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Management of snake bite cases in RIMS Ranchi, Jharkhand, India

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Abstract
Instant hospital-based study has been done to assess the outcome of snake bite cases brought to tertiary care hospital in Jharkhand state capital at RIMS Ranchi. In view of large number of deaths due to snake bite cases in India especially in rural part and also in many other countries, the necessity of having a study at Ranchi, being state capital of Jharkhand which is a state of tribal dominated population is evidently felt. Accordingly RIMS Ranchi being only medical college in state capital of Jharkhand has been chosen as tertiary care hospital for the relevant study. The present study describes 01-year prospective study of snake bite patients from January 2018 to December 2018 at RIMS Ranchi.
It is been observed that, the estimated death due to snake bites are around 40,000 – 50,000 annually in India. As per national data more than 95% bites occur in rural areas. The Studies was done on snake bite cases from Jharkhand area, where it is shown to be very few and non- conclusive. Over the period o one year total 375 cases of snake bite were brought to RIMS Ranchi who was managed by different protocol as per need and available resources. Out of this 375 snake bite cases, brought to RIMS Ranchi, 45 could not survive which means mortality is 12 percent. Out of total snake bite cases 61.33% was found male whereas 38.67% was found female. 93.33% cases had come from rural area and rest only 6.7 % were from urban area. More than 88% of the cases were successfully treated with low dose of ASV at this tertiary care hospital.
Keywords*: Epidemiology; Mortality; ASV; Snake bite;*

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I. Introduction

Snake bite is a major public health problem in India. According to the "million death" study, the estimated annual death due to snake bite in the year 2001–2003 ranged from 40,000 to 50,000 with the mortality rate being higher in the rural areas (4.8–6.0/100,000). Bihar had the third highest annual snake bite related deaths (4500 annually) and the death rate in the state of Jharkhand alone was 1000/year. At the same time, the Indian Government's official figure shows national death rate below 2000 deaths/year. Thus, there is remarkable under-reporting of the snake bite related deaths. There is a paucity of data on snake bite and related events, the approach of care in the snake bite management despite being a major public health problem in India. Out of the four medically important poisonous families of snakes (Elapidae, Viperidae, Atractaspidinae, Colubridae), the Viperidae (viper) and the Elapidae (Cobra and common Krait) remain the most common species of snakes responsible for most of the envenomation in Indian subcontinent.

Snake bite is a major public health hazard and neglected disease in India [1,2,3, 7,11,12,13,14,17]. Most of the snake bite cases occur in the rural areas and in the monsoon moths from June to September [2,3,7,13,14,17,21]. The estimated death due to snake bite in India is nearly 50,000 persons. The data on the true burden of the disease, role of polyvalent ASV, incident of ASV anaphylaxis, and treatment outcome from rural set up are scarce [2,11,13,17]. As per the national mortality survey in 2001 – 2003, approximately 4,500 deaths occur annually in the state of Bihar a rank third among snake bite related deaths in India. Despite this, there has been a paucity of data from this region.

Snake bite is a neglected tropical disease of global importance [4]. Data from the million deaths study in India estimates that snake bite deaths are more than 30-fold higher than recorded in official hospital returns

[5]. Snake venom contains several types of polypeptide toxins, of which the neurotoxins produce paralytic effect by binding to pre-synaptic and post-synaptic sites at neuromuscular junction [6]. Myotoxins acts on muscles causing muscle paralysis and myonecrosis while Haemotoxin causes severe derangement of coagulative mechanism. Identification of these symptoms leads to selection of specific type of anti-venom with ultimate positive outcome for victim. This study will further be helpful in above respect. In Maharashtra, common poisonous snakes are Cobra, Russel's Viper, Saw Scaled Viper, and Krait. It is a fact that in spite of heavy morbidity and mortality, very little attention is paid by the clinicians to this occupational hazard [10]

It is generally recognized that the epidemiology of snake-bite in the South-East Asia (SEA) region has not been adequately studied and that the published data, based almost exclusively on hospital returns to the Ministries of Health, are likely to be unreliable and therefore misleading. One reason is that many snake-bite victims are treated not in hospitals but by traditional healers [20]. In the past half century, only three attempts have been made to assess global snake-bite mortality. In 1954, Swaroop and Grab [18] of the Statistical Studies Section,

WHO, estimated that among half a million snake-bites and between 30 000 and 40 000 snake- bite deaths each year in the world as a whole, there were between 25 000 and 35 000 deaths in Asia.

