

# Clinical profile of snake patients in tertiary care centre

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## Abstract

**Background:** In India snakes are worshipped since ancient times, and it occupies important place in the field of medicine and medical emblems. Out of 216 species which are found in India only 52 (24.07%) species are poisonous. Approximately 2,00,000 persons are reportedly bitten by snakes out of which 35000 to 50000 persons meet death in India. **Aims and Objectives:** Several studies reported in the Indian literature state that there is variability of the clinical profile of snake bites. **Aims and Objectives:** This prospective study to clinical profile of patient admitted with history of snake bite was carried out. **Materials and Methodology:** Patients with history of snake bite were included in the study, 200 cases satisfied the criteria for inclusion. Patients transferred to other hospitals and could not be followed were excluded. Depending on clinical features, the patients were divided into two groups. Ineffective and effective bites. Effective bites were sub-classified as a local swelling, neurotoxicity, nephrotoxicity, cardiotoxicity and combined. The patients who had signs of envenomation were subjected for detailed hematological, biochemical, electrocardiogram and other investigations. **Results and Observations:** The male to female ratio was 1.29:1.00. In the age group of 21 to 30 years there was maximum number. The higher number of cases was from rural area. The highest number of bites occurred in lower limb 117 (59.70%). Out of 200 snake bite cases 77 (38.5%) were ineffective and remaining 123 were effective. Amongst them there were 101 (82.11%) patients had local reaction, 66 (53.65%) neurotoxicity, 19 (15.44%) nephrotoxicity, 5 (2.5) combined toxicity and 13 (10.56) had cardiotoxicity. Out of these 123 cases 19 (15.44%) cases developed renal failure who were treated conservatively or dialysis, out of these 4 (3.25%) patients died of uremia. Respiratory paralysis was developed in 15 (12.19%) patients who were given respiratory assisted ventilation, out of these 1 (0.81%) patients died. **Conclusion:** Low mortality in cases of snake bites is due to availability of independent dialysis unit, ventilator support and proper early anti snake venom treatment free of cost to the patients available in the institute. **Keywords:** Envenomation, Neuroparalysis, Vasculotoxicity.

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## INTRODUCTION

The fact remains that the snake is worshipped since ancient times, and it occupies important place in the field of medicine and medical emblems. There appears to be a reciprocal relationship between snakes and human beings; snakes are identified with Gods; and they are also hunted and killed. It has now been realized however that all

snakes are not harmful; and in fact snakes positively contribute to the welfare of farmers, by killing rats and rodents which infest and destroy crops. Special efforts are being taken to promote goodwill towards this reptile. Venomous snake have two types of bites, one being a bite inflicted when the snake is after a prey. In this case, large amount of venom is injected and victim dies instantly. The second bite is matter of defence or warning and little or no venom is injected, the snake's object is to escape. When snake bites human beings, it generally uses the second type of bite, therefore about 50% snake bite victims develop poisoning symptoms in them; and remaining have negligible symptoms. Only 25% of the victims develop serious symptoms of systemic envenomation. According to an estimate there are about two and half thousand species of snakes in the whole world. Out of 216 species which are found in India only 52 (24.07%) species are poisonous<sup>1</sup>. With the

development of a positive health approach and rapid urbanization, with the expansion of human colonization, better understanding of the problem is essential for prevention and therapeutic measures to reduce, if not eradicate, the morbidity and mortality from snake bite in the country. The common poisonous snakes found in India are Cobras, Kraits, Viper, Coral snakes and Sea snakes. The venom of Cobra and Kraits effects mainly nervous system producing neuroparalysis. The venom of Viper acts on blood and connective tissues, whereas the sea snake is myotoxic<sup>2</sup>. Though the exact figures are not available, but 2,00,000 persons are reportedly bitten by snakes out of which 35000 to 50000 persons meet death in India<sup>3</sup>. However with the performance of tracheostomy and the use of artificial respiration and Antivenine (ASV) mortality rate is reduced from 29% to 4%<sup>4</sup>. Several studies reported in the Indian literature state that there is variability of the clinical profile of snake bites. Hence this prospective study was carried out to find out the clinical profile of snake bite patients admitted to the Government Medical College and Hospital, Aurangabad, during December, 2001 to October, 2003 (23 Months).

