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Clinical and Epidemiological Characteristics of Spider Bites in Tripoli, Libya 2004-2012: a Retrospective Study

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Abstract:
Spiders are widespread, abundant predators, making them familiar and readily accessible to people everywhere. Despite having venom glands, most spiders bite humans in some situations, only when they are annoyed, trapped or injured. Studies on spider bites in Libya are limited, neglected, and affected by misdiagnosis and underreporting. The study aimed to interpret, analyze, and characterize the clinical characteristics of spider bite patients and their variations at Tripoli Medical Center (TMC), Tripoli, Libya, between 2004 and 2012. A retrospective study of 102 reported patients with spider bites at Tripoli Medical Center during the period from 2004 to 2012. A total of 102 patients were reported, mostly in May and June (16 cases in each month). The cases were mostly reported in 2007 and 2009 (17 each). The majority of cases were in age group of 19-29 years (41 cases), and female cases (68 cases, 66.6%) were higher than males (34 cases, 33.3%). The most bitten sites were proximal extremities (71.5%). Overall, most patients suffered from erythema (90%) and swelling (36%), followed by itching (33%), necrosis (29%) and fever (17%). Spider bites are common in Libya, but most bites cause minimal or no clinical effects and do not require medical attention. Diagnosing a spider bite is extremely challenging, but a comprehensive history and careful evaluation of symptoms, with correct verification of spider bites are helpful in diagnosing and treating spider bites.

Keywords: Medical, Records, Venom, Symptoms, *Latrodectus, Loxosceles*

الخصائص السريرية والوبائية لعضات العناكب في طرابلس، ليبيا 2004-2012: دراسة استعادية (بأثر رجعي)

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الملخص
العناكب كائنات مفترسة متنوعة وواسعة الانتشار، مما يجعلها مألوفة وسهلة الوصول للناس في كل مكان، وعلى الرغم من امتلاكها لغدد سامة فإن معظم العناكب تعض البشر في بعض المواقف فقط عند مضايقتها أو محاصرتها أو عند اصابتها. الدراسات حول عضات العناكب في ليبيا محدودة ومهملة وتتأثر بالتشخيص الخاطئ ونقص الإبلاغ. هدفت الدراسة إلى تفسير وتحليل وتوصيف الخصائص السريرية لمرضى عضات العناكب واختلافاتهم في مركز طرابلس الطبي (TMC)، طرابلس، ليبيا بين عامي 2004 و2012. دراسة بأثر رجعي لـ 102 مريض تم الإبلاغ عن تعرضهم لعضات العناكب في مركز طرابلس الطبي خلال الفترة من 2004 إلى 2012. تم الإبلاغ عما مجموعه 102 مريض، معظمهم في شهري مايو

ويونيو (16 حالة في كل شهر). تم الإبلاغ عن معظم الحالات في عامي 2007 و2009 (17 حالة لكل منهما). كانت أغلب الحالات في الفئة العمرية 19-29 سنة (41 حالة)، وكانت حالات الإناث (68 حالة، 66.6%) أعلى من الذكور (34 حالة، 33.3%). كانت أكثر مناطق الجسم تعرّضًا للعضّ هي الأطراف القريبة (71.5%). عمومًا عانى معظم المرضى من احمرار الجلد (90%) وتورم (36%)، تلاهما حكة (33%)، ونخر (29%)، وحمى (17%). تُعدّ عضات العناكب شائعة في ليبيا إلا أن معظمها لا يُسبّب آثارًا سريرية تُذكر، أو يُسبب آثارًا جانبية، ولا يتطلّب عناية طبية. يُعدّ تشخيص عضة العنكبوت أمرًا بالغ الصعوبة، ولكنّ التاريخ المرضي الشامل والتقييم الدقيق للأعراض، بالإضافة إلى التحقق الدقيق من عضات العنكبوت، يُساعدان في تشخيصها وعلاجها.

