

Latrodectus Bites in Northern Dalmatia, Croatia: Clinical, Laboratory, Epidemiological, and Therapeutical Aspects

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Aim. To analyze clinical and epidemiological characteristics of the black widow spider (*Latrodectus tredecimguttatus*) bites and assess the impact of antitoxin administration after the bite on the intensity and duration of pain.

Method. Retrospective analysis of clinical appearance, laboratory findings, and clinical assessment of the antitoxin administration efficacy in 32 patients with latrodectism treated at Zadar General Hospital between 1992 and 2002.

Results. All patients presented with generalized pain, profound perspiration, and burning in the sole of the foot. Laboratory findings revealed moderately increased serum glucose concentrations in half of the patients, concentrations of aspartate aminotransferase and alanine aminotransferase 2 to 3 times higher than normal in 8 of 32 patients, moderate leukocytosis in 16 of 32 patients, mature neutrophilia in 15 of 32 patients, and immature forms of leukocytes in 4 of 32 patients. In 21 patients who received the antitoxin, severe pain lasted 1-4 h (median, 1.2 h) after the antitoxin administration, moderate pain 1-5 h (median, 2.4 h), and hospitalization 1-5 days (median, 4 days). In patients who did not receive antitoxin, there was a statistically significant increase in duration of severe pain (median, 50 h; range, 24-72 h), moderate pain (median, 36 h; range, 24-48 h), and hospitalization (median, 6 days; range, 4-12 days) ($p < 0.05$ for all, Kruskal-Wallis H test). Men were more often bitten by the venomous spider (20 men vs 12 women); adults more often than children (30 vs 2, respectively), domestic population more often than tourists (30 vs 2, respectively), and rural mainland inhabitants more often than islanders (21 vs 11, respectively). All biting incidents occurred between June and September, most often in July (17 patients).

Conclusion. Latrodectism in Northern Dalmatia presents with severe clinical symptoms. Administration of the antitoxin is advisable in the treatment of all afflicted patients.

Key words: antitoxins; black widow spider; pain; toxins

Latrodectism is a cosmopolitan disease occurring on all continents in areas with warm or even continental climate (1). In Europe, *latrodectus tredecimguttatus*, a poisonous spider species, is found in the countries surrounding the Mediterranean Sea, Greece, Bulgaria, Moldavia, and Ukraine (1-7). In Croatia, latrodectism has been recorded in Istria, Croatian Littoral, Dalmatia, and the Adriatic Islands (1-4). Although latrodectism in Dalmatia was first described in 1774, information on this issue in medical literature is scarce, mostly based on personal notices (8).

Latrodectism is a clinical entity with characteristic symptoms and signs caused by the effect of the spider's poison on different organs, especially nervous and cardiovascular system (2,4). *Latrodectus tredecimguttatus* is domesticated in rural areas of coastal Croatia, where it is known as "the black widow" (Fig. 1). Adult females, sized 10-18 mm during pregnancy, are generally considered poisonous and can be found from the beginning of the summer until early fall.



Figure 1. The venomous spider *Latrodectus tredecimguttatus* ("black widow") in its natural environment.

Adult males, sized 3-5 mm, can be found mostly during early summer. After mating, the females usually slay them (1). The black widow's poison is neurotoxic

toalbumin, affecting the autonomous and central nervous system, both centrally and peripherally (1,2,9). Clinical symptoms vary from moderate to severe pain, potentially ending in a shock. In rare cases, the outcome can be lethal, most often in the elderly and children when biting occurs in richly innervated and vascularized areas (1,4,6,10).

Northern Dalmatia, with high air humidity, plenty of insects, and places appropriate for nesting (soil, grain fields, trenches, large stones and thick bushes), provides good life conditions for the black widow (Fig. 2).



Figure 2. Geographic area of the 32 cases of latrodectism recorded in Northern Dalmatia.

The aim of this study was to analyze clinical and epidemiological characteristics of latrodectism, and assess the effects of antitoxin administration on the intensity and duration of pain.

Patients and Methods

We conducted a retrospective analysis of clinical symptoms and signs and laboratory findings in 32 patients with latrodectism treated at Zadar General Hospital from 1992 to 2000. The symptomatic therapeutic scheme, applied to all patients, included diazepam 2 mL/10 mg and diclofenac 3 mL/75 mg intramuscularly, and 10% calcium gluconate 10 mL intravenously. In addition, 21 patients received specific antitoxin 2 mL intramuscularly (Immunoserum *contra venena Latrodectus tredecimguttatus (equinum)*, Immunological Institute, Zagreb, Croatia). The remaining 11 patients received no antitoxin due to the market shortage at the time.

