



PHARMACEUTICALS NEWSLETTER

SNAKES AND SNAKEBITES – Part 1: Prevention of Snake Bites

Moses Chisale,¹ Regional Advisor Pharmaceuticals, WHO Regional Office for Africa, Brazzaville, Republic of Congo

1. Introduction

Throughout the continent, snakes are feared and killed on sight even though most of them are harmless: venomous snakes bite humans only when they feel threatened (trodden upon accidentally). Despite this

Why the “AFRO Pharmaceuticals Newsletter”?

The WHO mission in the area of essential medicines is to help save lives and improve health. Although medicines have a huge potential, the reality is that for millions of people, particularly the poor and disadvantaged, medicines are unavailable, unaffordable, unsafe or misused. Providing policy-makers and essential medicine managers with practical and evidence-based information is one important element of WHO work. Hence, the objectives of the “AFRO Pharmaceuticals Newsletter” are to:

- Share information and experiences related to essential medicines and pharmaceutical policies with WHO Member States, partners in the pharmaceutical sector, health professionals and the general public;
- Serve as a forum for the diffusion of information on the work of the WHO Regional Office for Africa in collaboration with Member States and headquarters particularly in the following areas: medicines policy, access, quality assurance, rational use and traditional medicine.

The newsletter welcomes contributions from Member States, pharmaceutical sector partners, health professionals as well as the general public. They should be addressed to:

Regional Director
WHO Regional Office for Africa
Attention: Dr Moses Chisale
P.O. Box 6, Brazzaville
Republic of Congo

Tel: 47 241 39 258
Fax: 47 241 39 511 / 501 / 503
E-mail: chisalem@ga.afro.who.int trapsidaj@afro.who.int

unfortunate relationship, snakes co-exist with humans in homes, gardens, outhouses, farms and forests, but their presence usually goes unnoticed.

This mistrust of snakes is understandable as they are responsible for numerous bites, deaths and permanent physical handicap each year. No country is free from the risk of snake bite. However, the exact burden of human suffering attributable to snake bites is difficult to determine because they occur most commonly in rural areas where the first impulse is to seek the help of a traditional healer rather than attend a hospital where attendance will be recorded and reported to a national authority.

In Africa, health authorities have not given snake bite the attention it deserves, and it may be justified to consider it a neglected disease. There are only rare incidence data on snake bite; there is serious under reporting, since patients treated by traditional methods are not included in official statistics.

One study in Africa has shown the incidence of snake bites in the Benue Valley of northeastern Nigeria to be 497 per 100 000 people per year, with a mortality of 12.2%.² The reasons for high snake bite mortality in tropical Africa include scarcity of antivenoms, poor health services, and difficulties with rapid access to health centres.³ The whole population of Africa is not equally affected by snake bite. Children account for 20%–40% of cases in most published studies, while farmers and other agricultural workers are the commonest victims. Snake bite is an important public health problem, particularly in rural areas, and it deserves more attention from national health authorities. Despite the risk of snake bites, humans must learn to co-exist peacefully with snakes, respect their place in nature, and minimize the danger to exposure by avoiding snakes as much as possible.

1 With contributions from Sanda Ashe, Watamu Snake Farm, Watamu, Kenya.
2 Warrell DA, Arnett C (1976), The importance of bites by saw scaled or carpet viper (*Echis carinatus*): Epidemiological studies in Nigeria and a review of the world literature, *Acta Trop* 33: 307–341.
3 Theakston RDG, Warrell DA (2000), Crisis in snake antivenom supply for Africa, *Lancet* 356: 2104.

2. The need for guidelines

In November 2000, the Federal Ministry of Health of Nigeria requested the WHO Regional Office for Africa to develop guidelines for the management of snake bites because of the increasing cases of snake bite in many parts of that country. The Regional Office responded by developing and launching the requested guidelines. *Guidelines for the Management of Snakebites in the WHO African Region* (Document AFR/EDP/04.1) were distributed in 2004.

Since their release, comments were received from various snake experts, leading to a thorough re-examination of the guidelines. In November 2005, a meeting of various snake experts was organized in order to review the guidelines. The meeting agreed that the revised guidelines need to provide more practical information on the distribution of snakes in the African Region, the prevention of snake bites, the main clinical syndromes of snake bites in Africa, and clinical management of snake bite. The guidelines should also give an insight into the many practices and beliefs surrounding the treatment and management of snake bites in Africa, and in particular the harmful ones.

The revised guidelines are currently being finalized and will be released by August 2007. In the present edition of the *AFRO Pharmaceutical Newsletter*, we wish to provide some useful information about the distribution of snakes in Africa, prevention of snake bites and first aid for snake bite, with particular emphasis on what to do and what not to do. There is also some discussion on the role of traditional healers. Future editions will discuss venom, antivenoms and clinical syndromes of snake bites. More details on these topics are included in the revised snake bite guidelines to be published.

3. Snake distribution in Africa

There are about 400 snake species on the African continent; most are relatively harmless. Approximately 100 species are of proven medical importance, of which 30 are known to have caused human fatalities. The venomous species of medical importance are members of the following four families: Atractaspididae, Colubridae, Elapidae and Viperidae.

