



General Surgery

AWARENESS AND KNOWLEDGE REGARDING SCORPION BITE AND ITS FIRST AID MANAGEMENT AMONG FEMALE MEDICAL STUDENTS IN A TERTIARY CARE HOSPITAL OF URBAN AREAS OF WESTERN MAHARASHTRA

Dr. Anshika Mittal	Intern Department of General Surgery Symbiosis Medical College for Women and Symbiosis University Hospital and Research Centre, Symbiosis International, Deemed University, Pune, India
Dr. Raiba Deshmukh	Associate Professor, Department of General Surgery Symbiosis Medical College for Women and Symbiosis University Hospital and Research Centre, Symbiosis International, Deemed University, Pune, India
Dr. Yogita Dhalwal	Intern Department of General Surgery Symbiosis Medical College for Women and Symbiosis University Hospital and Research Centre, Symbiosis International, Deemed University, Pune, India
Dr. Priti Shah	Professor, Department of General Surgery Symbiosis Medical College for Women and Symbiosis University Hospital and Research Centre, Symbiosis International, Deemed University, Pune, India
Dr. Pankaj H Bansode	Professor, Department of General Surgery Symbiosis Medical College for Women and Symbiosis University Hospital and Research Centre, Symbiosis International, Deemed University, Pune, India

ABSTRACT

Background: Scorpion envenomation constitutes a significant, yet often underappreciated, public health challenge in numerous tropical and subtropical regions globally, known to cause serious complications and fatalities. Without prompt and accurate diagnosis, coupled with appropriate first aid and medical management, scorpion stings can lead to considerable morbidity and mortality in severe cases. Therefore, a good understanding of first aid protocols and recent advances in treatment, with broader clinical picture of scorpion envenomation is paramount for medical students to contribute effectively in improved patient outcome and reducing complications. **Aims and Objectives:** The aim of this study is to evaluate the knowledge, clinical awareness, and readiness of female medical students who tend to study in urban areas in identifying and managing scorpion envenomation, including appropriate first aid and hospital based interventions. **Materials and Methods:** A cross-sectional study was done on the female medical students of the tertiary Medical college & hospitals of urban areas of Western Maharashtra (India) to assess their knowledge and awareness about Scorpion bite first aid management. The sample size was calculated to be 272. The study was carried out using a semi structured questionnaire which was circulated among the students and interns and the data was analyzed via G Software. **Results:** A majority of the participants that is 90.1% knew that scorpion bites are life threatening. Whereas 90.4% haven't seen or treated scorpion bite and 91.9% were aware about the symptoms of scorpion bite. Almost half 52.9% knew washing the site with water and soap would be the first line of management in scorpion bite. While 44.9% knew that keeping the affected limb below the heart level to be the correct position after the sting, 41.9% felt that anti venom therapy should be given to the patient. Majority 52.9% selected prazosin to be administered in management of severe scorpion envenomation. Still 37.5% were not confident in providing the treatment and 37.5% were not sure of the technique. **Conclusion:** Scorpion envenomation remains a significant cause of morbidity and mortality in India. Its burden can be reduced through region-specific guidelines, improved first-aid awareness, structured case management training, and adequate availability of anti-venom. This study highlights that healthcare practitioners, often the first point of contact, rely largely on theoretical undergraduate knowledge with limited clinical exposure. Therefore, undergraduate medical curricula should be updated to include current epidemiological data and practical, context-specific management approaches relevant to the Indian setting.

KEYWORDS : First Aid, female Medical Students, Public Health, Scorpion bite.

INTRODUCTION

Scorpion sting envenomation (SSE) is a significant public health challenge in tropical regions, known to cause serious complications and fatalities.⁽¹⁾

The estimated global annual incidence of SSEs confidently surpasses 1 million, leading to approximately 3,000 deaths each year, even though the exact incidence is still not fully determined. Additionally, more than 1.2 million cases of scorpion stings are reported annually, resulting in 3,250 fatalities, highlighting a critical area for action in public health and safety.^(1,2)

