International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 05, 2020
ISSN: 1475-7192

Characteristics of Scorpionism in Montenegro

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Abstract--- *Scorpionism is a significant health problem in many parts of the world, due to the toxic stings, which can endanger the health and lives of the people. Severity of clinical manifestations and the problem is not of the efficiency of therapeutic treatment, present additionally problem. Montenegro is an endemic area for two types of scorpions: Mesobuthus gibbosus and Euscorpius italicus. The severity of poisoning depends on many factors: such as previous health condition, age of the victim, the location of the bite, penetration depth, scorpions' species and the degree of his agitation. After scorpion bites, become noticeable local and general symptoms. Especially dangerous are the symptoms were presenting of the heart, affecting CNS, to those that lead the serious changes in the respiratory system, and cause Hepatic Uremic Syndrome (HUS). The treatment of scorpions bites and poisoning is complex and controversial, in particular regarding the utility of the antivenins and symptomatic treatments that must be associated. Antidotes of poison of different scorpion species are very specific. Their efficiency has closely related to the geographical region and the scorpion species from which were is obtaining. In period of 2009 - 2015 years in Montenegro were officially registered 15 cases with scorpionismus, but it can be assumption that the real number is much higher. In 12 cases, it was a stab Mesobuthus gibbosus, the most common types of scorpions in Europe. In 3 cases it was a scorpion sting Euscorpius italicus living in all parts of Montenegro and the Montenegrin coast. In our series, fatal cases were not registered. In two cases, neurological damages are registered. In 2 cases, which were, manifesting by involuntary muscle twitches extremities where he sustained stab, of chronic degenerative changes at EMG investigation. In another case, a year after scorpion bites, developed transient hemiparesis, which lasted more than one year.*

Keywords--- *Scorpionism, Characteristics, Venoms.*

I. INTRODUCTION

Scorpionism is medical term used to refer to a syndrome of scorpion stings (1). Scorpions are venomous predatory arthropods and members of the classis of Arachnidae. (2) They first appeared as aquatic organisms formed 400 million years ago. Their size is it reached up to 1 meter. According to archeological finds, today look the same, with small morphological changes and smaller, so it has defined as a living fossil. In evolutionary terms, with scorpions has known large biochemical, physiological, behavioral and ecological adaptations. To date registered over 2000 species of scorpions, including a small number of non-toxic species (2, 3)

Scorpionism represents a major public health problem at the different levels of health care in many parts of the world. Primarily due to the high incidence or severity of venom damage that can lead to death, with the consequent difficulties of health care, or both reasons at the same time. Compared to scorpionisms, according to recent epidemiological studies identified seven high - risk geographical areas of the world (4) (Figure 1)

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DOI: 10.37200/IJPR/V24I5/PR201864
Received: 18 Feb 2020 | Revised: 12 Mar 2020 | Accepted: 23 Mar 2020

