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SAFETY, HYGIENE AND FIRST AID FOR SNAKEBITE IN INDUSTRIAL SETTING

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Abstract: Snake is one of the most mysterious and feared creatures on earth, and snakebite continues to be a major occupational health challenge, particularly in tropical and subtropical regions. Globally, an estimated 5 million snakebite cases are reported each year, resulting in approximately 2.5 lakh envenomation and nearly 1 lakh deaths. India alone accounts for the highest mortality, with around 1.5 million bites annually, leading to nearly 1 lakh envenomation and more than 50,000 deaths. Snakebite is a time-critical, acute, and life-threatening medical emergency, yet almost every fatality is preventable through timely intervention. Industrial workers, particularly those engaged in outdoor activities such as construction, mining, agriculture-linked industries, and storage operations, are at increased risk due to frequent exposure to snake-prone environments. The recommended first aid for snakebite is guided by the mnemonic "Do It R.I.G.H.T"—Reassure the patient, Immobilize the affected limb, Get to the hospital immediately, and Tell the doctor about any symptoms. Early initiation of appropriate first aid and rapid administration of Anti-Snake Venom (ASV) remain the cornerstone of survival. Incorporating industrial hygiene practices, use of personal protective equipment, and worker awareness training are crucial preventive strategies to reduce the incidence of snakebite in industrial settings. This article highlights the first aid measures, occupational safety perspectives, and preventive strategies to mitigate the burden of snakebite cases in industrial environments.

Index Terms - Snakebite, First Aid, Safety, Hygiene, Industry

I. INTRODUCTION

Snake is one of the mysterious reptiles on the earth. The existence of snake in the nature is extremely important for the sustainability of the ecosystem. Snakes usually bite for self-defense or to capture prey. Worldwide, almost 5 million snake bite cases document every year with approximately 2.5 lakh cases of envenomation and nearly 1 lakh fatality (1). It has been estimated that snakebite mortality is highest in India(2). It has also been estimated that almost 1.5 million bites occur annually in India with approximately 1 lakh envenomation and more than 50000 death(3). It is one of the common occupational hazards of farmers, laborers, herders, plantation workers, manly in the rural population. Considering the magnitude of the problem, the World Health Organization (WHO) has included snake bite into the Category-A of "Neglected Tropical Disease"(4). More than 2000 species of snakes are found in the world. India is home to nearly 300 species of snakes, of

which 60 species are venomous. The venomous snakes found in India belong to three families Elapidae (Cobra & Krait), Viperidae (Viper), and Hydrophidae (flat-tailed Sea Snakes)(5). Almost all the envenomation and death result from the bite of any of the snake in ‘‘The Big Four’’ category, i.e. Indian Cobra, Common Krait, Russell's Viper, and Saw-Scaled Viper. Snakes under “The Big Four” group are widely distributed throughout the country. Apart from that, cases of the bite from sea snakes have also been frequently reported in India.