The criteria for severe pain were the subjective patient's notion of flashing and/or burning pain, and the objective finding of muscular hypertonus, tactile hyposensitivity, and frequently repeated spasms and/or clonic muscle contractions. The criteria for moderate pain were the subjective patient's notion of tolerable pain, and the objective findings of hyperalgesia and hyperesthesia.

For statistical analysis, we used EPI-info version 5 software (Public Domain Software for Epidemiology and Disease Surveillance, Center for Disease Control Epidemiology Program Office Atlanta, GA, USA; and World Health Organization Global Program on AIDS, Geneva, Switzerland). The data were analyzed

with Student t-test and Kruskal-Wallis H test; $p < 0.05$ was considered statistically significant (11).

Results

The annual number of latrodectism cases ranged between 1 in 1996 and 5 in 1998. The spider bites were registered in July in all years in the studied period, and in June, August, and September in some years (Table 1). Only 8 out of 32 patients spotted the spider, whereas the remaining 24 only felt the bite and/or prick, without actually seeing the spider. Nevertheless, 27 patients presented with a papule or erythema localized at the site where the pain began, presumably the bite site (Table 2). The bite was most frequently localized on the foot, followed by the hand and upper leg, forearm, upper arm, and finally the abdomen and back (Table 1). The spider bite was more frequent in men than in women, in adults than in children, in domestic population than in tourists, and in rural coastal inhabitants more than in islanders (Table 1). Spider bites most commonly occurred during fieldwork, while working around the house (gardens, back yards, and garages), in vineyards, and tourist camps. The frequency of stings did not correlate with time of the day (Table 1).

The most frequent symptoms, registered in all cases, were generalized pain, profound perspiration, and burning in the sole of the foot (Table 2). Less frequent were motor agitation, facial and head and neck

Table 1. Epidemiological data on 32 patients with latrodectism admitted to the Zadar General Hospital between 1992 and 2002

Parameter	No. (%) of patients
Sex:	
men	20 (62.5)
women	12 (37.6)
Age:	
adults (> 14 years of age)	30 (93.8)
children (< 14 years of age)	2 (6.2)
Area of bite:	
mainland	21 (65.6)
island	11 (34.4)
People:	
domestic population	30 (93.8)
tourists	2 (6.2)
Month of bite:	
July	17 (53.1)
August	8 (25.0)
June	4 (12.5)
September	3 (9.4)
Time of the day:	
morning	11 (34.4)
afternoon	11 (34.4)
night	10 (31.2)
Place of bite:	
field	20 (62.5)
garden	9 (28.1)
vineyard	2 (6.3)
camp	1 (3.1)
Bite:	
noticeable	8 (25.0)
unnoticeable	24 (75.0)
Bitten part of the body:	
foot	8 (25.0)
fist	6 (18.8)
upper leg	6 (18.8)
forearm	4 (12.5)
lower leg	3 (9.4)
upper arm	2 (6.3)
stomach	2 (6.3)
back	1 (3.1)

Table 2. Clinical symptoms and signs of *latrodectism* in 32 patients admitted to the Zadar General Hospital between 1992 and 2002

Symptoms and signs	No. (%) of patients
Widespread pain	32 (100.0)
Profuse sweating	32 (100.0)
Burning in the sole of the foot	32 (100.0)
Muscle contraction	27 (84.3)
Papule/erythema at bite site	27 (84.3)
Flushed head, face, and neck	18 (56.3)
Hypertension	16 (50.0)
Rigidity of the abdomen	14 (43.8)
Nausea	13 (40.6)
Fever	9 (28.1)
Blepharoconjunctivitis	8 (25.0)
Diffuse rash	4 (12.5)
Vomiting	4 (12.5)
Somnolence	3 (9.4)
Cough	3 (9.4)
Agitation	2 (6.3)
Diarrhea	1 (3.1)
Urine retention	1 (3.1)

hyperemia (Fig. 3), rigidity of abdominal muscles, hypertension, nausea, and low-grade fever. The rarest symptoms included blepharoconjunctivitis, rash, vomiting, somnolence, cough, agitation, diarrhea, and urine retention (Table 2).

