https://doi.org/10.48047/AFJBS.6.16.2024.273-283

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

A SYSTEMATIC REVIEW ON MYTHS AND FACTS OF SNAKE ENVENOMATION.

Preetha Devi N B[1*], , Aasini Maria Georgina [2] Sandhiya R[3], Yuvarani. P[4], S. Sabari Rajan[5], Sadhvi. P[6], Subalakshmi.V [7], Abishek. S [8]

[*1]Lecturer, Panimalar College of Allied Health Sciences

[2]Lecturer, Panimalar College of Allied Health Sciences

3 Lecturer, Accident And Emergency Care Technology, Panimalar College of Allied Health Sciences

[4] Lecturer, Trauma Care Management, Saveetha College of Allied and Health Sciences

Corresponding Author:

Preetha Devi N B, M. Sc, Ph. D (Human Genetics)

Lecturer

Panimalar College of Allied Health Sciences,

Panimalar Medical College Hospital & Research Institute,

Varadharajapuram, Poonamallee,

Phone: 9551901080

Email: preethaboopathy98@gmail.com

Volume 6, Issue 16, Nov 2024

Received: 19 Oct 2024

Accepted: 18 Nov 2024

Published: 04 Dec 2024

doi:10.48047/AFJBS.6.16.2024.273-83

ABSTRACT

Poison, derived from the Latin "Potionem," refers to substances that can cause illness or death when ingested, inhaled, injected, or absorbed. Snake bites, a significant public health issue in tropical and subtropical regions, affect millions annually, particularly in low- and middle-income countries. These envenomation's predominantly impact vulnerable populations, including farmers, women, and children in impoverished rural areas, where access to medical care is limited. Snake venom exhibits complex biochemical diversity, leading to a range of clinical symptoms that can be local or systemic, such as tissue damage, thrombosis, and neurotoxic effects. The Viperidae family's venoms often result in bleeding and shock, while Elapidae venoms frequently cause neuromuscular paralysis. This neglected tropical disease demands urgent attention through enhanced research into venom composition and effects to develop more effective antivenoms and tailored treatment strategies. Public education campaigns focusing on preventive measures and rapid response techniques are essential for reducing snakebite incidents. By raising awareness and improving healthcare accessibility, the impact of snake bites on vulnerable populations can be mitigated, ultimately fostering better health outcomes and community resilience against this significant health challenge.

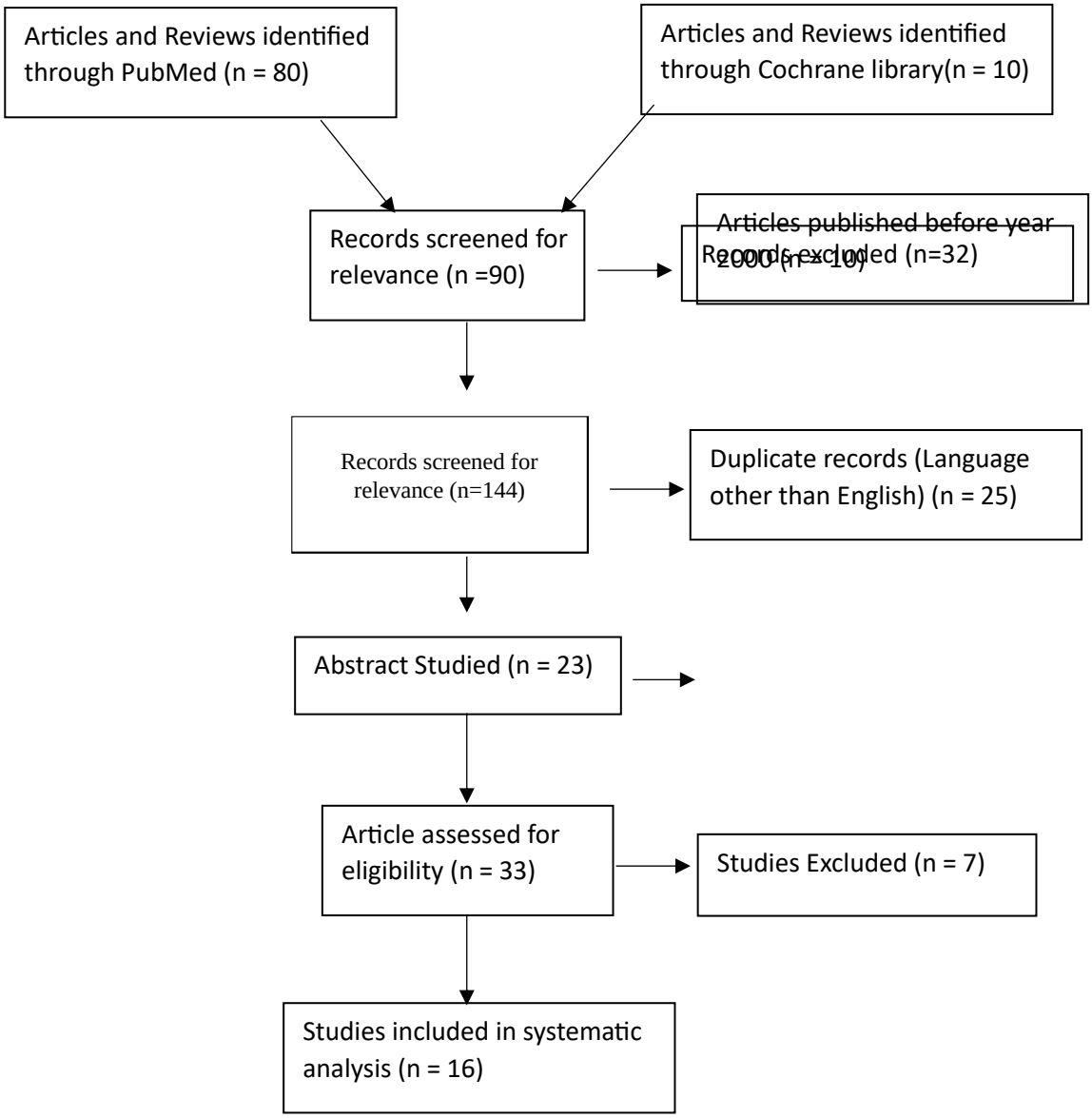
Keywords: snake bites, envenomation, public health, vulnerable populations, venom composition, antivenom, tropical disease, prevention, healthcare access.

