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# Snake bite poisoning

A twelve years retrospective analysis of telephone calls reported to the National Poisons Information Centre, AIIMS



# Background



- Snake bite is a major environmental and occupational hazard in rural India and South Asian region
- India has one of the highest rates of death from snake bite in the world
- WHO has estimated the highest number of snake bites (83,000) and deaths (11,000) per annum in India
- 80% of snake bite victims in most of the developing countries seek traditional remedies before visiting a health care facility. This has resulted in high mortality

# Epidemiology

- As per few reports there are cases of approximately 200,000 bites and 35,000-50,000 snake bite deaths
- No reliable national data available
- High occurrence of snake bite reported in the states of Uttar Pradesh, Andhra Pradesh, Tamil Nadu, Kerala, and Maharashtra
- Incidences of snake bites are twice in male then female
- Majority of the bites are on the lower extremities
- 50% of bites by venomous snakes are dry bites that result in negligible envenomation

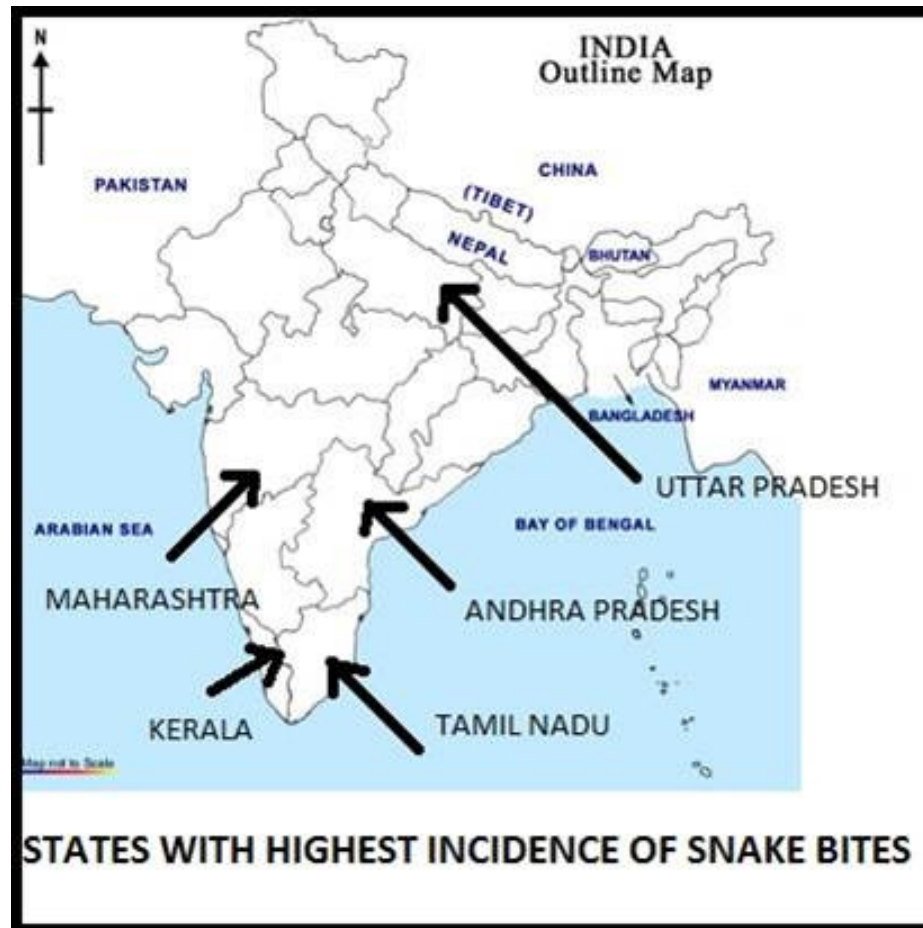
# Snake bite mortality in India: Study by Mohapatra et al (2011)