الكلمات المفتاحية: طبي، سجلات، سم، أعراض، *Latrodectus*، *Loxosceles*

Introduction

Spiders are one of the most ancient and successful groups of invertebrate animals, widely spread throughout the world, belonging to phylum Arthropoda, class Arachnida, and sharing this class with scorpions, ticks and mites. They have two body parts (cephalothorax and abdomen), four pairs of legs, one pair of pedipalps and one pair of chelicera [1]. More than 52,700 spider species all over the world have been described, which are classified into 4427 genera [2]. Spiders have the ability to expand and adapt to different ecosystems in the world [3]. However, most spiders are not regarded as 'naturally' aggressive or dangerous to humans; most of them do not hurt or bite humans, except for some situations when they are trapped against or pressed directly against skin (cannot bite through fabric), injured, annoyed (may easily occur while dressing, sleeping or when spiders are trying to protect themselves) [4, 5]. Moreover, most spiders'cheliceral fangs are too short, too weak and/or too fragile to penetrate human skin [6, 7]. While multiple bites can be caused by arthropods such as ticks, mites, biting flies, fleas and bedbugs, spiders very rarely bite more than once [6]. Spiders play an important role in ecosystems'preservation by feeding on insects and regulating insects'populations [8].

Almost all spiders have venom glands that deliver and release their secretions (venom) into their venom sacs through openings near tips of their cheliceral fangs [9]. Spider venom is a complicated cocktail of large number of enzyme and non-enzyme proteins, short or low mass peptides, free amino acids, and inorganic ions, all of them are toxins, which show hemotoxic, neurotoxic, cytotoxic, and insecticidal activity [10, 11]. Spider bites can cause pain, swelling, necrosis, fatigue, pulmonary edema, respiratory distress, hypertension, kidney dysfunction, and death in rare cases [9]. However, Spider bites can cause three important syndromes: latrodectism, loxoscelism, and funnel-web spider syndrome [9, 12]. Spider venom is divided into two major types, neurotoxic and necrotoxic, both can impact many physiological functions in arthropods and vertebrates. While neurotoxins can cause paralysis of the nervous system in both small and large animals, necrotoxins can cause tissue ulcers and massive tissue destruction. Moreover, spider venom components can damage muscle tissues and blood cells, potentially causing respiratory distress and in rare cases, death [13]. According to the data of World Health Organization (WHO), only four spider genera have species capable of causing deaths or serious medical problems for humans: *Loxosceles*, *Phoneutria*, *Latrodectus* and *Atrax* [10]. While neurotoxic venom (hit the nervous system) is well known to be secreted by *Latrodectus* and *Atrax* species, necrotic venom (destroy the tissue) is known to be released by *Loxosceles* species [14].

In Libya, studies on spiders and their impact on public health did not get much attention. A few studies have been published; a study conducted to identify spiders in a national park in Northern west Libya, demonstrated that some samples belong to spider's families of poisonous species such as Theridiidae and Sicariidae [15]. Another study identified 35 spider families, some of which were also venomous species of medical importance (i.e. Theridiidae and Sicariidae) [16]. Few studies focused on spider bites and their medical importance [5, 12]. Medically important spider species in Libya are *Loxosceles rufescens, Latrodectus geometricus, Latrodectus tredecimguttatus, Latrodectus dahli, Steatoda paykullian, Steatoda triangulosa, Cheiracanthium meldei* and *Tegenaria pagana* [17, 18]. The aim of this study was to interpret, analyse and characterize clinical features of patients with spider bites and their variations in Tripoli Medical Center (TMC), Tripoli, Libya between 2004 and 2012.

Methods

Study design and setting

Cross sectional study.

Data collection procedure

This study included all reported cases of spider bites; all patient data were obtained from patients' medical records at TMC in the period from 2004 to 2012. The data provided was gathered manually from medical record officers; it was collected from the patient registers (one file for each patient) totaling 102 patients. All cases were clinically diagnosed as spider bites; almost all patients admitted that they were bitten by spider, and the physician identified them as spider bites based on the patients' admission, cutaneous manifestations and the symptoms and signs which were consistent with those caused by the common medically important spiders in Libya.

