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PREVENTION AND MANAGEMENT OF SNAKE BITE – A NEGLECTED TROPICAL DISEASE

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ABSTRACT

Snakebite is a significant yet neglected public health hazard, particularly prevalent in tropical and sub-tropical regions. All over the world, snake bite envenomation remains an underreported human health issue. With approximately 5 million incidents annually, it results in up to 2.4 million envenoming, causing 94,000-125,000 deaths and around 400,000 amputations and disabilities, predominantly affecting Africa, Asia, and Latin America. Victims often include women, children, and farmers in rural communities of low and middle-income countries. Venomous snakes with their neurotoxin and tissue-damaging venoms leading to various symptoms, including swelling, pain, paralysis, and even death. Early recognition and prompt medical and nursing intervention are crucial, emphasizing the importance of seeking emergency care and administering appropriate antivenom. Awareness, education, and access to healthcare facilities are essential to mitigate the impact of snakebite and prevent fatalities and disabilities. This is only possible by inter-sectoral approach within different health facilities, general administration and community.

Keywords: *Snakebite, Public health, Neglected, Tropical and sub-tropical countries, Venomous snakes, CDC, First aid, WHO, AVS, AN.*

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INTRODUCTION

Snake bite is a neglected public health issue in many tropical and sub-tropical countries. About 5 million snake bites occur each year, resulting in upto 2.4 million envenoming (poisoning from snake bites) at least 94,000-125,000 death and around 400000 amputations and other permanent disabilities. Most of these occur in Africa, Asia, and Latin America. Snake bite is frequently found among women, children and farmers in poor rural communities in low and middle-income countries.(1)

Even if a snake seems harmless, its bite can lead to infection or allergic reactions. It's crucial to treat all snakebites as potentially venomous and seek emergency medical care promptly, particularly if unsure of the snake type. Timely administration of antivenin, tailored to the snake's venom, can prevent severe complications or fatalities. (2)

What snakes are venomous?

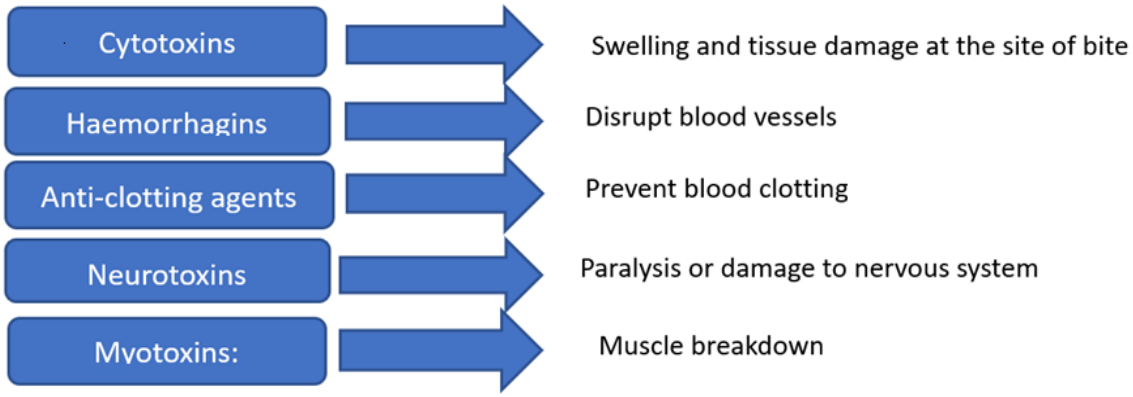
The majority of venomous snakebites in the U.S. are from pit vipers like rattlesnakes, copperheads, and cottonmouths, particularly rattlesnakes. Coral snakes and exotic imports result in fewer incidents. (2)

Elapids (cobra family): Elapids, such as cobras, encompass roughly 300 venomous species like kraits, mambas, coral snakes, and sea snakes. Their venom primarily targets the central nervous system but can also damage tissue and blood cells.