## MATERIALS AND METHODS

This is prospective cross-sectional study was carried out. The adult patients admitted to the medicine wards with history of snake bite were included in the study, there were 200 cases which satisfied the criteria for inclusion. The patients who were transferred to other hospitals and could not be followed were excluded. All the patients were registered for MLC after admission to the wards. After hospitalization the patients were examined in details. The local examination was carried out, for the site of the bite, local bleeding, s/o inflammation, swelling etc. The patients were also evaluated for cardiotoxicity, neurotoxicity and nephrotoxicity. The findings were entered in the proforma. Depending on clinical features, the patients were divided into two groups. (a) Ineffective bites and (b) Effective bites. a) Ineffective bites: The history of snake bite but the patients didn't show any local or systemic signs of envenomation. b) Effective bite: The patients who showed local and / or systemic signs of envenomation. Effective bites were further classified as: 1) Local reaction.2) Neurotoxic3 ) Nephrotoxic 4)Cardiotoxic 5} Nephrotoxic and Neurotoxic. The patients who had signs of envenomation were subjected for detailed haematological, biochemical and other investigations. 1) Haematologica: White blood cell count, Hamoglobuline ,Platelet count, Clotting time(full20 minutes blood clotting test), Prothrombine time, Partial prothrombine time.2) Biochemical :-Liver function test. Kidney function, Sr.Electrolyte, Urine Examination. Electrocardiogram (ECG), Special

Investigation: Arterior blood gas analysis (ABG) in patients with respiratory failure. This investigation was repeated in the patients who were on respiratory support; as needed. Depending upon the clinical manifestations the patients management was undertaken The treatment given to the patients included A) Local Treatment Cleaning and / or MgSO<sub>4</sub> dressing as required. B) Specific Treatment: The patients who showed signs of local and systemic snake envenomation were given Anti Snake Venom (ASV). The preparation used in the study was SNAKE ANTIVENIN IP by Haffkine Biopharmaceutical Corporation Ltd., Pimpri, Pune. Those patients with signs of neuroparalysis were given Inj. Neostigmine (0.5mg) and Atropine (0.6mg). The dose of which was adjusted depending upon the neurotoxicity C)General Treatment a)Tetanus Toxoid b)Antibiotics D)Supportive Treatment :Was given as per patient's requirement:-a)Respiratory support. b)Dialysis, c)Blood transfusion.

## RESULTS

By satisfying the criteria for selection of cases for the study, 200 cases of snake bite were included in the study for final analysis. There were 113 (56.5%) males and 87 (43.5%) females. The male to female ratio was 1.29:1.00 In the age group of 21 to 30 years there were maximum number i.e. 68 (34%) cases, which constitute a major group, out of these 37 (18.5%) were males and 31 (15.5%) were females. In age group of 12 to 20 years there were 56 (28%) cases, among them there were 33 (16.5%) males and 23 (11.5%) females. In the age group of 31 to 40 there were 46 (23%) cases, among them there were 24 (12%) males and 22 (11%) females. In age group of 41 to 50 years there were 14 (7%) cases, out of which there were 9 (4.5%) males and 5 (2.5%) females. In the age group of 51 to 60 years there were 14 (7%) cases in which there were (5%), males and 4 (2%) females. In age group above 60 years there were only two 2 (4%) cases who were females. Snakes are common in the rural as well as urban areas; however the rural areas are more favourable for them. Total number of cases from rural area were 187 (93.5%) among them there were 105 (52.5%) males and 82 (41%) females. Thus the higher number of cases were from rural area. Cases from urban areas were only 13 (6.5%); among them there were 8 (4%) males and 5 (2.5%) were females. Occupation :Nature of bite among the total 200 cases studied there were 140 (70%) farmers who had bite while working in the field; in 35 (17.5%) patients the bites occurred during sleep in the night inside their homes while in 15 (7.5%) patients the accident of bites took place in front of their houses, 10 (5%) bites were while walking barefoots on the road. The snake bites are often accidental and there is no specific time for snake bite, however the exposure to

