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REVIEW ON ANTIDOTES ON SNAKE BITES

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ABSTRACT

Rotecha Seratta is a traditional healing practice used by indigenous communities for the treatment of snake bites, particularly in regions with limited access to modern medical care. Rooted in centuries-old knowledge, Rotecha Seratta combines herbal remedies, spiritual healing, and specialized techniques to neutralize the venom and alleviate the symptoms of envenomation. This holistic approach emphasizes the balance between the physical and spiritual well-being of the affected individual. The practice typically involves the use of locally sourced plants believed to possess antidotal properties, along with ritualistic interventions performed by trained healers or shamans. While modern medical advancements, such as antivenoms and advanced wound care, have significantly improved the treatment of snake bites, Rotecha Seratta remains an essential component of healthcare in many rural or remote areas. This abstract explores the methods, cultural significance, and potential contributions of Rotecha Seratta in contemporary snakebite management. It also examines the intersection between traditional healing practices and modern medical science, highlighting opportunities for integration and mutual learning in addressing the global challenge of snakebite envenoming. Snake bites represent a significant health threat globally, particularly in rural and remote regions where access to modern medical care is limited. While antivenoms and advanced medical treatments are the most effective ways to manage snake envenomation, traditional remedies have been used for centuries in various cultures as an alternative or adjunctive approach. Among these traditional practices, Rotecha Seratta has emerged as an important method for treating snake bites, especially in indigenous communities. This practice involves the use of various plant parts, such as roots, leaves,

barks, seeds, and resins, known for their medicinal properties.[1]

INTRODUCTION

Snake bites are a significant health concern in many parts of the world. They occur when a snake delivers venom or physically harms a person through its bite. Snakes typically bite in defense or when they feel threatened, though some may strike when hunting for food. There are over 3,000 species of snakes globally, but only a small percentage of them are venomous and pose a direct threat to humans.

The severity of a snake bite depends on factors such as the type of snake, the amount of venom injected, the location of the bite, and the overall health of the person bitten. Venomous snakes inject toxins that can affect the body in various ways, including damaging tissues, disrupting blood clotting, causing paralysis, or even leading to death if not treated promptly. Common symptoms of a snake bite include pain, swelling, dizziness, nausea, and difficulty breathing, but these can vary depending on the snake and the individual. Immediate medical attention is critical for anyone bitten by a venomous snake to minimize the impact of the venom.

Snake bites are most common in tropical and subtropical regions, where venomous species are more prevalent. However, with proper knowledge and timely treatment, the risks of snake bites can be minimized. Preventive measures include being cautious in snake habitats, wearing protective clothing, and seeking immediate medical care after a bite.[1]

Severity of snake bites

The severity of a snake bite can vary widely depending on several factors, including the species of snake, the amount of venom injected, the location of the bite, and the time it takes to receive medical treatment. Here's a breakdown of the factors that influence the severity.[2]

Type of snake

Venomous snakes: Snakes like vipers, cobras, mambas, and taipans are venomous and can cause severe reactions.

The venom from these snakes can affect the body in different ways

Neurotoxic venom: Affects the nervous system, leading to paralysis or respiratory failure.

Examples: Cobras, Kraits and Mambas.

Hemotoxic venom: Causes blood clotting issues, tissue damage, and organ failure. **Examples:** Vipers and Pit vipers.

Cytotoxic venom: Leads to severe tissue damage and necrosis (tissue death). Examples: Some vipers and certain species of rattlesnakes.

Non-Venomous snakes: Most snakes do not pose a significant threat, but they can still cause harm through physical trauma or infection if bitten.[2]

Amount of venom

Dry bite: Sometimes, a snake may bite without injecting venom. In these cases, there may be no symptoms, and the bite is less severe.

Envenomated bite: When venom is injected, the severity depends on the amount. Some snakes can inject a lethal dose of venom, while others may inject a smaller amount, which may not immediately result in death but can still cause serious health issues.[2]

Location of the bite

Extremities (Hands, Feet or Arms): Bites in these areas may cause swelling, bruising, and pain, but they are less likely to be immediately life-threatening compared to bites near vital organs.

Torso or neck: A bite near the chest, abdomen, or neck can be more dangerous, especially if it affects breathing or major blood vessels. A bite to the neck or face can also cause rapid systemic effects from neurotoxic venom.

