

Magnitude of Snakebite in a Rural of Southern Sindh

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ABSTRACT

Objective: To determine the magnitude of snake poisoning and its incidence in pediatric population in rural of southern Sindh (Tharparkar).

Methodology: It is a hospital based descriptive, retrospective study conducted at Civil Hospital Mithi, Sindh in January 2017 to December 2017. The frequency and demographic characteristics and outcomes were obtained from case records and were analyzed.

Results: Total number of snakebites reported in the year 2017 was 454, out of them 81% were males and 19% were females with male to female ratio of 4.26:1. Out of all 22% were children having age <15 years. Based on clinical features the majority of snakebites were poisonous as out of all 350 patients (77%) were victim of poisonous snakes, whereas 104 patients (23%) were bitten by non-poisonous snakes. Total 6 (1.3%) patients out of 454 were died. Number of poisonous adults were significantly higher than poisonous children ($p=0.001$). Mortality rate in children was slight higher than the adults, while statistically insignificant ($p=0.200$).

Conclusion: This is a significant problem in rural of Sindh. Children are also affected. Delay in seeking medical care, long distances, poor communication and deep rooted superstitious beliefs contribute to the morbidity and underestimation of data.

Key words: Snake bite, Poisoning, Rural health

INTRODUCTION

In the undeveloped nations, snakebite poisoning is a significant public health issue. It is an overlooked tropical condition arising from the poisonous secretion 'venom' injected by a venomous snake into a human's body under unintended conditions[1]. Snake venom's chemistry is highly complex, and variability differs among species, leading to a dynamic toxicological and biochemical profile that describes a wide variety of clinical manifestations[2]. Some venomous toxins cause destruction to local tissues, frequently resulting in irreversible sequelae, while others produce systemic effects, like neurotoxic symptoms (e.g. respiratory paralysis), acute renal injury, autonomic hyperactivity, bleeding, rhabdomyolysis (e.g. generalized muscle fibre's breakdown), thrombosis, or cardio toxicity[1,3]. Globally, snakebite envenoming results in among minimum 1.8-2.7 million individuals annually along with mortality rates ranging between 81,410 and 137,880 deaths[4,5]. Occupational and environmental diseases are widespread and often destructive, in particular in tropical rural regions of underdeveloped nations[3]. In the Sindh province alone, 8 thousand incidents of snakebites appear annually, and most of the incidents are reported from Thar district[6]. There is also a lack of data regarding the prevalence of snakebites; there is inadequate epidemiological data, especially in rural regions where snakebites are highly prevalent. Due to under-reporting, current estimates are usually extracted from extrapolated medical reports and neighborhood surveys, as snakebite is infrequently reportable. [7]. In literature, there is broad information of snake species. The venomous snakes (front-fanged) are categorized into sea and land snakes: 1) land snakes have 3 families: Elapidae, Crotalidae and Viperidae. 2) Sea-Snakes have only one family, namely the Hydrophiidae [8]. The "Big-4" venomous snakes across

South Asia are termed as Bungarus caeruleus, Naja naja, Echis carinatus, and Daboia russelii, as they are the medically the most valuable snakes of that region. [9]. Envenoming consequences depend on the snake species concerned and in Pakistan there are two families snakes that have extremely venomous species: Elapidae and Viperidae, Elapidae family comprises of, sea snakes, kraits and cobras, and Viperidae family comprises of Russell vipers and saw-scaled [10]. Snakebite reports are mostly registered from Pakistan's most populated parts, the Harappa and the Indus Delta (Punjab and Sindh respectively), where nearly 95 percent of the agricultural activities of the Pakistan take place. 8 % of the overall population lives in the Harappa (or Indus Valley). Almost everyone in this area participates in such agricultural activities and is always at significant risk. [8]. Tharparkar is a subtropical desert land and the most southern part of Sindh, a province of Pakistan. We conducted the study to assess the magnitude of snakebite in rural area of southern Sindh, Mithi, Tharparkar District. Snakebite envenoming occurs globally and it leaves public health at a potential risk, specifically the rural tropics reasons, which abound in snakes.

MATERIALS & METHODS

This is a retrospective, Hospital based descriptive study. The study was conducted at district Hospital Mithi, a historical central town of arid zone of southern Sindh. All patients who were brought to Civil Hospital Mithi with alleged history of snakebite from January 2017 to December 2017 were included in this study. Snakebite is a significant problem in rural Sindh especially in Tharparkar district. All the data regarding frequency according to season, demographic characteristic and outcomes in terms of mortality were was obtained from case records and

entered in study proforma. Data was analyzed by using SPSS version 20.

