



Knowledge and Awareness of Avulsion Injuries Among Family Medicine Resident Physicians in Turkey: A Cross-Sectional Survey-Based Study

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ABSTRACT

Objectives: This study aimed to assess the knowledge and awareness of family medicine resident in Turkey regarding avulsion injuries, a severe form of dental trauma.

Materials and Methods: A cross-sectional, survey-based study was conducted in November 2023, involving 138 family medicine resident physicians from various universities and training hospitals across Turkey. Data were collected via an online questionnaire designed to evaluate participants' demographic information, educational background, and knowledge of dental avulsion management.

Results: Of the 138 participants, 68.8% were female and 31.2% were male, with an average age of 30 years and an average professional experience of 5 years. A significant portion (91.3%) had not received any training related to dental trauma, and 64.5% expressed a desire for such training. Only 7.2% of the resident physicians knew that an avulsed permanent tooth should be immediately reimplanted, while 85.5% preferred to refer the patient to a dentist without reimplanting the tooth due to infection risks. Furthermore, 73.9% of participants indicated insufficient knowledge about dental avulsion, and 54.3% acknowledged the importance of cleaning the avulsed tooth, with 31.2% preferring saline solution.

Conclusions: Family medicine resident physicians demonstrated inadequate knowledge about avulsion injuries and their management. It is recommended that emergency dental treatment and management courses, provided by dentists, be incorporated into the training programs for medical branches frequently encountering dental trauma patients. Enhancing resident physician awareness and knowledge is crucial for improving the prognosis of dental trauma patients through proper initial intervention.

Keywords: Avulsion, dental trauma, family medicine

Aile Hekimliği Asistanlarının Avülsiyon Yaralanmalarına İlişkin Bilgi ve Farkındalık Düzeyleri: Kesitsel Anket Tabanlı Bir Çalışma

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ÖZ

Amaç: Bu çalışma, ciddi bir dental travma türü olan avülsiyon yaralanmaları konusunda Türkiye'deki aile hekimliği asistanlarının bilgi ve farkındalık düzeylerini değerlendirmeyi amaçlamaktadır.

Gereç ve Yöntemler: Kasım 2023'te Türkiye genelindeki çeşitli üniversite ve eğitim araştırma hastanelerinde görev yapan 138 aile hekimliği asistanı ile kesitsel, anket tabanlı bir çalışma yürütülmüştür. Katılımcıların demografik özelliklerini, eğitim geçmişlerini ve dental avülsiyon yönetimine ilişkin bilgi düzeylerini değerlendirmek amacıyla çevrim içi bir anket uygulanmıştır.

Bulgular: Katılımcıların %68,8'i kadın, %31,2'si erkek olup, ortalama yaş 30 ve ortalama mesleki deneyim süresi 5 yıldır. Katılımcıların %91,3'ü dental travma ile ilgili herhangi bir eğitim almadığını, %64,5'i ise bu konuda eğitim almak istediğini belirtmiştir. Sadece %7,2'si avülse daimi dişin hemen replante edilmesi gerektiğini bilirken, %85,5'i enfeksiyon riski nedeniyle hastayı diş hekimine yönlendirmeyi tercih etmiştir. Ayrıca, katılımcıların %73,9'u dental avülsiyon hakkında yetersiz bilgiye sahip olduğunu belirtmiş, %54,3'ü avülse dişin temizlenmesi gerektiğini ifade etmiş ve %31,2'si serum fizyolojik kullanımını tercih etmiştir.

Sonuçlar: Aile hekimliği asistanlarının avülsiyon yaralanmaları ve yönetimi konusundaki bilgi düzeyleri yetersiz bulunmuştur. Dental travma olgularıyla sık karşılaşılan tıp branşlarının eğitim programlarına diş hekimleri tarafından verilen acil dental tedavi ve yönetim eğitimlerinin dâhil edilmesi önerilmektedir. Uygun ilk müdahale ile dental travma hastalarının prognozunun iyileştirilmesi için asistan hekimlerin farkındalık ve bilgi düzeylerinin artırılması önem taşımaktadır.

