

# Snakebite: A Study on Clinical Presentation, Treatment and Public Awareness

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## ABSTRACT

**Introduction:** Since ancient times, snakes have been worshipped, feared, or loathed in South Asia. It is surprising that, snake bite poisoning is seldom mentioned as a priority for health research in a developing country like India. Keeping in view the above facts present study is conducted among patients of snake bites in and around Rewa, public awareness of first-aid measures and clinical profile of the snake bite patients.

**Material and Methods:** The present study was carried out among 160 patients of snake bites poisonous and nonpoisonous, admitted in Serious Patient Ward in Department of Medicine over a period of 26 months. All the patients of poisonous bites were observed for complications and managed accordingly. Outcome was noted in the form of whether patient survived or died due to snake bite.

**Results:** Ghabrahat (96.77%) and local pain (51.61%) were the chief presenting complaints and tenderness (32.25%), redness (17.74%) at the local site were the main local findings, in non-poisonous group. In the poisonous group difficulty in opening of eyes (83.33%), difficulty in swallowing (77.78%), and difficulty in speaking (66.67%) were the main presenting complaints. Signs of envenomation in decreasing order were bilateral ptosis. (91.6%), bulbar palsy (72.85%), generalized paresis (55.56%), drowsiness (44.44%) and varying degree of respiratory paralysis (25%) the main local effects in poisonous group tenderness (44.44 %), bleeding (22.2 %), redness

(33.3%), oedema (27.7%). Of the total 36 cases, 30 (83.33%) survived and 6 (16.67%) died due to complications.

**Conclusion:** It can be concluded from the study that general public needs to be educated about pattern of behaviour of snakes, care while moving in night specially in fields, not to sleep on floors, importance of first aid specially use of tourniquet and immobilization of bitten parts not to waste time in seeking remedies from Ojhas etc and above all shift the affected person at the earliest to nearest medical centre where specific therapy for dealing with such victims is available. All these measures will go a long way in saving many of unfortunate victims of snake bite.

**Keywords:** Snake bite; Poison; Venom.

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## Article History:

**Received:** 22-12-2018, **Revised:** 16-01-2019, **Accepted:** 30-01-2019

### Access this article online

Website: <a href="http://www.ijmrp.com">www.ijmrp.com</a>	Quick Response code 
DOI: 10.21276/ijmrp.2019.5.1.067	

## INTRODUCTION

Since ancient times, snakes have been worshipped, feared, or loathed in South Asia. Cobras appear in many tales and myths and are regarded as sacred by both Hindus and Buddhists. Unfortunately, snakes remain a painful reality in the daily life of millions of villagers in this region. Indeed, although antivenom is produced in sufficient quantities by several public and private manufacturers, most snake bite victims don't have access to quality care, and in many countries, both morbidity and mortality due to snake bites are high.<sup>1</sup> In India alone, it has been estimated that as many as 2.8 million people are bitten by snakes, and 46 900 people die from snakebite every year.<sup>2</sup> This is the tip of the iceberg as the majority of snake bite deaths go unreported as many villagers go to traditional healers like tantriks and ojhas. Moreover snake bite is not a notified disease in medical fraternity.

It is surprising that, snake bite poisoning is seldom mentioned as a priority for health research in a developing country like India.

Chief poisonous snakes in India are saw scaled viper, Russell's viper, Cobras and common kraits.<sup>3</sup> Higher prevalence of snake bite, in Indian sub-continent is due to favorable climate for snake habitat and people are engaged in manual agricultural work, often with exposed lower extremities. The main cause of mortality and morbidity due to snake bites is late arrival to hospital usually after the failure of treatment by traditional healer or due to lack of proper transport facilities to the rural and state hospitals, where proper treatment facilities are available.<sup>4</sup> Because most snakebite victims are young, the economic impact of their disability is considerable. Despite the scale of its effects on populations, snakebite has not received the attention it deserves from national

and international health authorities, and may therefore be appropriately categorized as a neglected tropical disease. Snake bite is more prevalent in and around Rewa and therefore provides a unique opportunity to have an in depth understanding of cases of snake bites. To minimize the morbidity and mortality of snake bite victims, all physicians need to be acquainted with current concepts of mechanisms and treatment of snake bites. Keeping in view the above facts present study is conducted among patients of snake bites in and around Rewa, Madhya Pradesh, public awareness of first-aid measures and clinical profile of the snake bite patients.

