Bangabandhu Sheikh Mujib Medical University Journal 2025;18(3):e 78955
ISSN 2074-2908 | eISSN 2224-7750 |

RESEARCH ARTICLE

Clinical and biochemical profile of wasp sting patients in a tertiary care hospital

Parash Ullah[1] | Habiba Kabir[2] | M. M. Jahangir Alam[3]
Md. Shafiqul Bari[4] | Fazle Rabbi Chowdhury[2]

[1]Department of Gastroenterology, Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh
[2]Department of Internal Medicine, Bangladesh Medical University, Dhaka, Bangladesh
[3]Department of Medicine, Sylhet MAG Osmani Medical College, Sylhet, Bangladesh
[4]Department of Medicine, Dhaka Medical College, Dhaka. Bangladesh

Abstract

Background: Wasp stings and the resulting allergic reactions are common reasons for visiting the emergency department. Stings can be fatal due to multi-system involvement. In our country, the impact of massive wasp stings has been significantly underestimated and has not been systematically investigated. This study aimed to identify the clinical presentations and biochemical profiles of patients experiencing wasp stings in our context.

Methods: This case-series study was conducted at the Department of Medicine in Sylhet MAG Osmani Medical College Hospital, Sylhet, Bangladesh. The research involved species identification, based on photographic evidence, in conjunction with the patient's history and informed consent. The study documented the socio-demographic history, details of the wasp bite, and related complications.

Results: Among the 30 patients studied, there were 22 males, and 8 females, mean (standard deviation) 36.5 (13.1) years. The average number of stings was 57.6 (114.7) (2 to 500 bites), and hospital arrival time ranged from 15 minutes to 8 days. All the patients experienced local pain, swelling, myalgia and rhabdomyolysis. Systemic complications, such as acute kidney injury, were observed in 20% of cases, with half of these requiring hemodialysis. Biochemically, elevated creatine phosphokinase, hyponatremia, and hyperkalemia were frequent. Most of the stings were attributed to Vespa affinis (21; 70%) and Vespa tropica (7; 23%).

Conclusion: Rhabdomyolysis was a universal finding in wasp sting cases. Delayed arrival to the hospital significantly increases systemic complications, with acute kidney injury emerging as the most common severe outcome. Early medical intervention is necessary to minimise these risks.

Correspondence
Parash Ullah
drparashullah@gmail.com

Publication history
Received: 6 Jan 2025
Accepted: 12 July 2025
Published online: 24 July 2025

Responsible editor
M Mostafa Zaman
0000-0002-1736-1342

Reviewers
Hazim Abdul Rahman Alhiti
0000-0003-0000-8267
MA Jalil Chowdhury
0009-0002-9048-3693

Keywords
wasp sting, rhabdomyolysis, acute kidney injury, Vespa affinis

Funding
None

Ethical approval
Approved by IRB of Sylhet MAG Osmani Medical College (No. somc/2014/700, dated 1 Mar 2014).

Trial registration number
Not applicable

Declaration
This article encompasses FCPS thesis of Dr Parash Ullah

Key messages

Wasp stings are a relatively common but often underreported injury caused by arthropods, with Vespa affinis and Vespa tropica being identified as the most common offenders. Early detection and swift treatment can help minimise complications. To understand the burden of this issue, countrywide species-specific epidemiological studies are required.

Introduction

The interface between humans and animals contributes significantly to morbidity and mortality in humans. This interaction has intensified due to both natural and human-induced changes in population dynamics, ecological factors, and behavior [1]. Wasps, which belong to the vespid subgroup within the order Hymenoptera, typically sting when provoked, with incidents most frequently occurring in late summer and early autumn [2]. There are are over 6,000 wasp species worldwide, and wasp stings are common. In the U.S., they account for 27.4% to 29.7% of animal-related injuries, with a yearly mortality rate of 0.14 to 0.74 per million people [3, 4]. Insects that sting to protect their colonies are part of the order Hymenoptera. The medically significant groups within this order include Apoidea (bees), Vespoidea (wasps, hornets, and yellow jackets), and Formicidae (ants). These insects deliver venom to their targets through stings.

