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A clinical and epidemiological study on spider bites in Turkey

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ABSTRACT

Objective: To classify and characterize spider bites among inquiries to the National Poison Information Center (NPIC) between 1995 and 2004, in terms of the epidemiology and clinical symptomatology. **Methods:** Clinical and epidemiological data were obtained from the NPIC's patient records. The following information was recorded for each spider bite: demographics, circumstances of the bite, and local and systemic effects. **Results:** A total of 82 cases were reported. The accidents were mostly seen during August. The gender distribution was 59.76% male, 37.20% female, and 2.44% unknown and the 20–29 age group presented more spider bites. Most of the cases were in the Central Anatolia, Marmara, Mediterranean, and Black Sea regions. Local symptoms were observed in 60.87% of the cases, including local pain, edema, redness, itching, debris, burning, and numbness. Systemic symptoms were observed such as nausea, vomiting, abdominal pain, lethargy, anxiety, weakness, somnolence, dyspnea, hypertension, hypotension, and hyperthermia. **Conclusions:** In conclusion, these findings emphasize the presence of medically important spider species in Turkey. All patients and especially pediatric patients should be admitted to the hospital. Identification of spider species may be considered a useful clinical and epidemiological tool in determining the incidence and risk of spider bites.

1. Introduction

Spiders (Arthropoda: Arachnida) are an ancient and successful group of invertebrate animals, widely distributed throughout the world. More than 50 000 spider species all over the world have been described. Among them, about 200 species are actually considered dangerous to humans[1–5]. Spider venom is mainly two types, neurotoxic and necrotoxic, which affect a variety of vital physiological functions in insects and mammals[1,6]. Neurotoxins cause paralysis of the nervous system in arthropods and vertebrates. Necrotoxins form ulcers and heavy destruction in the tissues[1,5,7]. In addition, the venom damages the muscular system and blood cells and causes breathing difficulties and death. The venom of some species is fifteen times more effective than the venom of a viper[5].

In Turkey, some species of *Latrodectus*, *Steatoda*, *Loxosceles*, *Cheiracanthium*, *Segestria*, *Agelena*, *Tegenaria*, *Araneus*, and *Argiope* are venomous spider species of known medical importance[5,7]. Venomous species of *Latrodectus*, *Loxosceles*, *Phoneutria*, *Atrax*, and *Hadronyche* share human

beings' habitats[1,5,7].

The genera *Loxosceles* and *Latrodectus* include the primary species whose venoms produce significant toxic effects in humans[2,8,10]. Loxoscelism is caused by spiders that belong to the *Loxosceles* genus and the approximately 100 species are found from temperate southern Africa northward through the tropics into the Mediterranean region and southern Europe, and from temperate and tropical zones of North and South America and China[11].

In loxoscelism, a local necrotic lesion appears, and in many cases, loxoscelism or necrotic araneism is considered a serious public health problem[8,10–15]. Therefore, national poison information services or centers have an important role in case of envenomation.

The aim of this study was to classify and characterize spider bites among inquiries to the National Poison Information Center (NPIC) between 1995 and 2004, in terms of the epidemiology and clinical symptomatology.

2. Materials and methods

2.1. Data collection

NPIC was established in 1986 and is accessible on a 24-h/7-days-a-week basis. For this study, only cases involving spider envenomations in the NPIC database between 1995 and 2004 were investigated.

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2.2. Epidemiological and clinical data

Clinical and epidemiological data were obtained from the NPIC's patient records. The following information was recorded for each spider bite: demographics (age, gender, and geographical location), circumstances of the bite (time, date, activity at the time, season), and local and systemic effects. Clinical assessment was conducted from records during the period 1995–2004. The local group included patients with symptoms limited to localized pain, hyperemia, burning, and itching. The systemic group included patients who displayed local symptoms in addition to one of the following systemic symptoms.

3. Results

We compiled all reported cases in Turkey of human spider bites between 1995 and 2004. Among the gross total of 129 548 reported poisoning cases of various origins, 1929 (1.5%) of all incidents involved animal bites and stings, of which 82 (4%) were spider bites.

The incidents were reported in all regions of Turkey. The majority of the incidents occurred in the Central Anatolia region, followed by the Marmara region, the Mediterranean region, and the Black Sea. The Marmara region, despite being a relatively small region (8.5% of the total land area of Turkey), had the highest population per unit area (Table 1).

The majority of the incidents happened during the summer period (68.28%). The monthly distribution of incidents is graphically demonstrated in Figure 1, which displays a clear peak in early summer with 30.48% of the incidents occurring in July.