**MATERIALS AND METHODS**

The present study was carried out in Department of Medicine, S. S. medical college and associated S.G.M. Hospital, Rewa (MP) among 160 patients of snake bites poisonous and nonpoisonous, admitted in Serious Patient Ward in Department of Medicine over a period of 26 months. Inclusion Criteria was patient or attendant giving history of snake bite and patient proved to be a case of snake bite on clinical ground on the basis of:

1. Fang marks - Double or multiple punctured.
2. Local changes- Signs of inflammation, appearance of bullae, purpuric rashes and necrosis.
3. Systemic manifestations -
  - a. Haemo/vasculotoxicity
  - b. Signs of neurotoxicity - Ptosis, difficulty in swallowing, respiratory distress and other signs of neuroparalysis.

Cases of bites other than snakes were excluded by careful history, local examination for bite marks and systemic examination. All patients included in the study were subjected to detail history, thorough local, general and systemic examination and relevant investigations. Enquiries were made about type of bite whether poisonous or nonpoisonous, site of bite over body, time of bite, circumstances of bite, any treatment at home by themselves or by traditional healers/ ojhas, time interval between bite and medical aid and reason for delay to get health facility. According to history and findings of clinical examination, cases were divided into two groups- poisonous and non-poisonous bites. All the cases were

subjected to routine investigations which included:

1. Routine blood investigations- Hb, TLC, DLC.
2. Blood biochemistry- Blood urea, serum creatinine, serum bilirubin and SGPT.
3. Bleeding time and Clotting time in poisonous group.
4. Standard 12 lead electrocardiogram in poisonous group.

All the patients of nonpoisonous bites were kept under observation for at least 24 hours and patients with poisonous bites with signs of toxicity were started on treatment which included supportive treatment and polyvalent Anti Snake Venom (ASV).

All the ASV used was in hospital supply manufactured by Bharat Serums and Vaccines Limited. It was polyvalent and made from equine serum, already in reconstituted form supplied in vial. According to specifications each vial contained 10 ml of ASV. Each ml of ASV neutralized 0.6mg of Cobra venom, 0.45mg of Krait venom, 0.6 mg of Russel's viper and 0.45 mg of Saw scaled viper venom. After sensitivity testing ASV was given in dose range of 50-200 ml (5-20 vials) according to severity of toxicity. After an initial dose of 5 vials further doses were added up to a maximum of 20 vials according to response with initial dose. All the patients of poisonous bites were observed for complications and managed accordingly. Artificial ventilation was given to patients developing respiratory failure. Outcome was noted in the form of whether patient survived or died due to snake bite.

**RESULTS**

Table 1 shows that maximum no. of cases (79%) were below 40 years of age. It is also evident that 88 (55%) cases were male while 72 (45%) female. The average interval between bite and medical aid (after hospital admission) was more in non-poisonous snakebite (5.3 hours) as compared to poisonous snake bite which was 3.8 hours.

Table 2 also shows that the mean interval between bite and development of toxic feature was 2.47 hours, and the range was between 1-6 hours. The table also reveals that the mean interval between bite and death in poisonous snake group was 18.5 hours and the range was 4-36 hours, No patient died in non-poisonous group.

**Table 1: Distribution of age and sex (n=160)**

No.	Age in years	Case		Male		Female	
		No	%	NO	%	NO	%
1	14-20	31	19.37	19	11.87	12	7.50
2	21-40	95	59.37	49	30.62	46	28.75
3	41-60	29	18.12	16	10.0	13	8.12
4	Above60	5	3.12	4	2.50	1	0.62
	<b>Total</b>	160	100	88	55	72	45

$\chi^2 = 2.89, p > 0.05$ , insignificant.