II. Material And Method

The study was conducted in retrospective manner hospital-based cross-sectional and observational study in a tertiary care hospital of different indoor/outdoor departments of RIMS to describe the various clinical features and outcome related to snake bite over a period from 01.01.2018 to 31.12.2018 (one year). The study comprised of 375 cases of snake bite. A specific Performa was designed to collect the information regarding incidence and clinical outcome.

Inclusion criteria:

1) Snake bite of all age and sex groups.

2) History of unknown bite responding to ASV **(**Unknown bites not responding to ASV were excluded from the study.)

3) No history of snake bite but presenting with symptoms of snake bite and responding to ASV treatment.

4) Cases admitted to emergency departments and brought dead cases of snake bite directly/indirectly from different departments to Forensic Medicine and Toxicology, RIMS Ranchi.

Epidemiological profile:

Table 1: Age and Sex wise distribution of cases

Age (years)	Male		Female		Total	
	n	%	N	%	n	%
0-9	5	2.17	5	3.45	10	2.7
10-19	35	15.22	35	24.14	70	18.7
20-29	65	28.26	25	17.24	90	24
30-39	55	23.92	25	17.24	80	21.3
40-49	35	15.22	20	13.79	55	14.7
50-59	15	6.52	10	6.90	25	6.7
60-69	15	6.52	25	17.24	40	10.7
> 70	5	2.17	0	0.00	5	1.3
Total	230	100	145	100	375	100

$X^2=7.62$
df=2

p=0.02 (significant)
Maximum 60% victims belong to 20-49 yrs. age group. Among 46 males, 7.39% belonged to 20-49 yrs. age group whereas females of the same age group constituted 48.27%. There is a statistically significant difference in the age group of 20-49yrs of which 67.39% were male and 38.7% were females.

Table 2: Distribution of cases according to site of bite

Site of bite	Male		Female		Total	
	N	%	n	%	n	%
Unknown	0	0	10	6.90	10	2.7
Face	15	6.52	10	6.90	25	6.7
Neck	10	4.35	0	0.00	10	2.7
Arms	10	4.35	0	0.00	10	2.7
Forearms	15	6.52	5	3.45	20	5.3
Hands	65	28.26	20	13.79	85	22.7
Leg	25	10.87	20	13.79	45	12
Foot	90	39.13	80	55.17	170	45.3
Total	230	100	140	100	375	100

The given data shows out of the 375 cases, 170 cases had bites on foot accounting to 45.3%, followed by bites on hands in 85 cases accounting to 22.7%. No bites were recorded on head, trunk and thighs.

Table 3: Distribution of cases based on local manifestations

Local manifestation	n	%
Fang marks	35	9.3
Swelling	**5**	**1.3**
Fang marks & oozing	5	1.3
Fang marks & swelling	60	16.0
Cellulitis & swelling	**10**	**2.7**
Fang marks, Oozing & swelling	25	6.7
Fang marks, swelling & cellulitis	15	4.0
Fang marks, discoloration, swelling	40	10.7
Fang marks, discoloration & swelling & cellulitis	25	6.8
Fang marks, discoloration, swelling, cellulitis & blisters	10	2.7
Fang marks, oozing, discoloration & swelling	35	9.3
Fang marks, oozing, discoloration, swelling & cellulitis	35	9.3
No local signs	**75**	**20.0**
Total	375	100

No local signs were found in 20% cases. In 4% of cases cellulitis and or swelling was found. Of the 375 cases, 170 cases had bites on foot accounting to 45.3%, followed by bites on hands in 85 cases accounting to 22.7%. No bites were recorded on head, trunk and thighs. As per our record bite on face and neck region results in 100% mortality in case of cobra and krait bite.

Table 4: Distribution of cases based on symptoms

Symptoms	N	%
Pain at local site	255	68.0
Giddiness	160	42.7
Fright	40	10.7
Vomiting	85	22.7
Diarrhea	5	1.3
Frothing at mouth	25	6.7
Abdominal pain	50	13.3
No symptoms	110	29.3

Most common presenting symptom was pain at local site constituting 68% followed by giddiness constituting 42.7%.