Epidemiological and clinical data

Epidemiological and clinical data were gathered from TMC's patient's records. The following data were recorded for each spider bite: patient demographic characteristics (age, gender), circumstances of the spider bite (season, spider bite site,), and local effects. Medical assessment was conducted from patients' records in the period from 2004 to 2012.

Statistical analysis

All data were analyzed statistically by using the Statistical Package for Social Sciences (SPSS, version 20.0, SPSS Inc., USA).

Ethical approval

Ethical approval to conduct this study was issued by the standing ethics committee for Biosafety and Bioethics at the Research Documentation and Scientific Committee Office of the National Center for Disease Control (Libya), with ethical approval under reference number NBC: 002.H-25.1, on 20 April 2025.

Results

A total of 102 patients were registered in this study during the period between 2004 and 2012 (Figure 1.); the highest number of cases (17%) was recorded in 2007 and 2009, and the fewest cases (2%) were recorded in 2004. The total number of female cases was 68 (66.6%) compared to 34 male patients (33.3%). The ages of patients ranged from 6 to70 years, all suffering from different symptoms; all patients were living in Northern-West Libya. Most spider bites were in the age group of 19-29 years (40.19%) with 41 cases (15 males, 26 females) followed by age group of 30-39 (26.47%) with 27 cases (9 males,18 females) and age group 40-49 (13.72%) with 14 cases (2 males, 12 females) ((Figure 2.).

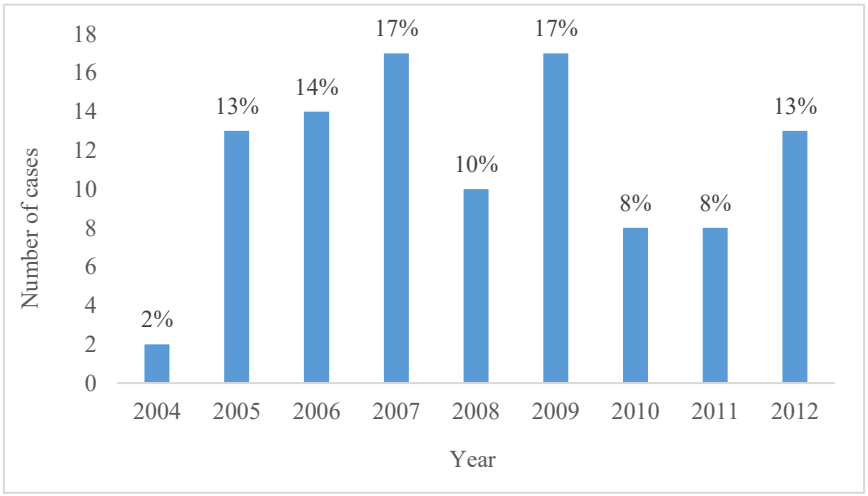

Figure 1. Number of cases from 2004 to 2012.

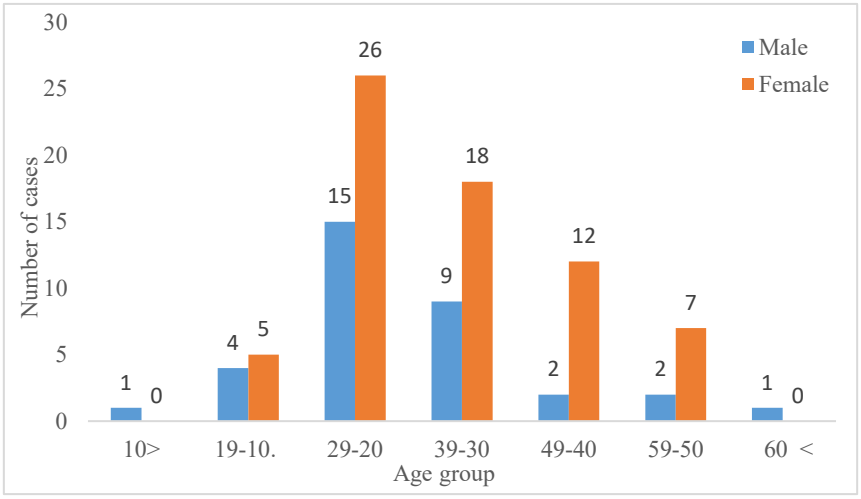

Figure 2. Age demographics of patients with spider bite.