RESULTS

In this retrospective study, there were total 454 cases of snakebite reported over the period of one year. Out of 454 cases, 81% (369 patients) were males and 19% (85 patients) were females with a sex ratio of 4.26:1. Twenty-two percent (105 patients) were children (age <15 years) and majority i.e. 78% (349 patients) were adults (age >15 years). (Figure.2.) Snakebites occurred throughout the year of study with most cases reported in the months with warmer climate and monsoon season i.e. from June to September. 278 cases (61.23%) were seen during this time period. The highest peak of cases was seen in the month of July with 100 patients (22.02%). Table.1

Based on clinical features, the snakes were categorized into two groups; non-poisonous and poisonous. The majority of snakebites were poisonous. Out of 454 cases, 350 patients (77%) were victim of poisonous snakes, whereas 104 patients (23%) were bitten by non-poisonous snakes. (Figure.1)

In this study, total 6 patients (1.3%) out of 454 died as a result of snakebites. Among those 6 patients, 66.6% (4 patients) and 33.3% (2 patients) were adults and children respectively. (Figure 2)

Further analysis showed that number of poisonous adults were significantly higher than poisonous children (p=0.001). Out of 105 children 55% were poisonous and 45% in children were non-poisonous. Out of 349 adults 82.5% were as a result of poisonous snakebites and 17.5% cases were a result of non-poisonous snakebites. Table.2

Mortality rate in children was slight higher than the adults, while statistically insignificant (p=0.200). Out of 105 children 1.9% (2 patients) died, whereas 1.14% (2 patients) adult were died out of 349. Table.2

Table.1. Demographic characteristics of the patients n=454

Variables	Statistics
Age groups	
<15 years	105(22%)
>15 years	349(78%)
Gender	
Male	369(81%)
Female	85(19%)
Snake bite according to season	
January-March	18(4.0%)
February	20(4.4%)
March	20(4.4%)
April	18(4.0%)
May	35(7.7%)
June	40(8.8%)
July	100(22.0%)
August	80(17.6%)
September	58(12.8%)
October	30(6.6%)
November	20(4.4%)
December	15(3.3%)

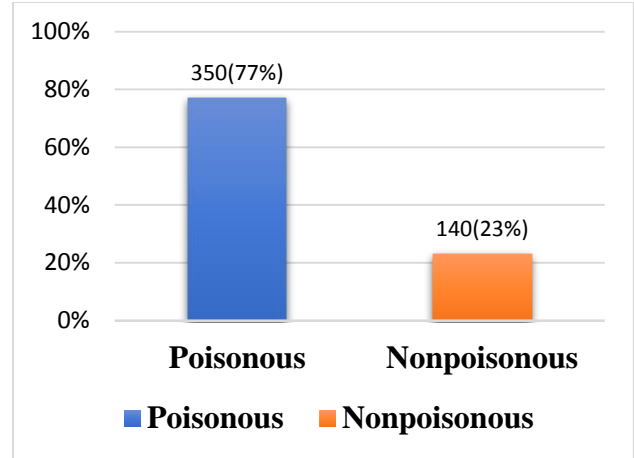


Figure1: Total number of poisonous and nonpoisonous snakebite cases (n=454)

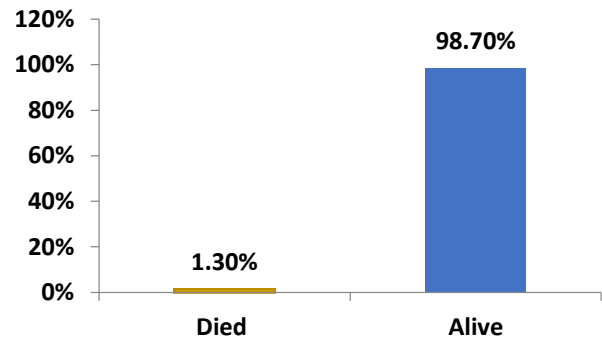


Figure 2: Death-to-case mortality rate of snakebite

Table 2: Mortality according to poisoning status and age (n=545)

Variables	Children	Adult	p-value
Poisoning status			
Poisonous	58(55.2%)	288(82.5%)	0.001
Non-poisonous	47(4.8%)	61(17.5%)	
Total	105(100.0%)	349(100.0%)	
Mortality			
yes	2(1.9%)	2(0.6%)	0.200
No	103(98.1%)	347(99.4%)	
Total	105(100.0%)	349(100.0%)	