Bees possess a barbed stinger, which they leave behind after stinging, ultimately leading to their demise. In contrast, Wasps, hornets, and yellowjackets are capable of stinging multiple times [5, 6]. Stinging incidents involving honeybees and wasps are infrequent, with most deaths or serious cases resulting from fewer than 10 stings, often due to anaphylactic shock. However, mass stinging can be life-threatening due to the toxic effects of large amounts of venom being injected [5]. Wasp venom is a complex mixture of proteins capable of impacting various tissues [7]. Stings from wasps and bees can cause reactions ranging from mild symptoms like swelling and redness to severe complications such as anaphylactic shock, rhabdomyolysis, acute kidney injury, heart attack, acute liver failure, and encephalitis [8, 9, 10, 11]. Undetected anaphylactic reactions to Hymenoptera stings are a major cause of sudden and unexpected deaths in young individuals, regardless of whether they have a history of atopic conditions [12]. Fatalities from honeybee or wasp stings are rare and usually result from Type I anaphylaxis linked to a single sting. Anaphylactic symptoms typically occur within 10 minutes and do not correlate with the amount or number of stings[13].

Wasp stings are common in our country but often go unreported. This study aims to examine the clinical and biochemical characteristics of sting victims and will also address the lack of taxonomic research on local wasp species, providing a foundation for future studies.

Methods

This case-series study was conducted in the Department of Medicine at Sylhet MAG Osmani Medical College Hospital, Sylhet, between April 2014 and March 2015. The study population consisted of all patients admitted to the Department of Medicine who met the inclusion criteria. The inclusion criteria were a recent history of wasp bite (the offending agent will be confirmed by showing photographs or by bringing live or dead species) and an age of 13 years and above, irrespective of gender. Patients poisoned by any other animals or arthropods except wasp (Excluded by history and photograph of wasp), and patients with mutism, stupor, and non-communicable conditions were excluded from the study. The wasp is locally known as "Bolla" or "Bola". Some individuals have provided dead specimens of the Bolla. A total of 30 cases were enrolled within the anticipated timeframe. Consecutive sampling was employed as the sampling technique, and all available participants who met the criteria were included until the desired sample size was reached. Data were collected using a semi-structured questionnaire.

Data collection procedure

Initially, informed written consent was obtained from the patients. A brief history of the wasp sting was then collected from the patient or their attendant. Once the offending wasp was identified in accordance with the inclusion criteria, a thorough clinical examination was performed, and necessary investigations were conducted. The investigation plan was based on the findings from the clinical examination, including both local and systemic assessments. If there was any uncertainty regarding species identification, the expertise of a zoologist was sought.

Statistical analysis

Data was processed manually using SPSS (Version 16.0. Quantitative data were presented as means with standard deviations. Qualitative data were reported in terms of frequency and percentage, with comparisons conducted using Fisher's exact test.

Results

A total of 30 patients' data were analysed. The mean (standard deviation (SD)) age of the respondents was 36.5 (13.1), and the age range was 13–70 years. The majority of affected individuals were male. Patients were primarily managed with symptomatic care, focusing on those who developed acute kidney injury (AKI). Out of six AKI cases, one required dialysis after sustaining 180–200 bite marks, with initial creatinine levels at 3.2 mg/dL, peaking at 7.2 mg/dL, and creatine phosphokinase (CPK) levels reaching 800 U/L. A total of 20 dialysis cycles were administered to normalise kidney function. The other cases were treated supportively, utilising forced diuresis with furosemide, along with intravenous saline, sodium bicarbonate, hydrocortisone, antihistamines, and antibiotics. The offender species was Vespa affinis.

All patients (30; 100%) experienced localised pain, swelling, and muscle pain, with all showing signs of rhabdomyolysis. Six patients (20%) developed acute kidney injury (AKI). Additional symptoms included vomiting (6; 20%), oliguria (6; 20%), hepatitis (4; 13.3%), and dyselectrolytaemia (4; 13.3%). Rare cases included hemolysis (2; 6.7%), myocarditis (1, 3.3%), pulmonary oedema (1; 3.3%), and sepsis (1; 3.3%) (Figure 1).

Table 1 outlines a study of 30 patients, categorised by bite count (fewer than 50 bites, n=21; more than or equal to 50 bites, n=9) and time to hospital presentation (within 1 hour, n=10; after 1 hour, n=20). All patients experienced rhabdomyolysis, but complications such as AKI, hemolysis, myocarditis, pulmonary oedema, septicemia, and hyponatremia were exclusive to those with over 50 bites, with AKI affecting 6 out of 9 in that group. Hepatitis was equally observed in both groups (n=2 each). Delayed hospital arrival (more than 1 hour) correlated with

