

# Türkiye'deki Acil Servislerde Çalışan Hekimlerin Yılan Isırıklarına Yaklaşımı

## The Attitudes of Emergency Physicians in Turkey Towards The Snakebites

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### ÖZ

**GİRİŞ ve AMAÇ:** Bu çalışmanın amacı, acil servis hekimlerinin yılan ısırıklarına karşı yaklaşımını değerlendirmektir.

**YÖNTEM ve GEREÇLER:** Bu çalışma acil serviste çalışan hekimlerin demografik özellikleri, çalışma yerleri ve sürelerini, yılan ısırıkları ile karşılaşmış ve karşılaşmadıklarını, antivenom kullanıp kullanmadıklarını, antivenom kullanma şekillerini, tedavi yaklaşımı ve deneyimlerini araştıran bir anketten oluşmaktadır.

**BULGULAR:** Çalışmaya 611 hekim katıldı. Hekimlerin 71.4%'ü (n=436) daha önce yılan ısırığı hastasına müdahale ederken, bu oran 42.0 % (n=183) ile en fazla acil tıp uzmanlarında (ATU) idi (p<0.001). Hekimlerin 48.9%'u (n=299) yılan antivenomlarının intravenöz (IV), 32.4%'ü (n=198) ise yarısı yara kenarına/yarısı intramusküler (YYK/YİM) olarak kullanılması gerektiğini belirtmişlerdir. Yılan antivenomlarının IV kullanılması oranı, ATU'larda 58.3% (n=123), Acil Tıp Asistanlarında (ATA) 54.0% (n=115) ve pratisyen Hekimlerde (PH) ise 32.6% (n=61) iken YYK/YİM kullanım oranı, PH'ler de 39.6% (n=74), ATU'lar da 31.3% (n=66) ve ATA'lar da ise 27.2% (n=58) olarak bulunmuştur (p<0.001).

**TARTIŞMA ve SONUÇ:** Bu çalışmada acil servislerde, zehirli yılan ısırıklarının primer tedavisi olan antivenomların yüksek oranda yanlış kullanıldığı saptandı. Bu yüzden hem mezuniyet öncesi hem de mezuniyet sonrası eğitimler ile bu konuların yeniden ve ayrıntılı olarak irdelenmesi gerekmektedir.

**Anahtar Kelimeler:** Acil Servis, Acil Hekimleri, Yılan Isırıkları, Yılan Antiserumu

### ABSTRACT

**INTRODUCTION:** The aim of this study is to investigate the attitudes of emergency physicians towards snakebites.

**METHODS:** This study includes a questionnaire aiming to examine emergency physicians' knowledge, skills and experience regarding snakebites as well as demographic characteristics. It also aims to identify the causes of shortcomings in the management of emergency department (ED).

**RESULTS:** A total of 611 physicians participated in the study. 71.4% of physicians (n = 436) experienced snakebite cases before. Emergency medicine specialists (EMS) had the highest rate 42.0% (n = 183) (p <0.001). 48.9% (n = 299) of the physicians stated that snake antivenoms should be used intravenously (IV), whereas 32.4% (n = 198) declared that snake antivenoms should be used as half wound edge / half intramuscular (HWE / HI). The rate of IV use in snake antivenoms was found to be 58.3% (n = 123) in EMSs, 54.0% (n = 115) in emergency medicine residents (EMR), and 32.6% (n = 61) in general practitioners (GP), while the rate of HWE / HI use in snake antivenoms was 39.6% (n = 74) in GPs, 31.3% (n = 66) in EMSs, and 27.2% (n = 58) in EMRs (p <0.001).

**DISCUSSION AND CONCLUSION:** We report high rates of misuse of antivenoms, the primary treatment of venomous snake bites, which is thought-provoking. This issue should be examined in detail through both undergraduate and postgraduate trainings.

