Instituto Nacional de Salud

• Tikuna Coralsnake •

(*Micrurus tikuna*)

Bites, venoms, and venomous snakes of Colombia

G4

MEDICAL IMPORTANCE GROUP 4

Snakes that bite rarely, and have not caused significant envenoming or have not causes documented bites

Poorly Reliable: Confidence for this species is poor due to the lack of data and information on Colombian populations. Therefore, most of our knowledge comes from a few studies and populations outside the national territory.

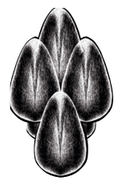
Detail of: Head, body and tail.

1. Envenomation symptoms

Micrurus tikuna is a rare, recently described South American coralsnake [1]. The bites provoked by this species have not been reported and described in the medical literature or in the National Surveillance Health System (SIVIGILA Spanish acronym). However, envenomation caused by South American Micrurus snakes can provoke local and systemic manifestations, the last one including respiratory paralysis (i.e., respiratory failure) [2,3].

Symptoms of envenoming caused by coralsnakes may include local effects such as pain and radiated pain, edema, erythema, bleeding, swelling and paresthesia [4]. Neurotoxic activity of the Micrurus venom is related to the most common systemic manifestations of envenomation. This effect includes palpebral ptosis, eye movements limitation, visual accommodation difficulties, diplopia, chewing or swallowing, decreased muscle strength, abdominal pain, paralysis of muscles and limbs, difficulty in moving and standing upright, acute myasthenic syndrome, dyspnea, and paralysis of the thoracic musculature that can then progress to diaphragmatic paralysis, and death [2,3,4]. In some cases, systematic manifestations may occur only a few minutes after the bite [4]. Muscular manifestations are also possible due to the myotoxic properties shown by the venom of some Amazonian coralsnakes [5].

Envenomation caused by Micrurus snake species can be classified as mild to moderate or severe according to the symptoms exhibited by the patient [5]. Envenomation caused by M. tikuna can be considered mild when in the first 6 hours the patient only manifests local symptoms that usually include minor bleeding from the fang marks and paresthesia (a numbness feeling in the bitten area that can latter spread nearby) [5]. A moderate envenomation is characterized by the manifestation of an acute myasthenia (weakness and fatigue in the muscles) without paralysis involved [3,4]. Finally, an envenomation is considered severe when there is an intense myasthenia that can evolve into paralysis [3,4].



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2. Treatments and snakebite care

Although there is low frequency of coralsnake bites in Colombia (see Chapter 9), it is not uncommon for this envenomation to be classified as moderate to severe [6]. Neurotoxic activity can cause systemic effects in a short period of time, (sometimes only a few minutes) manifested as a paralysis of the thoracic musculature that may require mechanical ventilation. For effective treatment, envenomation caused by Micrurus snake species needs urgent medical care, and it includes the use of antimicruric snake antivenom to neutralize the venom effects.

For envenomation caused by any species of coral there is a general management protocol. First, coral antivenom serum must be applied during the first two hours before or when the signs of paralysis appear [7]. The amount of antivenom serum to be administered will depend on the degree of severity of the bite, as well as neutralization capability of the serum laboratory brand. However, it is recommended to start with 5 vials (INS antivenom) for mild cases and 10 vials (INS antivenom) for moderate to severe cases [7]. Dosage is not different between children and adults [8]. In moderate and severe cases of envenomation the patient should be referred to a third and second level hospital with ventilatory support and intensive care units (ICU) without stopping the application of antivenom [7]. A hypersensitivity to antivenoms can always appear, so it is important that its application is done exclusively by medical trained staff.

The use of tourniquets to prevent systemic poisoning is a controversial view as there is a specific and detailed procedure that should be performed with the support of qualified teams [9]. In cases where the snake has not been correctly identified, tourniquets can lead to aggravation. The victim must be constantly observed within the first 24 hours after the snakebite.

3. Snakebite capacity

Micrurus tikuna is a rare species registered in only two localities of Colombia, Leticia municipality, Amazonas department, and in the town of Tabatinga, Amazonas state, Brazil [1]. Probably, bites from M. tikuna are more likely in isolated populations, such as indigenous and other Amazonian communities near the municipality of Leticia [10]. The capacity of this snake to inject venom is relatively low due to the osteological limitations present in several Micrurus snakes. They have a small head and a limited mouth opening that is about an angle of 30 degrees [10]. The alarming colors also allow them to be seen in advance by people. These animals usually stay hidden under leaf little of the forest floor. In general, Micrurus envenomation occurs in snake handling situations [2].

4. Recognition

Micrurus tikuna is a recently described coralsnake based on the analysis of two specimens (one male and one female). It can be recognized from its monadal pattern (i.e., single-ringed) composed of red, white, and black rings, the last ranging from 27 to 31 black rings along the body, usually with 3 to 4 dorsal scales. A black cephalic-cap is present and a black nuchal collar is absent. The ventral part of the head is black with irregular white blotches followed by red scales on the gular region. The tail is tricolor (i.e., with black, red and yellowish-white rings) with six to seven black rings (four to six dorsal scales long) [1].