High incidence states (Annual snake bite deaths) -

Uttar Pradesh:  
8,700

Andhra Pradesh:  
5,200

Bihar: 4,500



# Classification

- Worldwide, only about 15% of the more than 3000 species of snakes are considered dangerous to humans
- The family Viperidae is the largest family of venomous snakes, and members of this family can be found in Africa, Europe, Asia, and the Americas
- The family Elapidae is the next largest family of venomous snakes
- There are around 216 species of snakes in India, out of which 52 are recognized as poisonous

Traditionally big four include:

1. Elapidae (cobra and Krait)
2. Viperidae (Russell's and saw scaled viper)

Other snakes of medicinal significance– King cobra, monocle cobra, Asiatic cobra, Andaman cobra, saw scaled viper of northern India and the Hump nosed viper from Kerala

# Common Indian snakes

Cobra (*Naja naja*)

Common krait (*Bungarus caeruleus*),

Viperidae

Russell's viper (*Daboia russelii*)

Saw-scaled viper (*Echis carinatus*).

(Hump-nosed pit viper (*Hypnale hypnale*))



# Common Indian snakes: Characteristics

## **Cobra**

- Head of cobra is not distinct from neck which is dilatable and hood bears a binocellate mark on upper side.

## **Krait**

- The fangs are short and fixed. Steel blue coloured hexagonal scales on dorsal side with rows of paired white stripes across belly.

## **Vipers**

- Large mobile fangs which are canalized and retractable
- Russell's Viper is brown in colour, elliptical patches in three rows on body
- Triangular head with prominent nasal opening
- Pit viper is uncommon in India

## **Sea Snakes**

- Short mobile fangs
- Compressed posteriorly and has a flat tail



# Who are at risk?



Agriculture



Ecotourism



Dealing with venom



Fishermen



Hunters

# Common Indian snakes bites: Characteristics

Cobra	Krait	Vipers	Sea Snakes
<b>Local Effects</b>			
<ul style="list-style-type: none"> <li>• Pain</li> <li>• Swelling</li> <li>• May be followed by necrosis</li> </ul>	<ul style="list-style-type: none"> <li>• Mild local pain</li> <li>• Mild Swelling</li> <li>• Weakness</li> </ul>	<ul style="list-style-type: none"> <li>• Swelling at the site of bite</li> <li>• Severe pain at the site</li> <li>• Discoloration of skin around the site of bite</li> </ul>	<ul style="list-style-type: none"> <li>• Sharp initial prick</li> <li>• Generalized aching</li> <li>• Tenderness</li> <li>• Stiffness</li> </ul>
<b>Systemic Effects</b>			
<ul style="list-style-type: none"> <li>• Ptosis</li> <li>• Glossopharyngeal paralysis</li> <li>• Rapid pulse</li> <li>• Death due to respiratory paralysis</li> </ul>	<ul style="list-style-type: none"> <li>• Nausea</li> <li>• Abdominal pain</li> <li>• Visual disturbances</li> <li>• Diarrhea</li> <li>• Tachycardia</li> <li>• Shock</li> <li>• Arrhythmias</li> </ul>	<ul style="list-style-type: none"> <li>• Hematuria</li> <li>• Hemorrhage</li> <li>• Epistaxis</li> <li>• Melena</li> <li>• hemoptysis</li> </ul>	<ul style="list-style-type: none"> <li>• Headache</li> <li>• Myalgias</li> <li>• Myopathy</li> <li>• Rhabdomyolysis</li> <li>• Thick feeling of tongue</li> </ul>

# Monitoring period in Envenomation

Common Snakes	Average period	Range
Cobra	8 hours	12 min – 120 hours
Krait	18 hours	3 hours – 63 hours
Russell's Viper	3 days	15 min – 264 hours
Saw-Scaled Viper	5 days	25 hours – 1 day

# Snake venom has different predominant effects depending on the family...

## Elapidae

- Neurotoxic
- Cardiotoxic
- Nephrotoxic

## Viperidae

- Hemotoxic
- Necrotoxic

## Crotalidae

- Necrotoxic

# Pathogenesis of Snake venom

Signs/Symptoms and potential treatments	Cobra	Krait	Russell Viper	Raw Scaled Viper	Other Vipers
Local Tissue Damage/pain	Yes	No	Yes	Yes	Yes
Ptosis/ Neurotoxicity	Yes	Yes	Yes	No	No
Coagulation	No	No	Yes	Yes	Yes
Renal Problems	No	No	Yes	No	Yes
Neostigmine & Atropine	Yes	No?	No?	No	No