Anahtar Kelimeler: Aile hekimliği, avülsiyon, dental travma

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Introduction

Dentoalveolar traumas represent 20% of all acute and chronic injuries worldwide.¹ Traumatic dental injuries,

comprising 85% of all oral injuries, represent a significant public health concern due to their functional, aesthetic,

psychological, and economic impacts.^{1,2} These injuries can occur at any stage of life but are more prevalent during infancy, childhood, and adolescence.³ One of the most severe dental trauma is avulsion, which occurs when a tooth is completely dislodged from its alveolar socket due to trauma.^{4,5} According to the American Academy of Pediatric Dentistry, avulsion is among the most common traumatic dental injuries in children, typically occurring in those aged 2-4 and 8-12 years.^{6,7} Similarly, avulsion is reported to be the most common dentoalveolar trauma treated in emergency departments for children under the age of 15.⁸

The prognosis is dependent on the time elapsed since the avulsion injury and the conditions in which the tooth is stored.^{9,10} It is therefore essential that individuals who first encounter the patient after an accident are well-informed and aware of the appropriate steps to take, facilitating prompt and effective intervention. Inadequate, incorrect, or uninformed management, or a lack of intervention for a patient presenting with avulsion, can result in complications during the treatment process and an increase in the cost of care.¹¹

It is recommended that individuals who have experienced dental trauma seek the nearest healthcare facility.¹² The most commonly visited facilities include primary healthcare providers such as emergency departments, family health centres, oral and dental health centres, dental faculties, and private dental clinics.¹³ Family medicine resident physicians, who are primary healthcare providers, play a crucial role in providing post-dental trauma care, especially in communities with limited access to dentists and among patients with low socioeconomic status.¹⁴ Prompt, effective, and accurate intervention by resident physicians in these centres can prevent future functional, aesthetic, social, and psychological problems.

A substantial body of literature exists which assesses the knowledge levels of various professionals with regard to dental traumas.¹⁵⁻²¹ These include emergency medicine physicians, pediatricians, primary school teachers and sports coaches. The findings of these studies demonstrate a lack of knowledge among the aforementioned professionals with regard to trauma-related situations. Nevertheless, there is a paucity of studies that have evaluated the knowledge, awareness, or attitudes of family medicine resident physicians regarding dental traumas.²² This study aims to assess the knowledge and awareness of family medicine resident physicians, as primary healthcare providers, concerning avulsion injuries. The hypothesis of this study is that family medicine residents in Turkey possess inadequate knowledge regarding avulsion injuries and their management.

Materials and Methods

Research and Publication Ethics

This cross-sectional, survey-based study was conducted with the participation of family medicine

resident physicians in Turkey. The research and publication ethics of this study are presented in the following section. The study was conducted in accordance with the ethical standards of the 2008 Declaration of Helsinki and approved by the Ethics Committee for Non-Interventional Research at the Faculty of Health Sciences, Marmara University (Approval No: 26102023/102).

Study Design, Participants, and Data Collection

The data for the study were collected online in November 2023 using the online survey platform Google Forms. Although the exact size of this population is not definitively known, approximately 1,000 residency positions are advertised each year. Considering that the duration of residency training is three years, the total number of residents is estimated to be approximately 3,000. Given the absence of existing literature evaluating family medicine residents' knowledge of dental trauma, the sample size was calculated under the assumption of a finite population ($N \approx 3000$), with an expected proportion of $p=0.50$, a confidence level of 80%, and a margin of error of 5%, using the OpenEpi software (version 3.01). Based on these parameters, the minimum required sample size was determined to be 130. Prior to participation, informed consent was obtained from all subjects, who were then asked to complete the survey in its entirety. Data from 138 completed surveys were included in the final analysis.

The participants were contacted exclusively via institutional email addresses obtained from the staff webpages of 90 universities offering family medicine residency training and from the email addresses of family medicine clinics affiliated with training and research hospitals. Considering the possibility that some institutional email addresses might not have been up to date, recipients were asked to share the study invitation with colleagues undergoing training in their respective departments. Following the initial invitation, three reminder emails were sent at 10-day intervals. In total, 526 family medicine residents were reached by email during the recruitment process.

The survey questions were adapted from previous studies conducted by Pujita et al.¹⁹ and Gok et al.,²² with certain modifications made to reflect the specifics of avulsion injuries and their treatment (Table 1). The survey comprised three sections and 17 questions. The initial section comprised three questions pertaining to demographic data, including age, gender, and professional experience. The second section comprised five questions designed to ascertain the educational background and opinions of family medicine resident physicians regarding traumatic dental avulsion injuries. The third section comprised nine multiple-choice questions designed to assess the knowledge and management of dental avulsion among family medicine resident physicians.

Table 1. Survey Questions

A. Demographic Data
Age:
Gender
Male
Female
No Comment
Professional Experience:
B. Educational Background
Have you received any education on traumatic dental injuries (TDI)?
o Yes
o No
Do you think you need professional training related to TDI?
o Yes
o No
o Undecided
Do you think that education on traumatic dental injuries should be provided in during residency training?
o Yes
o No
o Undecided
Do you feel that you have adequate knowledge about TDI?
o I have comprehensive knowledge
o I have sufficient knowledge
o I do not have sufficient knowledge
Have you ever come across a patient with TDI?
o Yes
o No
C. Knowledge and Management of Dental Avulsion
The term "dental avulsion" is employed to describe the displacement of a tooth from its socket as a consequence of trauma.