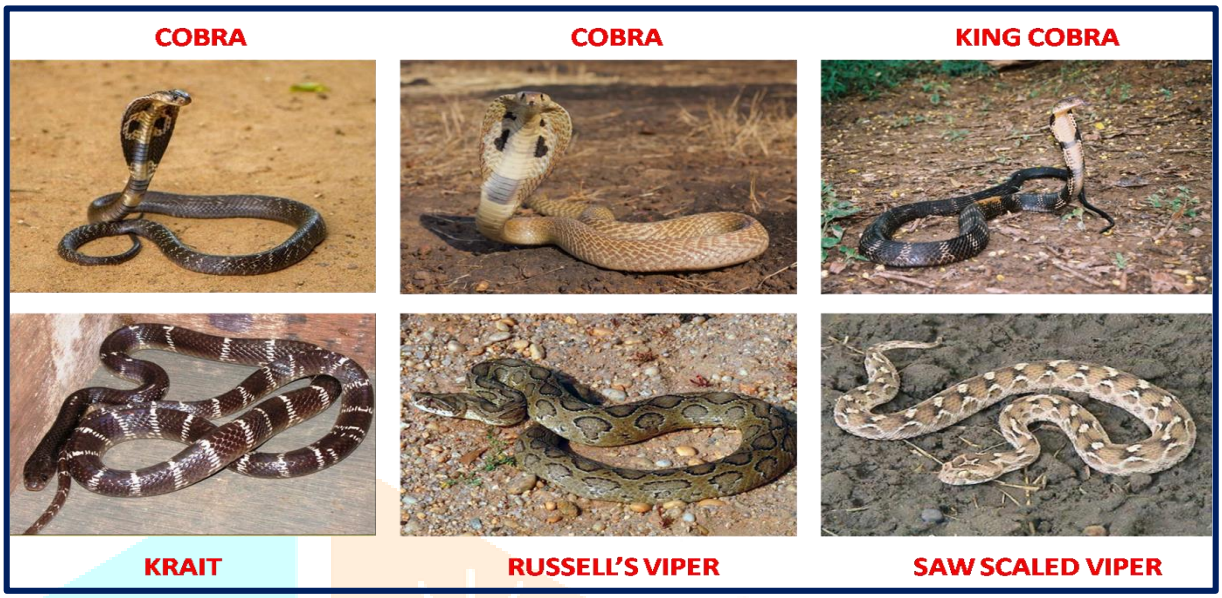


Fig-1: Venomous Snake commonly seen in India (Images are for educational purpose only)

II. Industrial Hygiene and Safety Aspect for Prevention of Snake Bite Cases

Prevention of snake bite incidents in industrial settings requires a comprehensive approach integrating industrial hygiene and occupational safety measures. Proper housekeeping, such as regular clearance of tall grass, weeds, scrap materials, and debris around work premises, minimizes hiding spots for snakes. Ensuring adequate lighting in outdoor work areas, storage yards, and pathways reduces the chances of accidental encounters, especially during night shifts. Use of appropriate personal protective equipment (PPE) such as high-ankle safety boots, gloves, and protective trousers is strongly recommended for workers in high-risk zones. Safety training and awareness programs should regularly sensitize employees on snake-prone areas, safe behavior, and emergency response protocols. Additionally, maintaining snake-proof fencing, installing warning signages, and establishing coordination with local wildlife rescue teams are essential industrial hygiene and safety practices that significantly reduce snake bite risks in industrial environments.

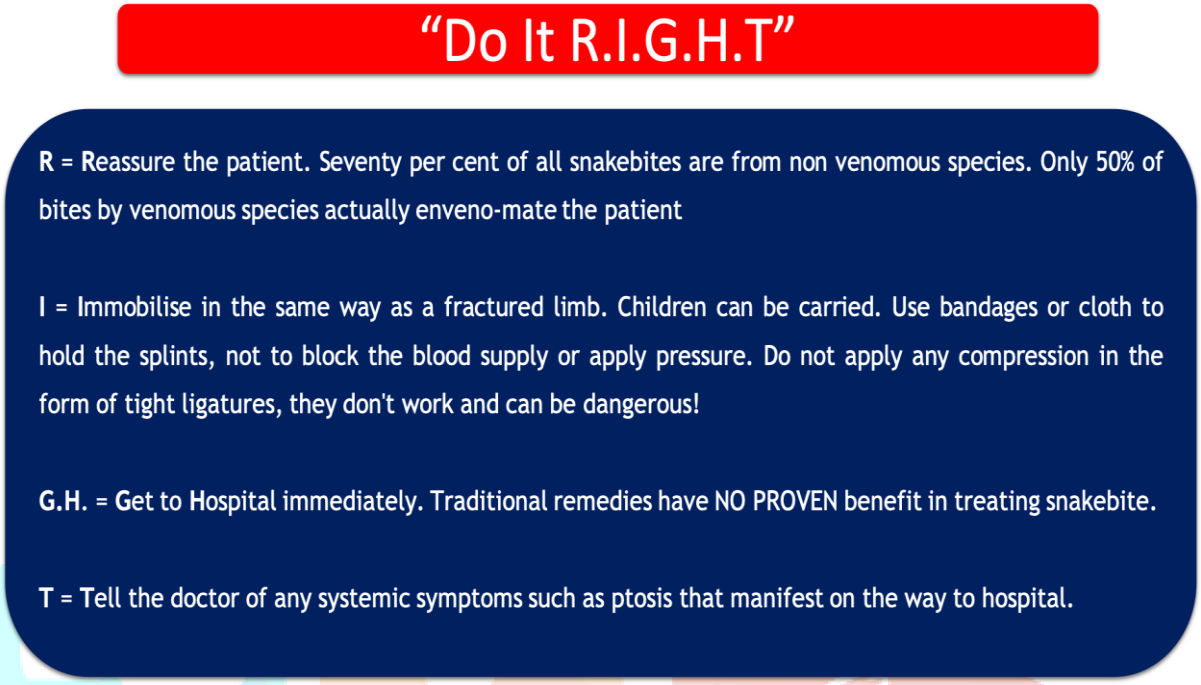
III. Signs and Symptoms of Venomous Snake Bite (2,4,6)