**Table 2: Interval between bite, medical aid, toxic feature and survival period in fatal cases**

Clinical group	No	Bite to medical aid interval (in hours)		Bite to toxic feature interval (in hours)		Bite to death interval (in hours)	
		Mean	Range	Mean	Range	Mean	Range
Non poisonous	124	5.3	1-18	-	-	-	-
poisonous	36	3.8	0.5-16	2.47	1-6	18.5	4-36

**Table 3: Presenting complaints in poisonous and non-poisonous snake bite.**

No.	Presenting complaints	Non poisonous		poisonous		Total	%
		No.	%	No.	%		
1	Ghabrahat	120	96.77	32	88.88	152	95.0
2	Local pain	64	51.61	24	66.66	88	55
3	Giddiness	18	14.51	30	83.33	48	30
4	Abdominal pain	-	-	14	38.88	14	8.7
5	Nausea /vomiting						
	Difficulty in	4	3.22	5	13.88	9	5.6
6	Opening of eyes	-	-				
	Swallowing	-	-				
	Speaking	-	-	30	83.33	30	19.37
	Opening of mouth	-	-				
	Breathing	-	-	28	77.78	28	17.5
		-	-	24	66.67	24	15
		-	-	6	16.66	6	3.75
		-	-	11	30.55	11	6.87
		-	-				
7	unconsciousness	-	-	3	8.33	3	1.87

**Table 4: Clinical signs of poisonous snake bite (n=36)**

No.	Clinical	No.of cases	%
1	Bilateral ptosis	33	91.66
2	Bulbar palsy	26	72.85
3	Generalized paresis	20	55.56
4	Drowsiness	16	44.44
5	Unconsciousness	3	8.33
6	Babinski Sign(positive)	5	13.88
7	Respiratory paralysis	9	25
8	Aspiration pneumonia	1	2.77

**Table 5: Local examination of snake bite.**

No.	Local signs	Non poisonous		poisonous		Total	%
		No.	%	No.	%		
1	Fang mark	72	58.06	27	75	99	61.9
	a. multiple punctured	61	49.19	00	00	61	38.12
	b. double punctured	11	8.87	27	75	38	23.75
2	Incision mark	21	16.94	8	22.22	29	18.12
3	Redness	22	17.74	12	33.33	34	21.25
4	Tenderness	40	32.25	16	44.44	56	35
5	Oedema	10	8.06	10	27.77	20	15.50
6	Bleeding	12	9.67	8	22.22	20	12.50
7	Cellulitis	1	0.80	5	13.88	6	3.75
8	Gangrene	-	-	1	2.77	1	0.62

The commonest presentation of nonpoisonous snakebite was ghabrahat (96.77%) and local pains (51.61 %) (table 3). In poisonous snakebites, all cases were of neurotoxicity. Maximum patients had ghabrahat (88 .88%) followed by giddiness (88 .33%), difficulty in opening of eyes (83.33%), difficulty in swallowing (77.78%), difficulty in speaking (66.67%). Abdominal pain (38.88%) and difficulty in breathing (30.55%) were other presenting features. No case of snake bite present with haemorrhagic manifestations.

Table 4 shows clinical signs of poisonous snake bite. Bilateral ptosis (91.66%) was the commonest presentation, followed by bulbar palsy (72.85%), generalized paresis (55 .56%) and drowsiness (44.44%). Respiratory paralysis was seen in 25% of cases, and patients were unconscious in 8.33% cases.

Fang marks were present in 58.06% in nonpoisonous snake bites and in 75% of bite in poisonous group. Fang marks were multiple in 49.19% in nonpoisonous bites, while they were double punctured in 75% of poisonous bites, none of the patients had

multiple punctured bites in poisonous group. Incision mark was present in 16.94% in nonpoisonous snake bite while it was present in 22.22% of bite in poisonous group. Tenderness at the site of bite was present in both poisonous and nonpoisonous groups(44.5% & 32.25% respectively). Other findings in poisonous group were redness (33 .33%), oedema (27 .78%) and local bleeding (22.23%) (table 5).

Table 6 shows that in poisonous group complications were present in 72.22%. Systemic complications (55 .55%) were, respiratory failure (25%), coma (25%) followed by aspiration pneumonia and paralytic ileus each (2 .77%). While local complications (16.66%) were, cellulitis (13 .83%) and gangrene (2.77%). Of the total 36 cases 30 (83.33%) survived and 6(16.67%) died due to complications.

Table 7 reveals the public awareness about the primary treatment of snakebite. The maximum number of patients 94 (58 .75%) did

not take any treatment at home. Tourniquet application was taken by 18 (50%) patients of poisonous bite as compared to 19(15.32%) of nonpoisonous bite. In poisonous group 26 (72.22%) cases had taken treatment at primary level. None of the patient of either group had used immobilization of limb.

