



Incidence & management practices of snakebite: A retrospective study at Sub-District Hospital, Dahanu, Maharashtra, India

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This study was undertaken to know the incidence and management practices of snakebite envenomation at the First Referral Unit - Sub-District Hospital, Dahanu, Maharashtra, India. Retrospective analysis of snakebite case records (n=145) was carried out for one-year period (January to December 2014). The annual incidence of snakebite was 36 per 100,000 population with case fatality rate of 4.5 per cent. Venomous snakebites were 76 per cent and non-venomous snakebites were 24 per cent. Overall, snakebites were more common in males (52.4%) than females (47.6%). Majority of the snakebites (66%) were in the age group of 18-45 yr. Seasonal variation was observed with highest snakebites in monsoon (58%). Lower extremities were the most common site of bites (63%). Neurotoxic and vasculotoxic envenomation were reported in 19 and 27 per cent snakebite cases, respectively. Anti-snake venom (ASV) was administered at an average dose of 7.5±0.63 vials (range 2-40, median 6). There was no uniform protocol followed for ASV administration as per the National Snakebite Management Protocol of Government of India (2009).

Key words Annual incidence - anti-snake venom - envenomation - snakebite - venomous

Every year worldwide, snakebite envenomation leads to more than 100,000 deaths and causes permanent disability or disfigurement in about 400,000 cases¹. South Asia is the most affected Region due to snakebite envenomation^{2,3}, and India contributes to 50 per cent of the estimated deaths due to venomous snakebites globally¹. In India, highest number of deaths due to snakebites have been reported in Uttar Pradesh, Andhra Pradesh, Bihar, Tamil Nadu, West Bengal and Maharashtra⁴. Anti-snake venom

(ASV) is the only effective specific treatment of snakebite envenoming⁵. A study conducted in Nepal reported ASV administration within one hour in only 14 per cent and within greater than five hours in 36 per cent of snakebite envenomation⁶. Delay in ASV administration was associated with high incidence of complications⁷ and high case fatality rates (CFRs) in snakebite patients⁶. National Snakebite Management Protocol (2009), Government of India⁸ and World Health Organization-South East Asia Regional Office

guidelines (2010)⁹ were available to the healthcare providers in India for the management of snakebites before the release of Standard Treatment Guidelines (STG, 2016) on management of snakebite by the Ministry of Health & Family Welfare (MoHFW), Government of India¹⁰. Department of Health Research, MoHFW, Government of India, sanctioned a Model Rural Health Research Unit (MRHRU) at Dahanu, district Palghar, Maharashtra in 2014¹¹. There was lack of information on incidence and management practices of snakebite envenomation in this tribal block of Dahanu. Therefore, the aim of the present study was to know the annual incidence and management practices of snakebite envenomation at the First Referral Unit (FRU) - Sub-District Hospital (SDH) Dahanu.

The snakebite admission case records and death registers were retrospectively studied from January to December 2014 maintained at SDH, Dahanu. The study was conducted at MRHRU, Dahanu, Maharashtra, and was approved by the Ethics Committee of ICMR-National Institute for Research in Reproductive Health, Mumbai (No. D/ICEC/Sci-108/145/2016). The data were collected on demographic characteristics, circumstances of snakebite, signs and symptoms, first aid, duration (h) between time of snakebite and access to FRU, estimated distance (km) from snakebite locality (based on address mentioned in SDH records)

to FRU, ASV administration (test dose, total ASV vials used), duration of stay at FRU (days) and outcomes. The snakebite cases were classified as venomous and non-venomous based on the clinical information and/or data available on species of snakes identified either by the patients or the treating medical officers (MOs) recorded in case record forms. Case records with incomplete or inadequate information were excluded. As per the Census of India (2011)¹², total population of Dahanu *taluka* was 402,095. This was used as reference population for calculation of incidence of snakebites, and CFR.

The annual incidence of snakebite was 36 per 100,000 populations which was comparable to Vidarbha region, Maharashtra¹³, lower than Sri Lanka¹⁴, Bangladesh¹⁵, Myanmar¹⁶ and Chitwan and Nawalparasi districts in Nepal¹⁷. Seventy six per cent snakebite cases (n=110) were due to venomous and 24 per cent (n=35) were due to non-venomous snakebites. Five of the 110 venomous snakebites had fatal outcome resulting in 4.5 per cent CFR with an annual incidence of one snakebite death per 100,000 populations. The CFR was comparable with other studies from Maharashtra, India^{13,18,19} and Myanmar¹⁶. The CFR was lower than Nepal^{6,17} but higher than West Bengal, India²⁰, Bangladesh²¹ and Sri Lanka²². One hundred and five snakebite cases were recovered with an annual incidence of 26 survivals per

