

# Facts and Perception about Snakes, Snake Bite and Its Management: A Review

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## Abstract

Snakebites are a serious public health problem in many regions of the world, particularly in rural areas lacking medical facilities. The World Health Organization (WHO) estimates that 81,000–138,000 people die each year from snakebites worldwide. Venomous snakebite and its effects are a source of fear for people living in southern Nepal. As a result, people have developed a negative attitude towards snakes, which can lead to human-snake conflicts that result in killing of snakes. About 48 People from different walks of life which includes farmers, teachers, businessmen, students and others were interviewed regarding their perception about snakes. The study reveals that 46/ respondents feared from snakes, 33/ respondents dislike snakes and 25/ like to kill all the snakes particularly venomous snakes.

**Keywords:** Snakes, Perception, Snake bite, Management, Venomous.

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## INTRODUCTION

Due to a long co-evolutionary history with snakes, both humans and non-human primates evolved specific neural mechanisms for rapid snake recognition [1-3] Snakes are thought to have evolved from either burrowing or aquatic lizards, perhaps during the Jurassic period, with the earliest known fossils dating to between 143 and 167 Ma ago. However diversity of modern snakes appeared during Paleocene. Among evolutionarily irrelevant (neutral) stimuli, snake pictures act as strong distractors [4], and are detected faster than, for example, flowers and mushrooms, but not faster than stimuli of modern threats such as guns [5].

Snakes belongs to class reptiles and is probably the most misunderstood and universally disliked animals in the world since times immorial. These are elongated, limbless, carnivorous reptiles of the suborder Serpentes. Like all other squamates, snakes are ectothermic, amniote vertebrates covered in overlapping scales. Many species of snakes have skulls with several more joints than their lizard ancestors, enabling them to swallow prey much larger than their heads (cranial kinesis). In order to accommodate their narrow bodies, their paired internal organs (such as kidneys) appear one in front of the other instead of side by side, and most have only one

functional lung. Where as on the other hand Lizards have evolved independently have elongate bodies without limbs or with greatly reduced limbs at least twenty-five times via convergent evolution as a result leading to many legless lizards [6]. These limb less lizards resembles to snakes, but several legless lizards have eyelids and external ears, which snakes lack, although this rule of differentiation is not universal.

Snakes are found on every continent except Antarctica and on most smaller land masses; exceptions include some large islands, such as Ireland, Iceland, Greenland, the Hawaiian archipelago, and the islands of New Zealand, as well as many small islands of the Atlantic and central Pacific oceans [7]. Moreover sea snakes are widespread throughout the Indian and Pacific oceans. There are thirty families of snakes currently recognized, comprising about 520 genera and about 3,900 species [8]. The size of snakes ranges from 10.4 cm-long i.e Barbados thread snake to the reticulated python of 7.5 meters (22.8 ft. approximately) in length [9]. Whereas fossil species *Titanoboa cerrejonensis* was 12.8 meters (42 ft) long [10].

The snakes have been generally categorised as poisonous and non poisonous. Venomous and poisonous animals are a considerable origin of global morbidity and

mortality. There are about 216 species of snakes identifiable in India, of which 52 are known poisonous. The major families of snakes in India are Elapidae which includes common cobra (*Naja naja*), king cobra and common krait (*Bungarus caeruleus*), viperidae includes Russell's viper, saw scaled viper (*Echis carinatus*) and pit viper and hydrophidae (the sea snakes) [11].

### General Features of Poisonous Snakes

Poisonous snakes generally possess the following character:

1. Vertically elliptical shaped cat like pupil.
2. A small depression (termed pit) between the eyes and nostrils.
3. Triangle shaped head e.g. Copperheads and rattle snakes, exception- Elapids.
4. Underside scales of tail go completely all the way across in a single row from the analplate; the very tip of the tail may possess two scale rows.
5. Head and body both are seen during swimming time.
6. Generally of multiple colors.
7. Emitting a warning rattle (a dry, whirring sound)

**Classification of Snake Venom:** Snake venom can be classified into four categories based on their clinical effect.

### Neurotoxins

Elapid and sea snake venoms have significant neurotoxicity. The toxins that alter the structure and function of nervous system. Following an elapid bite, paralysis is first detectable as ptosis and external ophthalmoplegia appearing as early as 15 minutes after the bite. This effect is caused by neurotoxins. These toxins can act either pre-synaptically or post-synaptically resulting in blocking transmission at neuromuscular junctions leading to paralysis of skeletal muscle. It is important to note that these neurotoxins do not cross blood brain barrier and do not alter consciousness [12].

### Hemotoxicity

The toxins that effects the blood. Hemotoxicity is chiefly caused by anticoagulants, procoagulants, fibrinolysins, haemorrhagins and haemolysins. These hemotoxins produce clinical symptoms such as haemorrhage and anemia [13].