If a cobra bites you, you can die from paralysis of your heart and lungs very quickly after. (3,4)

Vipers: There are more than 200 species of *Viperidae*, which includes pit vipers (like rattlesnakes, copperheads or cottonmouths). In their upper jaws snakes have long, hollow, venomous fangs which is attached to movable bones. They fold their fangs back into their mouths when they're not in use. (3)

Sign and Symptoms of venomous snake bite as per CDC



Another Signs or symptoms are included;

- Puncture marks at the wound
- Redness, bleeding, swelling, bruising or blistering around the bite
- Very severe pain and tenderness at the site of the bite
- Nausea, vomiting, or diarrhea
- Labored breathing (in extreme cases, breathing may stop altogether)
- Rapid heart rate, weak pulse, low blood pressure
- Disturbed vision
- Patient will have metallic, mint or rubber taste in mouth

- Increased salivation and sweating
- Numbness, tingling sensation around face and limbs. (5)
- Muscle twitching

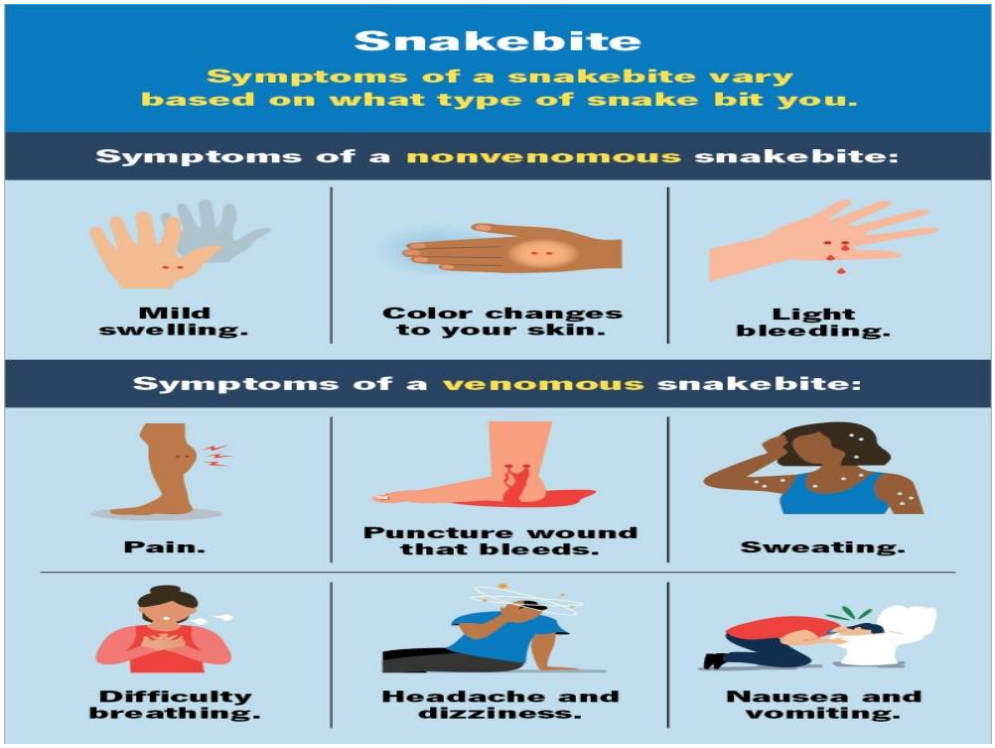


Figure. Signs of Snake Bite



First Aid for Snakebites as per WHO

If you suspect a snake bite:

- Move away from the bite area and use a stick to detach the snake if it's still attached.
- Remove any tight items around the affected area to prevent harm from swelling (rings,bracelets,watches, footwear etc.)
- Comfort the victim and immobilize them, using a splint if possible.
- Avoid using a tight arterial tourniquet and opt for safe methods like the Pressure Immobilization Bandage (PIB) for neurotoxic snake bites.
- Do not give alcoholic beverages or stimulant. They are known vasodialators and they speed up the absorption of venom.
- Apply pressure at the bite site if appropriate.
- Avoid using traditional or unsafe first aid methods.
- Transport the person to a healthcare facility promptly.

- Provide paracetamol for pain relief and position the person on their left side to prevent vomiting.
- Do not incise or manipulate the bitten site. Do not apply ice.
- Monitor the person's airway and breathing closely and be prepared to perform resuscitation if needed.