**Figure 3.** *Facies latrodectismica*: flushed face with painful grimace and blepharoconjunctivitis.

In patients who received the antitoxin, severe pain lasted 1-4 h (median, 1.2 h) after the antitoxin administration, and moderate pain between 1 and 5 h (median, 2.4 h). In the rest of the patients, severe pain lasted 24-72 h (median, 50 h), and moderate pain between 24 h and 48 h (median, 36 h) (Table 3). The duration of pain, either severe or moderate, was significantly shorter in patients who received the antitoxin than in those who did not ($p < 0.05$). Time elapsed between the bite and the antitoxin administration ranged from 1 h to 7 h (median, 3 h). Hospitalization in patients treated with antitoxin lasted 1-5 days (median, 4 days), compared with 4-12 days (median, 6 days) in other patients ($p < 0.05$) (Table 3).

We registered no allergic reactions or other side-effects caused by the antitoxin.

Laboratory findings revealed moderately increased serum glucose concentration in 16 out of 32

Table 3. The efficacy of antitoxin in treatment of 32 patients with *latrodectism* admitted to the Zadar General Hospital between 1992 and 2002

Parameters (median, range)	Therapeutic scheme	
	symptomatic + antitoxin	symptomatic only
No. (%) of patients	21 (65.6)	11 (34.4)
Time from bite to treatment (h)	3 (1-7)	
Duration of severe pain (h)	1.2 (1-4)*	50 (24-72)
Duration of moderate pain (h)	2.4 (1-5)*	36 (24-48)
Hospitalization (days)	4 (1-5)*	6 (4-12)

* $p < 0.05$ vs symptomatic treatment only, Kruskal-Wallis H test.

patients, concentrations of aspartate aminotransferase and alanine transferase 2 to 3 times higher than normal in 8 patients, moderate leukocytosis in 16 patients, mature neutrophilia in 15 patients, and immature forms of leukocytes in 4 patients.

Discussion

Our results show the continuing presence of the venomous spider *Latrodectus tredecimguttatus* in the rural parts of Northern Dalmatia, the potency of its toxin to provoke a broad spectrum of clinical symptoms and signs, and the justifiability of the antitoxin administration to reduce intensity and duration of pain after the bite and to prevent possible complications.

All our patients needed hospitalization due to the dramatic clinical appearance of *latrodectism*. However, according to the reports from other countries, the dramatic clinical picture is rare and the patients usually do not require hospitalization (7,12). It seems that we had more cases of severe clinical appearance, especially in children, the elderly, and persons with cardiovascular diseases.

Muscle relaxants, analgesics, and calcium are used in the treatment of *latrodectism*. Such symptomatic therapy is sufficient in patients with mild clinical symptoms and has the advantage of avoiding possible allergic reactions and other side effects (1). Due to the severity of clinical appearance, the administration of the antitoxin was indicated in all our patients. The main reason for this kind of therapy was the significant reduction in the intensity of symptoms after administration of a single dose of antitoxin. However, only minimal alleviation of symptoms was noticed in patients who received symptomatic therapy without antitoxin, which was not administered due to its market shortage at the time. In these patients, the period of pain duration and hospitalization was significantly longer. Many authors described successful treatment of *latrodectism* with the antitoxin (1,13,14).

The wide spectrum of unspecific symptoms of *latrodectism* makes it difficult to differentiate it from other conditions, ie, alimentary intoxication, bile stones, kidney stones, abdominal colic, peritonitis, myocardial infarction, and acute psychosis. In some cases, the consequences of a misdiagnosis were unnecessary laparotomies, inadequate therapy, and unnecessary prolongation of pain, fear of disease outcome, and in some cases even fear of death, all due to

the delay of the antitoxin application (1,9,12,15,16). Four of our patients were admitted to the internal medicine ward during the first 2-4 h after the bite, and 2 to the surgical ward, where the accurate diagnosis of latrodectism was reached after consulting the infectious disease specialists before unnecessary laparotomy or other medical interventions were performed.

The crucial factors in reaching the correct diagnosis of latrodectism are the knowledge and experience of the physician, and the epidemiological data. Our patients described the spider bite as pricking or stinging sensation accompanied by moderate pain, whereas patients in other reports described it as penetrating pain coinciding with the spider bite (1,12,15). We assume that such character of pain in our patients was the main cause why most of them did not spot the spider, which is in accordance with other reports (16-18). Engaged in fieldwork, most of our patients paid no attention to the incident, considering the mild pain being caused by a grass blade, thorn, or another insect bite, until the development of the symptoms. In most patients we found papules and diffuse rash at the site of pain origin. Such skin findings, together with sharp pain, hypertonus, and muscular rigidity with tendency towards generalization, pointed towards the diagnosis of latrodectism.