the snake bite is more common during the period when the people are outside their houses for their work, when the snake got opportunity for bite, following . The time of bite was arbitrarily grouped in four, six hourly apart. Highest number of snake bite occurred during 12 noon to 6.00 p.m. in this interval total bites were 80 (40%) which is highest. During period of 6.00 a.m. to 12.00 noon there were 55 (27.5%) bites, in interval between 6.00 p.m. to 12 p.m. bites occurred in 45 (22.55%) cases and the lowest number of bite occurred during 12.00 midnight to 6.00 a.m. Though only 24.07% snakes are poisonous there is apprehension in the patients and the relatives when the patients give history of snake bite. The patient may be taken to the nearest hospital or to the hospital having all the facilities. . There were 164 (82.0%) direct admission; among them there were 89 (44.5%) males and 75 (37.5%) females. There were 36 (18%) cases who were referral from other hospital for further management. Time Lag: Definition It is defined as the interval between snake bite and admission to hospital. Amongst the total 200 cases, 164 (82%) were directly admitted to this hospital, while 36 (18%) were referred from other hospital. The time lag therefore could be calculated exactly in only 164 cases. Among these 130 (79.26%) cases the time lag was upto 6 hours, which constitutes highest number of cases. In the group having time lag 6 hours to 12 hours there were total 18 (10.97%) patients. In 4 (2.43%) cases the time lag was more than 24 hours while in 5 (3.04%) cases it was 18 hours to 24 hours. The complication of snake bite were commonly observed in the cases in whom the time lag was more than 6 hours. **Site of bite:** In the present study site of bite is arbitrarily divided into three main categories:-In the present study there were four cases of bite in whom the exact site of bite could not be identified by the patient as well as during clinical examination. Among them 2 were males and 2 females. Thus out of 200 in only 196 (98%) cases in whom there was certainty about the site of bite were further analyzed. The highest number of bites occurred in lower limb 117 (59.70%); among them it was on foots in 82 (41.83%) cases, on the legs in 30 (15.30%), on the thighs in 4 (2.04%) and on the toes in 1 (0.5%). Second higher number site of bites occurred at upper limb there were 75 (38.26%) patients; amongst them bite was on hands in 54 (27.55%) cases, on fingers in 14 (7.14%), on the forearms in 6 (3.06%), and on arms in 1 (0.5%).The bite also occurred on the trunk, head, neck, face and abdomen in 4 (2.04%) cases. **Types of bite:** Snake bite is classified as A) Ineffective snake bite: If no evidence of poisoning present B) Effective snake bite: Those have sign of envenomation. Out of 200 snake bite cases 77 (38.5%) were ineffective, in remaining 123 (61.5%) cases it was effective snake bite. Amongst them there were 101 (82.11%) patients who had

local reaction, 66 (53.65%) had neurotoxicity, 19 (15.44%) had renal involvement. Though the effective bites were sub-classified as a local swelling, neurotoxicity, nephrotoxicity, cardiotoxicity and combined (nephrotoxicity as well as neurotoxicity), in many cases there was overlap of the poisonous effect of snake bite. Among 123 effective snake bite cases in 13 (10.56%) cardiotoxicity was observed, 3 patients were having ST-t-T changes and 10 patients had sinus tachycardia. The 5 (4.06%) cases had both nephrotoxicity as well as neurotoxicity. All these five patients had neurological clinical features as diplopia in 5 (4.06%) cases, blurred vision in 5 (4.06%) cases, ptosis in 5 (4.06%) cases, vomiting in 5 (4.06%) cases and renal toxicity as decreased urine output, deranged kidney function. Reaction To Antisnake Venom: Out of 200 patients studied there were 123 effective bites who were give ASV after local sensitivity testing. Only 13 (10.56%) patients developed ASV reaction. The reaction were in the form of urticaria in 3 (2.43%) patients. Ten (8.13%) patients developed dyspnea, bronchial spasm and hypotension. Out of the 200 patients studied, amongst them 123 (61.5%) cases had effective bite. Out of these 123 cases with effective bite 67 (33.9%) patients showed various symptoms of vasculotoxicity they are common symptoms observed were, local pain 66 (98.50%) cases, local swelling in 66 (98.50%) cases, local bleeding in 56 (83.58%)cases, fear and anxiety in 40 (59.70%) cases. Other common symptom observed was regional lymph node enlargement in 28 (41.79%) cases, haemorrhage in 20 (29.85%) cases and oligouria in 19 (28.35%) cases. The least commonly observed symptoms were dyspnea in 4 (5.97%) cases, abdominal pain in 6 (8.95%) cases and confusion in 6 (8.95%) cases. The snake bite results in local or systemic manifestation. Out of 200 cases studied, only 123 (61.5%) had effective snake bite. These cases showed various local signs, the analysis of these 123 cases these are bleeding from local sites, which is a major local sign, were observed in 119 (96.74%) cases. These were local swelling in 101 (82.11%) cases, there were ecchymosis in 27 (21.95%) cases, blister formation in 18 (14.63%) cases and tissue necrosis was seen in 2 (1.62%) cases. Out of the 200 patients studied amongst them 123 (61.5%) cases, had effective bite. Out of these 123 cases with effective bites 67 (33.9%) patients showed various signs of vasclotoxicity, among these are most common signs as local swelling in 66 (98.50%) cases, fang mark, in 46 (68.65%) cases, tender enlarge lymph node in 28 (41.79%) cases and there was local bleeding from the site of bite in 26 (38.80%) cases. In the present study hematuria was observed in 18 (26.86%) cases; there was spontaneous bleeding in 16 (23.88%) cases and altered level of consciousness in 4 (5.97%) cases, and

