



Original Research Article

Frequency of Coagulopathy Among Snake Bite Victims from the Local Community Presenting at MZD, AJK

Article History:

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Received: 12-11-2025

Revised: 25-11-2025

Accepted: 10-12-2025

Published: 30-12-2025

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Abstract: Background: The snake bite is an important medical emergency in developing countries and is associated with significant morbidity and mortality. Coagulopathy is one of the major hematological complications of snake envenomation and may lead to severe clinical consequences if not managed timely. Local data regarding frequency of coagulopathy among snake bite victims in Muzaffarabad, AJK is limited. **Objectives:** To determine the frequency of coagulopathy among snake bite victims of the local community presenting at a local hospital of MZD, AJK. **Study Design & Setting:** A cross-sectional study was conducted at the Department of Medicine, H.H Sheikh Khalifa Bin Zayed Al-Nahyan Hospital/CMH Muzaffarabad from 30 August 2024 to 30 February 2025.

Methodology: A total of 106 patients aged 18–75 years presenting with snake bite were included through non-probability consecutive sampling. Patients with history of coagulopathy, platelet disorders, intake of anti-platelet/anti-coagulant drugs, or bites from other animals were excluded. Baseline demographic and clinical data were recorded. Coagulopathy was assessed by 20-minute whole blood clotting test (WBCT). Data analysis was performed using SPSS version 20.

Results: The mean age of patients was 41.27 ± 15.84 years while 67.0% patients were males. Coagulopathy was observed in 61 (57.5%) patients. Higher frequency of coagulopathy was observed among patients presenting after more than 4 hours of snake bite (70.5%), illiterate patients (70.5%), and rural residents (65.8%). Significant associations were found with age, weight, duration of snake bite, educational status, and area of residence ($p < 0.05$). **Conclusion:** Coagulopathy was found to be a common complication among snake bite victims, particularly among rural residents and patients with delayed hospital presentation. Early diagnosis and prompt management may help reduce complications and improve outcomes.

Keywords: Coagulopathy, Envenomation, Rural population, Snake bite, WBCT.

INTRODUCTION

Snake bite is the most common animal bite worldwide and is one of the frequent emergency conditions encountered in hospitals.¹ In underdeveloped countries, nearly 40,000 individuals are reported to suffer snake bites annually, resulting in approximately 3000 deaths.² The clinical presentation of snake bite varies according to the species involved and the

severity of envenomation, which depends on factors such as the size and species of the snake, amount and toxicity of venom injected, location of the bite, first-aid measures taken, timing of treatment, presence of comorbidities, and individual susceptibility of the victim to venom.^{3,4} Snakes are generally classified as venomous and non-venomous, and venomous snake toxins can produce local, neurological, and

hematological effects. Hematological manifestations, particularly coagulopathy, are among the most serious complications associated with snake envenomation and can significantly increase morbidity and mortality if not diagnosed and managed promptly.⁵

Snake venom contains a complex mixture of enzymes, peptides, and toxins that can interfere with normal physiological and hematological functions. Hemotoxic venoms mainly affect the coagulation cascade and vascular endothelium, resulting in venom-induced consumption coagulopathy (VICC).⁶ These toxins activate clotting factors, promote fibrinogen degradation, impair platelet function, and may lead to disseminated intravascular coagulation, spontaneous bleeding, and hemorrhagic complications.⁷ In severe cases, patients may present with bleeding from gums, hematuria, hematemesis, ecchymosis, intracranial hemorrhage, and shock. The severity of coagulopathy depends upon the quantity of venom injected, duration between bite and treatment, and individual response of the victim.⁸ The 20-minute whole blood clotting test (WBCT) is commonly used as a simple bedside test for early detection of coagulation abnormalities among snake bite victims, particularly in resource-limited settings.⁹

Snake bite victims commonly present with a wide spectrum of clinical manifestations ranging from mild local symptoms to severe systemic complications. Local manifestations include pain, swelling, cellulitis, blister formation, and tissue necrosis, while systemic manifestations may involve cardiovascular, neurological, renal, and hematological systems.¹⁰ Patients presenting late to healthcare facilities are at increased risk of developing severe envenomation and coagulation abnormalities. Early recognition and appropriate management of systemic complications, particularly coagulopathy, are essential components in the management of snake bite victims.¹¹

