

# Evaluation of Anaphylaxis Knowledge Levels in 4th and 5th Year Students of Faculty of Dentistry

## *Diş Hekimliği Fakültesi 4. ve 5. Sınıf Öğrencilerinde Anafilaksi Bilgi Düzeylerinin Değerlendirilmesi*

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### ABSTRACT

**Objective:** Anaphylaxis is a rapidly developing and life-threatening phenomenon. Rare cases of anaphylaxis may occur during dental practice and may cause loss of life in patients. This study aimed to evaluate the level of anaphylaxis knowledge in 4th and 5th-year dental students.

**Methods:** This descriptive and cross-sectional study was conducted on 4th and 5th-year students at Erciyes University Faculty of Dentistry between September 1 and 31, 2024.

**Results:** In the research group, 50.7% of the students were in the 4th year, and 58.9% were female. The top five symptoms and signs thought to be related to anaphylaxis included respiratory distress (87.4%), rash (79.7%), itching (79.2%), swelling of the tongue (77.8%) and swelling of the lips (70.0%). The proportion of those who received first aid training was higher ( $P>.05$ ) for adrenaline, which is the first preferred drug in the treatment of anaphylaxis; IM, which is the first preferred route of drug administration; and 0.01 mg/kg; which is the drug dose.

**Conclusion:** The study's findings, which indicate a low rate of anaphylaxis in the study group, underscore the need for in-service first aid training for students in formal education and their professional lives after graduation. These results have practical implications for the professional lives of dental students, highlighting the importance of anaphylaxis management in dental care.

**Keywords:** Anaphylaxis, dentistry, epinephrine.

### ÖZ

**Amaç:** Anafilaksi hızla gelişen ve hayati tehlike yaratabilen olgulardır. Diş hekimliği uygulamaları sırasında nadirde olsa anafilaksi olguları görülebilir ve hastalarda yaşam kaybına neden olabilir. Bu çalışma, diş hekimliği fakültesi 4. ve 5. sınıf öğrencilerinde anafilaksi bilgi düzeylerinin değerlendirilmesi amaçlanmıştır.

**Yöntemler:** Tanımlayıcı ve kesitsel nitelikteki bu çalışma, 1-31 Eylül 2024 tarihleri arasında Erciyes Üniversitesi Diş Hekimliği Fakültesinde öğrenim gören 4 ve 5. sınıf öğrenciler üzerinde yapılmıştır.

**Bulgular:** Araştırma grubundaki öğrencilerin %50,7'si 4. sınıfta öğrenim görmekte olup %58,9'u kadındır. Anafilaksiyle ilişkili olduğunu düşünülen ilk 5 sırada yer alan semptom ve bulgular arasında solunum sıkıntısı (%87,4), kızarıklık (%79,7), kaşıntı (%79,2), dilde şişme (%77,8) ve dudakta şişme (%70,0) yer almaktadır. Anafilaksi tedavisinde ilk tercih edilen ilaç olan adrenalin, ilk tercih edilen ilaç uygulama yolu olan IM ve ilaç dozu olan 0,01 mg/kg tamamında ilk yardım eğitimi alanların oranı daha yüksektir ( $P>.05$ ).

**Sonuç:** Araştırma grubundakilerin anafilaksiyle karşılaşma oranları düşüktür. Öğrencilere örgün eğitimde ve mezuniyet sonrası meslek yaşamlarında da hizmet içi ilk yardım eğitimleri yapılarak anafilaksi olgularının yönetimine fayda sağlayabilir.

**Anahtar Kelimeler:** Anafilaksi, diş hekimliği, epinefrin.

### INTRODUCTION

Anaphylaxis is a rapidly developing and potentially life-threatening common allergic reaction characterized by some symptoms and signs.<sup>1</sup> In addition to skin changes such as itching and redness, it causes mucosal changes with swelling below the skin surface. In addition, symptoms and signs such as difficulty in swallowing and breathing due to swelling of the mouth, throat or tongue and hypotension with wheezing, rapid breathing and pulse rate may also be observed.<sup>2</sup> In dentistry, antibiotics, chlorhexidine, toothpaste, latex, iodoform, and local and general anesthetics are among the causes of anaphylaxis.<sup>2-4</sup> Prescribed antibiotics such as amoxicillin, phenoxymethylpenicillin and metronidazole, chlorhexidine which is an antiseptic found in dental products such as mouthwashes and dental implants,

