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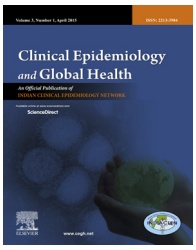

Original Article

Evaluation of demographic and clinical profile of snakebite casualties presented at a tertiary care hospital in Kerala

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ABSTRACT

Problem considered: India has the highest number of envenomation and the highest number of deaths due to snakebite in the world. However, there is wide variation in the regional prevalence of snake species involved in causation of snakebites. The objectives of the study were to determine the prevalence of causative species involved in snakebites presented to the institution and identification of risk factors that triggered the infliction.

Methods: The cross-sectional study was conducted among snakebite causalties admitted to a tertiary care hospital in Malappuram district of Kerala. Data were collected from the medication charts of confirmed bite victims admitted to critical care unit of the hospital prospectively. Statistical analysis was performed using χ^2, Student's *t*-test and ANOVA.

Results: The sample comprised of 60 (65.9%) males and 31 (34.1%) females, fashioning a gender ratio of 1.93. The causative snake species was unidentified in 48 (52.7%) instances. Russel's viper, hump nose viper (HNV), spectacled cobra and common krait were involved in 21 (23.1%), 14 (15.4%), 5 (5.5%) and 3 (3.3%) inflictions respectively. 77 (84.6%) victims were residents of rural area in opposition to 14 (15.4%) from urban area. 80 (87.9%) subjects presented with an alleged bite at lower extremities as opposed to 11 (12.1%) with infliction on upper extremities.

Conclusions: Russel's viper constituted the most prevalent species among identified cases in the study setting. Male gender, working class population, outdoor occupation without adequate protective footwear, monsoon season and rural residency were identified as risk factors for contracting snakebites.

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1. Introduction

India is home to 60 species of venomous snakes, with few of them being abundant in rural locations and causing serious envenomation incidents.[1] India is estimated to have the highest snakebite mortality in the world with World Health Organization (WHO) estimates indicating a high frequency of 83,000 bites per annum with 11,000 deaths.[2] In the Indian sub-continent, the envenomed snakebites have been linked to ''the big four'' comprising of Indian cobra, common krait, Russell's viper and saw-scaled viper. Anti-snake venom is a biological product that typically consists of venom neutralizing antibodies derived from a host animal, such as a horse or sheep and has been widely utilized to subdue manifestations associated with the envenomation. Depending on the species covered by the antivenom, it is classified as either monovalent, which can counteract against the bite of a single species; or polyvalent, having coverage against multiple snake species. There are international and national quality standards set by the WHO and Indian Pharmacopoeia respectively; which the ASV manufacturers has to abide by. The major dilemma faced by clinicians is that despite harbouring multiple venomous species in its biosphere, the clinical manifestations of many species in India resemble each other to an extent that, accurate diagnosis of the bite is usually ascertained by identifying the snake brought in by victim's relatives. Performing immunological tests for identification cannot be a feasible option in a lower-middle income country like India and therefore, the tendency has been to manufacture polyvalent antivenom, having coverage against the big four. However, polyvalent antivenoms are known to be less effective than monovalent antivenoms, and are more likely to induce allergic reactions, including anaphylactic shock.[3] Recently, various studies have revealed that the hump-nosed viper, previously considered harmless and misidentified as the saw-scaled viper, is capable of delivering a fatal bite.[4] In regions of Kerala, India, it may be responsible for nearly 10% of venomous bites and the polyvalent ASV provides no coverage against their venom.[5,6] Adding to these problems, there has been acute shortage of anti-snake venom in the country which the manufacturers claim is due to the lack of supply of raw materials. But there has been widespread allegation that the drug price control order 2013, which had reduced the price of ASV by half has been instrumental in shaping the manufacturers' response to intentionally cease production. The following study was aimed at studying envenomed and non-envenomed snakebite cases admitted to a tertiary care hospital in Northern Kerala, with respect to patient demographics, temporal variabilities and clinical manifestations. The major objective of the study was to determine the prevalence of causative species involved in snakebites presented to the institution. Secondary objective involved identification of risk factors and use them to delineate emphasis areas during prospective public awareness programmes, aimed at reducing snakebite causalities in the specific locality.

2. Material and methods

A cross-sectional study was conducted to scrutinize the pattern of snakebite and estimate predisposing factors among envenomed and non-envenomed snakebite causalities admitted to a tertiary care hospital in Malappuram district of Kerala. The hospital provides health services to the natives of this hilly terrain and also acts as a referral centres for snakebite cases in the region. The study was carried out from February 2012 to August 2014 in the Critical Care unit of the hospital. All cases of confirmed snakebite causalities were included in the study through continuous sampling method. The cases which were suspected as snakebites and on further evaluation found to be non-snakebites were excluded. The study got ethical clearance from the institutional ethical committee of the hospital, prior to enrolment of first subject. Informed consent was obtained from the patient's relatives as well as the treating physician prior to collection of data from each individual. The time at which the victims were brought to the hospital and the time taken to bring the victim to the institution under study were noted. Patients not presenting with fang marks were not excluded because of the fact that in many instances, Krait bites were not been found to be associated with fang marks. Confirmation of the snake species involved was done through visual examination of the dead or live snake that was brought to hospital or based on descriptions and testimony of accompanier. Clinical signs and laboratory values were used to assess the severity and classify them as local or systemic envenomation. The therapies administered for management of the cases were analyzed and the number of vials of ASV administered was noted if any. The parameters which were used as indication for ASV therapy were also scrutinized. The lab diagnostic tests used to further evaluate the effectiveness of therapy were noted. The requisite sample size was estimated based on retrospective evaluation of snakebite medication records. The pilot study evidenced that the causative species could be identified in 53.33% instances. The following equation was used to determine the minimum required sample size as 87.

$$n = \frac{4pq}{d^2}$$

where n = minimum required sample size, p = 53.33%, $q = 1 - p$ and d is the precision (taken as 20% of p).

SPSS version 18.0 was used for data analysis and the level of significance was set at 5% with p value <0.05 being considered as statistically significant. The data are presented as means $\pm$ standard deviation for continuous variables and frequency (percentage) for discrete variables. Differences in categorical and continuous variables were tested with χ^2 and Student's t-tests, respectively. Significance of difference between means of multiple groups was analyzed using ANOVA. Association of the potential risk factors with the clinical manifestations was assessed using Spearman's correlation.

3. Results

A total of 91 subjects who met the pre-determined criteria during the investigation period were enrolled in the study