# Study carried out to highlight the epidemiological features of snake bite calls reported to NPIC

National Poisons  
Information Centre,  
Department of  
Pharmacology,  
AIIMS

Provides round the clock  
service (24 x 7)

- (91) -11-26589391
- (91) -11-26593677
- 1800 116 117

Receives calls from:  
Physicians  
Health care  
professionals/consultants  
General Public  
Government agencies

Recording of Calls of the  
enquirers, providing  
Information after  
consulting database,  
journals, referral books,  
Micromedex, US  
Healthcare series etc,  
Documentation, Data  
analysis and publications

# Recording information

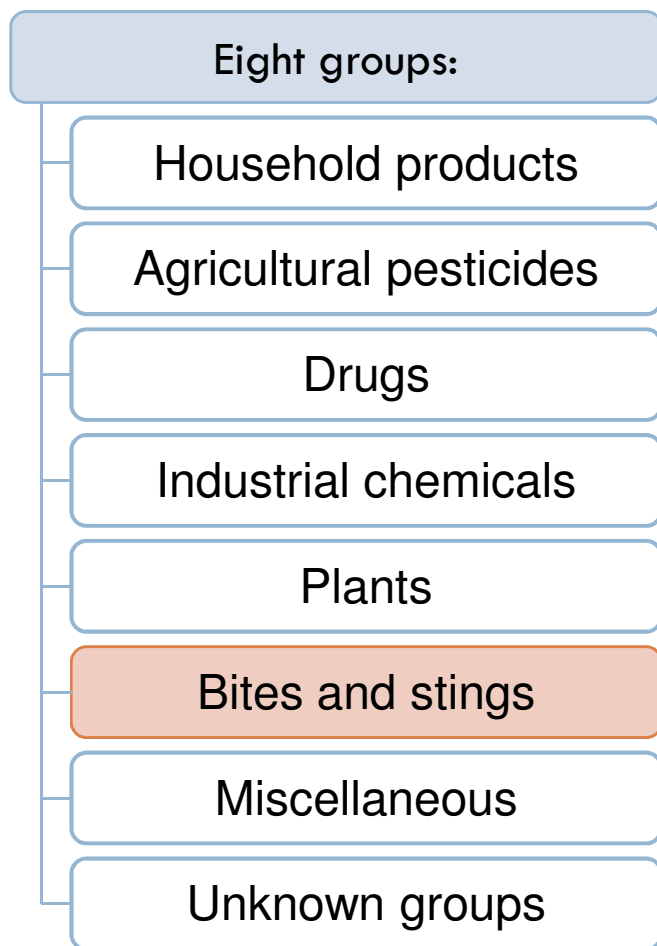
## Call Details

- Identify the caller
- Note patient's details- including age, occupation and sex
- Date and time of the bite- Day/ Night
- Site of the bite- Lower extremity/Upper extremity
- Fang mark- (single, double, scratches: Yes/No)
- Identification of snake: Poisonous/ Non poisonous ; Elapidae (Cobra, Krait), Russel's viper  
Saw –scaled viper, Unidentified
- Time Interval between bite & treatment given

## Prior First-aid received?

- Application of tourniquet- Yes/ No
- Local Application of substances like lime, chili, herbal remedies?
- Incision over bite site: Cryotherapy, Sucking over bite
- Any other treatments received
- Hospital admission
- ASV already administered
- No. of vials, Reactions with ASV
- Outcome