For snake distribution, Africa has three broad vegetation types: rainforest, savannah and desert. Transitional zones include woodlands where savannah becomes heavily wooded, and semi-desert where savannah becomes dry and sparsely vegetated. Snake species tend to occur in one of the three vegetation zones (forest, savannah or desert), often in one or both of the transitional zones (woodland or semi-desert), but very rarely in both savannah and forests, or both savannah and desert. No dangerous snakes occur in all three broad zones.

Other important vegetation zones are the Mediterranean coast of north Africa, the hills and mountains of eastern and south-eastern Africa, the temperate regions, hills and small deserts of southern Africa. Within these regions, there are some dangerous snakes with very

limited distribution. Sometimes they occur in only one country; some are confined to a single range of mountains.

The highest incidence of snake bite in Africa occurs in the west African savannah region where carpet or saw-scaled vipers (*Echis* spp.), spitting cobras (*Naja nigricollis*) and puff adders (*Bitis arietans*) commonly live. The incidence of snake bite increases in parallel with agricultural activity at the start of the rainy season.

In eastern Africa, most serious bites are attributed to puff adders, spitting cobras and mambas. Throughout eastern and southern Africa, the puff adder is considered the most potentially serious, followed by the cytotoxic spitting cobra. The neurotoxic mambas and Cape cobras (southwestern regions) are responsible for relatively few bites but are associated with high fatality.

Typical desert species are the black cobra (*Walterinnesia aegyptia*) and the horned viper (*Cerastes*). Typical savannah species are the saw-scaled vipers, puff adders, spitting cobras and Egyptian cobra (*N. haje*).

Rainforest species include the gaboon vipers (*Bitis gabonica* and *B. rhinoceros*), rhinoceros horned vipers (*B. nasicornis*) and the western green mambas (*Dendroaspis viridis* and *D. jamesoni*).

Small islands that have venomous snakes include Lamu, Pemba, Zanzibar and the islands off the coasts of Bioko, Sao Tomé and Príncipe, and southern Mozambique. The venomous snakes on these islands tend to be similar to those on the adjacent mainland.

4. Prevention of snake bites

Snakes adapted to a wide range of habitats and different prey. They are predatory carnivores; none are vegetarians although some eat eggs. Since snakes are preyed upon by other animals, they tend to be secretive and have evolved many survival strategies. By understanding something about snakes' habits, simple precautions can be adopted to lessen the chance of encounters, contact and therefore bites.

Snakes prefer not to confront large animals (such as humans) so give them the chance to run away. Some are mainly nocturnal and others are mainly diurnal.

Often, a snake is more scared of you than you are afraid of it. Be smart, give it a chance to escape and avoid a potential bite!

Very many snakes are NOT venomous, many are MILDLY venomous, and a few are HIGHLY venomous and a bite is dangerous. If a snake is in your living space, try to chase it gently away without giving it a chance to bite. Learn which dangerous snakes occur in your area, and note that there will be only a few dangerous species in any one area.

In the house, snakes may enter houses in search of food or to find a hiding place.

- Do not keep livestock or chickens in the house because some snakes will come to hunt them.
- Store food in rat-proof containers.
- Raise beds above the floor level and use a mosquito net which also safeguards against centipedes scorpions and snakes.

In the compound or garden, try not to provide suitable hiding places for snakes.

- Clear heaps of rubbish, building materials, old iron sheets etc. from near the house.
- Do not have tree branches touching the house.
- Keep grass short around the house and clear underneath low bushes so that snakes cannot hide close to the house.
- Build the granary away from the house (it may attract animals that snakes will hunt).
- Water sources, ponds, water reservoirs may also attract prey animals.
- Listen to domestic animals; they often warn of a snake nearby.
- Shine a light on the path when walking outside at night.

In the bush, avoid firewood collection at night.

- Watch where you sit and where your feet are heading. Step onto rocks or logs rather than straight over them: snakes may be sunning themselves on the other side.
- Wear loose long pants and if possible high leather or rubber boots for protection.
- Do not put hands into holes, nests or any hiding places where snakes may be resting.
- Be careful when handling dead snakes: even a snake's severed head may bite and inject venom by reflex. Some species may sham death as a defensive tactic.
- A lot of snakebites occur during ploughing, planting and harvest seasons. Rain may wash snakes and debris to the edges of roads, and flush some species out of their burrows, so be careful walking there after heavy rain, especially after dark.
- In general, avoid places where snakes are likely to be found: tall grass, rocky areas, fallen logs, deep holes as well as swamps or marshes. When moving in such places, poke the ground in front of you with a long stick to scare any snakes.

When driving, avoid deliberately running over a snake. You may not succeed in killing it instantly, and it may

lie on the roadside injured and angry, ready to bite the first innocent pedestrian. It may also get caught up in the undercarriage and slowly creep out or into other parts of the vehicle, or out into your garage. Anyone can be the first victim.

Finally, **alcohol** weakens inhibitions, making it more likely that you might attempt to pick up a snake, and therefore risking a deadly bite.