hypotension in 4 (5.97%) cases. Snake bite produces neurotoxicity. The presenting symptoms were blurred vision 52 (78.78), diplopia 52 (78.78), pain at site of bite 53 (80.30), vomiting in 36 (54.54%) cases, dyspnea in 18 (27.27%) cases, abdominal pain in 5 (7.57%) cases and loss of consciousness in 2 (3.03%) cases. Out of 200 cases studied 66 (33.33%) patients had signs of neurological involvement. Amongst the 66 (33%) cases who had signs of neurotoxicity there was ptosis in 66 (100%) cases, ophthalmoplegia in 53 cases (80.30%) pharyngeal paralysis in 15 (25.72%) cases, flaccid quadriplegia / quadriparesis in 10 (15.15%) cases and respiratory paralysis 15 (25.72%) cases. Duration of stay in hospital It has observe that 90 (45%) patients needed hospitalization up to 7 days, 57 (28.5%) patients were in the hospital for 2 days only. Short hospital stay of less than 24 hours was in 43 (21.5%) cases. Surprisingly only 10 (5%) cases needed more than 7 days for recovery and hospitalization. Mortality: Out of 200 cases studied 123 (61.5%) cases were of effective snake bites. Out of these 123 cases 19 (15.44%) cases developed renal failure who were treated conservatively or dialysis, out of these 4 (3.25%) patients died of uremia. Respiratory paralysis was developed in 15 (12.19%) patients who were given respiratory assisted ventilation, out of these 1 (0.81%) patients died.

## DISCUSSIONS

There is a great variability in various studies reported in classifying the patients in different age groups. In the present study the commonest age group observed was 21 to 30 years in which there were 34% cases, this was supported various studies<sup>5,6</sup>. Incidence of snake bites over all seems to be more common in the age group of 21 to 30 years. This is probably due to the fact that in this age group there are patients of working class who have highest risk of exposure to snake bites. Since the exposure of male is more to external environment, ecological factor increases the risk of snake bite in male. It is also observed in present study shows that male to female ratio 1.29:1. The male preponderance in the snake bite may be because the exposure of the male to external environment more as compared to female, it was supported by studies<sup>4,7,8</sup>. Agricultural accidents are becoming more frequent, even in the developing countries as a result of increasing use of agricultural machinery, insect and snake bites are the additional health problem in India<sup>9</sup>. In the present study it is observed that 70% bites occurred in farmers, these finding supported with studies of<sup>7,9</sup>. Which indicates that snake bite is an occupational hazard. Snake bite is common in rural areas, rural people live in huts and houses, and sleep mostly on the floor and therefore there is a increased risk of snake