Multiple bites: A person who is bitten multiple times by the same or different snakes may experience a compounded effect of venom, increasing the severity of the reaction.[3]

Time to treatment

Immediate medical attention: The sooner a bite victim receives medical care (such as antivenom and supportive treatment), the better the chances of recovery. Delayed treatment can allow venom to spread throughout the body, causing widespread damage or organ failure.

First aid: Prompt first aid can slow the effects of the venom while waiting for medical help, but it is no substitute for professional medical care.[4]

Age, Health and Immunity of the victim

Children and The elderly: Children, the elderly, and those with weakened immune systems or chronic conditions may suffer more severe reactions to a snake bite.

Pre-existing health conditions: People with pre-existing conditions such as heart disease, respiratory problems, or blood clotting disorders may experience more severe reactions to venom.

Previous exposure: If someone has been bitten by the same type of snake before, their immune system may develop some level of immunity, which could reduce the severity of future bites, though this is not always reliable.[5]

Symptoms of severe snake bites

Depending on the type of Venom and The amount injected, symptoms can range from mild to life- threatening. Severe symptoms include:

- Severe pain and swelling at the bite site
- Nausea and vomiting
- Dizziness, confusion, or unconsciousness
- Difficulty breathing or shortness of breath
- Hemorrhaging or blood clotting issues
- Paralysis, especially in the face, arms, or legs
- Organ failure (Liver, Kidney, or respiratory failure)
- Death, if untreated, especially in the case of neurotoxic venom (e.g., from cobras or mambas).[6]

Severity levels of snake bites

- **Mild:** Localized pain, slight swelling, no systemic symptoms, and no significant venom injection.
- **Moderate:** More intense pain and swelling, some systemic effects such as dizziness or nausea, and partial venom injection.
- **Severe:** Rapid onset of symptoms like difficulty breathing, paralysis, severe tissue damage, and potentially life-threatening complications if untreated.[6]

Effects of snake bites on immune system

1) Example of snakes: **Cobra** (Najaspecies); **Krait** (Bungarus species); **Black Mamba** (Dendroaspispolylepis)

Affected body systems

- **Nervous system:** Neurotoxic venom interferes with nerve signals by blocking the release

of neurotransmitters or by directly affecting nerve cell function. This can lead to symptoms such as:

- **Paralysis:** Difficulty moving limbs or controlling facial muscles, including the eyelids and mouth.
- **Respiratory failure:** As the venom paralyzes the diaphragm and other muscles responsible for breathing, it can cause difficulty breathing, which may eventually lead to suffocation if untreated.
- **Slurred Speech and Drooping eyelids:** These are early signs of paralysis due to neurotoxic venom.
- **Death:** If the paralysis affects the respiratory system severely and antivenom is not administered promptly, the victim may die due to respiratory failure.[7]

2) Examples of Snakes: **Pit Vipers** (e.g., Rattlesnakes, Copperheads)**; Gaboon Viper** (Bitis gabonica); **Fer-de-Lance** (Bothrops asper).

Affected body systems

- **Circulatory system:** Hemotoxic venom interferes with blood clotting and causes blood vessels to become leaky, leading to:
- **Internal bleeding:** The venom can disrupt clotting factors, causing the victim to bleed internally. This may manifest as bruising or severe hemorrhaging.
- **Blood pressure drop:** The leakiness of blood vessels and loss of blood volume can cause a dangerous drop in blood pressure (shock).
- **Organ failure:** Major organs like the kidneys and liver can suffer from blood loss or direct damage from the venom, leading to organ failure.
- **Swelling and Tissue damage:** Hemotoxins can cause significant swelling andnecrosis (tissue death) around the bite site. This can sometimes lead to the need for limb amputation if the damage is severe enough.[8]

3) Examples of snakes: **Russell's Viper** (Daboia russelii); **Gaboon Viper** (Bitis gabonica); **Boomslang** (Dispholidus typus)

Affected body systems

- **Tissues and Cells:** Cytotoxins break down cells in the local area of the bite, leading to:
- **Severe Pain and Swelling:** The bite site becomes extremely painful, and the surrounding

tissue begins to swell.