In Pakistan, there is a significant lack of documented data regarding the distribution of different venomous snake species in various regions of the country. Furthermore, species-specific anti-venoms are not available in the local hospitals of Muzaffarabad, and only polyvalent anti-venoms are used, which may have limited efficacy and may also lead to hypersensitivity reactions. Coagulopathy remains one of the most devastating complications of snake bite envenomation, and its management largely depends upon the timely administration of effective anti-venom therapy. Moreover, there is a paucity of local data regarding the clinical profile and frequency of coagulopathy among snake bite victims in the population of Muzaffarabad, Azad Jammu and Kashmir (AJK). Therefore, the present study will be conducted to determine the frequency of coagulopathy among snake bite victims from the local community presenting at a local hospital of MZD,

AJK. The objective was to determine the frequency of coagulopathy among snake bite victims of the local community presenting at a local hospital of MZD, AJK.

MATERIALS AND METHODS

A cross-sectional study was conducted at the Department of Medicine, H.H Sheikh Khalifa Bin Zayed Al-Nahyan Hospital/CMH Muzaffarabad. The duration of the study was six months after approval of the synopsis from CPSP from 30 August 2024 to 30 February 2025. A non-probability consecutive sampling technique was used. The sample size of 106 patients was calculated using the WHO sample size calculator by taking a confidence interval of 95%, absolute precision of 7%, and expected frequency of coagulopathy among snake bite victims as 16%.¹² After approval of the study proposal and obtaining informed consent from the patients, all patients presenting with snake bite at the emergency department and fulfilling the inclusion criteria were enrolled in the study.

Patients aged 18–75 years of either gender presenting with snake bite were included in the study. Patients with history of bite from any other animal, history of coagulopathy, history of platelet disorders, and history of intake of anti-platelet or anti-coagulant medications were excluded from the study. These conditions were assessed through review of previous medical records.

Baseline characteristics including age (in years), gender, weight (in kg), educational status (illiterate/school education or above), area of residence (rural/urban), and duration of snake bite (in hours) were documented. Thereafter, all patients were assessed for the presence of coagulopathy according to the operational definition. Appropriate treatment, including anti-venom therapy and supportive care, was provided to patients identified with coagulopathy. All data were collected through a predesigned proforma. Patient anonymity and confidentiality were maintained with utmost priority, and no personal identifiers were included in the documentation.

Coagulopathy was referred to as a positive 20-minute whole blood clotting test (WBCT), which was defined as failure of clot formation in 1 ml of blood collected in a clean and dry 5 ml boro-silicate glass tube of 10 mm internal diameter placed in an undisturbed position for 20 minutes.

Data analysis was performed using SPSS version 20. Numeric variables including age, weight, and duration of snake bite were presented as mean $\pm$ standard deviation (SD) or median (IQR) after assessment of normality through the Shapiro-Wilk test. Frequency and percentages were calculated for categorical variables including gender, educational

status, area of residence, and coagulopathy. Frequency of coagulopathy was stratified by age, gender, weight, and duration of snake bite to control effect modifiers. Post-stratification chi-square test or

Fisher's exact test was applied as the test of significance. A p-value of <0.05 was considered statistically significant.

RESULTS

The mean age of the patients was 41.27 ± 15.84 years, mean weight was 67.35 ± 11.42 kg, and mean duration of snake bite was 5.18 ± 2.76 hours. Most of the patients belonged to the age group of 31–45 years comprising 34 (32.1%) patients, followed by 18–30 years comprising 31 (29.2%) patients. Male patients were predominant with 71 (67.0%) cases while females constituted 35 (33.0%) cases. Regarding educational status, 62 (58.5%) patients had school education or above whereas 44 (41.5%) were illiterate. Majority of the patients belonged to rural areas with 73 (68.9%) patients while 33 (31.1%) patients belonged to urban areas, as given in Table 1.

Table 1: Baseline Characteristics of Snake Bite Victims (n = 106)

Variable	Category	Mean $\pm$ SD / n (%)
Age (years)	Mean $\pm$ SD	41.27 $\pm$ 15.84
Weight (kg)	Mean $\pm$ SD	67.35 $\pm$ 11.42
Duration of snake bite (hours)	Mean $\pm$ SD	5.18 $\pm$ 2.76
Age Groups	18–30 years	31 (29.2)
	31–45 years	34 (32.1)
	46–60 years	25 (23.6)
	>60 years	16 (15.1)
Gender	Male	71 (67.0)
	Female	35 (33.0)
Education Status	Illiterate	44 (41.5)
	School education or above	62 (58.5)
Area of Residence	Rural	73 (68.9)
	Urban	33 (31.1)

Coagulopathy was present in 61 (57.5%) patients while 45 (42.5%) patients did not develop coagulopathy, as given in Table 2.