bite during night time In present study the urban cases were 13 (6.5%) and the rural cases were 187 (93.5%), this was supported to studies of<sup>7,6</sup>. The patients of snake bite from the rural area had been referred to this Institute or had approached the hospital directly. The site of snake bite is important because the bite is less dangerous in the extremities as compared to the bite near the vital organs<sup>10</sup>. In the present study highest number of cases (59.70%) had bite on lower extremity which was followed by upper extremity i.e. 75 (38.26%) cases, these finding consisting with studies<sup>1,5,11</sup>. In the rural area the people commonly use chappals, in which most of the part of the foot except sole is exposed to risk of snake bite and therefore it is not surprising that the bites in the present study were mostly on the feet, toes or the lower part of the legs which are always the common sites for land snake bites because the victim is bitten while treading on the snake<sup>12</sup>. In the present study 4 (2%) patients the site of the bite could not be identified. Though the patients had clinical manifestation of envenomation. This is because pain and swelling around the bitesite is a prominent symptom of cobra bite but not of other elapid bite<sup>13</sup>. The symptoms of Krait poisoning are similar but milder than with cobra envenomation and there is little or no local swelling or pain<sup>14</sup>. The “time lag” is important because it is related with time of treatment of patient and consequences which follow. Out of 200 cases studied in 164 patients the time lag could be calculated as these patients were directly admitted to this hospital. The analysis of the time lag in 164 patients are in present study was found 24 hours it is important because if is short complication observed were less and hospital stay was short. The snake bite is often an accident and there is no specific time for snake bite: However the exposure of snake bite is more common during day time because the people of working class are at higher risk to the exposure of snake bite. In present study it was, 135 (67.5%) cases. The effective snake bite toxicity were grouped in five groups: 1) Local reaction 2) Neurotoxic 3) Cardiotoxic 4) Nephrotoxic 5) Nephrotoxic and Neurotoxic. Among the effective bite category the commonest type was local swelling, it may due to local reaction to injected venom, injection, bacterial infection<sup>19</sup>. Present study local swelling was reported in 101 (82.11%) cases. Neurotoxicity: it was reported in present study was in 66 (53.65%) cases. Nephrotoxicity was present study it was reported in 19 (15.44%) cases it may due to varying degree of bleeding, hypotension, intravascular hemolysis, may direct cytotoxic action of venom<sup>15</sup>.

### Cardiotoxicity

It was doubtful whether the cardiovascular changes are direct venom effects or secondary to carbon dioxide retention and acidosis from respiratory failure, or from

anxiety<sup>12,16</sup>. In present it as found in 13(10.16) cases. There was development of reaction in 13 (10.56%) patients in the present study. These ASV reaction was studied by various authors. The variations in ASV reactions may be because the ASV belongs to different batches, also the immunity of host dictates the intensity and nature of the react Snake bite produces various vasculotoxic symptoms, local swelling in present study it was in 66 (98.50%) cases which was most common symptoms found. The second common symptom was local pain, which was seen in present study it was in 66 (98.50%) cases, these was supported with studies<sup>17,8</sup>. The local signs snake bite have been studied .The local swelling following snake bite seems to be the most common observation, present study it was found 82.11%. Snake bite produces vasculotoxic signs, local swelling present study it is in 66 (98.50%) cases which was most common . Second common sign observed was fang marks from the site of bite, in the present study it was in 59 (51%) cases, it was supported with<sup>7,18</sup>, other less common signs were local bleeding, enlarged lymph node, local blister, hypotension, it caused by direct endothelial damage by venom component (khaemorrhagin) which does not affect coagulation<sup>19</sup>. Snake bite produces neurotoxic symptoms these were studies. The neurotoxic manifestations in the studies reported in the literature. The common neurological symptom was blurred vision which was reported. There seems to be greater variation in the blurred vision as neurological manifestation, In the present study there was 52 (78.76%) cases who had blurred vision. The second common neurologic symptom was diplopia which was in present study it was found in 78.76% cases it was reported studies<sup>20,21</sup>. Pain at site of bite was seen in 80.30% cases which was most common in present study where as in 25% cases<sup>21</sup>. Other less common signs were drowsiness, giddiness, pain, and abdominal pain. The snake bite produces neurotoxic signs in various forms, ptosis the present study it was in 100% cases. Ophthalmoplegia in the present study it was in 80.30% cases, which was second common sign observed, these observation supported with<sup>20,21</sup>. Other less were also seen flaccid quadriparalysis, pharyngeal paralysis, respiratory paralysis, and coma The systemic effects of venom are predominantly neurotoxic, causing a selective neuromuscular block, affecting mainly the muscles of eye, tongue, throat and chest leading to respiratory failure in severe poisoning.<sup>19</sup> The stay of snake bite patients in hospital is affected by clinical features of envenomation and its complication such as respiratory paralysis, renal failure, shock etc. Though the patients of snake bite are hospitalized, the hospital stay is not mentioned by many workers. While in present study the average stay worked out was 4 days in the range of 1 to 18 days Effective bite