Clinical presentation, signs and symptoms of venomous snake bite vary depending on the species of snake, season of bite, feeding status of the snake, amount of venom injected, bite of covered or uncovered skin, dry or incomplete bite, health status of the victim and many more. Cardinal sign and symptoms of envenomation can be manifested as one of the four clinical syndromes or in combination i.e. Neurotoxicity (Progressive weakness, Ptosis i.e. drooping or falling of the upper eyelid, respiratory difficulty, difficulty in speech, difficulty in swallowing and deglutition, blurring of vision), Haemotoxicity (Bleeding from Gum, Wound, during coughing, urine, Disseminated Intravascular Coagulation, Acute Kidney Injury, Shock), Progressive Painful Swelling (Local pain and swelling, blistering, ecchymosis, necrosis, compartment syndrome) and Myotoxicity (Muscle pain, muscle swelling, involuntary muscle movement, and compartment syndrome). Neurotoxicity is the cardinal manifestation of a bite by the Elapidae group (Cobra and Krait). Haemotoxicity and overt local reactions are the primary manifestations of bite by the Viperidae group (Russel’s Viper & Saw Scaled Viper). Myotoxicity is a key manifestation of bite by a flat-tailed sea snake. Apart from the cardinal signs and symptoms, some general symptoms like anxiety, palpitation, tachycardia are often reported by the

victim. In the case of Krait bite symptoms like abdominal pain, dyspepsia, vomiting is often reported by the patient without any local pain, or swelling at the site of the bite even without any bite mark.

IV. First Aid for Snake Bite: "Do It RIGHT"

Any snake bite is considered a medical emergency. Recommended first aid for a snake bite is based around the mnemonics "Do It R.I.G.H.T".(6)



In recent years, researchers are advocating to add another measure, in the "R" component of the "R.I.G.H.T" i.e. "Remove" various limb adorning ornaments, jewelry and other constricting materials present on the bitten limb to prevent complications (6).

Polyvalent Anti snake Venom (ASV) is the only specific treatment should be administered as early as possible in case of envenomation. ASV is readily available at government health facilities. In severe cases, respiratory support or hemodialysis may be required.

V. Important Don't in Snake Bite First Aid (5)

- Do not attempt to catch or kill the snake.
- NEVER GO TO TRADITIONAL MEDICINE MAN LIKE OJHAS OR GUNINS.
- Do not practice unscientific methods (black stones, scarification) and alternative medical/herbal therapy as they have no role and do more harm than good by delaying treatment.
- Do not practice any kind of manipulation at the bite wound like incisions, suction, tattooing, rubbing, vigorous cleaning, application of herbs or chemicals, cryotherapy, cautery, etc. as this may introduce infection, increase local bleeding and increase absorption of the venom which is extremely dangerous.
- Do not raise the site of the bite above the level of the person's heart.
- Do not allow the person to become over-exerted.
- DO NOT TIE TOURNIQUETS AS IT MAY CAUSE GANGRENOUS LIMBS.
- If the victim is expected to reach the hospital in more than 30 minutes but less than 3 hours crepe bandage may be applied by qualified medical personnel till the patient is shifted to the hospital. The bandage is wrapped over the bitten area as well as the entire limb with the limb placed in a splint. It should be capable of admitting a finger beneath it.

VI. CONCLUSION

Snakebite is a time limiting, acute life-threatening medical emergency. Almost every case of death from venomous snake bite is preventable. Prompt first aid response and early administration of ASV is the key to the survival of the victim. Recommended first aid for a snake bite is based around the mnemonics “Do It R.I.G.H.T” (R: Reassure the Patient, I: Immobilize the limb, GH: Get to Hospital Immediately, T: Tell the doctor of any symptom).

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