Most cases were recorded in May and June, with 16 cases (15.68%) in each month, followed by 15 cases (14.7%) in each of July and November; the lowest cases were recorded in as in February (1) and in January (3) with percentage of 0.98% and 2.94%, respectively (Figure 3.). The proximal extremities were the most bitten sites (71.5%) compared to distal parts (5.88%) and trunk (0.98%) as the least bitten areas (Figure 4.). The majority of cases (90% of total patients) suffered from erythema (93% from total females and 85% from total males) followed by 36% of patients suffered from swelling (38% from total females and 35% from total males); on the other hand, itching (33%), necrosis (29%) and fever (17%) were the least frequent symptoms (Figure 5.). The diagnosis of spider bite was made on patients' admission and the clinical findings since no spiders were brought in this study.

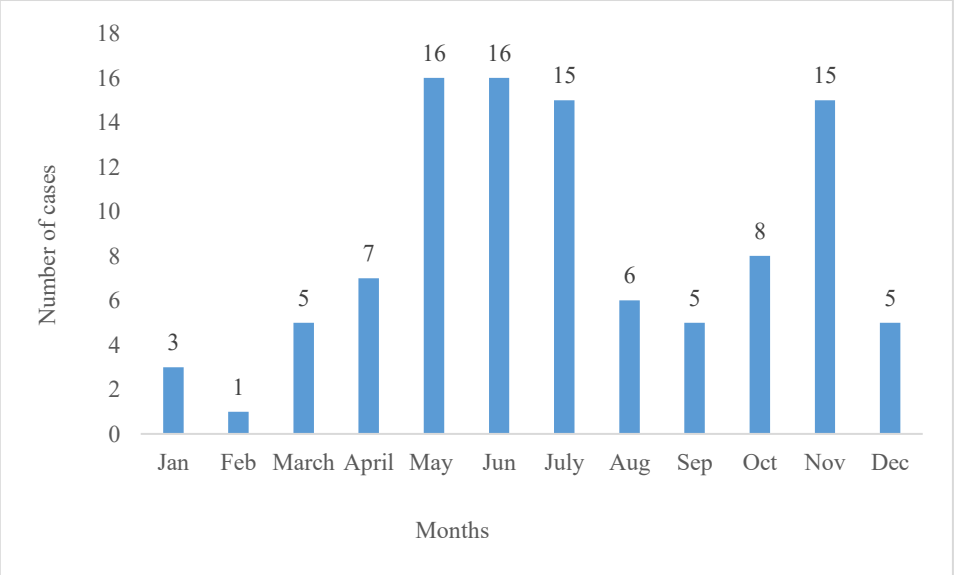

Figure 3. Spider bites incidence by months all over the years.