Table 5: Systemic manifestations in the study cases

Respiratory S/S	(n= 75)	%
Dyspnea	**145**	**38.7**
Nil	230	61.3
CVS S/S		
Tachycardia	25	6.7
Syncope	20	5.3
CNS S/S		
Ptosis	**195**	**52.0**
Dysphagia	110	29.3
Difficulty in speech	**145**	**38.7**
Convulsion	30	8.0
weakness of limbs	35	9.3
Hemostatic S/S		**%**
Ecchymosis	15	4.0
Bleeding gums	10	2.7
Hematuria	25	6.7
Malena	5	1.3
Hematemesis	15	4.0
Urological S/S		**%**
Oliguria	30	8.0
Anuria	10	2.7

Out of the 375 cases, maximum cases presented with CNS symptoms such as ptosis which constituted 52% followed by difficulty in speech constituting 38.7%. Dyspnoea was present in 38.7% cases. Ptosis was common among the Krait and Cobra species (52%). However, it is interesting to note that patients with viper bite and patients with unidentified snake species also had ptosis. When the patient complained of dyspnea, clinical examination revealed tachypnea and auscultation showed either rhonchi or crepitations and pulse oximeter saturation was <95% on room air. Data were available on 145 patients. Cobra and Krait bite were associated most commonly with the respiratory distress. The presence of coagulopathy was considered if there were documented bleeding manifestations like gum or nose bleed, hematuria, or malena (excluding the bleeding at the site of fang mark). At NJH, whole blood clotting time (WBCT) is routinely done as an objective measurement of coagulopathy. Results of 70 patients were available for the analysis. Clotting time exceeding 8 min was considered abnormal. If more than one clotting time is performed on one patient, then the highest value was considered to be the most abnormal and the value (in minutes) was recorded for analysis. For the analysis, the WBCT was divided into three groups: First group was of <8 min (normal clotting time, suggesting no coagulopathy); second between 8-15 min (mild coagulopathy); third group >15 min. About 46% of the patients had clotting time >8 min (Group II and Group III) of which majority had in Group II, suggesting that most patients had minor coagulopathy. Viper and Krait bite were the two most common snake species causing coagulopathy. It is interesting to observe that among the unidentified snake species bite, more than 60% had deranged clotting time.

Table 6: Distribution of cases based on ASV administration and ASV related information

ASV administered	**N**	**%**
Given	**315**	**84.0**
Not given	60	16.0
Total	375	100
Total ASV Vials		
1-5	45	14.3
5-10	145	46.1
11-20	120	38.1
>20	5	1.5
Test dose		
Given	5	1.3
Not given	310	82.7
Desensitization		
Done	5	1.3
Not done	310	82.7
Allergic reactions		
Yes	40	10.7
No	275	73.3
Steroid & CPM		
Given	55	14.7
Not given	260	69.3

The given data shows, out of the 375 cases, 84% received ASV. Of the 315 cases who received ASV, 84.2% needed 5-20 vials. Test dose and desensitization was done in 1 case. No allergic reactions were seen in 73.3% cases.

The data on the dosage of ASV were available for 315 patients 45 (14.3%) patients with normal WBCT were administered <5 vials of ASV based on local features of envenomation, signs of neurotoxicity, and standard operating procedure. 145 (46.1%) patients with mild coagulopathy were treated with up to 10 vials of ASV. Rest 125 (39.6%) with critical clinical state were administered >10 vials of ASV as indicated in the results.

The data outcome shows out of 375 cases, 330 (88%) patients were treated successfully which includes one DAMA case and one case referred to higher Centre, 25 (6.7%) expired, 20 (5.3%) were brought dead. In bivariate analysis, the mortality was significantly lower (P = 0.04, OR 2.7, 95% CI = 0.9–7.5) among those who presented within 5 h of the snake bite. There was no significant difference in the mortality among patients who were treated with low dose versus high dose of ASV (P = 0.11). Data on ASV-induced anaphylaxis were available on 355 patients. 40 (10.7%) patients developed anaphylactic reaction to ASV [Table 6]. When the

event of the anaphylactic reaction was compared among the patients who received Chlorpheniramine and hydrocortisone prophylaxis before or at the time of administration of ASV and those who did not receive the prophylaxis, the incidence of any grade of anaphylactic reaction was significantly lower among those who received Chlorpheniramine and hydrocortisone prophylaxis (ARR = 13.6; NNT = 7.4). The cost burden of the ASV was not considered for the management of snake bite in our study as it is fully supported by state government. Thus, nearly 88% of the patients could be successfully managed at this tertiary care hospital with a relatively low dose of ASV.