Two other species of coralsnakes from the western Colombian Amazon show the same tricolor pattern of dorsal body as M. tikuna: M. ornatissimus and M. remotus [1]. Micrurus tikuna differs from M. remotus by the presence of white spots on the supraocular scales and tail tricolor. Micrurus remotus has scales on the top of the head completely black, without any white spots and tail mostly bicolor, i.e., black, and yellowish-white rings.

Micrurus tikuna is morphologically very similar to M. ornatissimus, including an overlaying of some diagnostic characters. Following the species description, M. tikuna differs from M. ornatissimus by having black and red body rings that are 4–6 and 4–8 scales long, 27–31 black body rings, 6–7 black tail rings, and an absence of a black nuchal colar. Micrurus ornatissimus has black and red body rings that are 2–3 and 3–6 scales long respectively on the body and tail, 32–66 black rings on the body; 3–15 black rings on the tail; and a black nuchal collar present [1].

5. Distribution

In Colombia, M. tikuna is only known from Leticia municipality, Amazonas department, and in the extreme west of Brazil in the neighboring municipality of Tabatinga Amazonas state [1]. In the reptile collection of the Sinchi Institute there are two specimens from kilometers 11 and 12 of the Leticia-Tarapacá Road.

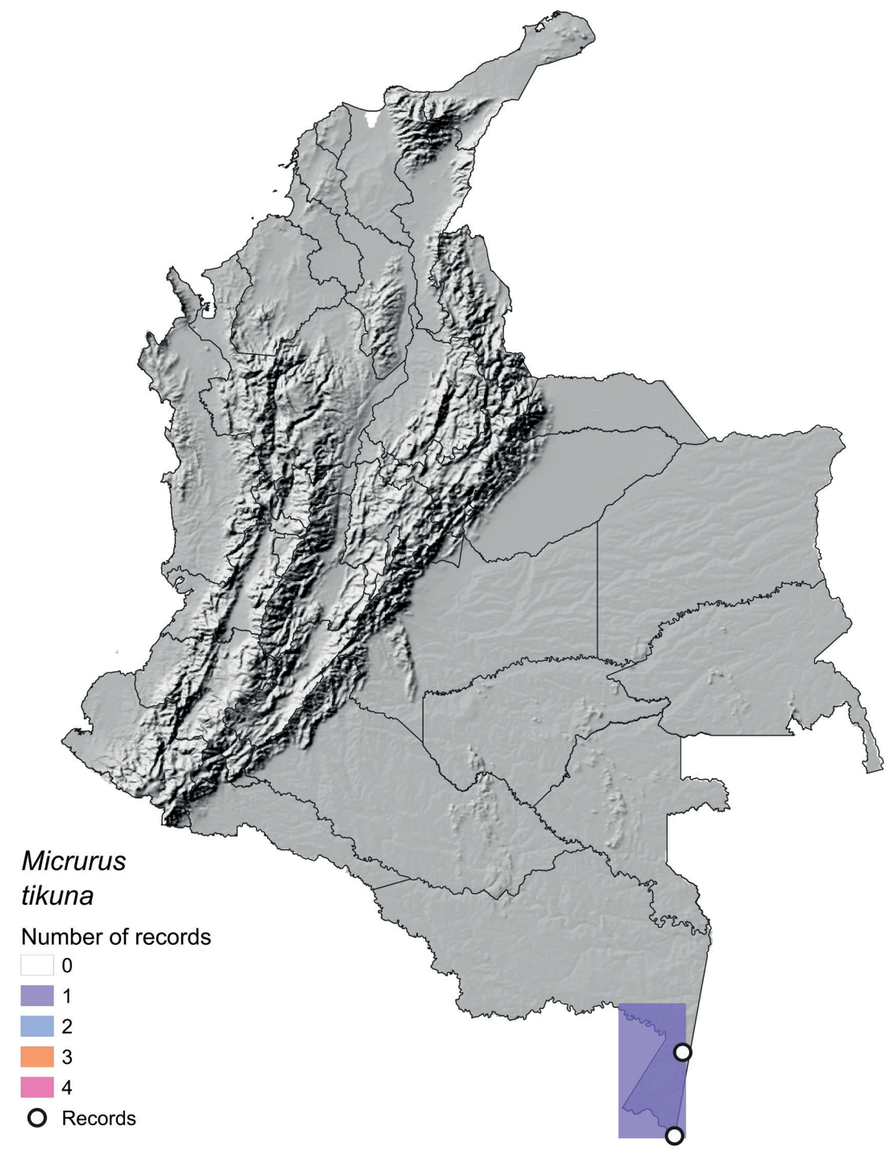

Figura 1. Geographic distribution of *Micrurus tikuna* in Colombia and its habitat suitability model. Based on bioclimatic variables, the habitat suitability model predicts the species' potential distribution in Colombia, identifying zones with suitable or unsuitable environmental conditions for its occurrence across the country. Values close to 1 indicate optimal environmental conditions (high probability of presence), while values close to 0 indicate unsuitable conditions (absence likely).