Table 2: Frequency of Coagulopathy Among Snake Bite Victims (n = 106)

Coagulopathy	n (%)
Present	61 (57.5)
Absent	45 (42.5)

Among patients aged 31–45 years, 23 (67.6%) developed coagulopathy while in the age group of 46–60 years, coagulopathy was observed in 17 (68.0%) patients. Coagulopathy was present in 45 (63.4%) male patients and 16 (45.7%) female patients. Patients weighing ≤ 65 kg had higher frequency of coagulopathy 36 (67.9%) compared to patients weighing >65 kg 25 (47.2%). Similarly, patients presenting after more than 4 hours of snake bite had greater frequency of coagulopathy 43 (70.5%) compared to those presenting within 4 hours 18 (40.0%). Illiterate patients showed higher frequency of coagulopathy 31 (70.5%) compared to patients with school education or above 30 (48.4%). Coagulopathy was also more common among rural residents 48 (65.8%) as compared to urban residents 13 (39.4%). Statistically significant association of coagulopathy was observed with age groups ($p=0.031$), weight categories ($p=0.041$), duration of snake bite ($p=0.002$), educational status ($p=0.026$), and area of residence ($p=0.019$), while gender showed no statistically significant association ($p=0.118$), as given in Table 3.

Table 3: Stratification of Coagulopathy with Respect to Baseline Characteristics (n = 106)

Variable	Category	Coagulopathy Present n (%)	Coagulopathy Absent n (%)	p-value
Age Groups	18–30 years (n=31)	13 (41.9)	18 (58.1)	0.031
	31–45 years (n=34)	23 (67.6)	11 (32.4)	
	46–60 years (n=25)	17 (68.0)	8 (32.0)	
	>60 years (n=16)	8 (50.0)	8 (50.0)	
Gender	Male (n=71)	45 (63.4)	26 (36.6)	0.118
	Female (n=35)	16 (45.7)	19 (54.3)	
Weight Categories	≤ 65 kg (n=53)	36 (67.9)	17 (32.1)	0.041
	>65 kg (n=53)	25 (47.2)	28 (52.8)	

Duration of Snake Bite	≤4 hours (n=45)	18 (40.0)	27 (60.0)	0.002
	>4 hours (n=61)	43 (70.5)	18 (29.5)	
Education Status	Illiterate (n=44)	31 (70.5)	13 (29.5)	0.026
	School education or above (n=62)	30 (48.4)	32 (51.6)	
Area of Residence	Rural (n=73)	48 (65.8)	25 (34.2)	0.019
	Urban (n=33)	13 (39.4)	20 (60.6)	

DISCUSSION

Venomous snake bites can produce local, neurological, and hematological complications depending upon the type and severity of envenomation. Coagulopathy is one of the most serious hematological manifestations and may lead to severe bleeding complications if not treated promptly.^{13,14} The frequency of coagulopathy among snake bite victims varies across different geographical regions. In Pakistan, limited local data is available regarding coagulopathy among snake bite victims, particularly in Muzaffarabad, AJK. Therefore, this study was conducted to determine the frequency of coagulopathy among snake bite victims presenting at a tertiary care hospital in MZD, AJK.

In the present study, the mean age of patients was 41.27 ± 15.84 years, and the majority of patients belonged to the 31–45 years age group (32.1%). Male predominance was observed, with 71 (67.0%) male patients compared to 35 (33.0%) female patients. Rural residents constituted 73 (68.9%) of the study population. Similar demographic findings were reported by Patel et al. (2021), who found that most snake bite victims were males and belonged to rural communities.¹² Likewise, Negi et al. (2023) also reported that the majority of snake bite patients presenting at tertiary healthcare centers in the sub-Himalayan region were males and rural residents. Comparable findings were observed by Sagar et al. (2017),¹⁸ where males constituted 23 (63.9%) cases while females comprised 13 (36.1%) cases, and 24 (66.7%) patients belonged to rural areas. Kumar et al. (2015) similarly demonstrated that males accounted for 65% of cases, with most patients belonging to rural farming communities and the 18–45 years age group comprising 74% of patients. These similarities may be attributed to increased outdoor occupational exposure of males and rural populations to agricultural fields and snake habitats.¹⁹