**Keywords:** Emergency Department, Emergency Physicians, Snakebites, Snake antivenom,.

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## INTRODUCTION

Throughout the world, about 30% of the 3000 snakes are venomous and accepted as dangerous for humans (1). It is known that at least 421,000 envenomation cases are encountered and 20,000 deaths occur throughout the world each year. Snake bite is one of the major public health problems encountered especially in rural tropical areas (2). Most of the poisonous snakes in the world are seen in South America, Africa and East Asia. The most poisonous species are grouped as Elapidae, Viperidae, Hydrophiida, Antractaspidida and Colubridae (3). These snakes cause neurotoxic, myotoxic and cardiotoxic effects. In our country, 41 snake species are known. 13 of those snakes are poisonous. From those poisonous species, 10 are Viperidae (Vipers), 2 are Colubridae and one species is Elapidae. These snakes are mostly seen in Eastern and Southeastern Anatolia, Eastern Black Sea and in northwestern Thrace. Viperidae, the most abundant species in our country, causes more haemotoxic and local tissue poisonings (3-6). Emergency departments(ED) are the first contact units for patients subjected to snake bites. Accurate and effective interventions in the EDs are life-saving. The aim of this study is to contribute the literature by investigating emergency physicians' knowledge and skills regarding snakebites, the problems encountered in emergencies and whether the patients follow current guidelines. In the literature, studies are mainly on clinical and laboratory findings of the patients exposed to snake bites.

## MATERIALS and METHODS

The participants of this study were the physicians working in EDs in Turkey. This study includes a questionnaire aiming to investigate emergency physicians' information and experience and experience regarding snakebites as well as demographic characteristics. It also aims to identify the causes of shortcomings in the management of EDs. In this survey, the participants were queried on their age, gender, work period, job descriptions and institutions; and whether they had witnessed patients with snake bites, whether they used antivenom, the way they used them, and whether they encountered any difficulties during their use in the emergency service, and finally whether they used tetanus or antibiotics. Data were gathered by answering the

questionnaire form traditionally, or sending the link of questionnaire installed on Google Drive through mail or WhatsApp between December 2015 and June 2016. The study has been approved by the Ethics Committee of Balıkesir University School of Medicine.

## Statistical Analysis:

For the statistical analysis, SPS 21.0 is used. We have checked whether the data fits the Gaussian distribution through the Kolmogorov-Smirnov and Shapiro-Wilk tests. The demographic properties and the investigations of the general answers are determined through identification tests and reported as percentages. The categorical variables have been analyzed through the Chi-Square and Fisher exactness tests. The continuous variables, in the case of Gaussian type distributions, have been identified with the mean and the standard deviation; and in the case of non Gaussian type distributions, have been identified with the median and IQR, and  $p < 0.05$  is assumed to be statistically meaningful.

## RESULTS

A total of 611 physicians participated in the study. 63.8% ( $n = 390$ ) were 34 years and under. In addition, 71.7% of the participants ( $n = 438$ ) were male. As for title, 34.9% ( $n = 213$ ) of the physicians were emergency medicine residents (EMR) 34.5% ( $n = 211$ ) were emergency medicine specialists (EMS) and 30.6% ( $n = 187$ ) were general practitioners (GPs). 40.4% of participants ( $n = 247$ ) were working in state hospitals, and 50.6% ( $n = 309$ ) were working in the emergency department for less than 5 years. The highest participation rate of the questionnaire was in the Marmara region (27.5% ( $n = 168$ )), whereas the lowest participation rate was in the Eastern Anatolia region (8.0% ( $n = 49$ )) (Table 1). 19.0% of the physicians ( $n = 116$ ) were regularly checking the snake antivenoms in the emergency room and the snake antivenoms were being mostly checked regularly by EMSs (55.2%) ( $p < 0.001$ ). 71.4% of the physicians ( $n = 436$ ) intervened to a snake bite patient before.

Tablo 1. Demographic data			
		n	%
Age Range	34 and younger than	390	63.8
	35-44	186	30.5
	45 and older than	35	5.7
Gender	Male	438	71.7
	Female	173	28.3
Title	General Practitioner	187	30.6
	Emergency Medicine Resident	213	34.9
	Emergency Medicine Specialist	211	34.5
Professional Experience (Year)	Less than 5 years	309	50.6
	5-9 years	175	28.6
	10-14 years	94	15.4
	More than 15 years	33	5.4
Institution	Public Hospital	247	40.4
	Training and Research Hospital	179	29.3
	University Hospital	164	26.8
	Private Hospital	21	3.4
Geographic	Marmara	168	27.5
	Aegean	89	14.6
	Mediterranean	73	11.9
	Southeast Anatolian	93	15.2
	Eastern Anatolian	49	8.0
	Black Sea Region	61	10.0
	Central Anatolian	78	12.8
Total		611	100