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iodoform in many endodontic products and latex found in gloves are among the causes of anaphylaxis which are frequently seen except dental practices.<sup>2</sup> Anaphylaxis that may occur during dental applications and treatments is usually caused by local and general anesthesia.<sup>5</sup>

Dental education consists of basic components based on medical knowledge and skill-oriented practice in dental practices and professional interventions. In the 5-year dental education, clinical applications are generally emphasized in the 4th and 5th grades. In the 4th and 5th grades, students are required to perform a certain number and quality of clinical dental practices.<sup>6</sup> For example, in the 2024-2025 academic year, a student in the 4th year of dentistry (in the faculty of dentistry where the study was conducted) is required to perform root canal treatment of “3 Incisor or Premolar Teeth” during the endontics clinical applications. In 5th year students (in the faculty of dentistry where the study was conducted), “2 Molar Teeth” are required to perform root canal treatment during the endontics clinical practice.<sup>7</sup>

Dental students may encounter anaphylaxis cases in their patients during clinical dental applications both during their student life and during their professional life after graduation. The aim of this study was to evaluate the level of knowledge about anaphylaxis in 4th and 5th grade dental students

METHODS

Ethics approval was received from Erciyes University social and humanities ethics committee (Date: 27.08.2024, No: 2024/361). Informed consent was obtained from all participants. This descriptive and cross-sectional study was conducted on 4th and 5th year students studying at Erciyes University Faculty of Dentistry. The study was conducted between September 1-31, 2024. The sample size was not determined and all students were included in the study. Although the data of 214 out of a total of 318 active students were reached, a total of 207 questionnaires were evaluated due to the incomplete survey data of 7 students. The reach rate was 94.3%. The data were obtained through face-to-face interviews using a two-part questionnaire form. The questionnaire form consisted of a total of 26 questions in the first part, including 10 questions about the socio-demographic characteristics of the students and the educational process and 16 questions about anaphylaxis.

Statistical analysis

The data were analyzed using SPSS 22.0 (IBM SPSS Corp., Armonk, NY, USA). In statistical analysis, percentage and frequency distributions, arithmetic mean, standard deviation were calculated and chi-square test was performed for qualitative data. *P*<.05 was considered statistically significant.

RESULTS

While 56.3% of the participants in the study group experienced anaphylaxis, 66.2% stated that they knew which immunoglobulin was involved in anaphylaxis. Among those who knew which immunoglobulin was involved, immunoglobulin (Ig) E was the immunoglobulin that played the most role in anaphylaxis with 97.8%. Respiratory distress (87.4%), rash (79.7%), itching (79.2%), swelling of the tongue (77.8%) and swelling of the lips (70.0%) were the top 5 signs and symptoms thought to be related to anaphylaxis. The first preferred drug in the treatment of anaphylaxis was adrenaline with 86.5% and the first preferred route of administration was Intramuscular (IM) with 82.6%. The distribution of the answers given by the research group to the questions related to anaphylaxis is shown in Table 1.

**Table 1.** Distribution of the answers given by the participants in the research group to questions related to anaphylaxis