If you are near enough to kill a snake, it is close enough to bite you. Be smart, avoid confrontation!

5. First aid

Despite all the precautions that may be taken, some snake bites are destined to happen. It is essential that the victim or bystanders know exactly **what to do** (first aid) and also **what not to do** before or while taking the victim to a medical facility.

In case of snake bite, stay calm, avoid excessive activity, immobilize the bitten extremity, and go to the nearest health facility.

If you have been bitten by a snake and you are in an isolated location where you cannot get immediate assistance from others, do the following:

- Stay calm. If you saw the snake, try to remember what it looks like, and describe it to the health worker.
- Do not try to catch or kill the snake; you may risk another bite.
- Take off jewelry or tight clothing near the bite, before swelling starts.
- If possible, clean the bite wound, wiping away from the wound.
- Get to a health facility as soon as you can. If you think it will take more than 30 minutes to get there, tie an elastic wrap about 5 centimeters above the bite. NB: It should be loose enough to slip a finger underneath it.
- **DO NOT** bleed the wound, **DO NOT** try to suck the venom, **DO NOT** put ice on the bite. No study has shown any benefit in survival or outcome from incision and suction.^{4,5} **DO NOT** apply a tourniquet of any kind.

4 Hall EL (2001), Role of surgical intervention in the management of crotaline snake envenomation, *Ann Emerg Med* 37:175–180.

5 Stewart ME, Greenland S, Hoffman JR (1981), First-aid treatment of poisonous snakebite: are currently recommended methods justified? *Ann Emerg Med* 10:331–335.

If bystanders are available, getting the bite victim to a medical facility is the priority:

- Move the victim to safety, away from the area where the snake might bite again.
- Remove the snake if it is still attached to the victim.
- Reassure the victim, who may be terrified (70% of all snake bites are from non-venomous species; even if the patient was bitten by a venomous snake, death may occur in hours or days).
- Do not rub, massage or tamper with the bite wound. This may encourage systemic absorption of venom from the site.
- Immobilize the patient and especially the bitten limb, but do not tie any tight bandages or cloth.
- Remove constricting clothing, rings, bracelets, shoes etc from bitten limb.
- Transport the patient as quickly and as passively as possible to the nearest medical facility.
- If the snake happens to have been killed, take it to the medical facility. If it is at-large, do not risk further bites and waste time by searching for it.
- Even snakes which appear to be dead should not be touched with the bare hands. Some snakes can pretend to be dead, and even a severed head can bite and inject venom by reflex!
- Observe the victim as you go to a medical facility and tell the doctor your observations (drooping eyes, difficulty swallowing or speaking, double vision, difficulty breathing, bleeding from the gums, rapid swelling).
- Avoid harmful, time-wasting traditional or other first-aid treatments such as cauterization, incision, excision, amputation, suction by mouth or vacuum pump, instillation of chemical compounds, or application of ice pack, black stone or electric shock. These are all contraindicated and harmful and have no proven benefit!
- Because vomiting is a common early symptom of systemic poisoning, the patient should lie in the recovery position (on the left side) with the head down to avoid aspiration.

Methods for attempting to delay systemic absorption of venom from the bite site, such as tourniquets, ligatures or the pressure-immobilization method, should be avoided. The efficacy of these techniques is still a question for debate, and even more so in cases of low molecular weight snake venoms. In particular, the tourniquet can cause ischemia leading to gangrene of the limb; it can increase the necrotic or tissue-damaging effects of snake venoms.

6. Snake bites and traditional practice

Traditional practices and healers play an important role in health, in general, and in snake bite management, in particular. However, there is no proven herbal antivenom. Anyone who claims to have been successfully treated by a traditional healer using herbs or other concoctions was certainly bitten by a nonvenomous snake, or if it was venomous, it was a case of dry bite. Scientific research on any promising plants for the preparation of antivenom is therefore essential and should be encouraged.

If a traditional healer claims saving the life of a snake bite victim using traditional remedies, it was certainly a bite from a non-venomous snake, or it was as case of dry bite.

Traditional healers can play a vital role in snake bite management and therefore should be involved in community snake bite management training activities, taking advantage of the trust that the public has in them. They are held in high esteem in most African communities. This trust is a positive aspect and should be used by countries to educate traditional healers in proper snake bite management. In particular they should not unnecessarily delay patient transfer to a medical facility where appropriate assistance can be provided.

Traditional healers should also be discouraged from engaging in practices whose efficacy has never been proven and which may further endanger the life of the victim, such as incisions, applying black stone, administering herbs that may cause vomiting.

7. Conclusion

Snakes are feared and misunderstood, even though most are harmless. Venomous snakes bite humans only when they feel threatened or are accidentally trodden upon. Even though snake bites may occur in or around homes, they mainly occur on farms, affecting mainly farmers and herdsmen, or in forests, affecting hunters. Farmers and school children require community education on the prevention of and proper first aid for snake bites. This is essential and needs to receive more attention from national health authorities. Staff in first-level health facilities should play a major role in such educational activities. In addition, they should be provided with all the relevant information, knowledge and skills for dealing with snake bites in the community.