Snake bites kill up to 138,000 yearly. Can getting to know our slithery friends save us?

There are more than 3000 species of snakes in the world. With so many snake varieties it is shocking that snakebites are a publicly neglected health issue with 5.4 million bites occurring per year and 2.7 of them being venomous. That’s 50% percent of every bite in the world being poisonous! To correctly administer first aid, identification of the snake that produced a bite is crucial. To classify a snake, understanding its phylum (classification) is needed. All snakes fall under the class reptilia since they are reptiles. They share their order squamata with their legged ancestors the lizards. Snakes are further classified in the suborder serpentes and often referred to as serpents. There are multiple snake families however the five major families are Boidae, Colubridae, Elapidae, Pythonidae and Viperida.

These families are characterised by common traits within themselves, for example Colubridae lack a functioning left lung. Boidea snakes such as the Boa constrictor are mainly large and non-venomous. The Elapidae snake family are usually small and agile however also contains some of the most lethal snakes in the world such as the Tiger snake. Pythonidae family commonly referred to as pythons are similar to Boas however differ in reproductive mode by producing offspring in eggs and have a novel bone above the eye. The Viperida family contains vipers with triangular head shapes and upper back zigzag patterns.

Now the global impact of snakebites is disastrous due to a lack of knowledge on identifying snakes by these traits. This means that the form of envenomation can’t be identified fast or correctly enough. This incorrect identification causes administration of incorrect treatment leading to the detriment of the patient. This results in incredibly high mortality and morbidity rates in countries such as India.

Snakebite morbidity has economic and social impacts

- 27% - negative employment change
- 10% - no longer working
- 22% - suffer PTSD
- 17% - residual disability

Snakebite impacts are also globally underestimated due to improper reporting. In India for example a direct study showed that the number of actual snakebite mortality incidences was 30 times the official government numbers. This underestimation of envenomation has lead to a reduction in the production of antivenom over the last 20 years leading to a prediction that supply failure is immanent in Africa.
Comparing different regions of the world a substantial disparity is present between wealthier urban regions in comparison to rural, poorer areas. An astonishing 14,112 deaths occur in Southern Asian per year, that’s 7056 times more than in Australasia! This is furthermore horrifying due to the estimations being considered the lowest figures possible. This difference in envenoming’s and mortality shows a greater disparity when considering that Australasia houses one of the most venomous snake families, the Elapidae family.

The Elapidae family houses snakes with particular neurotoxins that produce a range of clinical symptoms after envenomation.

**Clinical Symptoms of the Australian Elapid Envenomation**

**Neurotoxicity**

A specific form of neurotoxin from venom causes paralysis eventually preventing breathing. The venom acts by affecting neuron transmission at either a presynaptic neuron (sends signals like a radio station) or postsynaptic neuron (receives signals like an antennae). The toxin in the venom blocks the signal, making muscle not be able to receive signals to contract. Antivenom can protect against getting these signals blocked however if the venom affects the post synaptic (antennae) the antivenom can’t clear up an already blocked signal so fast and early administration is crucial.

**Coagulopathy**

The venom contains Prothrombin a specific converter that produces Thrombin. Thrombin acts to convert a clotting agent fibrinogen into fibrin (a version that gets degraded by the body ad removed). This causes the blood to no longer be able to clot due to depletion of clotting agent. This form of anticlotting is significantly more dangerous than other forms of anticlotting such as platelet depletion.

**Myotoxicity**

Presynaptic neurotoxins (toxins that affect the signal producing transmission between cells) cause breakdown of muscle. This breakdown of skeletal muscle (the muscle that is not part of your heart) releases two major components of muscle, myoglobin and creatine kinase. If the victim recovers from exposure studies show that permanent premature muscle aging has occurred. This is because muscle has fast and slow fibres however only the slow fibres recover after exposure to such a toxin.

So, can knowing more about snakes help humanity? The answer seems to be a resounding yes! Identifying a snake allows for correct observation of symptoms and administration of care as exhibited by the reduced fatalities in countries with such implementation.