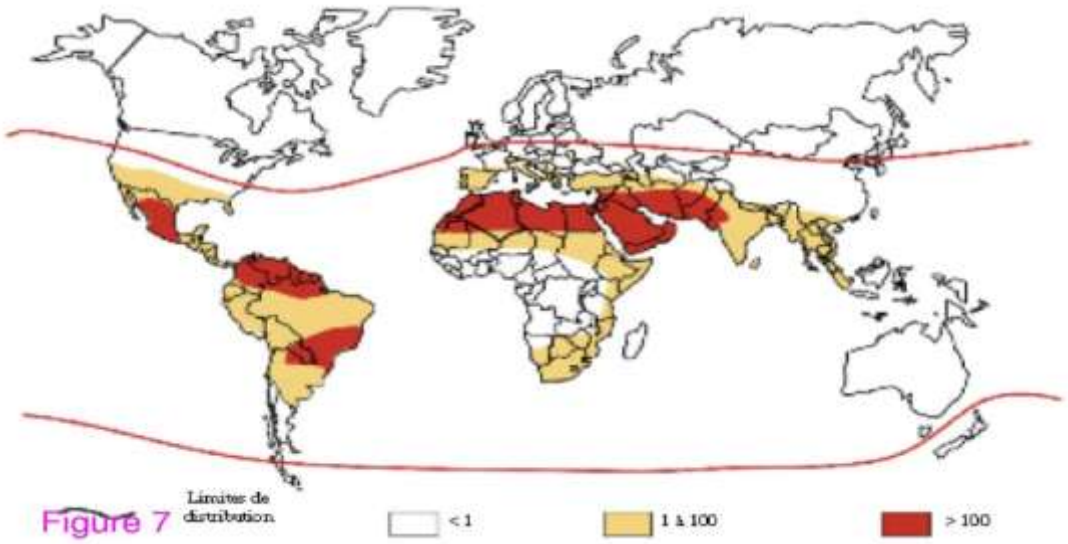

Figure 1: Scorpion Environment Remains a major Health Problem in many Tropical and Subtropical Countries. It is an Important Cause of Morbidity and Mortality, Especially among Children

North Saharan Africa, Sub-Saharan Africa, South Africa, Middle East, South India, Mexico and the southern Latin American country, east of the Andes. In these areas, 2.5 billion people living in these areas. The annual number of stitches scorpions exceeds 1.5 million people, of which approximately 3250 (0,27%) succumbs to the poison. (5, 6, 7, 8, 9). Although adults often acquire a scorpion stings, children have weight disorders and among them, mortality is higher. (10, 11).

Europe is hosts a surprisingly high diversity of scorpions. At the moment 64 valid species are reported : Spain, Portugal, Italy, France, Monaco, San Marino, Malta, Switzerland, Austria, Germany, Holland, Norway , Denmark, Sweden, England, Cyprus, Greece, Turkey, Russia, Ukraine and the Balkan countries (12, 13, 14, 15)

In our country Montenegro, the most common species of poisonous scorpions is Mesobuthus gibbosus of the family Buthide and Euscorpius italicus of the family Chacticidae. (12, 14, 15) (Figure 2 A and B)

A B

Figure 2: M. gibbosus and E. italicus is endemic in Mediterranean area. Represents real hazard for local inhabitants and tourists. The medical treatment of this type of scorpionism is exclusively symptomatic. A- M. gibbosus, B- E. italicus

DOI: 10.37200/IJPR/V24I5/PR201864
Received: 18 Feb 2020 | Revised: 12 Mar 2020 | Accepted: 23 Mar 2020

Mesobuthus gibbosus has yellow or yellow-brown color and it is very aggressive. (13, 14, 15). The popular name is "Kliještan". It grows from 67 to 85 mm. exclusively nocturnal hunter. Mainly feeds on insects. The rest of his life chasing everything he could, and even other scorpions. No food can stand up to a year. Scorpion use 70% of the food we brought, while the human babies use only 5%. A killing machine, the scorpion is one of the most resistant creatures. Most of his life (95%) carries out underground. Mesobuthus gibbosus inhabit the dry and hot empty field with sparse vegetation. It has can be found in olive groves in the hilly areas, moist forests, but also to the beaches, a few meters from the sea. Hibernate from September to May. Except in Montenegro, it is represent in Macedonia (Ovce Pole), Albania, Bulgaria, Greece, Cyprus, Turkey, Syria, Lebanon. It belongs to the most poisonous scorpions in Europe. The venom is neurotoxin, like all poisons representatives family Buthidae. In the medical literature, it has mentioned as potentially hazardous to human health. Scorpionism is a major health problem in Turkey, where there have been deaths in children (14, 15, 16, 17, 18).

Euscorpius italicus is representative of the family Chacticidae. Adults copy length is 40-50 mm. Body color is dark brown to black, with orange brown legs and sting. He likes warmer and less habitat than other scorpions. It has can be found in the ruins, basements, garages, abandoned houses, home furnishings, wall crevices, under rocks, boards, in the grass. It is proven that live in Albania, Croatia, France, Georgia, Greece, Italy, Macedonia, Monaco, Romania, Russia, San Marino, Slovenia, Switzerland, Turkey, Algeria, Iraq, Morocco, Yemen, Montenegro (18). The venom of this scorpion has a local effect, but rarely affects the cardiovascular and neuromuscular systems. It can cause very severe symptoms, but usually without deadly outcomes.