Table 8 shows that ASV dose range was 50-200 ml in 4(11.11%) patient ASV dose used was 50ml, in 15(41.67%) it was 100ml, in 10(27.78%) it was 150 ml and in 7(19.44%) ASV dose was 200ml. All deaths 6(85.71 %) occurred in group which received 200ml ASV. Average ASV dose required was 127.7 ml.

Table 9 shows that the complications of ASV were fever (16.66%), generalized rashes (11.11 %), hypotension (8 .33%) and anaphylactic reaction (5.55%).While 75% patients did not develop any complication. Of the 9 patients who developed complications, 2(22.22%) patients died and of the 27 patients who did not develop complications with ASV, 4(14.82%) patients died.

**Table 6: Complications of poisonous snakebite (n=36).**

No.	complication	No.	survived	Death
1	Absent	10	10	0
2	Present	26	20	6
	<b>Systemic</b>	20(55.55)	14(70)	6(23)
	a. respiratory failure	9(25)	3(33.33)	6(66.67)
	b. coma	9(25)	3(33.33)	6(66.67)
	c. aspiration pneumonia	1(2.77)	0	1(100.0)
	d. paralytic ileus	1(2.77)	1(100)	0
	<b>2. local</b>	6(16.66)	6(100)	0
	a. cellulitis	5(16.66)	6(100)	-
	b. gangrene	1(2.77)	1(100)	-
<b>Total</b>		36(100)	30(83.33)	6(16.67)

**Table 7: Treatment at home**

No.	Treatment	Non poisonous		poisonous		Total	%
		No	%	No	%		
1	Received	40	32.26	26	72.22	66	41.25
	Tourniquet	19	15.32	18	50	37	23.12
	Incision	10	8.06	1	2.77	11	6.88
	tourniquet+Incision	11	8.87	7	19.44	18	11.25
	Immobilization	-	-	-	-	-	-
	Not received	84	67.75	10	27.77	94	58.75
2	<b>Total</b>	124	100	36	100	160	100

$\chi^2 = 39.30, p < 0.001$ , significant

**Table 8: Doses of Anti Snake Venom (ASV) and outcome**

Dose (ml)	Survived (%)	Death (%)
50 (n=4)	4(100)	0(00)
100 (n=15)	15(100)	0(00)
150 (n=10)	10(100)	0(00)
200( n=7)	1(14.29)	6(85.71)
<b>Total</b>	30(83.33)	6(16.67)

**Table 9: Complication of ASV therapy (n= 36)**

Complication	No.	%	Survived	Death
None	27	75	23(85.18)	0
Present	9	25	7(77.77)	2(22.22)
Fever	6	16.66	6	0
Rashes	4	11.11	4	0
Hypotension	3	8.33	2	1
Anaphylactic reaction	2	5.55	1	1
Total	36	100	30	6

## DISCUSSION

The present work elaborates awareness of treatment at primary level, various therapeutic aspects and various factors affecting the prognosis of snake bites. In this study, all the 36 poisonous snake bite victims showed signs and symptoms of elapidae envenomation. No patient of viperine bite was seen in this study. Binayake P<sup>5</sup> in his study found 87.88% victims of elapidae bite and 12.12 % of viperine bite.

Ghabrahat and local pain were the main presenting complaints in non-poisonous group (96.77% and 51.61 % respectively). The local pain may be due to multiple bite marks, first aid measures like tourniquet, incision etc.

The presenting features of poisonous snake bite ( due to elapidae envenomation) in decreasing order were ghabrahat (88.88%), difficulty in speaking and difficulty in breathing (30.56%). 3 (8.33%) patients were unconscious at admission and all were in poisonous group. The present study revealed the signs of envenomation in decreasing orders as- bilateral ptosis (91.66%), bulbar palsy (72.85%), generalized paresis (55.56%), drowsiness (44.45%), varying degree of respiratory paralysis (25%). Dhand et al<sup>6</sup> also found that fear was very common feature of snake bites. They also found 32 cases with features of haemorrhagic manifestations. Gupta et al<sup>7</sup> found in their study 9 (3.8 %) had neurotoxic clinical presentation and 95 (91.3 %) had haemorrhagic manifestations.