Questions Related to Anaphylaxis	Number	Percentage
<b>Encounters with anaphylaxis cases</b>		
Yes	13	6.3
No	190	91.8
Does not know	4	1.9
<b>Do the clinics where you practice have treatment schemes about the approach to anaphylaxis?</b>		
Yes	43	20.8
No	103	49.7
Does not know	61	29.5
<b>Do you think anaphylaxis is important for dental practice?</b>		
Yes	198	95.7
No idea	9	4.3
<b>Do you think you can fully manage anaphylaxis in case of anaphylaxis?</b>		
Yes		
No	41	19.8
Does not know	69	33.3
	97	46.9
<b>Do you know which immune globulin plays a role in anaphylaxis?</b>		
Yes	137	66.2
No	70	33.8
<b>Immune globulin playing a role (n=137)</b>		
Immunoglobulin (Ig) E	134	97.8
Immunoglobulin (Ig) G	3	2.2
<b>What symptoms and signs do you think are associated with anaphylaxis?</b>		
Respiratory distress	181	87.4
Redness	165	79.7
Itching	164	79.2
Swelling of the tongue	161	77.8
Lip swelling	145	70.0
Death	132	63.8
Syncope	127	61.4
Urticaria	126	60.9
Anxiety	126	60.9
Chest pain	123	59.4
Swelling of the uvula	118	57.0
Hypoxia	114	55.1
Hypotension	105	50.7
Feeling of fullness in the throat	105	50.7
Cardiac collapse	86	41.5
Vomiting	78	37.7
Epileptic seizure	70	33.8
Abdominal pain	57	27.5
Headache	55	26.6
Hoarseness	54	26.1
Diarrhea	45	21.7
Hypotonia	43	20.8
Conjunctivitis	40	19.3
Runny nose	37	17.9
Incontinence	26	12.6
Knows no symptoms and signs	12	5.8
<b>What do you think is your first choice of medication for the treatment of anaphylaxis?</b>		
Adrenaline	179	86.5
Dexamethasone	10	4.8
No medicine knows	18	8.7
<b>How do you think your first choice medication is administered in the treatment of anaphylaxis?</b>		
Intramuscular (IM)	171	82.6
Intravenous (IV)	15	7.2
Subcutaneous (SC)	3	1.5
Does not know	18	8.7
<b>What do you think should be your first choice of drug dose in the treatment of anaphylaxis?</b>		
0,1 mg/kg	68	32.8
0,01 mg/kg	62	30.0
1 mg/kg	33	15.9
Does not know	44	21.3
<b>What drugs do you think are used in the treatment of anaphylaxis?</b>		
Adrenaline	182	87.9
Oxygen	124	59.9
Corticosteroid	89	43.0
H1 receptor blockers	59	28.5
H2 receptor blockers	49	23.7
Noradrenaline	48	23.2
Iprothorium Bromide	22	10.6
Albuterol	20	9.7
Magnesium Sulfate	13	6.3
Glucagon	13	6.3
Ranitidine	7	3.4
Cimetidine	4	1.9
<b>How long do you think an anaphylaxis patient should be followed up in the hospital after being stabilized by the first intervention?</b>		
1-2 hours	10	4.8
2-4 hours	16	7.7
6-8 hours	36	17.4
12-24 hours	65	31.4
48-72 hours	13	6.3
Does not know	67	32.4

In the research group, 50.7% of the participants were in the 4th year of their education and 58.9% were female. 49.4% of males and 73.5% of 5th year of their education had received first aid training. The rate of receiving first aid training was higher in those who thought that they could manage anaphylaxis fully in case of anaphylaxis and in those who knew which immunoglobulin played a role in anaphylaxis, and the difference was statistically significant ( $P<.005$ ). Although the rate of receiving first aid training was higher in those who stated that adrenaline was the first drug of choice in the treatment of anaphylaxis, the method of administration was IM and the dose of administration was 0.01 mg/kg, the difference was not statistically significant (Table 2). The evaluation of the research group according to various characteristics according to the status of receiving first aid training is shown in Table 2.

**Table 2.** Evaluation of the study group according to various characteristics according to the status of first aid training

Various Features	n	Receiving First Aid Training (n=99)		$\chi^2$	P
		Number	Percentage%		
Gender					
Female	122	57	46.7	0.145	.703
Male	85	42	49.4		
Education level					
4th grade students	105	24	22.9	53.240	.000
5th grade students	102	75	73.5		
Feeling fully capable of managing anaphylaxis in the event of anaphylaxis					
Yes, he/she can.	41	29	70.7	13.332	.001
Knowing which immunoglobulin plays a role in anaphylaxis					
Yes, She/he knows.	137	84	61.3	29.536	.000
Is a dentist authorized first responder in anaphylaxis?					
Yes, She/he is authorized.	168	89	53.0	9.478	.002
Symptoms and signs that you think are related to anaphylaxis **					
Respiratory distress	181	91	50.3	3.467	.063
Redness	165	88	53.3	9.885	.002
Itching	164	82	50.0	1.495	.221
Swelling of the tongue	161	84	52.2	5.489	.019
Lip swelling	145	74	51.0	1.997	.158
Your first choice of medicine to treat anaphylaxis					
Adrenaline	179	91	50.8	4.811	.028
Your first choice route of drug administration in the treatment of anaphylaxis					
Intramuscular (IM)	171	87	50.9	3.668	.055
What do you think should be your first choice of drug dose in the treatment of anaphylaxis?					
0.01 mg/kg	62	35	56.5	2.639	.104

Percentage of columns taken. \*\*Most common 5 symptoms and findings.