Do NOT do any of the following:

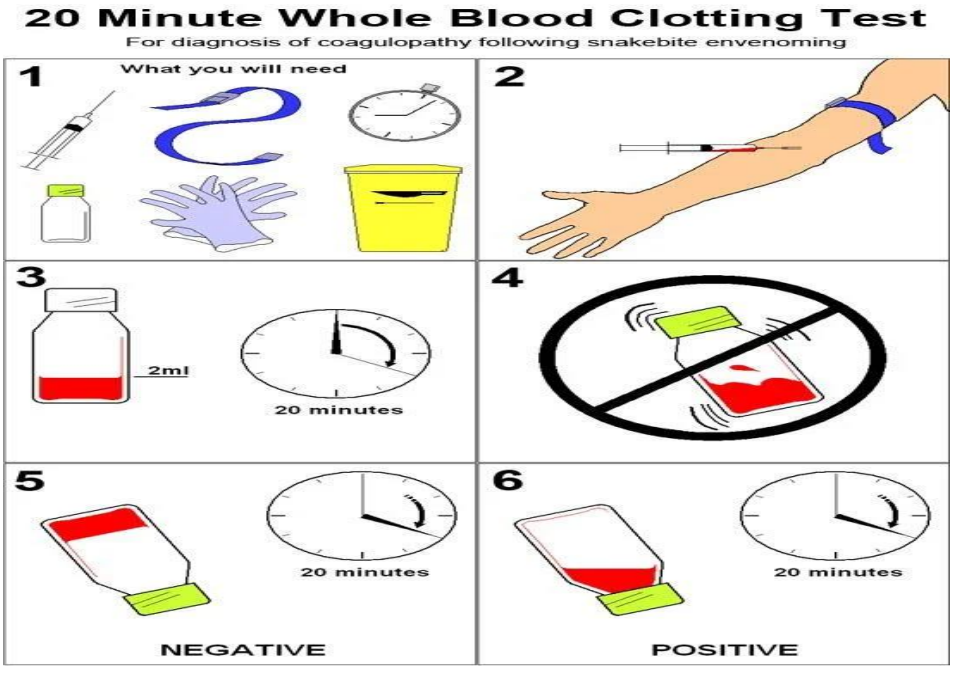
- Do not pick up the snake or try to trap it. NEVER handle a venomous snake, not even a dead one or its decapitated head. (5)
- Get medical help immediately.
- Don't use a tourniquet.
- Avoid cutting the wound.
- Do not try to suck out the venom.
- Do not apply ice or immerse the wound in water.
- Do not drink alcohol
- Do not take pain relievers (such as aspirin, ibuprofen, naproxen).
- Do not apply electric shock or folk therapies.

Barriers to early Antivenom access as per WHO

- Factors contributing to delayed antivenom treatment include:
- Distance to the nearest healthcare facility with antivenom.
- Cultural barriers affecting healthcare-seeking behavior.
- Limited transportation options, often resulting in long walks to seek treatment.
- Lack of cold-chain storage for antivenoms in rural healthcare facilities.
- Stock shortages or complete unavailability of AVS.
- Restrictions on antivenom administration in primary healthcare centres.
- High costs of antivenoms causing delays as families seek funds for treatment. (3)

Diagnostic tests and tools

Currently, only one commercial diagnostic test confirms the snake venom type in envenomed patients. Lack of commercial options hinders antivenom selection in some regions. The 20 Minute Whole Blood Clotting Test (20WBCT) aids in diagnosing envenoming, while diagnostic tools improve surveillance by identifying venom immunotypes in pathology samples. (3)



Management of snake bite at health centre

Role of Doctor, Nurse and other paramedics are very important in management of snake bite