1.INTRODUCTION

Poison is derived from the Latin word "Potionem," which means "to drink," "eat," "breathe," "inject," or "touch" enough of a chemical to make you sick or kill you. Any chemical that is toxic to the body when consumed, inhaled, injected, or absorbed through the skin is considered poison [1]. Venoms and toxins are biologically derived poisons that are typically saved for explaining animal stings or bites. Poisoning has grown in importance over the last ten years, both in India and internationally [2]. In many tropical and subtropical nations, snake bites are a neglected public health concern. The majority of these take place in Latin America, Asia, and Africa. An estimated 435 000 to 580 000 snake bites that require medical attention occur each year in Africa, and up to 2 million individuals in Asia are bitten by snakes. In low- and middle-income nations, envenoming affects farmers, women, and children living in impoverished rural communities. Countries with the weakest health systems and the fewest medical resources bear the brunt of this load. When a poisonous snake injects its highly specialized lethal fluid, venom, into a human, typically by accident, the result is snakebite envenoming, a neglected tropical disease. The snake's fangs, which are modified teeth that are attached to a venom gland by a duct, are used to inject venom. High levels of complexity and diversity are present in the composition of snake venoms, which leads to a diverse biochemical and toxicological profile that influences a broad spectrum of clinical symptoms. While some venom toxins cause local tissue damage that frequently leaves permanent effects, others cause systemic effects like thrombosis, autonomic hyperactivity, bleeding, acute kidney injury, rhabdomyolysis (a widespread breakdown of muscle fibres), cardiotoxicity, and neurotoxic manifestations (such as respiratory paralysis). Local effects and systemic signs linked to bleeding, coagulopathies, and hypovolemic shock are caused by the venoms of snakes belonging to the Viperidae family. Neuromuscular paralysis is one of the most common neurotoxic symptoms caused by the venoms of snakes belonging to the Elapidae family (elapids) (4, 5). Despite advances in

medical treatment and awareness, many communities still rely on ineffective and harmful measures to handle snake bites. These can also be addressed as myths of snakebite. Such as applying a tourniquet and trying to suck out the venom. These measures not only fail to relieve the effects of venom but can also exacerbate the victim's condition. Additionally, misconceptions about snake behaviour and first aid often lead to delayed medical attention, further increasing the risk of severe complications or death. Understanding these harmful practices is crucial for promoting effective prevention strategies and improving outcomes for snakebite victims.

2.METHODOLOGY



3. COMMON MYTHS ABOUT SNAKE BITES

SNAKE BITES: COMMON MYTHS

Myth 1: Every snake has venom.

Fact: Only 20% of snake species are venomous, despite what many people think. The majority of snakes are benign and essential to ecosystems, helping to regulate rodent populations, for example. Humans are not in danger from non-venomous species like corn snakes and garter snakes.

Myth 2: The venom should be sucked out.

Fact: This antiquated technique raises the danger of infection and is ineffectual at introducing bacteria into the wound. Instead, then trying to suck out the venom, current first aid standards advise immobilizing the injured limb and getting medical help right away.

Myth 3: Tourniquets are effective for snake bites

Fact I: The use of tourniquets can cause significant tissue damage and complications, such as loss of limb. Instead, the affected limb should be immobilized and kept at or below heart level to slow the spread of venom (10).