## DISCUSSION

It has been reported that the frequency of anaphylaxis in all age groups, including infants, has increased 5-7-fold in the last 10-15 years<sup>2</sup>. The American Anaphylaxis Epidemiology Study Group in 2006 reported that 50-2000 anaphylaxis attacks may occur per 100 thousand and the lifetime prevalence of anaphylaxis may be between 0.05-2%.<sup>8</sup> In publications in the last 5 years, it was reported that the annual incidence was between 50-112 per 100 thousand and the prevalence ranged between 0.3-5.1%.<sup>9</sup> In a study conducted in Turkey, the estimated prevalence of anaphylaxis was found to be 0.3-5.1%.<sup>10</sup> In this

study, 6.3% of the students encountered anaphylaxis cases during clinical practice (Table 1). In addition, in another study conducted in 2015 for dentists professor, associate professor, assistant professor and research assistant) and their students, 2.6% of the participants encountered a case of cardiac arrest.<sup>11</sup> Although anaphylaxis and cardiac arrest cases are not common both in the general population and in clinical dental practice, they may cause life-threatening situations. Therefore, it is important for dental students to recognize emergencies and manage the crisis moment well both in their student and post-graduation working lives in terms of patients and themselves.

Immunological mechanisms (food, drugs and bee venom) often play a role in the development of anaphylaxis. Immunological mechanisms cause anaphylaxis by causing mast cell and basophil degranulation.<sup>12,13</sup> Although a significant portion of anaphylaxis caused by immunological mechanisms occurs through IgE, it has been described that anaphylaxis cases caused by non-immunological mechanisms may occur through IgG.<sup>14</sup> In this study, 66.2% of the students knew which immunoglobulin played a role in anaphylaxis (97.8% of those who knew had IgE and 2.8% had IgG) (Table 1). In addition, while the rate of those who knew which immunoglobulin played a role in anaphylaxis received first aid training was 61.2%, the rate of those who did not know which immunoglobulin played a role in anaphylaxis received first aid training was 21.4% (Table 2). The difference is statistically significant ( $P<.05$ ). Knowing the pathogenesis of anaphylaxis can facilitate diagnosis and treatment. Therefore, providing first aid training to students through formal education and to employees through in-service training can be beneficial for the management of anaphylaxis cases.

Although there are cases where skin findings are not seen in anaphylaxis or are not present at the beginning, skin and mucosal symptoms are the most common symptoms of anaphylaxis.<sup>15</sup> In this study, the most common symptoms and findings were skin and mucosal (4 of the first 5 symptoms and findings), which were redness (79.7%), itching (79.2%), swelling of the tongue (77.8%) and swelling of the lips (70.0%) (Table 1). In addition, death in anaphylaxis is related to respiratory and cardiovascular system complications.<sup>16</sup> The most common symptom and finding is respiratory distress (87.4%), and the fact that death will occur in anaphylaxis (63.8%) is also important in terms of being aware that anaphylaxis cases are serious and life-threatening (Table 1). It should not be forgotten that anaphylaxis cases may occur without skin and mucosal findings.

Treatment after the development of anaphylaxis is life-saving. The most important drug in the treatment of anaphylaxis is adrenaline.<sup>2</sup> Adrenaline reverses peripheral vasodilation, reduces edema, increases blood pressure and improves respiration by widening the airways. In addition, adrenaline increases myocardial contractility and suppresses histamine and leukotriene release.<sup>2,17</sup> Adrenaline is administered IM to the vastus lateralis muscle located in the laterofemoral (lateral thigh) region at a dose of 0.01 mg/kg. The maximum dose of adrenaline that can be administered at one time is 0.5 mg in adults and 0.3 mg in children. If there is no improvement in the condition, adrenaline should be continued at the same dose at 5-15 minute intervals.<sup>18-20</sup> In this study, 86.5% of the participants stated that adrenaline is the first drug to be administered in anaphylaxis, and 90.5% stated that adrenaline is administered IM. The rate of those who know that adrenaline is 0.01 mg/kg in the application is 30.0% (Table 1). The rate of receiving first aid training is higher in those who know the correct application method and dose, since adrenaline is the first drug to be applied. However, there is no statistical significance between them (Table 2). Although the rate of knowing the first drug to be applied in anaphylaxis and the

application method is high, the rate of those who know the application dose is low. Anaphylaxis applications are holistic. Therefore, low drug dose rates may cause problems in terms of treatment.

## CONCLUSION

The rate of encountering anaphylaxis in the research group is low, and almost all of them think that anaphylaxis is important in terms of dentistry practices. Approximately one in every five students think that they can fully manage an anaphylaxis case. In-service first aid training can be provided to students during their formal education and post-graduation careers, which can benefit the management of anaphylaxis cases.

**Ethics Committee Approval:** Ethics approval was received from Erciyes University social and humanities ethics committee. (Date: 27.08.2024, No: 2024/361).

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