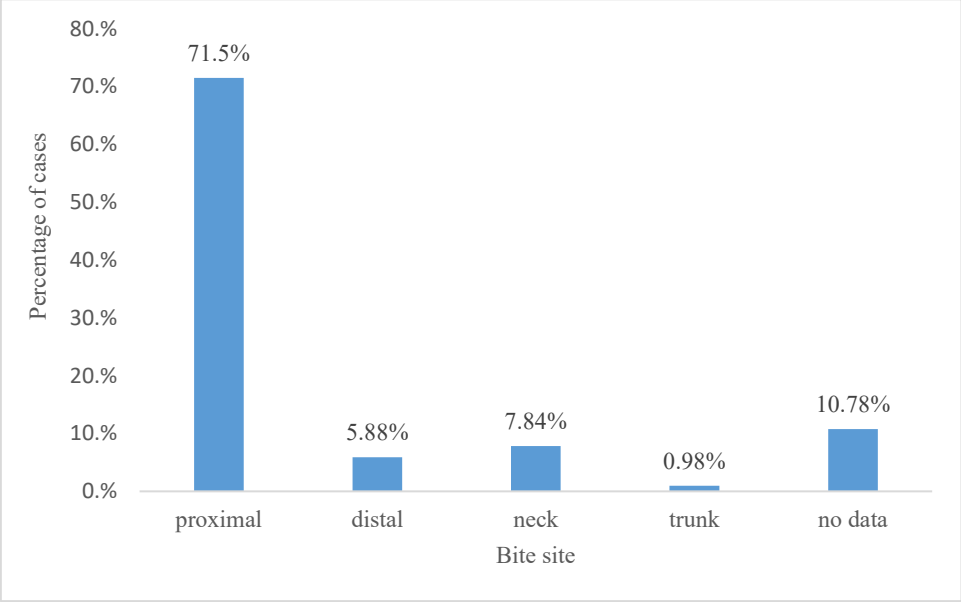

Figure 4. Spider bite localization on the patient's body.

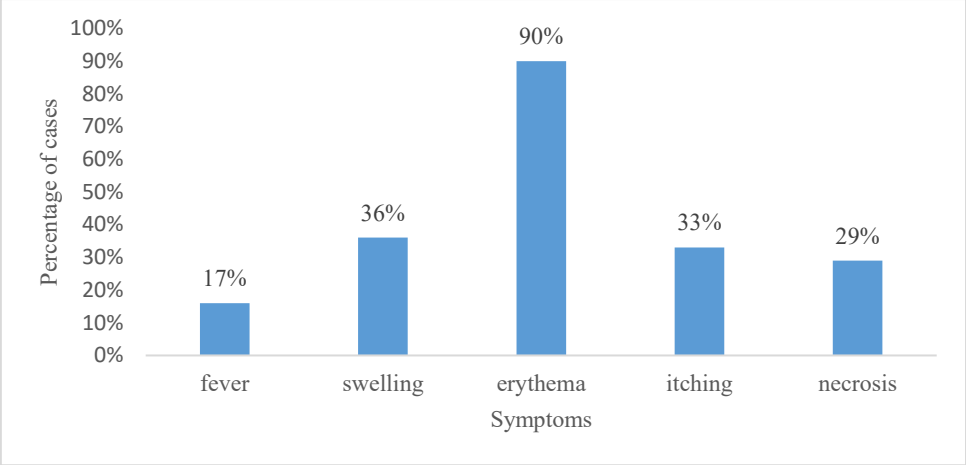

Figure 5. Percentage of spider bite symptoms from reported cases.

Discussion

Typically, spider bites have no distinct characteristic signs or symptoms, thus the majority of diagnoses are assumed to be presumptive (speculative) [19, 20]. Generally, neither physicians nor patients are properly acquainted (familiar) with or informed in spider identification; consequently, most of them are unable to identify spider species or differentiate spiders from other arthropods [21]. Skin lesions with unclear etiology (later diagnosed as skin and/or soft-tissue infections, allergic reactions, dermatoses etc.) are mostly attributed to spider bites. Misdiagnosing a wound as a spider bite can lead to medicolegal ramifications, delays in receiving the proper care, and/or potentially serious or even deadly outcomes. The medical literature is also affected by false/inaccurate information about spider bites, and it seems that people are not aware of the latest treatment recommendations for confirmed "verified" spider bites [4].

Several studies showed similar results to our study, with more female patients than male patients [5, 12, 16, 22, 23, 24, 25, 26, 27, 28, 29, 30]. Other studies exhibited contradictory findings, with more bite cases from males than from females [13, 31, 32, 33, 34]. Our finding might be attributed to the known fact that women are primarily responsible for housekeeping in Libyan society, which puts them in confrontation with spiders [5].

The correct verification of spider bites usually depends on three or four steps (currently meet the international standard as a "verified spider bite") as follows: 1- the spider bite has to be observed, 2- the spider must be collected (captured) while biting or immediately soon after the bite, 3- an expert must be able to identify the spider, and 4- there must be signs or symptoms of the bite (such as discomfort or pain) which are typically associated with spider bites, most probably due to the perception that spider bites are uncommon occurrences [35, 36, 37]. Thus, it is not surprising that cases that were officially identified as spider bites frequently turned out to be false when verified by experts [37].