82.3% of the physicians (n = 503) stated that some measures should be taken against the complications that may occur during the application of snake antivenoms. That rate was 88.6% (n = 187) in EMSs, and 74.3% (n = 139) in GPs (p = 0.001). 65.0% (n = 397) of the participants reported that they hesitated to initiate snake antivenoms. That rate was 58.3% (n = 123) in EMSs, and 69.5% (n = 130) in GPs (P = 0.039). On the other hand, 41.1% (n = 251) of the participants expressed that they need a consultation to initiate antivenom. That rate was found to be 75.4% (n = 141) in GPs, and 15.9% (n = 40) in EMSs (p <0.001). 48.8% (n = 298) of the participants reported that the some problems were experienced in the hospitalization of snake bite patients in the institution they work for. That rate was

found as 62.2% (n = 102) in university hospitals, while it was 19.0% (n = 4) in private hospitals (p <0.001).

That rate was found as 86.7% (n = 183) in EMSs, 68.5% (n = 146) in EMRs, and 57.2% (n = 107) in GPs (p <0.001). 48.9% (n = 299) of the physicians stated that snake antivenoms should be used intravenously (IV), while 32.4% (n = 198) declared that snake antivenoms should be used as half wound edge / half intramuscular (HWE / HI). The rate of IV use in snake antivenoms was 58.3% (n = 123) in EMSs, 54.0% (n = 115) in EMRs, and 32.6% (n = 61) in GPs. On the other hand the rate of HWE / HI was found to be 39.6% (n = 74) in GPs, 31.3% (n = 66) in EMSs, and 27.2% (n=58) in EMRs (p <0.001) (Table 2).

Tablo 2. Distribution of snake antivenom use according to variables

		IV	IM	HWE - HIM	Other N (%)	Total N	P Value Standard Deviation(Sd)
		N (%)	N (%)	N (%)			
Age Range	34 and younger than	197 (50.5)	48 (12.3)	113 (29.0)	32 (8.2)	390	P=0.029
	35-44	93 (50.0)	14 (7.5)	68 (36.6)	11 (5.9)	186	Sd=6
	45 and older than	9 (25.7)	6 (17.1)	17 (48.6)	3 (8.6)	35	
Gender	Male	217 (49.5)	54 (12.3)	134 (30.6)	33 (7.5)	438	P=0.298
	Female	82 (47.4)	14 (8.1)	64 (37.0)	13 (7.5)	173	Sd=3
Title	General Practitioner	61 (32.6)	26 (13.9)	74 (39.6)	26 (13.9)	187	P<0.001 Sd=6
	Emergency Medicine Resident	115 (54.0)	28 (13.1)	58 (27.2)	12 (5.6)	213	
	Emergency Medicine Specialist	123 (58.3)	14 (6.6)	66 (31.3)	8 (3.8)	211	
Professional Experience (Year)	Less than 5 years	141 (45.6)	43 (13.9)	93 (30.1)	32 (10.4)	309	P=0.016 Sd=9
	5-9 years	96 (54.9)	14 (8.0)	56 (32.0)	9 (5.1)	175	
	10-14 years	51 (54.3)	8 (8.5)	33 (35.1)	2 (2.1)	94	
	More than 15 years	11 (33.3)	3 (9.1)	16 (48.5)	3 (9.1)	33	
Institution	State Hospital	98 (39.7)	28 (11.3)	95 (38.5)	26 (10.5)	247	P=0.032 Sd=9
	Training and Research Hospital	100 (55.9)	19 (10.6)	51 (28.5)	9 (5.0)	179	
	University Hospital	89 (54.3)	20 (12.2)	45 (27.4)	10 (6.1)	164	
	Private Hospital	12 (57.1)	1 (4.8)	7 (33.3)	1 (4.8)	21	
Geographic Region	Marmara	71 (42.3)	10 (6.0)	75 (44.6)	12 (7.1)	168	P<0.001 Sd=18
	Aegean	46 (51.7)	8 (9.0)	32 (36.0)	3 (3.4)	89	
	Mediterranean	34 (46.6)	10 (13.7)	18 (24.7)	11 (15.1)	73	
	Southeast Anatolian	49 (52.7)	19 (20.4)	21 (22.6)	4 (4.3)	93	
	Eastern Anatolian	27 (55.1)	7 (14.3)	9 (18.4)	6 (12.2)	49	
	Black Sea Region	33 (54.1)	6 (9.8)	15 (24.6)	7 (11.5)	61	
	Central Anatolian	39 (50.0)	8 (10.3)	28 (35.9)	3 (3.8)	78	
Ever had a snake bite intervention	Yes	227 (52.1)	50 (11.5)	136 (31.2)	23 (5.3)	436	P=0.003 Sd=3
	No	72 (41.1)	18 (10.3)	62 (35.4)	23 (13.1)	175	
Total		299 (48.9)	68 (11.1)	198 (32.4)	46 (7.5)	611	