1. **Assessment** : A simple medical assessment including history collection and simple physical examination should be carried out to identify local swelling, painful tender enlarged local lymph glands, persistent bleeding from the bite wound, blood pressure, pulse rate, level of consciousness, drooping eyelids and other signs of paralysis.
2. **Check**: 20WBCT and urine examination (appearance and sticks testing for blood etc). Identify the snake or a photo (if brought).
3. **Analgesia**: Paracetamol(acetaminophen), adult dose 500 mg to maximum 1 gm, 4gm in 24 hours; children 10-15 mg/kg to maximum 100mg/kg/day or codeine phosphate, adult dose 30-60 mg to maximum 240 mg in 24 hours: children more than 2 years old, 0.5 mg/kg, maximum 2mg/kg/day can be given every 4-6 hours by mouth. Do not use aspirin or NSAIDs which can cause bleeding. (1)
4. **Antivenom** & **AN (Atropine & Neostigmine)**
   Step 1:In case of Venomous bite (scorpion bite/krait bite) start IV fluid with NS or 5%Dextrose. (250 -500 ml). (6)
   Step 2: Administered 0.25 ml adrenaline in sub-cutaneous route before AVS.(6)
   Step 3: Add 10 vials of AVS in running fluid NS start in jet (less than 1 hr). No skin test is required. Dose of AVS is same for adult, children, pregnant and women. (6)
   Step 4: If any evidence of neurological signs like respiratory paralysis, ptosis, choking throat administer Inj. Atropine 1 amp(0.6mg) IV (must) for adult and for children 0.02 mg/kg, Min 0.1 mg). Then provide Inj. Neotigmine 3 ml (1.5 mg) IV or IM (children 0.04 mg/kg). (6)
   Step 5: If improvement occurs after 30 minutes, maintenance dose of Inj neostigmine IV/IM/SC (0.5mg). Children will get 0.01 mg/kg every 30 minutes for 5 doses. Atropine 0.6 mg IV continuous infusion over 8 hours, children 0.02 mg/kg over 8 hr IV infusion. (6,7)
   Step 6:If signs not improving after 1st dose of Atropine + Neostigmine, repeat both AN after one hour, infuse 2nd dose of 10 vials AVS rapidly 2 hours after of 1st dose. If neuro deficit not improving 1 hour after of 2nd dose of A+N, transfer the patient for artificial ventilation. (6)
5. **In case of AVS reaction** administers Hydrocortisone and HI Antihistaminic.
6. **If the patient is oliguric**, initiate conservative management.
7. **If necrotic wound** give antibiotic and tetanus prophylaxis.
8. If the patient has evidence of **acute kidney failure** then treat with peritoneal or haemodialysis or haemofiltration.
9. If the patient is **bleeding severely** or already seriously anaemic: cross match and transfuse blood.
10. **Encourage exercising** of bitten limb.
11. Now a day's **plastic surgery** has an important role in snake bite management and the resulting complications. (8)

Emergency Snake Bite management Tray

It contains -

1. AVS
2. Inj. Hydrocortisone
3. Inj. Neostigmine
4. Inj. Atropine
5. Inj. Antihistaminic
6. Tab Paracetamol
7. Inj. Tramadol
8. Antibiotic
9. NS/5%Dextrose
10. Syringe
11. Glass test tube
12. Ambu Bag with mask
13. Laryngeal tube

Oxygen Cylinder should be present at emergency department.

Rehabilitation

Snakebites cause disabilities such as scarring, limb loss, and blindness for up to 400,000 people yearly. There are no dedicated resources globally to address these issues, leaving victims with prolonged hospitalization and rehabilitation needs. Collaboration with organizations aiding disabled individuals in developing nations is vital for improving access to care. (9)

Recommendations for people who work in snake prone zone as per CDC(11)

Employers must protect their workers from venomous snake bites by give them training about:

- Their risk of being bitten by venomous snakes,
- How to identify venomous snakes,
- How to prevent snake bites, and
- What they should do if they see a snake or if a snake bites them.
- Do not touch or handle any snake.
- Keep distance from tall grass and piles of leaves.
- Avoid climbing on rocks or piles of wood where a snake may be hiding.
- Be aware that snakes are most active at dawn and dusk and in summer.
- Wear boots and long pants when working outdoors.
- Wear leather gloves during handling brush and debris.

Preventing Snakebites

While some snake bites are unavoidable, you can lower your risk by following these precautions:

- Avoid disturbing snakes; many bites occur when people attempt to kill or handle them.
- Stay out of tall grass unless wearing sturdy boots; stick to marked hiking trails.
- Refrain from reaching into unseen areas; avoid lifting rocks or firewood within striking range of snakes.
- Exercise caution and awareness while climbing rocks.
- Mass awareness

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