Two studies showed that the age range of 20-29 years-old was the most commonly affected by spider bites [5, 13]. Several studies revealed that most spider bites occur in adults age range of 20-49 years old with an approximate percentage of 50% or higher [22, 25, 31, 38]. Other studies suggest that the majority of patients subjected to spider bites were at age of 20 years or older with more than 66% in a study at Texas, USA [23] more than 78% in a South African study [29], and more than 90% in a USA study [27]. Our results are in concordance with these findings.

It is not unusual to find that most spider bites generally occur seasonally during warmer months (late spring and summer) as suggested by several studies [4, 23, 26, 28, 29, 30, 32, 34, 36, 38, 39, 40]. The majority of spider bites will occur during the day, whether indoors or outdoors, especially in the spring and summer, when there is a higher chance of human-spider contact[41]. Moreover, studies are suggesting that most adult spiders have characteristic behavioural activity during late spring and summer [12, 25, 30]. All of these are consistent with our findings.

More than two thirds of spider bites were recorded in proximal parts of patients, followed by neck and distal body extremities. One suggested cause is that uncovered (with relatively large surface area) proximal parts during warmer months make them more vulnerable to spider bites than other body parts. Similarly, some studies stated that the body parts most affected by spider bites were proximal parts, followed or not by distal ones [5, 12, 24 39, 42, 43]. On the other hand, several studies reported that distal extremities presented the most bites followed or not by proximal parts [25, 27, 28, 31, 32, 35, 40, 44], or neck [22]. While some authors claim that biting spiders prefer human habitats, finding themselves in situations that may get pressed by victim' body (mostly thigh, arm or trunk) [43]; others suggest that the anatomical location of spider bites seems to be far more reliant on the activity of human victims at the time of bites, rather than on the biting spiders' preferred habitats or feeding habits [41].

Erythema/skin redness/red mark was the most frequent symptom/sign of spider bites in many studies [27, 32, 35,

39, 40, 41, 45]. Moreover, various studies were consistent with this study, showing that erythema, pain and swelling (oedema) were three main presenting symptoms in most patients with spider bites [13, 22, 24, 27, 29, 30, 31, 38, 40, 42, 44]. Although during the study, spiders were absent, and no spider species were identified and recorded, the 29% necrosis patients are probably due to necrotizing arachnidism caused by the Mediterranean brown recluse spider (*Loxosceles rufescens*); similar study in Libya suggested that this species was responsible for local skin necrosis in 71% of patients [12]. Almost all reviewed studies showed that most patients with mild, moderate or severe cutaneous necrosis (Loxoscelism) were bitten by *Loxosceles* species [31, 39, 42, 45], or *L. rufescens* [5, 30]. The only group of spiders for which there is strong proof linking bites to necrotic arachnidism is *Loxosceles spp*., as demonstrated by human case series and studies on the venom [35]. Moreover, some *Loxosceles* cases show extensive necrosis while others have only mild injuries; possible causes are: the spider species, the time of the year, amount of the venom injected, the variation in the venom toxicity amongst spiders, and the patients' genetic makeup [42].

Conclusion

In conclusion, although spider bites are common in Libya, the majority of bites cause only minor or no clinical effects, and do not need treatment; thus, they are considered a rare occurrence. Moreover, the diagnosis of spider bite is very difficult, but obtaining a thorough history and careful evaluation of both local and systemic symptoms, together with correct confirmation of "verified spider bites" by following the literature [35, 36, 37] are beneficial in the diagnosis and management of spider bites. However; based on some literature studies, after a spider bite, there is virtually little chance of major health issues in the Mediterranean region [4, 46].

Disclaimer

The article has not been previously presented or published, and is not part of a thesis project.

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Authors contributions

HME, AME and WKS designed the study and were responsible for the statistical analysis and interpretation of the data; HME, AE and WKS collected clinical and epidemiological data; HME, AME and WKS drafted and revised the manuscript. All authors read and approved the final manuscript. AME and WKS are guarantors of the paper.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

Data availability

All the data are included in the manuscript.

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