- **Tissue necrosis:** If untreated, the venom can cause the tissues near the bite to die, leading to necrosis (rotting) of the skin, muscles, and even bones.
- **Infection:** The necrotic tissue is highly susceptible to infection, which can further complicate the injury.
- **Scarring and Disability:** In some cases, the tissue damage may be so severe that it causes permanent scarring or disability, including loss of function in the affected limb.(9)

Number of peoples affected in last 5 years

Snakebites remain a significant global health concern, affecting millions annually. While precise data for the past five years (2020–2025) is limited, available studies provide valuable insights into the global impact of snakebites.

Global Incidence and Mortality

- A systematic review and meta-analysis covering studies from 2001 to 2022 estimated that annually, 1.2 to 5.5 million people worldwide are envenomed by snakebites, resulting in over 125,000 fatalities and 3 to 4 times that number experiencing disabilities or disfigurements.

Regional data

- **The americas:** Each year, more than 57,000 snakebites are reported, with a fatality rate of 0.6% and serious sequelae in over 3% of victims.
- **South sudan:** An AI-powered application is being trialed to assist medics in identifying venomous snakes and improving treatment accuracy, highlighting the ongoing challenges in snakebite management.

Projected trends: Climate change is anticipated to alter the distribution of venomous snakes. A study suggests that by 2070, countries like Nepal, Niger, Namibia, China, and Myanmar may experience an influx of venomous snake species, potentially increasing snakebite incidents in regions that are currently unprepared.

Graphical representation

Correlation Between Rainfall and Snakebite Incidence: This graph illustrates how annual rainfall correlates with snakebite incidents, emphasizing environmental factors influencing snake activity.

Geographical Distribution of Snakebite Envenomings and Deaths: This map highlights regions with the highest incidence of snakebite envenomings and fatalities, underscoring areas most affected.[10]

Traditional methods for snake bites

1. **Herbal remedies**

- **Turmeric and Ginger Paste:** In some regions, a paste made from turmeric and ginger is applied to the bite area. These herbs are thought to have anti-inflammatory properties, though their effectiveness in treating venomous snakebites is not supported by modern science.
- **Ash from certain plants:** Ash from certain plants is sometimes applied to snakebite wounds. The belief is that it can help "draw out" the venom, though this method is not backed by scientific evidence.
- **Garlic:** Garlic is sometimes used as a traditional remedy for snakebites due to its purported antiseptic and anti-inflammatory properties.
- **Plant-Based Poultices:** Various plants are used to make poultices that are applied to the bite site. For example, in some African cultures, the sap of the *Euphorbia* plant is believed to neutralize venom.[11]

2. **Sucking the venom out**

- In some traditional practices, people attempt to suck the venom out of the wound. This method is extremely dangerous as it can lead to further infection or spread the venom to the person's mouth or gums. Modern medicine completely discredits this practice.[11,12]

3. **Incisions and Cutting**

- Another traditional method involves making incisions near the bite wound and attempting to drain the venom. However, this practice can be harmful and may increase the risk of infection and further tissue damage.

4. **Tight bandages or tourniquets**

Applying tight bandages above the bite site is a traditional practice that some people believe prevents venom from spreading through the body. However, this is not a recommended method. In fact, it can do more harm than good, restricting blood flow and potentially causing further tissue damage or amputation.[13,14]

5. **Cauterization (Burning the bite area)**

- Some traditional methods involve burning the bite area using hot objects or fire. This was thought to "neutralize" the venom. This is very dangerous and can cause severe tissue damage or infection, and it should never be attempted.[14]

6. **Animal or insect remedies**

- In certain cultures, the bite is treated with remedies involving animal products. For example, some cultures may use the saliva of certain animals or insects like ants, believing these creatures possess healing properties.[15]

7. **Prayer and Spiritual healing**

- In many parts of the world, snakebites are seen not only as physical injuries but also as spiritual or supernatural events. Traditional healers may perform prayers, rituals, or chants to "banish" the venom or the spirit of the snake. While this is a cultural practice, it does not have any proven effect on the venom itself but may provide psychological comfort to the patient.[16]

8. **Cleansing with water or alcohol**

- Some traditions involve cleansing the bite site with water, alcohol, or herbal infusions. This is believed to purify the area and prevent infection, though it does little to treat the venom itself.[17]