# April 1999 –March 2011: Total calls 13,162 telephone calls, snake bite cases=290



Calls from Delhi- 71.35%

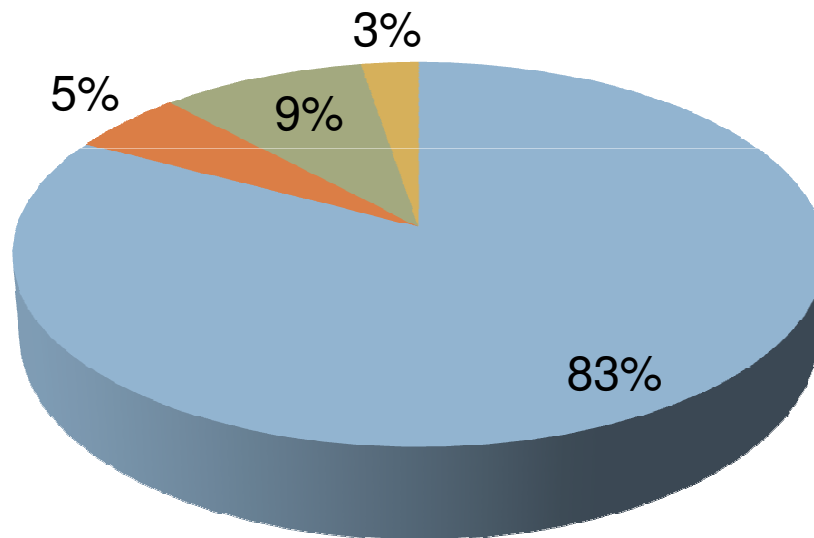
Calls from other states of India - 28.65%

- Adults involved - 77.66%
- Children involved - 22.33%
- Age group with the highest incidence of reporting was between 18-40 years (82.53%)
- Males outnumbered females (M=73.10%, F= 26.89%)



# Incidence of snake bites

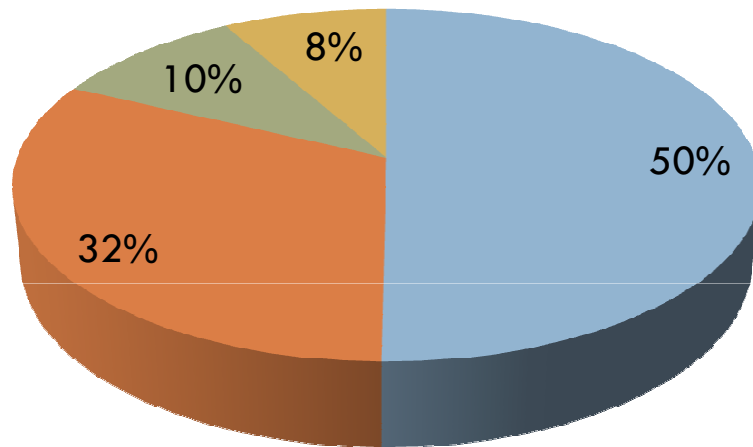
■ Cobra and Krait ■ Vipers  
■ Unidentified ■ Non-poisonous



North India:  
Elapids

South India:  
Viperidae

# Site of snake bites



- Lower limb
- Upper limb
- Eyebrow, abdomen, ear, neck, face
- Unidentified bite area