IV: Intravenously, IM: Intramuscular, HWE – HIM: Half wound edge / Half intramuscular

The participants stated that 40.6% of those patients (n = 248) were hospitalized in intensive care unit (ICU), 13.7% (n = 84) were taken to internal medicine, 13.6% (n = 83) were hospitalized in infectious diseases, 7.0% (n = 43) were taken to the Orthopedics and Traumatology, and 25.0% n (n = 173) were followed in other sections, especially in emergency services (p <0.001). The question "In which department should those patients be hospitalized?" was answered as ICU by 59.1% (n = 361), infectious diseases by 16.4% (n = 100), internal medicine by 11.9% (n = 73), Orthopedics and Traumatology by 4.4% (n = 27), and other department especially EDs by 8.2% (P = 0.003). The question "Should tetanus prophylaxis be questioned in snakebites?" was answered as "yes" by 94.4% of the participants (n = 577). That rate was found as 89.8% (n = 168) in GPs, 96.2% (n = 205) in EMRs and 96.7% (n = 204) in EMSs (p = 0.004). The question "Should antibiotic prophylaxis be applied in snakebites?" was answered as "yes" by 78.2% (n = 478) of the participants. That rate was 84.5% (n = 180) in EMRs, 80.7% in GPs (n = 151) and 69.7% (n = 147) in EMSs (p = 0.001).

## DISCUSSION

Snake antivenom is the primary treatment for poisoning (7). Antivenoms are mainly used for some of the systemic and local complications (3). Mortality rates decreased under 1% in well-treated patients after snake antivenom were applied even if they were 5% to 25% before the use of snake antivenom (5). Antivenoms commonly used in our country are mostly derived from horse serum, and are effective against the viper, which is the most common type of snakes in Turkey. Two of the most popular antivenoms that are used in Turkey are produced in Egypt and Croatia, and one other is made in Turkey. Although antivenoms are mandatory to be held in emergencies according to the regulation of health ministry, the rate of "regular control of antivenoms" and "knowing the commercial name of the antivenom" was low. We think this situation may be due to the fact that snake bites are not common. Complications which may occur during the use of antivenoms are divided into two as early and late reactions. Early reactions can be classified as anaphylactoid reactions with urticaria,

bronchospasm, and hypotension as well as simple febrile reactions during the application of antivenom resulting from pyrogens in poorly produced antivenoms (8). Up to 40% of patients who have early reactions also develop systemic anaphylaxis (9). Adrenaline, antihistamines and corticosteroids should be available for allergic reactions / anaphylaxis depending on the use of antivenom (6). Late reactions, which are commonly related to serum sickness, include lymphadenopathy, proteinuria, fever, itching and urticaria, and arthralgia. They develop one to two weeks after treatment. After the treatment with some antivenoms, the frequency may be as high as 75% (10). In this study, 82.3% of the participants stated that necessary measures should be taken to prevent possible complications before using antivenoms. This rate was the highest in EMSs, while it was the lowest in GPs, which was found to be statistically significant. (p = 0.001). We think that this situation may be related to emergency medical training and clinical experience. In the user manual of antivenoms used in our country, it was stated that antivenoms can be used as IV and HWE / HI. However, in the literature, the use of antivenoms as IV is recommended ((8, 11)8, 23). IV administration is a more effective method (12, 13). Additionally, IV use is advantageous in controlling the infusion rate and enables easier cessation of antivenom administration (14). Subcutaneous or IM injection is not suggested (15) as IM use causes delayed and incomplete neutralization of venom components, lower bioavailability, and a longer time to reach peak concentration (16, 17). Also, as well as local injections' slower neutralization of the poison, used antivenoms impair circulation by increasing pressure as the bitten regions are mostly feet or hands in which pressure is already high (18). We think that one of the most important results of this study was the answer to "How should antivenoms be used?" question. Only 48.9% of the participants expressed that antivenoms should be used as IV, while other participants stated the need for various methods of application. According to the gender of the participants, no statistically significant difference was found. However, when age, length of work, titles, institutions and geographical regions were considered, statistically significant results were obtained. (Table 2). No data or suggestions regarding IM use of antivenoms were encountered in either the

