In a study conducted with medical students at the University of Rijeka in Croatia, 77.6% of students stated that an avulsed tooth should be placed in its original position in the jaw¹⁸. Nevertheless, fifty percent of doctors working in the emergency departments of Israeli hospitals stated that an avulsed permanent incisor was believed that under no circumstances should be relocated¹⁹. In a survey study by Mehrabkhani et al. in 2015, 47.2% of schoolteachers in Iran opted to immediately replace the tooth back in the socket¹⁷. These findings were not in agreement with the present study. The fact that both medical and educational students rarely decided in favor of replantation is indicative of an inadequate knowledge about the topic in these faculties.

According to the International Association of Dental Traumatology (IADT), an avulsed tooth should be held by the crown without touching the root, and if the tooth is dirty, it should be cleaned by rinsing with milk, saline solution, or the patients' saliva²⁰. If avulsed teeth are inserted into the socket without cleaning, inflammation rates increase due to the presence of foreign bodies on the root. Due to this inflammation, healing of the periodontal ligament may also adversely affected^{13,21}. The possibility of ankylosis also increases if the periodontal ligament on the root surface is damaged by being touched with a brush or other object²¹. Chemical agents can also affect the viability of the periodontal ligament. Up-to-date information about the management of dental emergencies has been provided in detail in an endeavor to endow dentistry students with a better understanding of the subject. The dentistry students in the present study were therefore more aware than those in some paper published in previous years. For example, two similar studies involving dental students in Japan and Saudi Arabia reported correct response rates in terms of avulsed tooth

cleaning of 70.8% and 64.7%, respectively^{21, 22}. These rates are lower than in the present study.

While medical students' undergraduate curricula provide information about medical emergencies, it does not include dental emergencies. However, it is important for medical students also to receive detailed training on dental emergencies since they may be the medical personnel performing the first intervention²². Even more serious is the lack of training concerning both medical and dental emergencies in non-health related faculties. It is very important for non-medical professionals to possess basic knowledge of dental emergency management and the ability to apply it^{9, 23}. Unfortunately, the education and medical students in this study were largely unaware of the critical role of the time factor in replacing an avulsed tooth. Most university students from these two faculties agreed that they should be given dental emergency training in more detail.

According the IADT guideline, if the avulsed tooth cannot be replanted for any reason, it should be kept in a suitable storage medium (Hanks balanced salt solution, milk, saline solution, etc.) and transported to the emergency department²⁰. Hanks balanced salt solution is recommended as the optimal transport medium for the avulsed tooth^{24, 25}. Periodontal ligament cells can be kept vital for longer in this solution than in milk and saline solution. However, this solution is not widely available in Turkey, and milk, saline solution or saliva can instead be used as a transport medium²⁶. Keeping the tooth in the mouth is another alternative. However, this is not recommended in young patients due to the risk of swallowing²¹. Dental students have recommended milk as a transport medium at different rates (39-92%) in different countries^{13, 14}. Medical students, doctors/nurses, and primary school teachers have been reported to prefer milk as a transfer medium at rates of 43%, 36% and 17%, respectively²⁷⁻²⁹. In the present study, 69.8% of the dentistry students preferred milk as a storage medium, a figure in line with the average value in the literature, although other faculty students were unaware that milk is the most practical medium for transportation.

According to the IADT, periodontal ligament cells that remain dry for more than 60 minutes cannot maintain their viability²⁰. No substantial difference in the number of viable periodontal ligament cells with a dry time of 30 min and no dry time was reported in a study³⁰. The shorter the time elapsed after trauma; the more viable periodontal ligament cells will be available for healing the avulsion. The importance of the time factor in avulsion cases should therefore be well understood, and close attention should be paid to this when the issue arises. Iyer at al.²⁸ reported that more than half of physicians, 53.3%, recommended immediate referral and reimplantation²⁸. Another study investigated the awareness of primary school teachers in India concerning traumatic dental injuries and emergency management in

children, with 45.9% of participants believing that the avulsed tooth should be reimplanted within 30 min²⁹. However, another study reported a much lower rate (33.8%) among teachers³¹. Unfortunately, most of the university students (except for dentistry students) in the present study were unaware of the critical role of the time factor in replacing an avulsed tooth. This again indicates a lack of current knowledge on this subject.

When the responses to the primary tooth avulsion case were evaluated, medical and dental students generally selected correct approaches. However, the accuracy percentages of the education faculty students were lower than others. Educators in Turkey, where preschool education starts at the age of three, should possess greater knowledge than other members of the community. It is therefore very important to overcome this lack of knowledge in education faculties and to include the correct management approaches in this regard in undergraduate education.

Tetanus vaccination status should be investigated in case of dental trauma. Although the findings of the present study indicated that dentists and medical students have a high level of knowledge of tetanus prophylaxis, another study showed that only one quarter of dentists were aware of the anti-tetanus protocol³². This discrepancy may be attributed to educational content and priorities differing from country to country.

Undergraduate curricula for medical and dental students naturally consider medical emergencies. A study show that approximately half of teachers receive training concerning medical emergencies²³. However, a low level of basic knowledge of medical first aid has been reported among non-professional individuals³³. It is noteworthy that a limited number of medical and education students have attended courses or educational programs regarding the management of dental trauma in previous studies^{18, 28}. Furthermore, most education and medical students agreed that they should receive dental emergency training. They were also unaware about the critical role of the time factor in replacing an avulsed tooth^{18, 23, 28}.

A lack of confidence and competence was highlighted in terms of trauma management among dentists and suggested that more emphasis should be placed on dental trauma management in the undergraduate curriculum³⁴. In the present study, the knowledge level of dental trauma management among students who were about to graduate from the dentistry faculty was generally high, although in agreement with previous studies, a lack of confidence was detected in terms of in therapeutic applications. Consistent with previous studies^{7, 19, 28}, it may be concluded that few physicians may be capable of providing appropriate emergency treatment in case of avulsion, and that teachers have very low knowledge concerning the emergency management of dental traumas.

This study is important in terms of revealing the knowledge levels and deficiencies of different occupational groups that may possibly encounter traumatic dental injuries. Previous studies in the literature have mostly focused on emergencies involving permanent teeth. The fact that this study also considered primary teeth avulsion, which is more common in the preschool period, will help close this gap in the literature. However, this study also has some limitations that should be taken into consideration. First, this research involved only a limited number of university students. The data presented may not therefore exactly represent knowledge levels across Turkey as a whole. Nationwide research might now be conducted to shed further light on this issue. Additionally, a general limiting characteristic of self-reporting surveys is the probability of socially acceptable responding, and the results may therefore not necessarily fully reflect university students' true knowledge and daily professional practice.

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CONCLUSION

In general, university students' knowledge concerning avulsion is not at the desired level. Physicians appear to lack adequate training on avulsion, which is likely to be encountered in operating rooms during intubation or in emergency clinics. Since there is a high possibility of dental trauma in the school environment, the initial intervention of teachers in case of trauma is of great importance to children's health. There is therefore an urgent need for awareness of trauma management in the medical and educational undergraduate curricula to be improved. In addition, dental students, whose theoretical knowledge was found to be sufficient, should also be given the opportunity to experience practical applications.

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