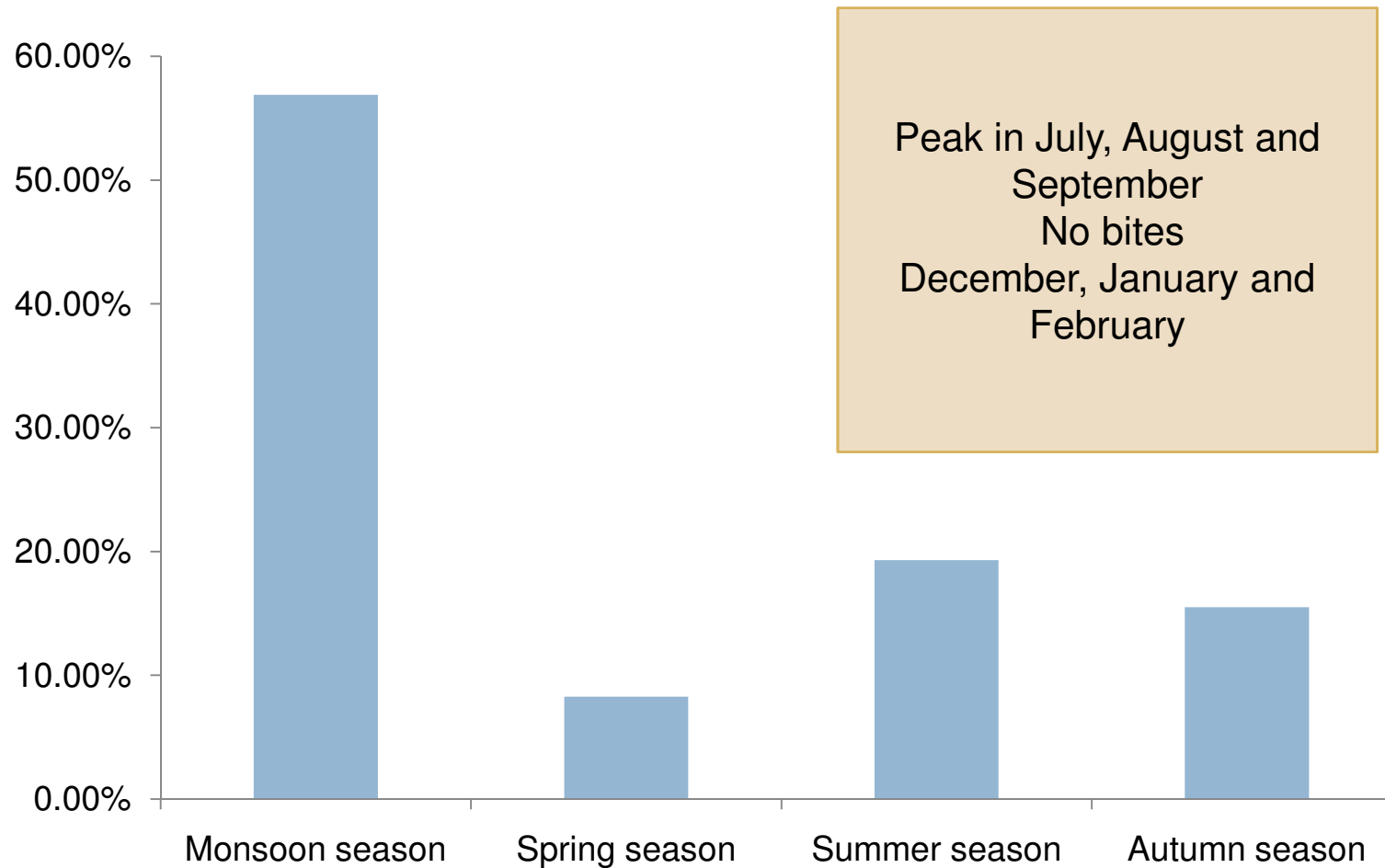
•The victims were bitten mostly at night or midnight:

**Nights** 58.73%  
**Daytime** 41.26%

•A significant number of cases occurred while the victims were asleep



# Incidence of snake bite varies with climate...



# Clinical Presentation

Local effects observed at the bite site		Systemic manifestations	
Pain	57.14%	Neurological	46.44%
Bleeding	7.14%	Respiratory	28.08%
Swelling	26.98%	Generalized weakness	11.61%
No local reaction	8.73%	Bleeding disorder	8.23%
		Ocular paralysis	1.49%
		Renal failure	2.99%
		Asymptomatic	1.15%

# Medical aid received

- The time interval:
  - Within 1-4 hours                      51.77%
  - After 4 hours                              48.22%
  - Antivenom received                      71.25%
  
- Most of patients received 17-20 vials of Polyvalent anti-snake venom (ASV)
- Two patients were given 140 ASV vials
- One patient was given 350 vials of ASV over 10 days without any clinical improvement

# Summary of data

- Majority of the snakebite cases were due to Cobras and Kraits
- Increased incidence of bites during Rainy/Monsoon season
- High incidence of bites reported at night
- Males outnumbered females (M= 73.10%, F= 26.89%)
- Highest incidence reported between 18-40 years
- Incidence of bites in lower extremities was high (50%)
- Sign of local envenomation was predominant, with pain (57.14%)
- Early administration of antivenom reduced the risk of complications
- The limitation of this study was the data collected from telephonic calls.
- We do not have the prognosis of the snake bite cases reported to the respective hospitals

