

## Original Research Article

# Tourniquet application in snake bite: are we aware?

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**Received:** 19 June 2020

**Accepted:** 15 July 2020

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### ABSTRACT

**Background:** To assess the use of tourniquets as mentioned in National Snake Bite Management Protocol among peripheral health care providers.

**Methods:** This was a prospective cross-sectional study conducted in a tertiary care institute between June 2016 to June 2017. A total of 36 patients of snake bite referred from peripheral health facility were enrolled in the study and were evaluated for : date and time of bite, site of bite, weather snake was seen, type of envenomation, first aid given in Govt facility/alternative practitioner, tourniquet applied/not applied, anti snake venom given/not given as first aid and outcome.

**Results:** The mean age of the study population was 39 years (17.38) range 18 years to 75 years. 18 patients were male and 18 were female. 30 (83.3%) patients had site of bite over the extremities. The venom was hemotoxic in 12 (33.3%) patients and neurotoxic 21 (58.3%). 30 (83.3%) patients received first aid in the Government health facility manned by qualified in healthcare practitioner and 6 (16.7%) were treated by traditional healers. 29 (80.6%) patients had a tight tourniquet tied to the site of the bite when seen in emergency department of institute. None of the patients had their limbs splinted. 31 (86.1%) patients had received anti snake venom (ASV) at the peripheral health facility. The mortality rate was 5.6% with only 2 deaths.

**Conclusions:** The majority of peripheral health care providers both qualified and unqualified use tourniquets in patients suffering with snake bite. The peripheral health care providers are not aware of importance of limb splinting and immobilisation. Though the rate of instilling ASV is good, the health care providers in the peripheral institutes should be made aware of recommendations of national snake bite management protocol with regard to use of tourniquets and limb splitting in snake bite patients.

**Keywords:** Peripheral health care providers, Snake bite, Tourniquet

### INTRODUCTION

Snake bites are a common cause of medical emergency in India. As majority of our population resides in rural area and is associated with agriculture, incidence of snake bite is quite high. It is estimated that mortality of snake bites is highest in India and according to World Health Organisation (WHO) estimates there are about 83000 cases of snake bite per annum with about 11000 deaths in the country.<sup>1</sup> India has been known to the western world

as the land of snake charmers. Snake is considered sacred in this country and is worshipped. This sacred belief has also instilled lots of misconceptions about the treatment of snake bite in our community.

Tying a tight tourniquet around the site of bite is a prevalent practise throughout the country. The national snake bite management protocol has clearly mentioned that use of tourniquet is contraindicated in snake bite cases.<sup>2</sup> This study was performed to analyse the use of tourniquet by health care providers in primary care

facilities, while attending to snake bite patients in emergency.

## METHODS

This was a cross sectional prospective study conducted in a tertiary care institute between June 2016 to June 2017.

All the patients with history of snake bite who were referred from primary health facility and gave informed consent were enrolled in the study.

A total of 36 patients were included and were evaluated on following points; date and time of bite, site of bite, weather snake was seen, type of envenomation, first aid given in Government facility/alternative practitioner, tourniquet applied/not applied, anti snake venom given as first aid and outcome.

Statistical analysis was performed using the IBM SPSS (version 21) software. The results are expressed as mean ( $\pm$ SD).

## RESULTS

The present study enrolled 36 patients of snake bite who were referred from peripheral health facility and were admitted in the medicine ward.

The mean age was 39 years (17.38) range 18 years to 75 years. 18 patients were male and 18 were female. 34 patients (94.44%) had snake bite in the months of June, July, August and September cumulatively. 22 (61.11%) patients had snake bite between 12 am to 12 pm and 14(38.88%) between 12 noon to 12 midnight.

An overwhelming 30 (83.3%) patients had site of bite over the extremities'. This fact can be easily correlated with working in fields without proper protection in our population. 18 (50%) of patients were awake when they had encountered snake and 18 (50%) were asleep at time of bite. 21 (58.3%) had seen the snake after the bite. The venom was found to be hemotoxic in 12 (33.3%) patients, while majority 21 (58.3%) patients had neurotoxic envenomation (Table 1).

**Table 1: Demographic and clinical details of patients.**

Sex	Male	18 (50%)
	Female	18(50%)
Month of bite	May	2 (5.6%)
	June	11 (30.6%)
	July	8 (22.2%)
	August	5 (13.9%)
	September	10 (27.8%)
Time of bite	12 am to 12 pm	22 (61.11%)
	2 pm to 12 am	14 (38.88%)
Site of bite	Limbs	30 (83.3%)
	Trunk	2 (5.6%)
	Head and Neck	2 (5.6%)
	Others	2 (5.6%)
Activity	Sleep	18 (50%)
	Awake	18 (50%)
Type of envenomation	Hemotoxic	12 (33.3%)
	Neurotoxic	21 (58.3%)
	Local	3 (8.3%)

The present study majority of the patients 30 (83.3%) received first aid in the Government health facility which are manned by qualified allopathic medical practioners. Only 6 (16.7%) patients were treated by traditional healers. Despite such a high number of patients getting treatment by the qualified medical personnel the disturbing fact which was highlighted in the present study is that 29 (80.6%) patients had a tight tourniquet tied to the site of the bite when they were first seen in the emergency department of the institute. Another glaring

observation is that out of 30 patients who had bite over limbs 29 (96.66%) patients had a tight tourniquet tied over the site of bite. This points that first aid providers weather qualified or unqualified applied a tight tourniquet over the site of bite in 96.66% of cases when they could have applied it over the limbs. Though it is highlighted in the national snake bite management protocol<sup>2</sup> that the limb should be immobilised in the same way as in fracture, none of the patients had their limbs splinted by the health care providers. The positive outcome which was highlighted in the study was that 31 (86.1%) patients

had received anti snake venom (ASV) at the peripheral health facility. The mortality rate was low at 5.6% with only 2 deaths significant (Table 2).