9. **Pressure immobilization**

- In some regions, a form of pressure immobilization is used, where the area around the bite is tightly bound with a cloth or bandage. This method is believed to slow the spread of venom to the bloodstream. While pressure immobilization is sometimes used in certain modern first aid techniques, it should be done with great care and is not a substitute for proper medical care.[18]

Plants used in treatments of snake bites

1. **Euphorbia (Euphorbia species)**

- **Use:** The sap of the *Euphorbia* plant is used in some African and Asian cultures to treat snakebites. It is believed to neutralize venom and reduce swelling, though its safety and effectiveness have not been proven.
- **Note:** *Euphorbia*sap can be highly toxic and cause severe irritation or burns if applied to

the skin.[19]

2. **Garlic (Allium sativum)**

- **Use:** Garlic is sometimes applied to snakebite wounds or consumed to reduce the effects of venom. It is believed to have antibacterial and anti-inflammatory properties.
- **Effectiveness:** While garlic is widely recognized for its health benefits, there is no scientific evidence to support its ability to treat snakebites.[19]

3. **Turmeric (Curcuma longa)**

- **Use:** Turmeric is applied topically as a paste or consumed in some cultures. It is thought to have anti-inflammatory and antioxidant properties, which may help reduce swelling and pain.
- **Effectiveness:** The active compound curcumin in turmeric has been shown to have anti-inflammatory properties, but there is no evidence to suggest it can neutralize snake venom.[19]

4. **Jatropha (Jatropha curcas)**

- **Use:** In some parts of Africa and Asia, the leaves and seeds of *Jatropha curcas* are used to treat snakebites. The plant is believed to reduce swelling and prevent infection.
- **Effectiveness:** While *Jatropha* is used in traditional medicine, it can be highly toxic and cause serious side effects if used improperly.[19]

5. **Sida acuta (Wireweed)**

- **Use:** This plant is used in traditional medicine in various parts of Africa and India. It is believed to act as a remedy for snakebites by reducing swelling and pain.
- **Effectiveness:** There is limited scientific evidence on its effectiveness for snakebite treatment, and the plant is more commonly used for other conditions like wounds or inflammation.[19]

6. **Cissampelos pareira (Indian moonseed)**

- **Use:** The roots of *Cissampelos pareira*, also known as Indian moonseed, have been traditionally used in parts of India and South America to treat snakebites. It is thought to have antidote-like properties that neutralize venom.
- **Effectiveness:** This plant is a popular remedy in Ayurvedic medicine, but there is little scientific research to validate its efficacy in treating snakebites.[19]

7. **Cucumber (Cucumis sativus)**

- **Use:** In some regions, cucumber slices are applied to snakebite wounds, as it is believed to draw out venom and reduce inflammation.
- **Effectiveness:** This is not a proven treatment. While cucumbers are hydrating and soothing, they do not neutralize snake venom.[19]

8. **Aloe Vera (Aloe barbadensis miller)**

- **Use:** Aloe vera gel is sometimes applied topically to snakebite wounds to reduce swelling and promote healing. It is also thought to help alleviate pain.
- **Effectiveness:** Aloe vera has soothing properties and may help with wound healing, but it does not neutralize venom.[19]

9. **Bitter Gourd (Momordica charantia)**

- **Use:** In some Asian cultures, bitter gourd is used as a remedy for snakebites. The juice is consumed or applied to the bite area to detoxify the body and neutralize venom.
- **Effectiveness:** While bitter gourd has medicinal properties for other conditions, there is no solid evidence supporting its use for snakebites.[19]

10. **Neem (Azadirachta indica)**

- **Use:** Neem leaves, bark, and oil are used in traditional medicine to treat a wide range of ailments, including snakebites. It is believed to have antimicrobial and anti-inflammatory effects.
- **Effectiveness:** While neem is widely recognized for its medicinal properties, there is no scientific evidence to confirm its effectiveness in treating venomous snakebites.(19)

Marketed formulation

1. **Antivenom (Specific snake venom antiserum)**

Antivenoms are the primary and most effective treatment for snakebites. These are biologically derived medications that neutralize venom in the body and prevent severe effects like organ failure, paralysis, and death.