# Management - Pre Hospital

- Keep the victim calm
- Wash the bite site with soap and water/wound should clean with antiseptic
- Immobilize the bitten area
- Do not cover the bite area and puncture marks

## **What not to do ?**

- No cryotherapy
- No incision at the bite site
- Do not burn the wound
- Do not suck the wound with mouth
- Potassium permanganate should never be used

# Hospital & Antivenom Therapy

- ❑ Maintain airway, breathing and circulations
- ❑ Oxygen supplementation
- ❑ Intravenous fluid
- ❑ Vasopressors for hypotensive shock
- ❑ Antihistamines anaphylactic reactions
- ❑ Analgesics alleviate pain
- ❑ Antibiotics and antitetanus

## **Investigation**

Blood samples for total blood count, coagulation profile, serum biochemistry renal and hepatic functions

20WBCT

ASV reactions Early Anaphylactic reactions & Anaphylaxis (10-180 min)



## Anti-snake venom (ASV) is the mainstay of treatment

- **ASV is produced both in liquid and lyophilized**
  - ▣ *liquid ASV requires a reliable cold chain and has 2-year shelf life.*
  - ▣ *Lyophilized ASV, in powder form, has 5-year shelf life and requires only to be kept cool.*
  
- No monovalent ASV
- Polyvalent ASV is Questionable ?
- Humpnosed pit viper (*Hypnale hypnale*)
- Saw-scaled viper (*Echis carinatus sochureki*)

# Administration of antivenom

- Freeze-dried (lyophilised) antivenoms are reconstituted, usually with 10 ml of sterile water. The freeze-dried protein may be difficult to dissolve
- Skin and conjunctival “hypersensitivity” tests may reveal IgE mediated Type I hypersensitivity to horse or sheep proteins but do not Predict the large majority of early (anaphylactic) or late (serum sickness type) antivenom reactions. Since they may delay treatment and can in themselves be sensitizing, these tests should not be used.



Epinephrine should always be drawn up in readiness before antivenom is administered.

Antivenom should be given by the intravenous route whenever possible.

# Constraints in management of snake bite

## Problem in management

- Superstitions surrounding snake bites, apprehension and terror towards non-traditional medicine
- Time wasted in going to traditional/local healers
- Lack of awareness among people for seeking early medical help

## Availability of ASV reduces the bite to needle time

- Sensitized early administration of ASV results in better outcomes
- ASV neutralizes circulating snake venom, as while time elapses more and more, venom is bound to the target tissues becoming less amenable to neutralization by ASV.

# Present Scenario

- Rural people trust herbal and other traditional forms of treatment
- Traditional practitioners are readily available in the village and their services are cheap
- About 50% of bites by venomous snakes result in envenoming (injection of sufficient venom to cause local and/or systemic effects) even useless remedies will appear effective in a proportion of cases.

**However, these treatments have no scientifically demonstrable effectiveness, may be harmful and will delay the patients' arrival in hospital.**

**Alternative therapies should therefore be discouraged or the traditional practitioners educated to refer patients with definite symptoms of envenoming**

# Some important points

- ❑ NPIC works round the clock to provide its services
- ❑ Awareness in the local population on providing first aid to snake bite
- ❑ Local healers/ tantriks/ojhas should be avoided in snake bites cases
- ❑ Peripheral doctors should be trained on the diagnosis and management of snake bite use of anti venom
- ❑ In absence of symptoms, victim should be observed for at least 24 hours

Country wide epidemiological picture can't be drawn due to non existence of central registry of cases

# Prevention

- Community education is the key to reducing the risk of snake-bite.
- Encourage safer working and walking by using adequate footwear
- Avoid walking through knee high grass
- Wear leather ankle shoes for out door activities
- Protective clothing and carrying a light after dark
- Safer sleeping by using a well tucked-in mosquito net
- Victims of bites are encouraged to travel to hospital without delay,
- Not wasting time with traditional treatments.

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