Table 7: Distribution of cases based on type of envenomation

Type of envenomation	**n**	**%**
Non venomous	55	14.7
Hemotoxic	205	54.6
Neurotoxic	100	26.7
Semi-venomous*	15	4.0
Total	375	100

**Semi-Venomous-Those who had only local manifestations.*

Almost 60% of the snake bite belong to younger are group (median=35± 15 years) representing the working class of the population. We also found difference in the gender- wise occurrence of snake bite during the 1 – year period. There could the referral bias as this is the only Tertiary care hospital which continuous care at zero cost expenditure (in our study cost ASVS vial is considerable for population under study). Among the patients from the villages in Ranchi, more than 60% presented within the 5h of the snake bite but significantly a smaller number of patients located in the farm villages of Ranchi and other districts. This is attributable to two main social reasons; viz limited access to the transportation the practice of receiving first treatment from thes local village nonmedical pactioner's prior to presentation to the hospital (table-8).

Table 8: Distribution of cases based on the reason for Delay* in seeking medical care

Bite not appreciated by patient	**N**	**%**
Not appreciated	45	12.0
Appreciated	330	88.0
Delay due to first aid		
Yes	120	32.0
No	255	68.0
Lack of transportation		
Yes	**285**	**76.0**
No	90	24.0
Treatment from Quack		
Yes	**95**	**25.3**
No	280	74.7
Distance to be travelled		
Yes	**80**	**21.3**
No	295	78.7
Multiple reference		
Yes	40	10.7
No	335	89.3

**Delay- Delay is considered if the time taken to approach the health care facility is beyond the expected time in normal circumstances.*

Table 9: Distribution of cases based on number of days of hospitalization

Hospitalization in days	n	%
1-2	85	23.9
3-5	125	35.2
6-7	85	23.9
8-14	35	9.9
>14	25	7.1
Total	**355**	**100**

Note: 20 Cases were 'brought dead' with history of snake bite. 59.1 % cases needed hospitalization between 3 to 7 days.

Table 10: Distribution of cases based on Outcome

Outcome	n	%
Recovered	330	88.0
Death	45	12.0
Total	**375**	**100**

88% of the cases recovered which includes 1 DAMA (Discharge Against Medical Advice) case and 1 which was referred to other center. Mortality noted was 12%.

III. Discussion

Krait and viper and cobra were the most frequent alleged snake species. Foot and hand accounted 68% of the sites of bites. This is consistent with the findings of most other studies from India except one study from Himachal Pradesh by *Bhardwaj and Sokhey [2,3,11,13,17]*.Local features of envenomation and coagulopathy were present in nearly half of the patients while ptosis and respiratory distress were present among 52% and 38.7%, respectively. Overall mortality was around 12 % and significantly higher among those who presented beyond 5 hour of envenomation. This was among those who came from nearby districts of Ranchi and farthest villages of Ranchi district. More than 88% of the cases were successfully treated with low dose of ASV at this tertiary care hospital, and only one case needed referral. This is consistent with most other described studies from India [2,8,11,12,16]. The cost incurred in the patient care is nil here as RIMS Ranchi is a Government medical institute and hospital. The prophylactic administration of Chlorpheniramine and hydrocortisone prevents ASV hypersensitivity reactions significantly. Thus, with low dose ASV and prophylactic Chlorpheniramine and hydrocortisone administration, the majority of the snake bite cases in rural set up can be successfully managed.[8,9,15,19,21] Out of this 375 snake bite cases, brought to RIMS Ranchi, 45 could not survive which means mortality is 12 percent. Out of total snake bite cases 61.33% was found male whereas 38.67% was found female. Snake bite cases in rural area predominates as 93.33% over 6.7 % were from urban area. Most of the cases can be managed successfully below the tertiary care set up and at low dose of polyvalent ASV. The morbidity and mortality increase with the delay in bringing to the hospital, which in turn depend on the social beliefs and practices. Public awareness to bring snake bite cases to trained medical persons at the earliest without wasting precious time in local practices of *JHAD-PHUK* and also majority of cases of snake bite cases can be saved by appropriate treatment in hospital.

Further randomized trials are warranted on the dose of polyvalent ASV in various Further randomized trials are warranted on the dose of polyvalent ASV in various toxidromes and the role of anti-histaminic and steroids in the management of snake bite cases in India. and the role of anti-histaminic and steroids in the management of snake bite cases in India.

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