### Cytotoxicity

Edema, blisters and necrosis are frequently seen at the site of bites caused by Viperidae or Elapidae. These are due to local effects of cytotoxic components [14].

### Myotoxicity

Skeletal muscle damage caused by snake venom myotoxins can be local or systemic leading to skeletal muscle breakdown, muscle weakness, pain, tenderness, and myoglobinuria. Sea snake venom

contains myotoxins that cause myalgias, myopathy and rhabdomyolysis [15].

### Cardiotoxicity

Viper and elapid venom can cause direct myocardial damage manifesting as arrhythmias, bradycardia, tachycardia or hypotension.

### Shock

A variety of factors contribute to shock. They include fright, hypovolemia (due to extravasation of fluids and blood loss), myocardial depression, haemorrhage into the adrenals and pituitary and increased kinin production (as in Viper bite).

### Symptoms

Signs or symptoms of a snake bite may vary depending on the type of snake, but may include:

1. Puncture marks at the wound.
2. Redness, swelling, bruising, bleeding, or blistering around the bite.
3. Severe pain and tenderness at the site of the bite.
4. Nausea, vomiting, or diarrhea.
5. Labored breathing (in extreme cases, breathing may stop altogether).
6. Rapid heart rate, weak pulse, low blood pressure.
7. Disturbed vision or blurred vision.
8. Metallic, mint, or rubber taste in the mouth.
9. Increased salivation and sweating.
10. Numbness or tingling around face and/or limbs.
11. Abnormal blood clotting and bleeding. Severe bleeding can lead to a hemorrhage or kidney failure.
12. Low blood pressure, a faster heart rate and a weaker pulse.
13. Difficulty breathing, or in serious cases, complete loss of breath.
14. Weakness in your muscles and numbness in the face or limbs.

### Perception about Snakes

A total of 48 interviews were carried out from September 2023 to Nov.2023. Out of 48 respondents 38 were male and 10 were female, and both the sexes were in the age group of 18 to 50 years. The respondents includes 22 agriculturist ( farmers),8 belong to business class,9 were teachers 6 were students and 3 belongs to other professions. The result indicated that 16(33/) respondents dislike snakes, 12(25/) would like to exterminate all the snakes particularly venomous and 20 (46) feared from snakes.

It was further observed that farmers were most negative towards snakes and teachers were most ambivalent towards them, where as other shows mixed reactions.

## Management of Snake Bite

### First Aid

1. Person should take these steps if a snake bites them:
2. Seek medical attention as soon as possible (call local Emergency Medical Services).
3. Antivenom is the treatment for serious snake envenomation. The sooner antivenom can be started, the sooner irreversible damage from venom can be stopped.
4. Driving oneself to the hospital is not advised because people with snakebites can become dizzy or pass out.
5. Take a photograph of the snake from a safe distance if possible. Identifying the snake can help with treatment of the snakebite.
6. Keep calm.
7. Apply first aid while waiting for EMS staff to get you to the hospital.
8. Lay or sit down with the bite in a neutral position of comfort.
9. Remove rings and watches before swelling starts.
10. Wash the bite with soap and water.
11. Cover the bite with a clean, dry dressing.
12. Mark the leading edge of tenderness/swelling on the skin and write the time alongside it.

### Do Not Do Any of The Following

1. Do not pick up the snake or try to trap it. NEVER handle a venomous snake, not even a dead one or its decapitated head.
2. Do not wait for symptoms to appear if bitten, get medical help right away.
3. Do not apply a tourniquet.
4. Do not slash the wound with a knife or cut it in any way.
5. Do not try to suck out the venom.
6. Do not apply ice or immerse the wound in water.
7. Do not drink alcohol as a painkiller.
8. Do not take pain relievers (such as aspirin, ibuprofen, naproxen).
9. Do not apply electric shock or folk therapies.
10. Management of snake bite

The patient should be reassured and moved to the nearest hospital as quickly as possible. Active movements should be as minimal as possible. The bitten part should be immobilized with a splint or sling. Tourniquets and compression bandages are potentially dangerous as they can cause gangrene, increased fibrinolysis and bleeding in the occluded limb, peripheral nerve palsies and intensification of local envenomation. The only indication for their use is in case of severe elapid or sea snake bites where the delay in reaching a medical centre is likely to be more than 0.5 hours but less than 2-3 hours. Here compression / tourniquet delay absorption of the venom and so help retard onset of respiratory muscle paralysis. Tourniquet should be tight

enough to occlude the lymphatic and venous flow but not the arterial flow. A useful guide is that it should be loose enough to permit a finger to slip under it. The tourniquet should be released for 30 seconds every 15 minutes to allow slow release of venom into circulation, thereby enabling its neutralization. The tourniquet should only be released after the first dose of antivenom is given [16]. The bite wound should be gently wiped with sterile cotton gauze. In case of incoagulable blood or oozing from puncture wounds only use the intravenous route for medication.