user guide of the manufacturer or the literature. High rates of this application are quite thought-provoking. We believe that this application might be confused with applications such as rabies and tetanus immune globulin application. In addition, IM suggestions of the manufacturers may also mislead the physicians. HWE / HI application increases with the age. Additionally, HWE / HI use is higher in GPs in terms of the title, state hospitals in terms of institution, and in Marmara in terms of region. We believe that those results may be related that GPs and the older physicians do not follow current guidelines. In addition, the reason why HWE / HI use was high may be that GPs commonly work in state hospitals and snake bites are rare in the Marmara region because of the increasing industrialization and urbanization. Another result of this study is that most of the physicians (65.0%) hesitated to start antivenom. Additionally, 41.1% of the physicians need consultations to start antivenoms. This situation can be explained by the rarity of a snake bites and clinical inexperience. No consensus has been reached regarding which department should intervene the medical condition in emergency services (Burns, tendons, blood vessels and nerve injuries, etc.). That situation may cause a conflict between physicians in emergency services and other related physicians. This has a negative impact on patient care and emergency operations. To solve this problem, local solutions are usually adopted on the basis of hospitals. As snake bites require a multidisciplinary approach, problems are experienced in the management of after emergency. This study also confirmed this fact. 48.8% of the participants stated that problems were encountered in the hospitalization of those patients. Most of the admission problems were encountered in university hospitals (62.2%) which was statistically significant ( $p < 0.001$ ). We believe that the limited number of beds, and the time consuming consultation process are some of the factors which cause problems in University Hospitals. 40.6% of physicians stated that such patients were hospitalized in ARICU in their institutions. That rate was found to be quite lower in University Hospitals compared to other health institutions (28.7%). Additionally, these patients were mostly followed in emergency services in University Hospitals (40.2%), which was statistically significant ( $p < 0.001$ ). Which department should follow the

patients is not clear. This situation can be considered as one of the reasons for the high rate in university hospitals in addition to bed and consultation problems mentioned before. To handle the situations which require hospitalization, intensive care units have been established in emergency departments of some universities and teaching and research hospitals. Routine use of tetanus are recommended for the treatment of snake bites (5). 94.4% of the participants of this study stated that tetanus prophylaxis should be questioned. According to the title, this rate was found as the highest in EMSs and the lowest in GPs, which was statistically significant. The routine use of antibiotics in the treatment of snakebite is controversial. Some sources suggest routine use of antibiotics in patients initiated antivenom (5), while some sources advice antibiotics to the patient to undergo surgical procedure (19). 78.2% of the participants suggested the use of antibiotics. The rate of antibiotic use was the highest in EMPAs, while it was the lowest in EMSs, which was statistically significant ( $P < 0.001$ ). A clinical staging has been established for the treatment of poisonous snake bites in emergency rooms (20). However, there is an uncertainty regarding the care of those patients after emergency services as snake bites require a multidisciplinary approach. So, we believe that a clinical algorithm should be established by the Ministry of Health and other specialty associations.

### LIMITATIONS

The most important limitation of this study was the number of participants. The reason of this situation might be related to the reluctance of physicians to fill out a questionnaire on this issue and the misbelief "questioning the knowledge ". In addition, that the physician distribution is not homogeneous and the participation rates across regions are not balanced, and does not cover all of the geographic regions, and the absence of the Cronbach's alpha calculation of the survey, may be viewed as further limitations and deficiencies.

### CONCLUSION

As a result, physicians working in emergency services are inadequate in the diagnosis and treatment of the patients who are exposed to snakebites and they experience various problems in the management after emergencies. Antivenom use is the most important

method in treating those patients. However, the wide misuse of antivenoms is highly thought-provoking. Thus, these issues should be re-examined and addressed in detail in undergraduate and post graduate trainings.

#### Conflict of interest:

There is no conflict of interest.

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