With over 2,200 known scorpion species worldwide, only 30 to 40 are classified as medically significant. In India, among the 86 identified species, the Indian red scorpion (*Hottentotta tumulus*) stands out as a major threat due to its highly potent venom. Additionally, the Indian black scorpion (*Giganometrus Swammerdami*) is also known to be potentially venomous to humans, underscoring the serious risks these creatures pose.⁽¹⁾ Demographic patterns frequently indicate higher incidence among males and outdoor workers, with the upper and lower extremities being the most common sting sites.⁽³⁾ Although Stings being often more frequent during summer months and between 6 p.m. and 6 a.m.⁽⁵⁾ This prevalence is more in rural areas, mostly among agricultural laborers, and homes with some specific construction types (e.g., mud floors, thatched roofs)⁽³⁾ This high burden is particularly concentrated in

specific regions, including Western Maharashtra, parts of Karnataka, Andhra Pradesh, Saurashtra, Pondicherry, Tamil Nadu, and Uttar Pradesh. It is important to acknowledge that children face a significantly higher risk of severe envenomation in these regions. Addressing this risk is imperative for protecting their health and safety.⁽³⁾

The clinical presentation varies widely, from localized pain to severe systemic effects, depending on the scorpion species, venom quantity and individual sensitivity.⁽⁴⁾ The neurotoxins in the venom trigger a complex physiological reaction by stimulating the excessive release of acetylcholine from parasympathetic ganglia, as well as epinephrine and norepinephrine from sympathetic ganglia and the adrenal glands.⁽¹⁾ Systemic symptoms are more frequent and severe in children and infants—may include breathing difficulties, muscle twitching or thrashing, abnormal movements of the head, neck, and eyes, excessive drooling, sweating, slurred speech, high blood pressure, rapid heart rate, and restlessness.⁽⁵⁾ Severity is often classified into grades, Grade 3 involving cranial nerve or skeletal neuromuscular dysfunction and autonomic dysfunction.

Grade 4 having both, potentially leading to hyperthermia, pulmonary edema, and multi-organ failure.4 Priapism, an incidental finding, is particularly notable in male children under 15 years of age.⁽⁶⁾

Scorpion sting envenomation syndrome clearly results in venom-

related excitatory neurotoxicity that severely impacts both the sympathetic and parasympathetic systems. This condition manifests with intense pain, tachycardia, hypertension, mydriasis, and hyperglycemia. Additionally, it can lead to incontinence, agitation, myocardial injury, pulmonary edema, and cardiogenic shock. Ultimately, without prompt intervention, this syndrome can result in multiorgan failure, coma, and even death. The "tap test" is a diagnostic tool used to support suspicion of a sting, as tapping the affected area typically intensifies the pain⁽⁴⁾

A study was conducted in rural India found that first aid measures were overlooked in 95% of scorpion sting cases, underscoring a significant gap between recommended guidelines and actual practices⁽³⁾

Effective management of scorpion stings begins with prompt and appropriate first aid, followed by thorough medical treatment—ideally in a tertiary care facility. Key first aid steps include gently cleaning the sting site with mild soap and water, applying a cool compress (but not direct ice, which is a common misconception), and keeping the affected limb immobilized⁽⁷⁾

In tertiary health care settings, management primarily focuses on supportive care with specific pharmacological interventions. Supportive therapy includes pain control (using NSAIDs, opioids, or benzodiazepines for neuromuscular symptoms), establishing intravenous access, with administering tetanus prophylaxis⁽⁵⁾

A study was conducted in rural India found that first aid measures were overlooked in 95% of scorpion sting cases, underscoring a significant gap between recommended guidelines and actual practices⁽³⁾

Effective management of scorpion stings begins with prompt and appropriate first aid, followed by thorough medical treatment—ideally in a tertiary care facility. Key first aid steps include gently cleaning the sting site with mild soap and water, applying a cool compress (but not direct ice, which is a common misconception), and keeping the affected limb immobilized⁽⁷⁾ Patients experiencing scorpion stings must be urgently hospitalized in an intensive care unit. Regrettably, many of them depend on traditional healers and receive inadequate first aid before reaching the hospital. This reliance significantly elevates the mortality rate associated with scorpion stings, even though deaths should be uncommon for a condition where serious effects can be reversed. Effective first aid is crucial; administering the correct treatment to scorpion sting victims is one of the most powerful strategies to reduce mortality⁽²⁾

Patients experiencing scorpion stings must be urgently hospitalized in an intensive care unit. Regrettably, many of them depend on traditional healers and receive inadequate first aid before reaching the hospital. This reliance significantly elevates the mortality rate associated with scorpion stings, even though deaths should be uncommon for a condition where serious effects can be reversed. Effective first aid is crucial; administering the correct treatment to scorpion sting victims is one of the most powerful strategies to reduce mortality.