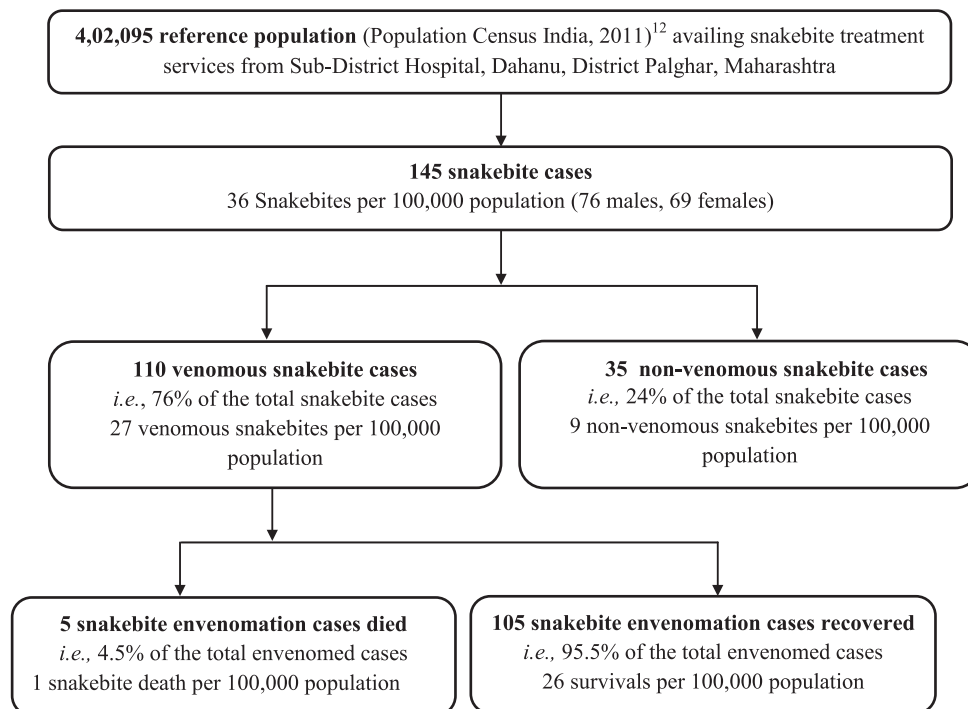


Fig. 1. Flow chart showing population at risk for snakebite, venomous and non-venomous snakebite cases admitted at Sub-District Hospital, Dahanu, Maharashtra, India.

100,000 populations (Fig. 1). The overall distribution of snakebite was higher in males (n=76, 52.4%) than females (n=69, 47.6%). However, the distribution of venomous snakebite was higher in females (53.6%) than males (46.4%) (Fig. 2A). The mean age of snakebite cases was 33.2±1.3 yr [mean ± standard error of mean (SEM), median 32, range 1.6-70 yr]. Majority of the venomous and non-venomous snakebites were higher in the age group of 18-45 yr (Fig. 2B) comparable with other studies from India^{19,20,23} and Nepal^{16,17}. Ninety per

cent of the snakebite cases were admitted during the months of May to November (Fig. 2C). The distribution of snakebites as per the time was reported as eight per cent early morning (0300-0559 h), 25 per cent morning (0600-0959 h), 26 per cent daytime (1000-1659 h), 22 per cent evening (1700-1959 h) and 21 per cent night (2000-0259 h).

Majority of snakebites occurred on lower limbs (Fig. 2D). The estimated mean distance between the place