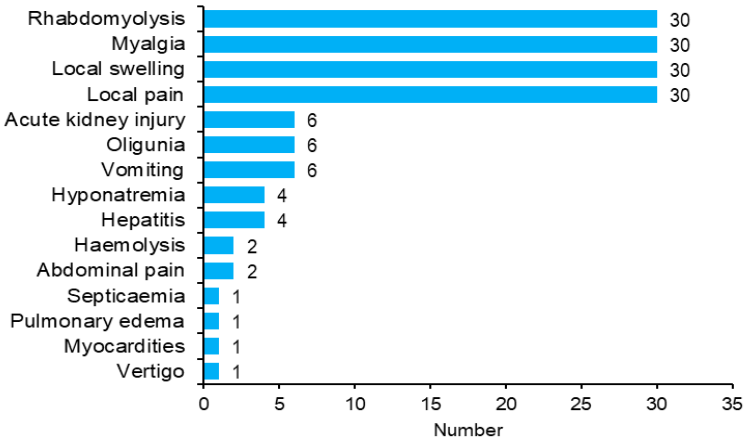

Figure 1 Systemic involvement of patients with wasp bite (n=30)

increased systemic complications, including AKI (n=5), hemolysis (n=2), myocarditis (n=1), pulmonary oedema (n=1), septicemia (n=1), and hyponatremia (n=4), with a significant association noted (P=0.04). Table 2 summarises the results of various biochemical parameters. The mean (SD) SGPT level was 42.6 U/L (39.2 U/L), showing considerable variation among the individuals. The serum creatinine level had a mean (SD) of 1.8 mg/dL (2.0 mg/dl). CPK levels were significantly elevated, with a mean (SD) value of 1495.5 U/L (2676.2 U/L). Hyponatremia was common, with a mean (SD) value of 122.4 mmol/L (6.2 mmol/L). Serum potassium showed a mean (SD) value of 6.0 mmol/L (0.1 mmol/L). The study also identified the specific species of wasps responsible for the stings. Most cases involved 'Vespa affinis' (21; 70%), followed by 'Vespa tropica' (7; 2%), 'Vespa mandarina' (1; 3.3%) and 'Vespa velutina' (1; 3.3%) were rarely reported.

Discussion

In this study, two-thirds of the patients fell within the 20 to 40 year age group. The findings are consistent with another study by Paudel *et al.* where the mean age was 35.5 years. Pérez Pimiento *et al.* [14] reported a mean age of 40.2 years, which differs slightly from our findings [15]. Males were affected significantly more than females, and the findings are quite similar to those of other studies [14, 15, 16]. This increased incidence in males is attributed to their greater outdoor activity compared to females.

Table 1 Relation of systemic involvement (n=30) with the number of bite and time to hospital arrival

Characteristics	Number of bites		Lag period between bite to hospitalisation	
	<50 (n=21)	≥50 (n=9)	≤1 hour (n=10)	>1 hour (n=20)
Rhabdomyolysis	21	9	10	20
Acute kidney injury	0	6	1	5
Haemolysis	0	2	0	2
Myocarditis	0	1	0	1
Hepatitis	2	2	1	3
Pulmonary edema	0	1	0	1
Septicaemia	0	1	0	1
Dyselectrolytaemia (Hyponatremia)	0	4	0	4
P	0.01		0.04	

Interestingly, most of the symptoms were more common in males, except for vertigo, hemolysis, and myocarditis. The cause of this gender difference remains unclear. Witharana *et al.* observed that all patients (100%) experienced local pain, but there was a notable difference in the occurrence of local swelling between studies. In our study, local swelling was present in 100% of cases, compared to 86.7% in their study [16]. In this study, all patients developed myalgia and rhabdomyolysis, which were more prevalent compared to the cases reported from Nepal, where these conditions affected 73% of patients [14].

A fifth of the patients developed renal injury, including oliguria and Acute kidney injury. This result is consistent with the findings of Xie *et al.* in China, where they studied 1091 cases over 8 years from 2004 to 2011 [17]. In a study conducted in India, more than 85% of patients experienced severe AKI and required dialysis [18]. However, in this particular study, only six patients developed AKI, and just 1 of them needed dialysis. The incidence of liver injury, hemolysis, and pulmonary oedema was also lower compared to the Chinese study. The variation could be due to differences in wasp species, venom composition, and health-seeking behaviours of people in different geographies [17].