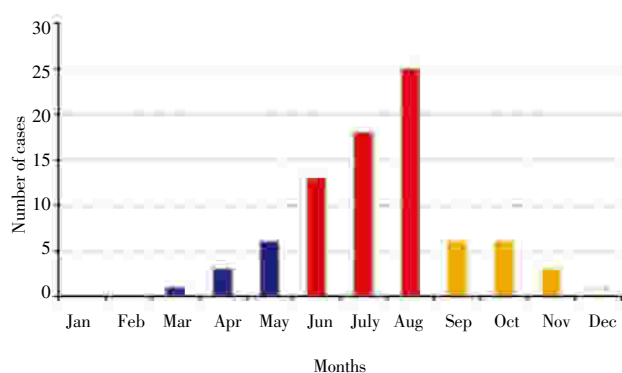


Figure 1. Seasonal distribution of spider bites in Turkey.

The gender distribution was 37.20% female and 59.76%

Table 1

Geographic distribution of spider bites according to regions.

Regions	Patient data		Demographic data	
	Cases (n)	Percentage (%)	Land area (%)	People (/km ²)
Central Anatolia	25	30.49	20.0	71
Marmara	20	24.39	8.5	258
Mediterranean	17	20.73	15.0	71
Black Sea	15	18.29	18.0	59
Aegean	3	3.66	10.0	96
Eastern Anatolia	1	1.22	21.0	37
Southeastern Anatolia	1	1.22	7.5	112
Total	82	100.00	100.0	83

male as shown Table 2. With respect to age, the 20–29 age group presented more spider bites (24.40%) than the other groups; the distribution was 17.07% for the 30–39 age group and 14.63% for the 0–4 age group.

The majority of the victims (85.36%) arrived at a local healthcare facility or hospital less than 1 h after the incident (Table 2). Most of the spider bites occurred in daylight (57.89%), as shown in Table 2.

The spider bites caused local and systemic effects. Local symptoms were observed in 60.87% of the cases, including local pain (29.16%), edema (29.16%), redness (12.15%), itching, debris, burning, and numbness (4.16%). In cases where systemic symptoms (39.13%) were observed, the most frequent findings in descending order were nausea, vomiting, abdominal pain, lethargy, anxiety, weakness, somnolence, dyspnea, hypertension, hypotension, and hyperthermia (Table 3).

4. Discussion

There are a few studies of definite bites with expert spider identification, but these have been either small studies or case reports on spider bites in Turkey. However, as far as we know, the present study is the first epidemiological and clinical study of spider bites in Turkey. In this study, a retrospective analysis of NPIC records showed a total number of 82 inquiries on spider bite cases within a period of ten years (1995–2004).

The highest incidence of spider bites took place during the warmest months of the year in different regions^[12,14,16,17]. The present study shows that cases are frequent during hot months with the maximum frequency in August. This result is in agreement with previous studies. Epidemiological studies showed that most cases were seen in women^[12,16,17]. In our study, the results are a little bit different: spider bites were seen mostly in men (59.76%). On the other hand, another study reported that the highest incidence of accidents was seen in male victims^[18]. The majority of bites occurred between 08:00 and 20:00^[7]. In this study, we also found similar results. Cristiano et al stated that most spider bites were seen in patients between 20 and 49 years old (49.8%)^[17]. In this study, similar results were found for the same age group (53.66%). In Brazil, the majority of victims arrived at the hospital after 3 h^[17]. In the present study, 85.36% of patients presented to healthcare facilities in less than 1 h (47.76%) after the bite.

Biting arthropods are capable of injecting venom or allergens that may lead to significant medical reactions. Spiders are predators and deliver venom to their prey through their chelicerae, or fangs. Most spiders do not

Table 2

Distribution of spider bites according to patients' epidemiological characteristics.

Epidemiological characteristics		Number of patients (n=82)	Percentage (%)
Age	≤4	12	14.63
	5–9	8	9.76
	10–19	10	12.19
	20–29	20	24.40
	30–39	14	17.07
	40–49	10	12.19
	50–59	5	6.10
	60–69	2	2.44
≥70	1	1.22	
Gender	Male	49	59.76
	Female	31	37.20
	Unknown	2	2.44
Time of day (n=57)	Day time (08:00–20:00)	33	57.89
	Night time (20:00–08:00)	24	42.11
Hospital arrival time (n=67)	≤1	32	47.76
	1–2	8	11.94
	2–3	1	1.49
	≥4	26	38.81
Admission center	Local hospital	70	85.36
	Private medical center	10	12.20
	Primary health center	2	2.44

Table 3

Details of the clinical effects occurring in nine patients after spider bites.