### Treatment/ Evaluation in Hospitals

A bite is considered to have been poisonous in case any of the following features are present:

1. Swelling, blistering or necrosis at the site of the bite and its extension.
2. Hypotension / shock
3. Haemorrhage
4. Laboratory evidence of coagulation defect.
5. Neuroparalytic manifestations.
6. Arrhythmias / bradycardia / tachycardia.
7. Myoglobinuria.

Monitor pulse, blood pressure, respiratory rate, and muscle weakness hourly. Local swelling and necrosis should also be charted hourly. Examine gingival sulci carefully for bleeding. Monitor ECG and CPK, serum transaminases, blood urea and serum creatinine daily. Serum electrolytes, especially potassium, should be estimated 6 hourly in case of sea snakebite.

Coagulation profile should be tested 6 hourly (especially for viper bites). A useful test for venom-induced defibrinogenation is the 20-minute whole blood clotting time. A few milliliters of venous blood is put in a clean test tube and kept aside for 20 minutes. It is then tipped to see if it has clotted or not. Incoagulability indicates systemic envenomation by *Vipera* or *Echis* species. Other sensitive tests are plasma prothrombin time and fibrinogen degradation product estimation. Platelet count should be estimated twice daily.

Urine should be examined for microscopic haematuria and active sediments. Output should be monitored in case of renal failure.

The most important decision in managing a case of snakebite is to decide whether to administer antivenom or not. There is evidence that in patients with severe envenomation, the benefits of this therapy far outweigh the risk of reactions [17].

Haemostatic abnormalities such as spontaneous systemic bleeding, incoagulable blood, or thrombocytopenia. It is almost never too late to give anti-venom as long as systemic signs of envenoming persist. Antivenom has been shown to be effective up to 2 days after sea snake bite and in patients still defibrinated weeks after viper bite. anti-venom available in the

Armed Forces is a polyvalent equine antiserum. This is effective against the 4 most important venomous snakes in India, namely, Cobra, Common Krait, Russell's viper and saw-scaled viper. The antiserum is available in a lyophilized form and has to be reconstituted with 10 ml sterile water for injection. The dose required depends on the clinical state of victim.

The antivenom is diluted in approximately 5ml / Kg body weight of isotonic saline or 5% Dextrose and is administered as a slow intravenous infusion over 1-2 hours. This method is preferred over the 'push' technique where the undiluted serum is pushed intravenously at a rate of 4 ml/minute. Response to antivenom is dramatic and rapid. Neurotoxic signs may improve within 30 minutes but usually take several hours. Spontaneous systemic bleeding usually stops within 15 - 30 minutes and blood coagulability is restored within 6 hours of antivenom provided a neutralizing dose has been given. Antivenom therapy should be repeated if severe signs persist after 1 - 2 hours or if blood coagulability is not restored within 6 hours. In case of severe neurotoxicity, the dose may have to be repeated half hourly till progression of weakness stops. In viper bites the antivenom should be repeated every 6 hours till clotting profile returns to normal and progression of local swelling ceases.

#### Supportive Treatment/ Therapy

1. Tetanus prophylaxis
2. Antibiotics are indicated only in cases of severe envenomation with significant local reaction
3. Surgical debridement of dead tissue
4. Fasciotomy for compartment syndromes
5. Management of respiratory paralysis: Airway patency and toilet should be ensured. Ventilatory support must be considered and instituted early. The "Tensilon test" should be done as follows: Atropine sulphate (0.6 mg for adults and 0.02-0.05 mg/Kg for children) should be given I/V followed by Edrophonium chloride (10mg for adults and 0.25 mg for children) I/V. Patients who respond convincingly can be maintained on neostigmine methyl sulphate (50 - 100 µg/Kg body weight) and atropine four hourly or by continuous infusion.
6. Hemostatic disturbances usually respond well to antivenom treatment. In case of severe bleeding fresh frozen plasma, cryoprecipitates, & platelet concentrates may be required. There is no role for heparin.

#### CONCLUSION

People with predisposed negativity towards snakes were not proponents of snake conservation. Fear, negativity, ambivalence towards, and ignorance about, snakes and the need for snake conservation were strong indicators of the propensity to harm or kill snakes. It seems that if wanton killing of snakes continues, local

snake populations will decline, and rare and endangered snake species may even become locally extirpated. Moreover, inappropriate perception and knowledge about snakes and snakebites may put BZ people at increased risk of venomous snakebite. Therefore, intensive, pragmatic educational efforts focused on natural history and ecology of snakes and prevention of snakebite should be undertaken in communities and at schools and universities.

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