The concept of "neglect" in neglected tropical diseases (NTDs) must be addressed through the lenses of economic inequality and social stigma. Patients frequently face catastrophic expenses and income loss that push them deeper into poverty. Notably, scorpion sting envenomation is inexplicably absent from the WHO list of NTDs. This oversight is significant, as it primarily impacts rural resources as it primarily impacts rural, resource-poor populations that lack access to essential medical care, sharing critical characteristics with other recognized NTDs. It is imperative that we acknowledge and address this issue⁽¹⁾

The significance of this study is it addresses a vital opportunity to enhance the quality of medical education in India by tackling critical knowledge gaps. This study decisively examines the knowledge and perceptions of Indian medical students concerning the characteristics and first aid management of scorpion bites. Enhancing the knowledge of healthcare workers based on this study's findings will subsequently lead to improved patient care and higher quality clinical practices.

AIM AND OBJECTIVES:

The aim of this study is to evaluate the knowledge, clinical awareness, and readiness of female medical students in identifying and managing scorpion envenomation, including appropriate first aid and hospital-based interventions.

This research endeavors to furnish actionable, evidence-driven recommendations for transformative curriculum reform, profoundly enhancing the preparedness and clinical competence of future healthcare professionals to confront this significant public health challenge.

With Objectives To assess the knowledge of female medical students regarding scorpion envenomation.

To evaluate their awareness of first aid measures for scorpion stings.

METHODOLOGY:

A cross sectional study will be conducted among female medical students and interns of tertiary Medical college of urban areas of Western Maharashtra (India) to assess their knowledge and attitude about scorpion bite and first aid management. Study involved female medical students and interns in tertiary care teaching hospital in Western Maharashtra. Data collection to be done through a self-administered, pre-validated, and structured questionnaire. This questionnaire is developed to gather comprehensive information on participants' demographic profiles, their general understanding of scorpion biology and envenomation, their ability to identify spectrum of symptoms (both localized and systemic), and their knowledge of appropriate first aid measures.

The sample size was calculated using confidence level of 95% with margin of error to be + 5% of the surveyed value with population proportion of 50% . Hence the sample size came out to be 272.

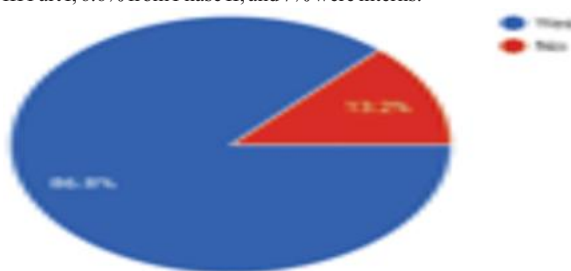
Which included female medical students of 1st, 2nd, 3rd phase part 1 and 3rd phase part 2 and Medical interns excluding non-medical students and paramedics.

Since the majority of students in our nation are enrolled in medical schools who are the future doctors, who will serve the nation, we chose medical undergraduates (MBBS) students since their answers to questions about scorpion bite knowledge would, if other streams were taken into consideration, show the highest percentage of those who correctly answered. In the third year of the MBBS, the students are taught Forensic medicine and Toxicology which acts as the formal education concerning Scorpion bite treatment as well as information on the various species of snakes and the myths and realities surrounding them. They have a platform through their internship where they were exposed to Scorpion bite management scenarios where they work in the health care sector. Approval of Institutional Ethical Committee was obtained before the start of the study. Consent of the participants was taken before the start of the study. Structured questionnaire included questions about sociodemographic data, general information about scorpion, knowledge about Scorpion bite, its first aid management.

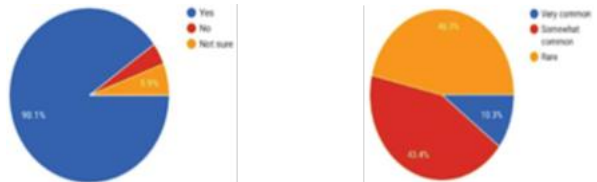
The authors got in touch with the students after their regular classes ended to explain the study's goals and how to fill out the questionnaire. Students were advised to answer the form truthfully and as completely as possible. The students were also informed that the answers would be kept anonymous and that no identifiers would be used on the forms when filling out the questions in order to encourage them to respond confidently.