Almost all scorpions possess toxins. Scorpion venom from different parts of the world has differs significantly. (19, 20). Mostly are composed of neurotoxin peptide. Some kinds of scorpions contain cytotoxin. The European scorpion has alpha-scorpion toxins (alpha-ScTx), which is a mixture of two polypeptides (40 and one of the other amino acids 60-79). The toxin acts now. Nevertheless, less than 5% of the scorpion sting can have signs and symptoms that require medical intervention.

Stab Non-Buthidae family scorpion; usually manifest themselves with local symptoms, mild to intense pain at the injection site, with possible symptoms of local inflammation (swelling and redness). Scorpions, spiders and snake, injected venom via the tail spike, which is associated with the gland that there is poison.

The severity of poisoning depends on many factors: such as previous health condition, age of the victim, the location of the bite, penetration depth, or if it is applied through the thick clothes or shoes, scorpions' species and the degree of his agitation. Victims with heart and respiratory problems are at greater risk. (20)

For most victims the signs and symptoms develop after 30 minutes, and sometimes only after 4-12 hours I gradually intensify, leading to a difficult situation during the next 24 hours. The pain to be most pronounced at the puncture site or in the lower extremities and accompanied by abdominal pain, vomiting and diarrhea. Among the other symptoms are common parestesiae, hypersensitivity to various stimuli, including tingling and gooseflesh in the extremities, face and scalp. They manifested hyperesthesia, especially excessive sensitivity of the skin to clothes and bedding, sensitivity to noise. It can manifest ataxia, impaired coordination of muscle movements, especially of the lower extremities, which the rigidity of the musculature, ataxia, involuntary movements, tremors and muscle

DOI: 10.37200/IJPR/V24I5/PR201864
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weakness. (20) It can occur with tachycardia 100/150 beats per minute or marked bradicardia with less than 55 beats per minute. (21, 22). The other significant and possible disorders are high blood pressure, dysphagia, difficulty swallowing, and hipper salivation, excessively speaking difficulties, dysarthria, sweating, headache, nausea, vomiting and diarrhea, ptosis of eyelids, discomfort and anxiety, urinary retention. In some species, it is possible pulmonary edema and death due to respiratory distress syndrome (23), Hemolytic uremic syndrome (HUS) (24), which is a major complication that can lead to death. (20)

The treatment of scorpion poisoning is complex and controversial, in particular regarding the utility of the antivenins and symptomatic treatments that must be associated. Antidotes of different species of scorpions are very specific so that the application of Mexico's serum against the bite of European scorpions no protective effect. (25)

II. MATERIALS AND METHODS

During our investigations, in period of 2009 - 2015 years in Montenegro were officially registered 15 cases with scorpionism, but it can to be assumption that the real number is much higher. In 12 cases, it was a stab Mesobuthus gibbosus, the most common types of scorpions in Europe and our country. In 10 cases of scorpionism stings have occurred in a small geographic area of the Montenegrin coast in rural areas, villages Krimovica, Bigova, Pobrdje, Glavatičići, which are endemic to this kind of scorpion, and 2 cases in Podgorica.

In three cases it was a scorpion sting Euscorpius italicus living in all parts of Montenegro and the Montenegrin coast. Bites occurred in Kavac village (near to Kotor) one case, and the two cases in Podgorica.

III. RESULTS

In the investigated series, the youngest patient was 18 years and the average age of other patients ranged from 25 to 55 years. According to geographical distribution, all scorpion stings types Buthide Mesobuthus gibosus, 10 took place in a Montenegrin coast in rural areas, villages Krimovica, Bigova, Pobrdje, Glavatičići, which are endemic to this kind of scorpion, and 2 cases in Podgorica.

In three cases, the scorpionism is consequence of the bites of Euscopius italicus species, which lives in all parts of Montenegro. The bites occurred in Podgorica 2 cases and one case of the Montenegrin coast in the village Kavac, near to Kotor.