DISCUSSION

According to WHO database and several other studies, out of >3000 snake species globally, nearly 600 species are venomous as well as >200 are deemed as medically important [11,12]. Since this study was conducted at a historical central town of arid zone of southern Sindh of district Tharparkar, where majority population occupation is agriculture with low socioeconomic status - this contributes to increased snake - human interaction. In consistent to our data, Gutiérrez [7] and Harrison [13] also reported snakebite affecting poor rural communities where agricultural and other outdoor practices contribute to increased snakebite cases [14]. Stahel including others reported, the risk of the population differs between

countries; such as, tea pickers in Sri Lanka, southern India, and in Liberia, Malaysia, Thailand, other countries of Southeast Asia and Brazil are at risk, and sugarcane labourers in Saint Lucia, South Africa, and Martinique are also at risk.. [15-17]

Being ectothermic, snakes are widespread in warmer regions, limiting the highly endemic snakebite countries mainly to underdeveloped tropical nations (specifically some Asian, African, Oceanic and Latin American countries) [4,18,19]. In the monsoons, the occurrence of snakebite rises when individuals are participating in agricultural practices and flooding is caused by heavy rain. The rain water fills the gaps, pushing snakes out of their holes and nests/burrows [20]. During the period of July (monsoon), this study recorded the highest number of events. This is the possibly the best pattern of characteristics that has also been documented in other studies [1]. There is relatively frequent interaction between humans and snakes, especially in the monsoon rains when field activities of humans corresponds with the breeding season of the snakes.

The sex incidence of snakebite victims throws light on the vulnerable section of the population. Compared to this study, which shows the 81% of male victims of snakebite. Asif R in his study reported 90% of male being affected and involved in outdoor activities [21]. The result of greater frequency of males being the victimized by snakebite was comparable with other study too [22]. We concluded that the males are more involved in fieldwork and this make them more susceptible to snakebites.

The incidence rates of being affected more severely are higher among children as compared to adults, because of their lesser body mass. The data Analysis of mortality reports presented by WHO (2002) advocates that out of total deaths (globally) in children, 35% deaths are attributed to snakebite, [23]. Our data showed Twenty-two percent of children (age <15 years) being affected. Furthermore death-to-case mortality rate in children was slightly higher than in adults.

Globally, Snakes have been found to have >3000 species and about 15% of these species are poisonous [24]. This study showed predominance of poisonous bites. The result obtained from this study was similar to the data of other study done in rural of India where 66.7% bites were subjected to venomous snake and 33.3% bites were subjected to non-venomous snakes [25]. The markedly higher incidence for the poisonous snake bites, despite only 15% of the snakes being poisonous, can be explained by the fact that in rural areas not all people with non-poisonous bites report to the hospital due to mild nature of the symptoms. Furthermore, the simple first aid recommendations are unfortunately rarely followed in rural areas leading to loss of vital time. And this is because majority of the victims initially respond to the traditional healers as mentioned in other studies as well [26-27]. Incisions, chanting, attempting venom sucking from the bite site and the using snake stones or herbal medicine are common traditional treatments for snakebite. [28]. Hence these myths of visiting traditional healers are the reasons for delayed entrance to hospital, spontaneous deaths and further contribution to underestimation of actual data.

Snakebite remains a serious and significant medical challenge in several regions of Pakistan, mainly in Tharparkar district of Sindh. This data shows death-to-case mortality rate of 1.9% (in children) and 1.14% (in adults). Hayat et al., in their study reported 25,000-30,000 deaths occurring in South Asia yearly from snakebite and approximated annual rate of mortality in Pakistan is around 1.9 per 100,000 populations [29]. In consistent to our study rural areas of India showed the mortality rate of 1.85% in children [25]. Because of the traditional norms of villagers as seeking treatments from quack, villagers come to the hospital very late following the incidence [30]. Therefore we believe that the true obtainable epidemiological data on snakebite remains scattered and more possibly under estimated. However awareness amongst general population is extremely important regarding the seriousness and early treatment of snake bite.

CONCLUSIONS

This study summarized the epidemiological characteristics and burden of snakebite and their outcomes in rural of southern Sindh. The area of the study is snake-infested and responsible for a fair share of number of victims. Most snakebites occur in very remote rural areas and we do not know exactly how many are able to reach the Hospital in time or if the reporting in hospitals is accurate. However, a number of risk factors have been already studied. This work has shown the value of required reporting of snakebites in order to enhance their administration, given that the data is endorsed and evaluated by the health officials. Therefore it appears appropriate to continue this endeavour, to strengthen the framework of case reporting as well as to take the steps that could be derived from the review of the received existing data.

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