RESULT:

A total of 272 female medical students and interns from a tertiary care teaching hospital of Urban areas of Western Maharashtra were invited to participate through a structured online questionnaire. All individuals consented and completed the survey, yielding the final study sample. All respondents were female. The largest proportion of participants (51.5%) belonged to Phase III Part II, followed by 34.9% from Phase III Part I, 6.6% from Phase II, and 7% were interns.



Awareness of scorpion envenomation was high, with 86.8% of respondents reporting prior knowledge of the condition. Among these, 90.1% recognized its potentially life-threatening nature. However, understanding of its regional burden remained limited. Nearly half of the participants (46.3%) were unaware of its prevalence, and an equal proportion perceived it as rare in their locality, whereas only 10.3% correctly acknowledged its relative commonness in Maharashtra

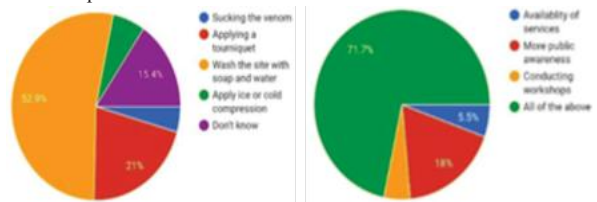


In terms of seasonal occurrence, 60.3% of respondents correctly associated scorpion stings with the monsoon season. Conversely, 22.8% were uncertain, while smaller proportions attributed higher incidence to summer (15.1%) and rest to winter. Knowledge of clinical presentation was comparatively strong, with 91.9% indicating familiarity with symptoms. When asked about the nature of venom, just over half (49.3%) correctly identified it as predominantly neurotoxic, while 28.3% and 4.8% incorrectly categorized it as hemotoxic and cytotoxic, respectively. Perceptions of risk distribution revealed that most participants believed all age groups are equally susceptible; however, 34.6% identified children as being at greater risk.



With respect to first aid practices, 52.9% appropriately selected washing the affected area with soap and water. In contrast, 21% endorsed the use of a tourniquet, which is not recommended, and 15.4% lacked knowledge of first aid measures. Only 44.9% correctly indicated that the affected limb should be kept in a dependent position (below heart level), while others suggested elevation (26.1%) or maintaining it at heart level (8.5%).

Knowledge regarding definitive management showed variability. While 41.9% believed that antivenom is universally required, 27.6% appropriately indicated that its administration depends on clinical severity, and 13.2% did not support its use. A majority of respondents (52.9%) correctly identified prazosin as a key therapeutic agent, whereas 22.8% were unaware of its role. A smaller proportion selected atropine (9.9%) and adrenaline (9.2%), reflecting some misconceptions.



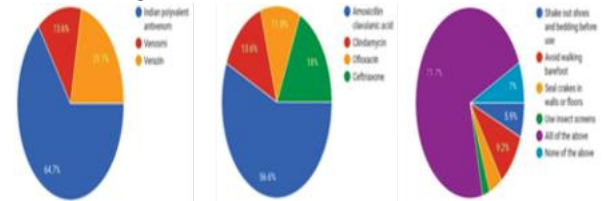
Self-reported confidence in managing scorpion stings was suboptimal. Approximately 37.5% of participants expressed lack of confidence in providing first aid, and 35.5% were uncertain about their competence. Furthermore, 22.8% acknowledged inadequate overall awareness, while only 20.6% considered themselves sufficiently informed while majority are not aware.

Participants identified several measures to improve outcomes, with 71.7% emphasizing the importance of improved healthcare accessibility, enhanced public awareness, and targeted training programs. A substantial majority (90.4%) underscored the necessity of community-level education for prevention. Reported barriers to effective management included insufficient knowledge (58.5%), poor housing conditions (14.7%), and lack of access to pest control measures (8.5%).

Preventive strategies most frequently recognized included shaking clothing and bedding before use, avoiding barefoot walking, sealing

cracks in walls and floors, and installing insect screens (71.7%). Regarding pharmacological management, 56.6% identified amoxicillin as a first-line antibiotic, followed by ceftriaxone (18%), ofloxacin (11.8%). Additionally, 64.7% of respondents reported Indian polyvalent antivenom as the most commonly used preparation, while others selected alternatives such as Verazin (21.7%) and Venosin (13.6%).

Overall, while general awareness of scorpion envenomation was high among participants, significant gaps persist in knowledge of epidemiology, first aid, and evidence-based management, highlighting the need for targeted educational interventions.