- **Types of antivenoms:** There are several brands of antivenoms, each developed to treat specific venomous snakebites. Antivenoms are typically species-specific, meaning they are developed for the venom of specific snakes, such as cobras, vipers, or pit vipers.
- **Examples of antivenoms**
- **Polyvalent antivenoms:** These are designed to treat multiple types of snakebites.

- **Viper venom antiserum:** For the treatment of bites from viper species.
- **Monovalent antivenoms:** These are specific to one snake species. For example:
- **Cobra antivenom:** For cobra bites, typically derived from horse serum.
- **Elapidae antivenom:** For bites from elapids like kraits and mambas.
- **Manufacturers:**
- **Sanofi Pasteur**: Known for its Antivenin for treating pit viper bites.
- **Biological E**: Manufactures antivenoms used in India and other parts of Asia.
- **Haffkine Institute**: Known for producing antivenoms for Indian snakes.(20)

2. Topical Ointments and Creams

While there is no scientifically supported topical treatment for neutralizing venom, some over- the-counter formulations are marketed for wound care, pain relief, and inflammation after a snakebite. These are not substitutes for proper medical treatment but may be used in adjunct to medical care.

- **Snake bite creams:** Some herbal-based creams claim to soothe the bite area, reduce swelling, and support wound healing. These often contain ingredients like aloe vera, calendula, or turmeric, which are known for their anti-inflammatory properties.
- **Antiseptic ointments:** Used to prevent secondary infections in the wound from bacterial entry. These ointments may contain ingredients like iodine, silver sulfadiazine, or hydrogen peroxide.[20]

3. Herbal Supplements

Various herbal products are marketed as supportive treatments for snakebites. These often claim to neutralize venom, reduce swelling, and promote healing. However, it's important to note that none of these products have been proven to effectively treat snake venom, and they should never replace professional medical care.

- **Examples**
- **Snakebite herbal capsules:** These are marketed in some regions, often containing blends of herbs such as *Sida acuta*, *Cissampelos pareira*, *Garlic*, or *Turmeric*. The claims typically include detoxification and inflammation reduction.
- **Ayurvedic remedies:** Some traditional formulations from Ayurvedic medicine, including certain preparations of *Cissampelos pareira* (Indian moonseed), are marketed as snakebite treatments, although their effectiveness has not been scientifically validated.[20,21]

4. Snakebite First Aid Kits

Some companies market first aid kits specifically designed for snakebites. These kits often include bandages, splints, and instructions on how to manage the bite site until medical help is available.

- **Contents may include**
- **Pressure bandages:** Aimed at slowing the spread of venom in certain snakebites (though this should only be used by medical professionals).
- **Antiseptic wipes:** To clean the area around the bite to reduce infection risk.
- **Suction devices:** These claim to suck out venom but have been shown to be ineffective in clinical studies.
- **Snakebite identification cards:** Some kits include guides on identifying snakes and determining if medical attention is needed.
- **Examples of companies**
- **Surviveware snake bite kit:** A popular first-aid kit that includes supplies and instructions for treating snakebites.
- **Adventure medical kits:** Known for creating comprehensive wilderness first-aid kits that include basic tools for snakebite management.[20,21]

5. Vaccines (Preventive)

While not used as a treatment for snakebites, vaccines for snake venom are in development in certain regions. The idea is to provide immunity to specific venoms before a bite occurs. This is an area of ongoing research, but as of now, there are no widely available snake venom vaccines for humans.

- Snakebite Immunization Programs: In some countries, especially those with high incidences of snakebites, immunization programs are being explored or offered as part of broader disease prevention strategies.[21]

6. Tinctures and Extracts

Some snakebite treatments are sold as tinctures or extracts of plants known in folk medicine to treat venomous bites. These are typically sold in unregulated markets or in herbal medicine stores, and many are not proven to be effective.

- **Example**
- **Viper extracts:** Some snake venom extracts or tinctures are marketed in traditional medicine to treat bites, but again, these are not scientifically validated and can be

dangerous.[22]

7. Snake venom testing kits

While not for treatment, some diagnostic kits are marketed to help identify snake venom. These kits allow health professionals in remote areas to identify which type of venom a patient has been exposed to. This can help with selecting the appropriate antivenom.

- **Examples**
- **Snake venom detection kits:** Used in laboratory settings to identify the type of venom in the bloodstream.[22]

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