Table 2 Biochemical parameters of patients with wasp bite (n=30)

Parameter	Mean (SD)[a]	Reference ranges
Serum glutamic pyruvic transaminase	42.6 (39.2)	(7.0–56.0) U/L
Serum creatinine	1.7 (2.0)	(0.6–1.2) mg/dL
Creatine phosphokinase	1495.5 (2676.2)	(20.0–200.0) U/L
Sodium	122.4 (6.2)	(135.0–145.0) mmol/L
Potassium	6.0 (0.1)	(3.5–5.1) mmol/L

[a]SD indicates standard deviation

In this study, the occurrence of abnormal biochemical parameters was consistent with the findings of Xie *et al.* [17]. A notable difference in CPK levels was observed in our study, with significantly higher rates (100% versus 52%) amongst the patients who developed AKI. However, elevated CPK or rhabdomyolysis alone may not cause AKI, as other factors, such as wasp venom toxins and acute tubular necrosis, also contribute to renal impairment [19, 20]. Systemic manifestations were more commonly observed in patients with more than 50 stings, which aligns with the results reported by Paudel B *et al.* [14]. Other complications, such as haemolysis, myocarditis, hyponatremia, pulmonary edema, and septicemia, were consistent with Thiruventhiran *et al.* and Xuan *et al.* studies [10, 13]. Most clinical features and systemic manifestations were seen in patients who arrived at the healthcare centre after one hour. Those treated within the first hour had minimal symptoms. The lag period between sting and initiation of treatment directly correlates with patient outcomes, as was seen in a Nepalese same [14].

The commonest species were Vespa affinis and Vespa tropica. Since this is the first systematic study on species-specific envenomation in this area, no previous data were available for comparison of the findings. Although a case report by Ullah *et al.* from

this region found the Vespa affinis species to be the commonest offender [19, 20]. Patients with multiple stings should be hospitalised for hydration and urine alkalization to prevent AKI, as there is no antivenom available, and treatment is mainly supportive. This study is the first in Bangladesh to systematically examine wasp sting cases, providing valuable clinical, biochemical, and species-specific insights. It highlights the correlation between delayed treatment initiation and severe complications like AKI and offers practical recommendations for early management. A major limitation of the study was its small sample size and absence of a control group of other insect bites. Patients often provided species-specific information after viewing the album, which may lead to incorrect identification. Moreover, the study was limited to hospitalised patients.

Conclusion

This study emphasises that stings from Vespa affinis and Vespa tropica can cause serious complications like rhabdomyolysis and AKI, particularly when treatment is delayed. The link between treatment timing and outcome severity underscores the importance of prompt medical care and improved protocols for managing wasp envenomation. Quick treatment is essential to save lives and reduce hospital stays. To prevent complications, avoid nephrotoxic analgesics. Additionally, tracking specific wasp species is important for a better understanding of biodiversity.

Acknowledgments

We would like to thank the Department of Medicine, Sylhet MAG Osmani Medical College Hospital, Sylhet for their valuable support in conducting this study.

Author contributions

Conception or design of the work; or the acquisition, analysis, or interpretation of data for the work: FRC. *Drafting the work or reviewing it critically for important intellectual content:* PU, HK, FRC. *Final approval of the version to be published: PU,* HK, FRC, MMJA, MSB. *Accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved:* FRC, PU.

Conflict of interest

We do not have any conflict of interest.

Data availability statement

We confirm that the data supporting the findings of the study will be shared upon reasonable request.