The current study demonstrated that coagulopathy was present in 61 (57.5%) patients. Our findings are higher than those reported by Patel et al. (2021), who documented coagulopathy in 32 (16%) of snake bite victims,¹² but lower than the findings of Ansari et al. (2015), who reported positive 20-minute whole blood clotting test (WBCT) in 103 (73.6%) out of 140 patients. The variation in frequency of coagulopathy among studies may be related to differences in snake species, severity of envenomation, delay in presentation, geographical variation, and criteria used

for defining coagulopathy.¹⁵ Patil et al. (2016) also highlighted that coagulation abnormalities were among the most frequent hematological manifestations among envenomated snake bite victims, supporting the high frequency of coagulopathy observed in our study.¹⁶ Similarly, Negi et al. (2023) reported that hematotoxic manifestations and coagulation abnormalities were common among snake bite patients presenting to tertiary care hospitals.¹⁷ Kumar et al. (2015) found laboratory evidence of disseminated intravascular coagulation with prolonged PT and APTT in 23% of patients, indicating substantial coagulation derangement among snake bite victims.¹⁹ Jeon et al. (2019) further reported overt disseminated intravascular coagulation (DIC) in 21 patients among 226 hospitalized snake bite victims, while two patients developed major bleeding complications. These studies collectively support the observation that coagulation abnormalities are major systemic complications following snake envenomation.²⁰

In the present study, coagulopathy was more frequent among patients presenting after more than 4 hours of snake bite, where 43 (70.5%) patients developed coagulopathy compared to 18 (40.0%) patients presenting within 4 hours ($p=0.002$). Similar observations were reported by Kumar et al. (2015), who found that delay in administration of anti-snake venom (ASV) was associated with persistent coagulation defects and higher ASV requirements, whereas early ASV administration resulted in prompt reversal of coagulation abnormalities.¹⁹ Sagar et al. (2017) also emphasized that early hospitalization and timely administration of anti-snake venom were the cornerstones in management of snake bite patients. These findings indicate the importance of early presentation and prompt initiation of treatment in preventing severe hematological complications.¹⁸

Our study also demonstrated that illiterate patients had higher frequency of coagulopathy 31 (70.5%) compared to educated patients 30 (48.4%) ($p=0.026$), while rural residents showed significantly greater frequency of coagulopathy 48 (65.8%) compared to urban residents 13 (39.4%) ($p=0.019$). These findings may reflect delayed healthcare access, lack of awareness regarding first aid and treatment seeking, and increased occupational exposure among rural populations. Similar observations regarding higher burden of snake bite in rural populations were reported by Sagar et al. (2017),¹⁸ Patel et al. (2021),¹²

Negi et al. (2023),¹⁷ and Kumar et al. (2015).¹⁹ Furthermore, Dang et al. (2021) reported significant associations between coagulation disorders and prolonged clotting parameters including EXTEM, INTEM, and FIBTEM clotting times, highlighting the clinical importance of coagulation monitoring in snake bite victims.²¹ The mean age reported by Dang et al. (2021) was 41.27 ± 14.72 years, which is remarkably similar to the mean age observed in our study (41.27 ± 15.84 years), thereby further supporting the consistency of demographic characteristics among snake bite victims across different populations.²¹

Study Limitations

This study had certain limitations. Being a single-center study, the findings may not be generalizable to the overall population. The relatively small sample size may also limit the external validity of the results. Species identification of snakes was not possible in all cases, which could influence clinical presentation and severity of coagulopathy. In addition, long-term outcomes and complications of coagulopathy were not assessed.

CONCLUSION

Coagulopathy was found to be a common complication among snake bite victims presenting at MZD, AJK. Delayed presentation, rural residence, and lower educational status were associated with higher frequency of coagulopathy. Early hospital presentation and timely management may help reduce complications and improve patient outcomes.

Acknowledgement: We sincerely acknowledge the support and guidance of our mentors, colleagues, and the staff of the participating hospital for their valuable assistance throughout this study.

Conflict of Interest: No

Funding Disclosure: None

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