This avulsed tooth looks like...
o Looks like a primary tooth
o Looks like a permanent tooth
o I don't know
If the avulsed tooth is a primary tooth, should it be reimplanted into the socket?
o Yes
o No
o Undecided
If the avulsed tooth is a permanent tooth, should it be reimplanted into the socket?
o Yes
o No
o Undecided
Where should the avulsed tooth be held?
o held by the crown without touching the root
o where it is held does not matter
o I don't know
Should the avulsed tooth be cleaned before reimplantation into the alveolar socket?
o Yes
o No
o I don't know
What should be used to clean an avulsed tooth?
o rinsed with saline
o wet sponge
o I don't know
Is tetanus immunization necessary?
o Yes
o No
o I don't know
Does the time elapsed after trauma affect the prognosis of the tooth?
o Yes
o No
o I don't know
Which do you think is the best storage medium for an avulsed tooth? (You may choose multiple answers)
o Milk
o Saline
o Patient's saliva
o Sterile Sponge
o Ice
o Disinfectant
o Don't know

Statistical Analysis

The statistical analysis was conducted using IBM SPSS v29 (Statistical Package for Social Sciences, Chicago, Illinois, USA), which was also employed for data

visualization. Descriptive data were presented as frequencies and percentages for categorical variables and as medians with interquartile ranges (IQR) and minimum and maximum values (min-max) for continuous variables.

Table 2. Descriptive Data

	Median	IQR	Min-Max
Professional Experience	5	5	1-31
Age	30	5	24-53
	n (%)	n (%)	n (%)
Gender	Female	Male	-
	95 (68.8)	43 (31.2)	-
Have you received any education on traumatic dental injuries	Yes	No	-
	12 (8.7)	126 (91.3)	-
Do you think you need professional training related to TDI?	Yes	No	Undecided
	72 (52.2)	40 (28.7)	26 (19.1)
Do you think that education on traumatic dental injuries should be provided in during residency training?	Yes	No	Undecided
	89 (64.5)	29 (21.0)	20 (14.5)
Do you feel that you have adequate knowledge about TDI?	I have comprehensive knowledge	I have sufficient knowledge	I do not have sufficient knowledge
	29 (21.0)	7 (5.1)	102 (73.9)
Have you ever come across a patient with TDI?	Yes	No	-
	58 (42.0)	80 (58.0)	-

*IQR: Interquartile Range, Min-Max: Minumum and Maximum values.

Table 3. The distribution of participant's responses

	N (%)
This avulsed tooth looks like...	
o Looks like a primary tooth	65 (47.1)
o Looks like a permanent tooth	35 (25.4)
o I don't know	38 (25.5)
If the avulsed tooth is a primary tooth, should it be reimplanted into the socket?	
o Yes	25 (18.1)
o No	57 (41.3)
o Undecided	56 (40.6)
If the avulsed tooth is a permanent tooth, should it be reimplanted into the socket?	
o Yes	10 (7.2)
o No	10 (7.2)
o Undecided	118 (85.5)
Where should the avulsed tooth be held?	
o held by the crown without touching the root	65 (47.1)
o where it is held does not matter	-
o I don't know	73 (52.9)
Should the avulsed tooth be cleaned before reimplantation into the alveolar socket?	
o Yes	75 (54.3)
o No	10 (7.2)
o I don't know	53 (38.4)
What should be used to clean an avulsed tooth?	
o rinsed with saline	43 (31.2)
o wet sponge	13 (9.4)
o I don't know	82 (59.4)
Is tetanus immunization necessary?	
o Yes	101 (73.2)
o No	14 (10.1)
o I don't know	23 (16.7)
Does the time elapsed after trauma affect the prognosis of the tooth?	
o Yes	99 (71.7)
o No	-
o I don't know	39 (28.3)
Which do you think is the best storage medium for an avulsed tooth?	
o Correct Answer (Milk, Saline, Patient's saliva)	31 (22.5)
o Incorrect Answer (Sterile Sponge, Ice, Disinfectant)	31 (22.5)
o Don't know	76 (55.1)

Results

A total of 138 family medicine resident physicians participated in the study, of whom 68.8% were female and

31.2% were male. The median age of the participants was 30 years (range: 24–53 years), and the median duration of professional experience was 5 years (range: 1–31 years).