Supplementary file

None

References

1. Liu Z, Li XD, Guo BH, Li Y, Zhao M, Shen HY, Zhai Y, Wang XL, Liu T. Acute interstitial nephritis, toxic hepatitis and toxic myocarditis following multiple Asian giant hornet stings in Shaanxi Province, China. Environ Health Prev Med. 2016 Jul;21(4):231-236. doi: https://doi.org/10.1007/s12199-016-0516-4
2. Ryakitimbo A, Kennedy M, Shao E, Itana ME, Mbwasi R, Kinabo G, Yeates K, Kilonzo K. Acute kidney injury in a Tanzanian boy following multiple bee stings in resource -limited setting: a case report. Oxf Med Case Reports. 2018 Oct 3;2018(10):omy070. doi: https://doi.org/10.1093/omcr/omy070
3. Forrester JA, Holstege CP, Forrester JD. Fatalities from venomous and nonvenomous animals in the United States (1999-2007). Wilderness Environ Med. 2012 Jun;23(2):146-152. doi: https://doi.org/10.1016/j.wem.2012.02.012
4. Forrester JA, Weiser TG, Forrester JD. An Update on Fatalities Due to Venomous and Nonvenomous Animals in the United States (2008-2015). Wilderness Environ Med. 2018 Mar;29(1):36-44. doi: https://doi.org/10.1016/j.wem.2017.10.004. Erratum in: Wilderness Environ Med. 2018 Jun;29(2):284. doi: https://doi.org/10.1016/j.wem.2018.03.005
5. Vetter RS, Visscher PK, Camazine S. Mass envenomations by honey bees and wasps. West J Med. 1999 Apr;170(4):223-237. PMID: 10344177
6. Fitzgerald KT, Flood AA. Hymenoptera stings. Clin Tech Small Anim Pract. 2006 Nov;21(4):194-204. doi: https://doi.org/10.1053/j.ctsap.2006.10.002
7. Bhatta N, Singh R, Sharma S, Sinnha A, Raja S. Acute renal failure following multiple wasp stings. Pediatr Nephrol. 2005 Dec;20(12):1809-1810. doi: https://doi.org/10.1007/s00467-005-2044-0
8. Zhang L, Tang Y, Liu F, Shi YY, Cao Y, Xu H, Fu P. Multiple organ dysfunction syndrome due to massive wasp stings: an autopsy case report. Chin Med J (Engl). 2012 Jun;125(11):2070-2072. PMID: 22884081
9. Chu Roy M, Chatterjee M, Deb S, Pandit N. Encephalitis following wasp sting. Indian J Pediatr. 2010 Oct;77 (10):1193-1194. doi: https://doi.org/10.1007/s12098-010-0201-3
10. Xuan BH, Mai HL, Thi TX, Thi MT, Nguyen HN, Rabenou RA. Swarming hornet attacks: shock and acute kidney injury--a large case series from Vietnam. Nephrol Dial Transplant. 2010 Apr;25(4):1146-1150. doi: https://doi.org/10.1093/ndt/gfp583
11. Lin CJ, Wu CJ, Chen HH, Lin HC. Multiorgan failure following mass wasp stings. South Med J. 2011 May;104 (5):378-379. doi: https://doi.org/10.1097/SMJ.0b013e318213ebee
12. Diaz JH. Hymenopterid bites, stings, allergic reactions, and the impact of hurricanes on hymenopterid-inflicted injuries. J La State Med Soc. 2007 May-Jun;159(3):149-157. PMID: 17694935
13. Thiruventhiran T, Goh BL, Leong CL, Cheah PL, Looi LM, Tan SY. Acute renal failure following multiple wasp stings. Nephrol Dial Transplant. 1999 Jan;14(1):214-217. doi: https://doi.org/10.1093/ndt/14.1.214
14. Paudel B, Paudel K. A study of wasp bites in a tertiary hospital of western Nepal. Nepal Med Coll J. 2009 Mar;11(1):52-56. PMID: 19769240
15. Pérez Pimiento AJ, Prieto Lastra L, Rodríguez Cabreros MI, Vásquez Bautista AA, García Cubero A, Calvo Manuel E. Systemic reactions to wasp sting: Is the clinical pattern related to age, sex and atopy? Allergol Immunopathol (Madr). 2007 Jan-Feb;35(1):10-14. doi: https://doi.org/10.1157/13099089. Erratum in: Allergol Immunopathol (Madr). 2007 Mar-Apr;35(2):51. PMID: 17338896
16. Witharana EW, Wijesinghe SK, Pradeepa KS, Karunaratne WA, Jayasinghe S. Bee and wasp stings in Deniyaya; a series of 322 cases. Ceylon Med J. 2015 Mar;60(1):5-9. doi: https://doi.org/10.4038/cmj.v60i1.7406
17. Xie C, Xu S, Ding F, Xie M, Lv J, Yao J, Pan D, Sun Q, Liu C, Chen T, Li S, Wang W. Clinical features of severe wasp sting patients with dominantly toxic reaction: analysis of 1091 cases. PLoS One. 2013 Dec 31;8(12):e83164. doi: https://doi.org/10.1371/journal.pone.0083164
18. Vikrant S, Jaryal A, Parashar A. Mortality due to mass Hymenoptera attacks: A serious but underrecognized public health problem in a mountainous state of India. Indian J Public Health. 2019 Apr-Jun;63(2):154-156. doi: https://doi.org/10.4103/ijph.IJPH_222_18
19. Arya A, Jindal A. Acute kidney injury and rhabdomyolysis due to multiple wasp stings. Indian J Crit Care Med. 2014 Oct;18(10):697-698. doi: https://doi.org/10.4103/0972-5229.142181
20. Ullah P, Chowdhury A, Isha IT, Mahmood S, Chowdhury FR, Zeesan-ul-Abir M, Manna AA, Patwary MI. Wasp stings (Vespa affinis) induced acute kidney injury following rhabdomyolysis in a 25-year-old woman. J Emerg Pract Trauma. 2015;2(2):55–57. doi: https://doi.org/10.15171/jept.2016.08