DISCUSSION

The findings of this study indicate that, although female medical students and interns demonstrate a high level of general awareness regarding scorpion envenomation, important deficiencies persist in applied knowledge and clinical preparedness. While most participants recognized the potential severity and clinical features of scorpion stings, there were notable misconceptions related to regional epidemiology, appropriate first aid practices, and evidence-based management. In particular, the persistence of incorrect measures—such as tourniquet application—and uncertainty regarding limb positioning and indications for anti-venom reflect gaps that may adversely affect patient outcomes in real-world settings.

These observations are in agreement with established literature. Pioneering work by Bawaskar HS and Bawaskar PH has consistently highlighted the high burden of scorpion envenomation in endemic regions such as Maharashtra, and has demonstrated that early administration of prazosin significantly reduces morbidity and mortality⁽⁸⁾. Furthermore, studies reported in journals including the *The Lancet* and the *Indian Journal of Critical Care Medicine* emphasize that prompt recognition, avoidance of harmful traditional practices, and timely pharmacological intervention are critical determinants of survival.

The low levels of self-reported confidence in delivering first aid and managing scorpion stings observed in this study are also consistent with prior research in medical education, which suggests that theoretical knowledge alone is insufficient to ensure clinical competence, particularly in emergency and toxicology settings. Additionally, the limited awareness of preventive strategies and local disease burden reflects patterns identified in community-based studies, where environmental factors such as inadequate housing and limited pest control measures continue to contribute to the incidence of scorpion stings.

Taken together, these findings underscore the need for a more structured and competency-based approach to training in toxicological emergencies within undergraduate medical education. Incorporation of simulation-based learning, case-based discussions, and skill-oriented workshops may help bridge the gap between knowledge and practice. Parallel efforts to enhance community awareness and strengthen primary healthcare systems are equally important to ensure timely intervention and prevention. Addressing these gaps will be essential for improving the overall management and outcomes of scorpion envenomation in endemic regions.

CONCLUSION:

Scorpion envenomation continues to be a major contributor to morbidity and mortality in India. The burden of disease can be significantly reduced through the implementation of region-specific management guidelines, structured training programs for case management, and improved public awareness regarding appropriate first-aid measures. Additionally, ensuring the adequate availability of anti-venom and strengthening support systems for healthcare professionals at all levels are essential for promoting the dissemination of accurate, evidence-based treatment practices.

The findings of this study indicate that, despite delays in patient

presentation and limited awareness among female medical students, the knowledge of female healthcare practitioners—who frequently serve as the first point of contact—remains largely confined to theoretical concepts acquired during undergraduate education. This training often lacks sufficient practical exposure to clinical cases. Therefore, there is a pressing need to revise undergraduate medical curriculum to incorporate updated epidemiological insights and context-specific clinical management protocols relevant to the Indian healthcare setting.

REFERENCES:

1. Scorpion Sting Envenomation, a Neglected Tropical Disease: A Nationwide Survey Exploring Perspectives and Attitudes of Resident Doctors from India - PubMed <https://pubmed.ncbi.nlm.nih.gov/37696517/3>. Assessment of knowledge about first aid methods, diagnosis, and treatment of scorpion stings among health workers in Ouarzazate region, Morocco: A cross-sectional study - PubMed
2. <https://pubmed.ncbi.nlm.nih.gov/39216795/>
3. https://www.researchgate.net/publication/314483896_Profile_of_scorpion_envenomation_in_Rural_India
4. Scorpion Toxicity - StatPearls - NCBI Bookshelf, accessed July 23, 2025, <https://www.ncbi.nlm.nih.gov/books/NBK430928>
5. (Insect and Scorpion Stings | Concise Medical Knowledge - Lecturio, accessed July 23, 2025, <https://www.lecturio.com/concepts/insect-and-scorpion-stings/>
6. Retrospective Study of Children with Scorpion Envenomation in a Tertiary Care Center of North India - ResearchGate, accessed July 23, 2025, https://www.researchgate.net/publication/343812837_Retrospective_Study_of_Children_with_Scorpion_Envenomation_in_a_Tertiary_Care_Center_of_North_India
7. Scorpion Bites: Symptoms, Causes, and Treatment - American Red Cross, accessed July 23, 2025, <https://www.redcross.org/take-a-class/resources/learn-first-aid/scorpion-bites>
8. Bawaskar HS, Bawaskar PH. Prazosin in management of cardiovascular manifestations of scorpion sting. *The Lancet*. 1986;1(8479):510–511.