6. Natural history

Rare. As it is a rare and a recently described species with only two known specimens, the basic biological features such as diet, reproductive cycle, antipredator behavior, and ecological interactions remain unknown. To date, it is only known that the species inhabits tropical rainforests of the western Amazon [1].

7. See it in the wild, rural or peri-urban areas

According to information provided by the species description, an adult male was collected at Km 9.5 from the Leticia-Tarapacá Road in 1996, and an adult female was collected at INCRA neighborhood in 1991 [1]. It has been observed foraging at sunset, on leaf litter in secondary forest cover, near the city of Leticia (pers. obs. provided by Dario Alarcón).

8. Conservation

Least Concern. Due to its known range distribution, Micrurus tikuna inhabits areas with potential expansion of agriculture, cattle ranching, logging, and urban development, that would continue to reduce the known habitat of M. tikuna. Thus, this coralsnake needs a detailed review of its conservation status. Currently, the species is not listed in the Resolution 1912 of 2017 of the Colombian Environmental Ministry.

9. Scientific name and common names

The name of the genus Micrurus alludes to the small tail shown by these snakes. The word “mikros” means small, and the word “oura” means tail. Both are from Greek language. The specific epithet “tikuna” is a name originate from Tupi indigenous word taco-uma, that means a man with their face or nose painted with black. Tikuna also refers to a native Indian nation that lived in the Amazon region along the upper Solimões River, near the boundaries between Brazil, Colombia and Peru. As well as the members of the Tikuna Indians, M. tikuna has a head that is predominantly black. [1].

Table 1. Summary of important biological, venomic, epidemiological and medical traits.

TOXICITY AND BIOLOGICAL ACTIVITY ★	VENOM ACTIVITY PROFILE	GENERAL BIOLOGICAL TRAITS
LD_{50} (µg/mice): Unknown	**Proteolytic:** Unknown	**Total Length (cm):** ♂ ♀ 54-63
MCD (µg/mL): Unknown	**Neurotoxic:** Yes	**Weight (g):** Unknown
MDD (µg/mice): Unknown	**Myotoxic:** Unknown	**Reproduction:** oviparous
MED (µg/mice): Unknown	**Hemotoxic:** Unknown	**Diet:** Unknown
MHD (µg/mice): Unknown	-	**Distribution:** Leticia municipality, Amazonas Department, Southern of Colombia

PROTEOME			
PLA_2: Unknown	**SVSP:** Unknown	**SVMP:** Unknown	**NGF:** Unknown
CRISP: Unknown	**CTL:** Unknown	**DIS:** Unknown	**KUN:** Unknown
BPPs: Unknown	**VEFG:** Unknown	**3FTx:** Unknown	
Crotoxin: No	**Crotamine:** No	**LAAO:** Unknown	

MAIN ENVENOMATION SYMPTOMS		RISK	GRADE OF ENVENOMATION
Hemorrhage: Unknown	**Ecchymosis:** Unknown	**Bites per year:** Unknown	**Mild:** Unknown
Nausea: Unknown	**Hematemesis:** Unknown		
Hypotension: Unknown	**Blisters:** Unknown	**Bites per 1,000 people yearly:** Unknown	**Moderate:** Unknown
Edema: Unknown	**Vomiting:** Unknown		
Coagulopathy: Unknown	**Diarrhea:** Unknown	**Sequalae caused per year:** Unknown	**Severe:** Unknown
Sialorrhea: Unknown	**Local Pain:** Unknown		
Hematuria: Unknown	**Necrosis:** Unknown	**Deaths caused per year:** Unknown	
Renal failure: Unknown			

★ Poorly Reliable: Confidence for this species is poor due to the lack of data and information on Colombian populations. Therefore, most of our knowledge comes from a few studies and populations outside the national territory. LD_{50}: median lethal dose; MCD: minimum coagulant dose; MDD: minimum defibrinating dose; DEM: minimum edema-forming dose; DHM: minimum hemolytic dose; PLA_2: phospholipases A_2; SVSP: serine proteases, SVMP: metalloproteinases; NGF: nerve growth factor; CRISP: cysteine-rich secretory protein; CTL: C-type lectin/lectin-like, DIS: disintegrins, KUN: Kunitz peptides; BPPs: bradykinin-potentiating peptides; VEFG: vascular endothelial growth factor; 3FTx: three-finger toxins; LAAO: L-amino acid oxidases.

10. Referencias

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