The delay of pain onset after the bite in our patients ranged between 15 minutes and one hour, as reported elsewhere (1,11). Longer latency has rarely been reported (1).

Latrodectism in Northern Dalmatia is limited to rural areas in both the mainland and the islands. The high frequency of bites in fields during fieldwork or recreational activity can be explained by the close contact with the spider in its biotope. Although we did not have many children among our patients, the intensity of clinical symptoms and signs was more intense in them. Seasonal occurrence of latrodectism during the summer, especially in July, is determined by favorable air humidity and temperature at that time of year, as well as by yearly schedule of fieldwork. Also, fields and vineyards are usually in close vicinity of settlements, and fieldwork is done in early mornings, late afternoons, and in the evenings; this can explain why we found no differences in the frequency of bites according to the time of day. Still, some authors describe higher incidence of biting in the mornings and night hours (1,7).

The epidemiological and clinical data presented in our study, as well as the efficiency of the antitoxin and differential diagnosis of other acute emergencies characterized with pain and fear, especially in the June-September period – the time of highest activity of the spider and the peak of rural tourism – obviates the need for physicians to be able to recognize the clinical entity of latrodectism and administer the appropriate treatment.

References

- Maretić Z. Araneism with special reference to Europe [in Croatian]. 2nd ed. Pula: Otokar Keršovani; 1985.
- Vutchev D. A case of intoxication after a bite by *Latrodectus tredecimguttatus*. *Scand J Infect Dis* 2001;33:313-4.
- Bettini S. Epidemiology of latrodectism. *Toxicon* 1964;2:93-101.
- Maretić Z. Some clinical and epidemiological problems of venom poisoning today. *Toxicon* 1982;20:345-8.
- de Haro L, David JM, Jouglard J. Latrodectism in southern France. A series of cases from the poisoning center of Marseille [in French]. *Presse Med* 1994;23:1121-3.
- Torregiani F, La Cavera C. Review of latrodectism and Malmignatta sting (*Latrodectus tredecimguttatus*) in Italy [in Italian]. *Minerva Med* 1990;81(7-8 Suppl):147-54.
- Krasnonos LN, Kovalenko AF, Ukolov IP, Ergashev NE. Cases of mass karakurt bites in Uzbekistan [in Russian]. *Med Parazitol (Mosk)* 1989;4:39-42.
- Fortis A. Travels into Dalmatia [in Croatian]. 26th ed. Zagreb: Globus; 1984.
- Maretić Z. Latrodectism: variations in clinical manifestations provoked by *Latrodectus* species of spiders. *Toxicon* 1983;21:457-66.
- Faust EC, Russel PF, Jung RC. Clinical parasitology. 9th ed. Philadelphia (PA): Lea and Febiger; 1974.
- Jekel JF, Elmore JG, Katz DL. Epidemiology, biostatistics and preventive medicine. Philadelphia (PA): WB Saunders Company; 1996.
- Wilson DC, King LE Jr. Spiders and spider bites. *Dermatol Clin* 1990;8:277-86.
- O'Malley GF, Dart RC, Kuffner EF. Successful treatment of latrodectism with antivenin after 90 hours. *N Engl J Med* 1999;340:657.
- Jelinek GA. Widow spider envenomation (latrodectism): a worldwide problem. *Wilderness Environ Med* 1997;8:226-31.
- Russell FE, Wainschel MD, Gertsch WJ. Bites of spiders and other arthropods. In: Conn HF, editor. *Current therapy*. Philadelphia (PA): WB Saunders Company; 1973. p. 866-8.
- Pulignano G, Del Sindaco D, Giovannini M, Zeisa P, Faia M, Soccorsi M, et al. Myocardial damage after spider bite (*Latrodectus tredecimguttatus*) in a 16-year-old patient. *G Ital Cardiol* 1998;28:1149-6.
- Taubenhaus LJ. The black widow spider bite syndrome. *N C Med J* 1952;13:37.
- Torregiani F, La Cavera C. Differential diagnosis of acute abdomen and latrodectism [in Italian]. *Minerva Chir* 1990;45:303-5.

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