Case No./Year	Age/Sex	Month	Province	Location	Admission time	Systemic effects
11933/2001	40/F	October	Konya	Central Anatolia	<1 h	Hyperthermia
12473/2003	33/M	August	Sivas	Central Anatolia	16 h	Nausea, vomiting, abdominal pain
11128/2002	21/M	September	Osmaniye	Mediterranean	12 h	Anxiety
5329/2004	12/M	July	Antalya	Mediterranean	9 h	Pain and hypertension
2046/2004	6/F	May	Izmir	Aegean	5 h	Numbness, weakness, hyperthermia
8488/2001	27/M	August	Kocaeli	Marmara	U	Hypotension
6520/2001	2/M	July	Cankırı	Central Anatolia	U	Lethargy
12594/2003	60/F	October	Kastamonu	Black Sea	5 h	Somnolence
12477/2003	16/M	August	Yozgat	Central Anatolia	1 h	Dyspnea

U: Unknown, M: Male, F: Female.

cause clinically important bites or envenomation in humans because the spider either possesses toxin that is too weak to harm humans or does not possess chelicerae that are large and strong enough to penetrate human skin^[7,19,20]. Symptoms usually resolve between 12 and 72 h after envenomation, although paresthesias, muscle aches, weakness, malaise, and fatigue may persist for days or weeks^[19]. Systemic findings depend on the size of the spider, the motivation of the spider and the time of the year, the size of the victim, the location of the bite, underlying health problems, and the age of the victim^[20]. Bites of the *Loxosceles reclusa* result in reactions that vary from mild and local to severe ulcerative necrosis with eschar formation, known as necrotic^[8,9,19]. Black widow venom causes depletion of acetylcholine at motor nerve endings and the release of catecholamine at adrenergic nerve endings^[9,19]. Consequently, the majority of local effects were pain, swelling, edema, redness, and itching, and clinical symptoms occurred in patients such as nausea, vomiting, diaphoresis, salivation, hypertension, tachycardia, and, rarely, priapism, sweating, hypertension, myocarditis, abdominal pain, anxiety, irritability, agitation, and headache^[9,10,12–16,19–27].

In our study, local symptoms were observed in 60.87% of the cases, including local pain (29.16%), edema (29.16%), redness (12.15%), itching, debris, burning, and numbness (4.16%), in agreement with previous studies. There were no necrotic lesions or ulcers as a consequence of any spider bites, but the systemic symptoms of nine spider bites are considered in more detail.

Systemic effects such as nausea, vomiting, abdominal pain, weakness, hypotension, hypertension, anxiety, lethargy, somnolence, dyspnea, and fever were observed. We evaluated these signs according to Clark's grading scale for *Latrodectus* envenomation^[28]. These signs were in grade III. In Turkey, spider fauna hasn't exactly completed yet^[29]. Nevertheless, black widows (Theridiidae), *Latrodectus tredecimguttatus* called the "Mediterranean black widow" have been recorded in Istanbul, Ankara, Adana, Mardin, Erçiş, and Kars^[4]. *Steatoda grossa* and *S. paykulliana* are dangerous. They can be seen in many places in Turkey. Violin Spider (Loxoscelidae) and *Loxosceles rufescens* have been reported in Nusaybin (Mardin), Elbistan (Kahramanmaraş), Dört Yol (Hatay), Kemer (Antalya), Datca (Muğla), Didim (Aydın), and Kabatas (Istanbul). Six-eyed

spiders, *Segestria florentina*, and *S. senoculata*, have been reported in Muğla, İzmir, and İstanbul^[4,8,30,31](Figure 2). Therefore, *Latrodectus* spider species may be responsible for accidents.



Figure 2. Map of Turkey and locations of previously designed studies or case reports.

In summary, the majority of spider bites occurred in adults, and individuals of both genders were at approximately equal risk of spider bites. The majority of spider bites were seen during the daytime. The accidents were seasonal and occur most frequently during the warmest time of the year. The majority of patients were admitted to healthcare facilities in less than 1 h. After the spider bite, local and systemic symptoms were observed, but no necrotic lesions were observed.

In conclusion, there are venomous spiders of medical importance known in the Turkey. Therefore, each victim should be asked about bite history. Even if the spider is not captured, medical professionals must be able to identify spider bites and should consider the etiology of spiders, according to the clinical and epidemiological findings and all symptoms. All patients and especially pediatric patients should be admitted to the hospital. Identifying spiders may be considered a useful clinical and epidemiological tool in determining the incidence and risk of spider bites.

Conflict of interest statement

We declare that we have no conflict of interest.

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