**Table 2: Rate of tourniquet application, ASV instillation, limb splint age and mortality in study group.**

Tourniquet present	29 (80.6%)
ASM given	31 (86.91%)
Limbs splinted	0 (0%)
Deaths	2 (5.6%)

## DISCUSSION

Snake bite is an occupational disease which most commonly occurs in agriculture workers, plantation workers, labourers working at construction site and fishermen etc. Though snake bite is common in rural areas some large urban cities such as Jammu in north India has high incidence of snake bite in people living in small huts named *jhuggis*.<sup>3</sup>

As snake bite is prevalent in India so are the traditional methods to treat it and applying a tight tourniquet around the site of bite is one of them. Different types of tourniquets are mentioned in the literature. The arterial tourniquets have high pressure gradient and impede distal blood flow to the limbs and can cause serious tissue necrosis. Venous tourniquets only have enough pressure to prevent venous and lymphatic flow.<sup>4</sup> Use of any type of tourniquet has been contraindicated in national snake bite management protocol. The reasons for discouraging the use of tourniquets are risk of ischemia and loss of the limb, increased risk of necrosis, increased risk of massive venom bolus when tourniquet is released, risk of embolism if used in viper bites due to pro-coagulant enzymes which will cause clotting in distal blood. In addition, the effect of the venom in causing vasodilation presents the danger of massive hypotension when the tourniquet is released. Several experimental studies have shown that tourniquets do not work and venom was not slowed by their use. Tourniquet give patients a false sense of security, which encourages them to delay their journey to hospital.<sup>2</sup>

There are other guidelines also which do not support the use of tourniquets. According to World Health Organisation use of tourniquets is contraindicated in snake bite patients as it can occlude the distal pulses and can cause ischemia, nerve injury and gangrene. The deleterious effects of tourniquet can occur within 20 minutes to 2 hours of application.<sup>5,6</sup> The Wilderness Medical Society also does not recommend use of tourniquets.<sup>7</sup> Many times health care provider encounters a situation where a tight tourniquet has been tied by the attendants before seeking medical advice. In such a situation the tourniquet should not be released immediately as it can lead to bolus venom effect. The

bolus effect is acute progression of venom complications due to sudden removal of tourniquet. This is caused due to sudden increase in venom dose on releasing the tourniquet. Before releasing the tourniquet health care provider should be equipped to handle acute toxicity and anaphylaxis. Always palpate the pulse distal to the tourniquet and if it is absent ensure that a doctor is present at time of removal. If decision has been made to start ASV it should be started before releasing the tourniquet and attempt to remove the tourniquet should only be made when patient is tolerating full rate of ASV infusion. The tourniquet should be removed gradually.<sup>8</sup> The present guidelines recommend that the bitten limb should be immobilised and splinted in same way as that of a fracture. The splint can be made of any locally available material such as wood, card board, stick etc as they are equally effective as fancy expensive splints. Cloth or bandage can be used to hold the splints. Care should be taken not to occlude the distal blood supply. The patient should be immobilised as such he is having a fracture as it will impede systemic venomation.<sup>2</sup> In the present study none of the health care provider had splinted the limb of the patient.

ASV is costly and should be administered if there are signs of envenomation. After assessing if it is decided that patient requires ASV, it should be started immediately with the dose in hand without waiting for full dose. In India polyvalent ASV is only available, it is effective against all the four common species Russells viper (*Daboia russelii*), Common Cobra (*raja naja*), Common Krait (*Bungarus caeruleus*) and Saw Scaled viper (*Echiscarinatus*).<sup>9</sup>

In the present study ASV administration was started in 31 (86.1%) patients in the peripheral health institutions which is an encouraging trend. National snake bite management protocol has recommended the following first aid guidelines which should be followed by health care providers and general public when dealing a patient of snake bite. These first aid guidelines can be easily remembered by mnemonic Do it Right

R stands for Reassure the patient that 70% bites are non poisonous. And only 50% of bites from poisonous snakes can cause envenomation.

I stands for Immobilise and splint as in fracture limb. Do not allow patient to move.

GH stands for get to hospital immediately.

T stands for tell doctor about systemic symptoms such as ptosis.

## CONCLUSION

This study points out that use of tourniquet in snake bite patients is widespread in peripheral health care providers weather they are medically qualified or not. Another

finding is that health care providers are not aware of importance of splinting and immobilising the bitten limb. Both observations point towards lack of proper knowledge and training of our medical professionals and general public about the role of tourniquets and use of splint in snake bite patients as mentioned in national snake bite management protocol.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Gargi G, Saini A. Tourniquet application in snake bite: are we aware? Int J Res Med Sci 2020;8:3031-4.