Fact II: The use of a tourniquet concentrates the venom in the affected limb, thereby increasing local tissue damage. Moreover, releasing the tourniquet may cause venom flooding, leading to shock, pulmonary embolism, and death. Some clinical practices and guidelines discourage tourniquet use because of uncertain benefits and the potential for worsening local tissue damage. Therefore, tourniquet use after snakebites remains controversial.(17)

Myth 4: A snake's colour indicates if it is deadly.

Fact: The colour of a snake does not necessarily indicate the strength of its venom. For protection, many non-venomous snakes imitate the colours of venomous snakes. Certain physical traits must be understood for accurate identification.

Myth 5: You always need antivenom

Fact: Antivenom is not necessary for minor bites, but it is essential in cases of severe envenomation. To choose the best course of action, a comprehensive evaluation by medical experts is necessary.

4. EPIDEMIOLOGY OF SNAKE BITES

Incidence: An estimated 2.5 million snake bites occur annually in India alone, with varying rates across different regions (G snake bite epidemiology in Africa, Asia, and Latin America).

Demographics: Snake bites predominantly affect agricultural workers, children, and individuals in rural communities, often during activities such as farming or collecting firewood.

5. SYMPTOMS AND DIAGNOSIS

The symptoms of envenomation might vary, but they typically include systemic effects including nausea, vomiting, and respiratory distress, as well as local pain, swelling, and bruises. Depending on the kind of snake, the amount of venom injected, and the site of the bite, envenomation symptoms can differ significantly. Bruising or colouring of the skin surrounding the bite, localized swelling that may worsen quickly, and sudden, severe pain at the bite site are typical local symptoms. Tissue necrosis may develop in extreme situations, which could result in ulceration and even limb loss. The body's reaction to the venom may also manifest as systemic symptoms, such as weakness, nausea, vomiting, and dizziness. Allergy reactions or the venom's impact on the respiratory muscles might cause respiratory discomfort. Additional

systemic symptoms include tachycardia (fast heartbeat) and increased salivation and perspiration.

For snake bites to be effectively treated, a precise diagnosis is essential. A comprehensive patient history is taken at the start of this procedure in order to collect information regarding the event, such as the date, time, and place of the bite as well as any distinguishable traits of the snake. In order to evaluate the patient's general health, a physical examination includes checking the bite site for swelling, redness, and other systemic symptoms in addition to keeping an eye on vital signs. Complete blood counts and coagulation profiles are two examples of laboratory tests that can be used to detect the systemic consequences of envenomation. Serum analysis may occasionally be used to identify the species of snake or find out whether venom is present, this will helpful in establishing the best course of action. Expert advice may be required in difficult circumstances. Overall, timely recognition of envenomation symptoms and a thorough diagnostic process are vital for effective management and improved patient outcomes.

6. PREVENTION

The most effective method of preventing snakebites is through education directed at high-risk communities, and designed and driven from within those communities 7. A full range of media should be used, including radio, TV, mobile phone apps, social media, posters, puppet and drama performances and village-based public meetings. Awareness of snakebite envenoming must be increased, together with advice on safer walking, working and sleeping 8. Transport of individuals with a snakebite to clinics where they can receive medical care can be improved, even in areas that are inaccessible to conventional ambulances, for example, using boats or volunteer village-based motorcyclists (9). Wasting time by visiting traditional therapists should be tactfully but firmly discouraged.

6.1. Treatment Protocols

First Aid: Immediate first aid involves keeping the victim calm, immobilizing the affected limb, and ensuring that the patient remains still. Prompt medical evaluation is essential.

Medical Treatment: Treatment may involve the administration of antivenom, oxygen, pain management, and monitoring for complications such as anaphylaxis or compartment syndrome.

6.2. Prevention Strategies

Public Education: Education campaigns focused on snake bite prevention, identification of local species, and safe behaviours in snake-prone areas are crucial. Community engagement can enhance awareness and reduce incidents. The most effective method of preventing snakebites is through education directed at high-risk communities, and designed and driven from within those communities (6,7). A full range of media should be used, including radio, TV, mobile phone apps, social media, posters, puppet and drama performances and village-based public meetings. Awareness of snakebite envenoming must be increased, together with advice on safer walking, working (7) and sleeping (7). Transport of individuals with a snakebite to clinics where they can receive medical care can be improved, even in areas that are inaccessible to conventional ambulances, for example, using boats or volunteer village-based motorcyclists (8). Wasting time by visiting traditional therapists should be tactfully but firmly discouraged. Recommendations include wearing boots and long pants in areas known for snake activity and avoiding sudden movements in dense vegetation.

7. DISCUSSION

The persistence of myths surrounding snake bites contributes to delayed treatment and increased risk of complications. Effective public health strategies must address these

misconceptions through community education and training for healthcare providers. Understanding the realities of snake bites can empower individuals to take appropriate actions when confronted with such situations.