The most frequent are registered stitches on the under extremities of 9 cases, and the upper extremities of the 6 cases. Seasonal distribution of scorpionism, has registered by May to the end of October, with the highest incidence in the summer months, in August 8 cases. The distribution of respondents by sex and occupation is statistically insignificant, considering that there is a general sensitivity of the human population to the scorpion venoms. In relation to age, the most severe form of clinical manifestations of scorpionism was older immunedeficient patients (with heart problems, kidney disease, chronic respiratory diseases). Scorpion bites in our patients incurred during the construction works in 9 cases, in 4 cases during walks, in 2 cases when working in the garden.

In our investigated group with scorpionism caused by the Mesobuthus gibbosus, from general symptoms was anxiety, muscle cramps, paleness, profuse sweating.

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From local symptoms were dominant: local pulsating pain and redness, bruising of the skin at the injection site, parestesiae along the extremities.

In 2 cases after the bite of Mesobuthus gibosus, have developed chronic neurodegenerative changes. In two cases, parestesiae left feet with occasional muscle cramps, registered the three years after a scorpion sting. Finding peripheral neuropathy, determined as severe degenerative changes of peripheral nerves of the left leg. Verified with the Electromyelographic method (EMG). In another case, a year after scorpion bites on his right hand, developed right hemiparesis, with progressive course, paresthesiae, difficulty in movement.

In two cases after bites of Euscorpius italicus, the local symptoms have been reported swelling, redness and pain, and the general symptoms: numbness of extremities, hyper-salivation and nausea.

After the sting, it is important to identify the species of scorpion, in order to plan a therapy session and considering that are no laboratories in which could be the identification of toxins.

Patients must to instruct on the need for monitoring the health status in a hospital environment, which has conducted in eight of our patients.

In all cases applied the symptomatic treatment. In our investigated series, there not have been fatal cases, and more severe allergic reactions. In 3 cases a progressive and prolonged stream of neurological complications, warning that the scorpion venom can potentially lead to chronic immune mediated disorders, important for the planning of therapy and the future of patient's life quality.

IV. DISCUSSION

Montenegro, a Mediterranean country, is an endemic area for two species of scorpions, which are represent and in the whole of Europe (24, 25). These are Mesobuthus gibosus and Euroscorpion italicus. (30, 31) The first of a species Butidae, all of which are toxic and may endanger the health and lives of patients, on the basis of different components, which cause toxic and neurotoxic damages primarily to the neurological and cardiovascular system.(26-28, 30, 31)

The venom of scorpions stimulate massive release of neurotransmitters and affect the autonomic nervous system and peripheral endings neuromuscular attachment, resulting in sympatic, parasympatic and paralytic symptoms (2, 12). Pain is the most common and most consistent symptom, as demonstrated by our investigations. Disruption occurs due to the presence of serotonin in the venom of scorpions (2). Paresthesiae are also present, in a high percentage in our patients. A systemic disorder has result of venom-induced release of acetylcholine and catecholamine's.

Common symptoms are following this scorpionism are dry mouth, thirst, sweating, nausea, dispnea, cyanosis, increased bronchial secretion, hypotension / hypertension; tachycardia / bradycardia, arrhythmias, muscle contraction, tachypnea, convulsion, pulmonary edema, shock, and death due to cardio respiratory failure (9, 10, 13).

Anxiety, hiperlacrimation, hypersalivation, diarrhea, nausea, vomiting, hypertension, fever, muscle fasciculations, opisthotonos, paralysis, difficulty in speaking, dyspnea, wizing (2.14).

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Our first patient, with local had severe symptoms and general infectious syndrome, which is has explained by direct injection of toxins in the venous blood vessel.

Anxiety of varying intensity was present in all patients, is associated with the specific peptide toxin, which has a specific MAO inhibitory effect (15, 27, 28). All patients had parestesiae locally at the injection site. Late effects of the first patient, after 3 years (occasionally expansion and superficial veins bulge, stinging her during the night and the occasional muscle twitches stabbed legs), cannot be explained, but apparently attributable, chronic immune mediate of peripheral nerves.