Descriptive data regarding demographic characteristics, opinions, and clinical approaches to dental trauma are summarized in Table 2, while participants' knowledge levels related to avulsion injuries are presented in Table 3.

The majority of participants (91.3%) reported that they had not received any prior education on dental trauma. Although 52.2% of all participants expressed a willingness to receive training on dental trauma, 64.5% of all participants believed that education on dental trauma should be formally incorporated into the residency training programme.

Only 25.4% of the participants were able to correctly identify the demonstrated tooth as a permanent tooth. While 71.7% acknowledged the importance of the time elapsed after trauma for prognosis, substantial uncertainty was observed regarding avulsion management. For avulsed primary teeth, 41.3% correctly stated that reimplantation should not be performed, whereas 18.1% believed reimplantation was acceptable and 40.6% were unsure. In cases of permanent tooth avulsion, 85.5% of the participants reported uncertainty regarding the appropriate management approach.

Knowledge gaps were also evident in handling and storage procedures. Only 47.1% indicated that an avulsed tooth should be held by the crown without touching the root, and 22.5% correctly identified appropriate storage media. Furthermore, 38.4% were unsure whether the avulsed tooth should be cleaned prior to reimplantation, and 59.4% did not know which substance should be used for cleaning. In contrast, 73.2% of the participants correctly recognized the need for tetanus immunization following an avulsion injury.

Discussion

A number of studies have been conducted to assess the knowledge and awareness levels of various medical professionals with regard to dental trauma. These include emergency medicine physicians, dentists and endodontists.^{13,23-25} This study is the first multicentre investigation to evaluate the knowledge and approaches of family medicine resident physicians regarding dental avulsion across Turkey. Based on the results obtained in this study, the null hypothesis has been accepted.

The current study found no evidence that the gender or professional experience of the physicians in question affected their knowledge level or attitudes regarding dental trauma. This result is consistent with those of previous studies evaluating the trauma knowledge of emergency medicine physicians.^{11,14,23}

Previous studies have reported high proportions of physicians without formal training in dental trauma, including 90.2% in Chile, 83.3% in Kuwait, 76.5% in the United Kingdom, and 47.5% in Saudi Arabia.^{5,26-28} Similarly, Ulusoy et al.¹⁷ reported the absence of structured dental trauma training in undergraduate medical education and postgraduate programmes in Turkey. In line with these findings, 91.3% of the family medicine resident physicians in the present study reported that they had not received any training related to dental trauma.

A review of the literature indicates that the vast majority of physicians (86–100%) believe that courses on dental trauma should be incorporated into undergraduate or postgraduate medical education.^{15,18,22,29} This perspective is similarly reflected in the present study. However, the proportion of participants expressing a willingness to receive dental trauma training in the current study was lower than that reported in previous studies.^{18,30} This discrepancy may be attributed to differences in study populations, as earlier surveys were primarily conducted among emergency medicine physicians and general practitioners, who are more likely to encounter trauma cases than family medicine resident physicians.

In this study, to ensure that participants could relate to the survey questions without getting caught up in terminology, dental avulsion was defined and explained with an illustration based on the current International Association of Dental Traumatology (IADT) guidelines.³¹ The participants were presented with an image of an avulsed permanent tooth and were asked to indicate whether the tooth was primary or permanent. Only 25.4% of the family medicine resident physicians correctly identified the tooth as permanent. Similar studies have also identified a similarly low rate of correct responses.^{22,24} Despite the inclusion of topics related to tooth development and anatomy in the medical school curriculum in Turkey, the inability of a significant portion of physicians to answer correctly suggests that these topics are not adequately covered.

The knowledge questions in the final part of the survey were prepared in accordance with the treatment protocol of the IADT guidelines.³¹ In accordance with the specified guidelines, an avulsed permanent tooth should be held by the crown, rinsed with milk, saline, or the patient's saliva, and reimplanted into the alveolar socket as soon as possible. Following this procedure, the patient should be referred to a dentist for further treatment. Additionally, in the event that reimplantation is not possible, the tooth should be transported in an appropriate medium and presented to a dentist within the first 60 minutes. Furthermore, reimplantation of an avulsed primary tooth is not recommended due to the potential risk of damaging the underlying permanent tooth germ. In contrast to the present study, a previous study conducted among emergency medicine physicians reported a higher proportion of participants who correctly recognized that avulsed primary teeth should not be replanted (75.9% vs. 41.3%, respectively).²⁴ This discrepancy may be attributed to the different specialties of the physicians in the studies and the higher frequency of trauma cases seen by emergency physicians compared to family physicians. On the other hand, the finding that the majority of physicians were uncertain regarding the reimplantation of avulsed permanent teeth is consistent with the existing literature.^{22,26,30}