results in complication and can lead to death of patients. Various studies reported the cause of death by snake bite complication. While in present study it was only 1 (0.8%) death due to respiratory failure, it. This may be because the facility for ventilatory support was available in the hospital where this study was conducted. Cause of death due to renal failure in the present study it appears to be less 4 (3.25%) deaths probably because this study was conducted in a hospital where the facility for dialysis is available.

## CONCLUSIONS

This prospective cross sectional study was conducted in Govt. Medical College, Aurangabad. There were total 200 patients, 113 (56.5%) males and 87 (43.5%) females and male to female ratio was 1.29:1. Incidence of snake bite in rural area is high. Present study there were 187 (93.5%) cases from rural area and 13 (6.5%) cases from urban population .Most of bite cases (40%) occurred during 12.00 noon to 6.00 p.m. (day time) .Out of 200 patients 164(82.0%) came to this hospital directly. Amongst them time lag was 6 hours in 130 (79.26%) patients. Out of 200 cases 140 (70.00%) were farmers or farm laborers bitten while working in the field. It shows that snake bite is an occupational hazard. Out of 200 cases in 4 (2%) cases the bite mark could not be confirmed. Amongst the 196 (98%) cases the commonest site of bite was the lower limb, in 117 (59.69%) cases out of which 82 (41.83%) were on foot, 30 (15.30%) on leg, 4 (2.04%) on thigh and 1 (0.5%) on toes. Out of 200 cases which were selected for study 123 (61.5%) cases were of effective bites and 77 (38.5%) cases were ineffective bites. In the effective bite cases 123 (61.5%) the most common local signs observed were bleeding at the bite site in 119 (96.74%) cases and local swelling in 101 (82.11%) case. The common vasculotoxic symptoms observed, local pain in 66 out of 67 (98.50%) cases and local swelling in 66 (98.50%) cases. The commonest vasulotoxic sign observed was local swelling in 66 (98.50%).The common neurotoxic symptoms observed, pain at the site of bite in 53 (80.30%), blurred vision in 52 (78.78%) cases; diplopia in 52 (78.78%) cases; followed by drowsiness in 42 (63.63%) cases. Common neurotoxic signs observed, ptosis in 66 (100%) cases, ophthalmoplegia in (80.30%) cases, respiratory paralysis in (22.72%) and pharyngeal paralysis in (22.72%) Combined nephrotoxic as well as neurotoxic clinical features were observed in 5 (4.06%) cases. Among total 123 effective bites, 101 (82.11%) had local reactions, 66 (53.65%) had neurotoxicity, 19 (15.44%) had renal involvement, pain at site of bite was seen in 80.30% cases which was most common in present study , (10.56%) had cordiotoxicity and, 5 (4.06%) had combined (nephrotoxic

as well as neurotoxic) effects. Amongst 66 (53.66%) patients having signs and symptoms of neurotoxicity, 15 had respiratory failure, among them 14 patients recovered with endotracheal intubation and intermittent positive pressure ventilation (IPPV), anti snake venom injection, neostigmine and injection atropine; one patient died. Out of total 19 cases of renal involvement, 12 patients recovered with peritoneal dialysis, diuretics, blood transfusion and anti snake venom (ASV). 3 patients recovered by diuretics alone and 4 patients died in spite of treatment. Average hospital stay was 4 days (range 1 to 18 days). Out of 123 effective bite cases, 5 (4.06%) patients ultimately died due to complications – 4 (3.25%) of renal failure and 1 (0.81%) of respiratory failure. Thus the mortality in the present study is 4.06%. Low mortality is due to facilities such as an independent dialysis unit with its own staff and the ventilatory support available at Govt. Medical College and Hospital, Aurangabad that too being provided to the medico-legal cases of snake bite free of cost.

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