The present study revealed that the fang marks were present in 58.06% in nonpoisonous snake bites and in 75% of bite in poisonous group. Fang marks were multiple in 49.19% in nonpoisonous bites, while they were double punctured in 75% of poisonous bites, none of the patients had multiple punctured bites in poisonous group. Incision mark was present in 16.94% in nonpoisonous snake bite while it was. 22.22% of bite in poisonous group. Tenderness at the local site was the main presentation in 44.45% of the poisonous group as compared to 32.25% in non-poisonous group. Chakraborty P et al<sup>8</sup> found 12% had local feature of envenomation in form of pain, oedema and necrosis.

Present study shows that in poisonous group complications were present in 72.22%. Systemic complications (55.55%) were, respiratory failure (25%), coma (25%) followed by aspiration pneumonia and paralytic ileus each (2.77%). While local complications (16.66%) were cellulitis (13.83%) and gangrene (2.77%). Of the total 36 cases 30 (83.33%) survived and 6(16.67%) died due to complications. Chakraborty P et al<sup>8</sup> found that 8% snake bite victims needed respiratory support. Bhatti AR et al<sup>9</sup> observed in his study that 2(4.3%) patients, required

mechanical ventilation, 2( 4.3%) with nephrotoxicity were referred to dialysis unit, and 2(4.3%) mortalities were encountered one with intracranial bleed and other with mixed toxicity and delayed presentation of patient.

Menon JC et al<sup>10</sup> studied clinical profile and laboratory parameters in 1051 victims of snakebite from a single centre in Kerala and reported that major complications include death in 38 (3.6%) victims, acute respiratory distress syndrome 20 (1.9%), acute renal failure 220 (20.9%), needing haemodialysis in 110 (10.4%). Ventilator support was needed in 41 (3.9%) victims and gangrene was seen in 43 (4%). 891 (85%) patients received ASV with adverse reactions in 379 (37%) with 3 having anaphylaxis. The mean dose of antivenom given for neuroparalytic snakebite was 12.26 vials (range 0-32) and 16.79 vials (range 2-52) for hemotoxic bites. 45% of the victims had a hospital stay of 15 days. Conclusion: This study highlights that snakebite is an occupational hazard, and the time between bite and treatment determines the prognosis

The priorities for treatment of people bitten by snakes are transport to medical care as quickly as possible and the delay of life-threatening shock and respiratory paralysis until professional care is available.<sup>11</sup> Reassure the victim that death is not imminent and medical care is available. Control anxiety as excitement will increase heart rate and lead to spread of venom. Make the victim lie flat with bitten limb below the heart level. Remove shoes, rings, watches, jewelry and tight clothing from the bitten area as they can act as a tourniquet when swelling occurs. Immobilize the victim's bitten limb using a splint and lightly put a bandage. Be prepared to treat the shock and provide cardiopulmonary resuscitation (CPR). Get the victim to the nearest secondary or tertiary care hospital where antivenom can be provided. Do not apply a tourniquet. Do not wash the bite site with soap or any other solution to remove the venom. Do not make cuts or incisions on or near the bitten area. Do not use electrical shock. Do not freeze or apply extreme cold to the area of bite. Do not apply any kind of potentially harmful herbal or folk remedy. Do not attempt to suck out venom with your mouth. Do not give the victim drink, alcohol or other drugs. Do not attempt to capture, handle or kill the snake and patients should not be taken to quacks.<sup>12</sup> Traditional treatment delays presentation, distorts the clinical picture, and can cause bleeding, infection, gangrene, and other complications. Modern methods of health promotion should be applied to educate affected communities. Swift transport to hospital or dispensary should be encouraged, and ineffective and harmful traditional treatments should be discouraged.<sup>11</sup>

## CONCLUSION

It can be concluded from the study that general public needs to be educated about pattern of behaviour of snakes, care while moving in night specially in fields, not to sleep on floors, importance of first aid specially use of tourniquet and immobilization of bitten parts not to waste time in seeking remedies from Ojhas etc and above all shift the affected person at the earliest to nearest medical centre where specific therapy for dealing with such victims is available. All these measures will go a long way in saving many of unfortunate victims of snake bite.

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**Source of Support:** Nil.

**Conflict of Interest:** None Declared.

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**Cite this article as:** Atul Kumar Saitya. Snakebite: A Study on Clinical Presentation, Treatment and Public Awareness. *Int J Med Res Prof*. 2019 Jan; 5(1):300-05. DOI:10.21276/ijmrp.2019.5.1.067