Local symptoms caused by the bite of Mesobuthus gibbosus and other Mesobuthus (eupeusa, caucaicusa, nigrocinctusa) pain, skin hyperemia, edema, burning at the injection site, paresthesia and itching (9.10)

Signs of stitches and the local effect of venom (edema, redness, bleeding) in our series, it is variable and different long (mainly short) duration.

Allergic reactions to scorpion bites can also be extremely pronounced (10). Necrosis is rarely expressing, excluding special studies in Iran and Iraq, where they often register bites of Hemiscorpius cepturus (15). In our series, we did not have the weight of local skin changes.

Although considered to be at scorpionisms caused by the Euscopius italicus, local symptoms are dominant (pain at the injection site of medium intensity, less redness, edema with itching), and that can cause severe damage. There is evidence that this kind of scorpion stings sometimes can have drastic consequences: restlessness, generalized muscle pain, profuse sweating, nausea, muscle cramps, haematuria, proteinuria (16,17). As the most serious consequences in the literature describes the HUS, two days after the infection (18, 33). In our two patients, in addition to local symptoms (pain, burning, itching, swelling and redness), there were also general symptoms (anxiety, excruciating, hyper salivation, numbness of extremities).

According to recent statistics, obtained by processing a large sample from Turkey, scorpion stings occur most often in the summer months (June, July, August), and sporadically in May and September. More frequent are stings in women (60%). According to age, the most common is a group of 15-29 years, then 0-14, then 30 and more years. The most frequent register stitches on the upper and lower extremities, rarely on the trunk, head and neck (9).

Of particular importance is the registration and monitoring of symptoms by the vegetative nervous system, neuromuscular irritability (activity of sympathetic and parasympathetic). Routine laboratory analyses are not specific. Possible can be registered increase in the total number of leukocytes, hyperglycemia, increase of serum amylases, creatine phosphokinases (which we had in one case). In severe cases, renal function can be disturbed and to registered coagulation disorders (14). Described cases with symptoms of affection of the central nervous system, and the cerebrospinal fluid found pleocytosis (14). Frequency of CNS symptoms includes anxiety, muscular hyperactivity. Variable hypertension is often erroneous treated with sedatives.

Patients with registered systemic disorders, requiring the application of oxygen and pulse - oximetric monitoring of cardiac and pulmonary status. In cases with acute respiratory failures, with endotracheal intubation, can be prevented pulmonary edema. (14).

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After the sting of venom of Buthidae, applied therapy- comprising administering: calcium, antihistamines, corticosteroids, barbiturates, anti-tetanus protection, analgetics, dihydroergotamine, monovalent scorpion venom antiserum, in countries that have it (4, 19). In scorpionism Mesobuthus gibbosus, can be giving in addition to antiserum specific for the type and antiserum against poison Androctonus crassicaudatussa (20). Based on our experiences, instead of barbiturates, is useful in the treatment of diazepam, resulting in a psychological calming the patient and relieve muscle spasms. The application of dihydroergotamine and antiserum do not consider useful, in such cases with scorpionism. (27, 28, 32)

Scorpionism causing representatives Euscorpius species is not lethal. The treatment is only symptomatic, although in Turkey produced an antidote for scorpionism challenged with Euscorpius italicus and carpathicus (21).

V. CONCLUSION

Scorpionism is a significant health problem in many parts of the world, due to the severity of the clinical manifestations and the impossibility of an adequate therapeutic treatment. Montenegro is an endemic area for two types of scorpions. Based on the number of registered cases and the fact that not registered death cases, it might be wrong to conclude that scorpionism is not a big problem in our country. (30, 31)

In contrast to findings in Europe live very poisonous scorpions, this can cause serious and even fatal damages to the CNS, cardiovascular system, blood vessels and others systems. (21, 22, 23, 33) The absence of an adequate and specific therapeutic treatment emphasizes the additional dimensions of the problem. (32)

On the question of how climate change will affect the further evolution of scorpions, for now from epidemiological point of view there is no precise answer, but it certainly can predict the spread of endemic areas and consequently an increase in the number of victims scorpion s.

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