Among the family physicians surveyed, 54.3% indicated that the tooth should be cleaned following avulsion. This proportion is consistent with the findings of

similar studies in the literature.^{22,24,32} In accordance with the 2012 IADT guidelines,³³ an avulsed tooth may be rinsed with running tap water. However, the 2020 guidelines advise that a dirty avulsed tooth should be rinsed gently with milk, saline, or the patient's saliva, rather than tap water.³¹ Consequently, the response option 'rinsed with saline' was included in the survey instead of 'rinsed with tap water'. Given the prevalence of saline use in hospital settings for a range of applications, it is anticipated that physicians would favour its use for dental cleaning. However, in the present study, the majority of physicians demonstrated a lack of knowledge regarding the appropriate method for cleaning an avulsed tooth. The low rate of correct responses suggests that physicians lack sufficient knowledge about reimplantation procedures.

It has been demonstrated that reimplantation within the initial 15 minutes following avulsion is crucial for the long-term prognosis.^{9,34} In current study, 71.7% of physicians demonstrated an awareness of the significance of time, a proportion consistent with that observed in previous studies.^{18,26}

In the event that immediate reimplantation is not feasible, the tooth must be transported in an appropriate solution.³⁵ These solutions may include milk, saline, or the patient's saliva, and if necessary, even tap water can be used. However, it is of the utmost importance to avoid leaving the tooth dry in order to maintain the viability of periodontal ligament cells.³⁶ Over half of the physicians surveyed were unaware of the appropriate medium for transporting an avulsed tooth (55.1%). This study findings corroborate those of previous studies in the literature.^{5,23,30,32} This lack of knowledge can directly affect the prognosis of the tooth, underscoring the importance of increasing awareness. Given that family physicians may be the first point of contact for trauma patients in primary care settings, inadequate knowledge regarding avulsion management may directly affect early intervention and referral decisions. Educational interventions may include the incorporation of dental trauma modules into family medicine residency curricula, short guideline-based training sessions, and interdisciplinary collaboration with dentists.

The current IADT guidelines recommend tetanus immunization and antibiotic use following avulsion.³¹ In accordance with these guidelines, 73.2% of the physicians in present study acknowledged the necessity of tetanus immunization after avulsion. This rate is consistent with the findings of Kuru et al.²⁴ It may be reasonably inferred that this high rate of correct responses is attributable to the physicians' high level of awareness of topics related to their medical field.

This cross-sectional survey was conducted among family medicine resident and specialist physicians working at medical faculties and training and research hospitals across all 81 provinces in Turkey. While the findings provide a general overview of family physicians' knowledge and attitudes regarding dental avulsion, the limited participation restricts the depth and robustness of

the conclusions that can be drawn. Therefore, further multicentre studies involving a larger number of physicians are warranted to enhance the generalizability of the results.

Additionally, several methodological limitations should be acknowledged. The present study was designed as an exploratory investigation. Accordingly, the questionnaire used was not subjected to formal psychometric validation or reliability analyses. Although the survey items were adapted from previous studies and based on current guidelines,^{19,22,31} the findings should be interpreted as preliminary data reflecting the current knowledge levels of family medicine residents regarding dental avulsion.

An additional limitation of this study is that, although associations between knowledge- and management-related responses and demographic or professional variables were initially explored, stratification of the sample into subgroups resulted in small cell sizes and limited statistical power, thereby precluding reliable inferential analyses. To avoid potentially misleading interpretations, the analyses were therefore restricted to descriptive statistics.

Another important limitation relates to the use of an online survey methodology. Participation was voluntary, which may have introduced selection and volunteer bias. Moreover, as the exact number of physicians who received the survey invitation and the characteristics of non-respondents were unknown, the response rate could not be precisely calculated. These factors may limit the representativeness of the sample and should be considered when interpreting the findings.

Conclusions

It was determined that, within the limitations of this study, family medicine resident physicians demonstrated inadequate familiarity with avulsion injuries and their associated treatments. It is recommended that training courses on emergency dental treatment and management, provided by dentists, be made available to medical branches that frequently encounter dental trauma patients. Furthermore, it is vital to raise awareness among medical practitioners. It can be reasonably deduced that an enhancement of the knowledge and confidence levels of family medicine resident physicians will contribute to an improvement in the prognosis of patients who have suffered dental trauma through the implementation of proper initial intervention.

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Not applicable.

Conflicts of Interest Statement

No potential conflict of interest relevant to this article was reported.

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