8. LIMITATIONS

One of the drawbacks of dealing with snakebite envenomation is the lack of data, as many cases are not reported, which results in an underestimating of the problem's severity. Myths and deeply ingrained cultural beliefs can obstruct community behaviour change and effective public health messaging. Furthermore, therapeutic delays brought on by inadequate access to healthcare in rural areas can exacerbate health outcomes. The creation of universal treatment protocols and successful interventions is further complicated by the variability in venom composition and the interaction of socioeconomic factors.

9. CONCLUSION

Particularly for vulnerable populations like women, children, and low-income farmers living in rural regions, snake bites pose a major health concern. These populations often face more risks and have less access to medical facilities because of their close proximity to natural settings where snakes are prevalent. Further research on the composition and effects of snake venom is also essential. Making use of this knowledge can aid in the development of stronger antivenoms and treatment strategies tailored to individual species. Public education efforts should focus on both rapid reaction strategies and preventative measures, such as habitat management and snake awareness training, to decrease encounters. By increasing access to treatment and increasing public knowledge, we can significantly reduce the impact of snake bites on vulnerable populations, improving health outcomes and fortifying the community's response to this neglected tropical disease.

Acknowledgement

I Sincerely extend my deepest gratitude to Dr. C. Sakthi Kumar, Director of Panimalar group of Institution and to Dr. C. Illamparuthi Dean of Panimalar Medical College Hospital and Research Institute, Varadharajapuram, Poonamallee Chennai

Ethical Considerations

Not Applicable

Funding Statement

No Funding Source.

Informed Consent

Not Applicable

Disclosure of Interest

The authors declare that they have no competing interest.

10. REFERENCES

1. Sumbria tarlok, Sharma Amit, Prabhakar Shina, Kosey, Sourabh, Devgan Shalini. Introduction to poisoning; a systematic review. IJPJTP, 2015, 6(4), 2615-2619. 2. World Health Organization.
2. World Health Statistics 2016. Monitoring health for the SDGs sustainable development goals; 2016.
3. Sharma SK. Snake bites and dog bites in Nepal: community based studies on snake bites and dog bites. Department of Medicine, B P Koirala Institute of Health Sciences, presentation made at the WHO first Consultative Meeting on Rabies and Envenomings, Geneva, 10 January 2007.
4. Mohapatra B, Warrell DA, Suraweera W, Bhatia P, Dhingra N, Jotkar RM, Rodriguez PS, Mishra K, Whitaker R, Jha P. Snakebite Mortality in India: A Nationally Representative Mortality Survey. PLOS Negl Trop Dis. 2011. 5(4): e1018
5. Suraweera W, Warrell D, Whitaker R, Menon G, Rodrigues R, Sze HF, et al. Trends in snakebite deaths in India from 2000 to 2019 in a nationally representative study. Elife. 2020. 9: e54076.

6. Fox S, Rathuwithana AC, Kasturiratne A, Lalloo DG, de Silva HJ. Underestimation of snakebite mortality by hospital statistics in the Monaragala District of Sri Lanka. Trans R Soc Trop Med Hyg. 2006. 100(7): 693–695.
7. WHO Regional Office for Africa. Guidelines for the prevention and clinical management of snakebite in Africa. WHOhttp://apps.who.int/medicinedocs/documents/s17810en/s17810en.pdf (2010).
8. WHO Regional Office for South-East Asia. Guidelines for the management of snakebites (2016).
9. Sharma, S. K. *et al*. Effectiveness of rapid transport of victims and community health education on snake bite fatalities in rural Nepal. *Am. J. Trop. Med. Hyg.* 89, 145–150 (2013).
10. American College of Emergency Physicians. (2016). Clinical Policy: Critical Issues in the Management of Adult Patients Presenting to the Emergency Department with a Potential Snake Bite
11. Watt, G. (2014). Clinical features of snake bites in Thailand. *Tropical Medicine & International Health*, 19(7), 831-837.
12. Medline Plus. Snakebite. Accessed at WWW. Nlm. Nih. Gov/medicinenet. Com/ snakebite/ article.htm.
13. Medicine Net. Com. Snakebite. Accessed at WWW. medicinenet. Com/ snakebite/ article. Htm. BenLERman, Snakebites: Myths Vs Reality, Jun4, 2018.
14. Ronale Tucker Rhodes, MS, Myths and Facts: Venomous snakebites, 2016
15. Bond, C.; Buhl, K.; Stone, D.2012. Neem oil General Fact Sheet; National Pesticide Information Centre, Oregon State University Extension Services
16. Impact of tourniquet use on severity of snakebite envenoming in Chongqing, China: a

single-center retrospective study: Journal of internation Medical Research: January 23, 2024