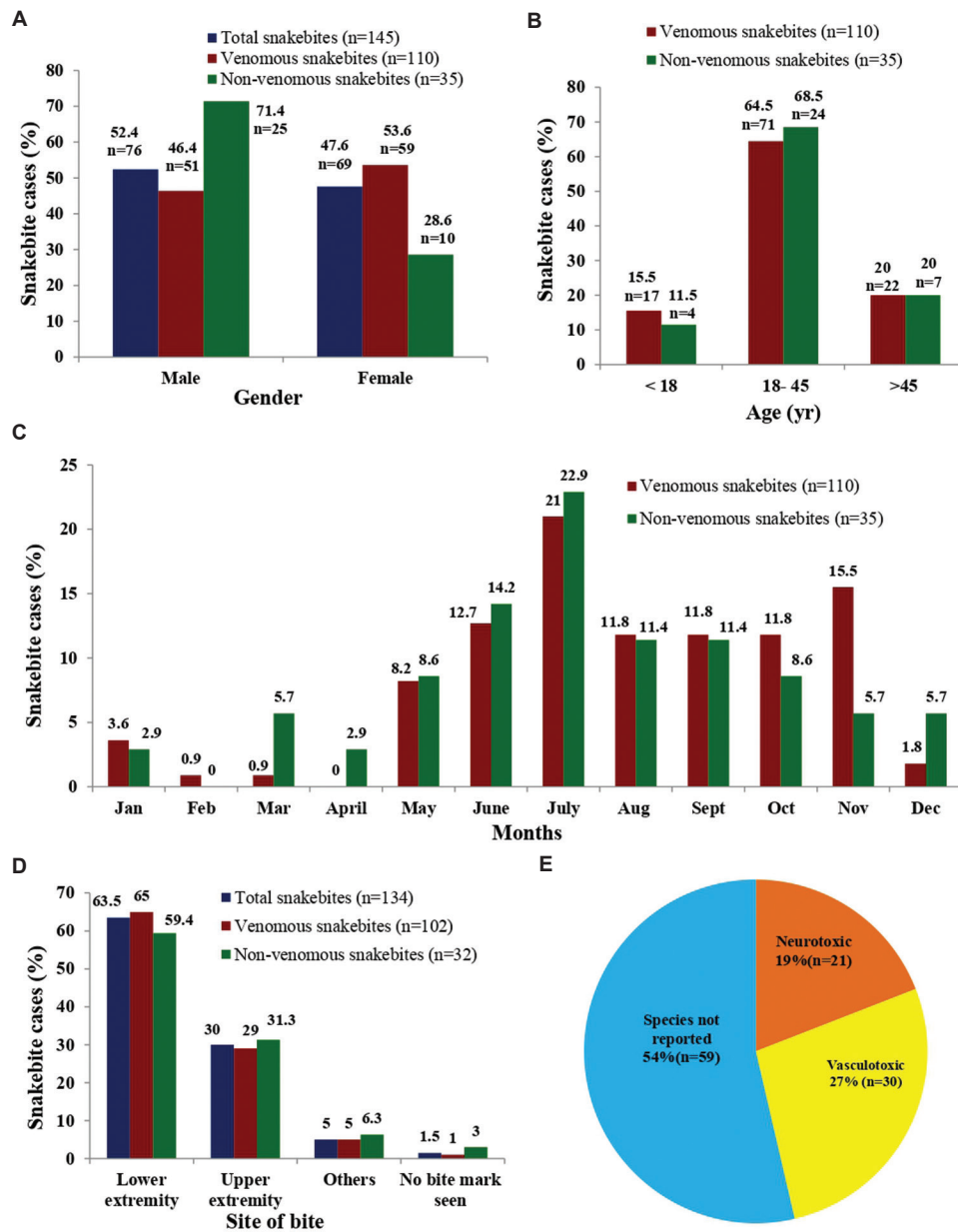


Fig. 2. Characteristics of snakebite cases. (A) Gender-based distribution of venomous and non-venomous snakebite cases. (B) Age-wise distribution of venomous and non-venomous snakebite cases. (C) Seasonal variation of snakebite cases. (D) Site of snakebite (Data were available for 134 cases out of 145), n=134. (E) Categorization of snakebite based on signs and symptoms of envenomation.

of snakebite occurrence and FRU was 19.02±4.28 km. The mean time duration between snakebite and access to FRU was 3.13±0.46. There was no information available related to mode of transport for snakebite case transfer to FRU. The higher mean time duration (with >3 h) between snakebite and admission to FRU could be due to long distance of the place of snakebite occurrence or referral and poor availability of transport facilities, especially during night.

As represented in Figure 2E, 19 per cent showed evidence of neurotoxic envenomation and 27 per cent showed evidence of vasculotoxic envenomation. None of the cases reported evidence of myotoxic envenomation. All snakebite patients received injection tetanus toxoid. The average dose of ASV administered to all venomous snakebite cases was 7.5±0.63 vials (range 2-40, median 6). Seventy snakebite cases received <10 ASV vials, 35 received 10-20 ASV vials and five cases received 21-40 ASV vials. ASV intradermal skin test was reported in 14 non-venomous and three venomous snakebites. No specific record of anaphylactic, pyogenic and serum sickness reactions was maintained at FRU. The average duration of hospital stay was 3.13±0.18 days (median 3, range 1-14 days).

Since there was no awareness and training on the management of snakebites as per the National Snakebite Management Protocol⁸, there was no uniform protocol followed for the management of snakebite envenomation at FRU. Non-compliance of standard treatment protocol, use of ASV test dose and ASV administration in non-venomous snakebite cases suggest an urgent need of capacity building of public healthcare system on diagnosis and management of snakebites as per the STG¹⁰. Lack of detailed information on occupation, activity at time of bite, exact time of ASV administration, anaphylactic reactions to ASV *etc.*, were some of the limitations of this study.

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Conflicts of Interest: None.

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