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# Jellyfish Envenomation in Coastal Karnataka

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## Abstract

Jellyfish, belonging to the phylum Cnidaria, encompass diverse species with varying degrees of danger to humans. Despite many being harmless, their venomous tentacles can cause local and systemic effects, necessitating tailored treatment approaches. Current strategies often include oral/topical analgesics, hot water, ice packs, and vinegar application to mitigate symptoms. Here, we present a case study of a 19-year-old female successfully managed for a jellyfish sting using conservative measures and aggressive hydration, underscoring the importance of individualized care in such incidents.

## Keywords

Jellyfish; Envenomation; Coastal; Biodiversity

## Introduction

Jellyfish are aquatic invertebrates that have stingers on the ends of their tentacles, and they float in salt water. The tentacles are long and can inject venom, a proteinaceous toxin, from thousands of microscopic, barbed stingers, into the skin. They belong to the phylum Cnidaria. The phylum is subdivided into five classes: Staurozoa (Stauromedusae); Scyphozoa (true jellyfish); Hydrozoa (Portuguese Man O' War, fire corals, and hydroids); Cubozoa (box jellyfish); and Anthozoa (sea anemones and true corals), and is composed of about 10,000 species, with 100 of them known to be dangerous to humans [1, 2]. Despite most being harmless, a variety of local and systemic envenomation effects may occur. The treatment of the stings depends on the size and type of the jellyfish and the individual response of the patient – from mild symptoms to anaphylaxis. With some differences between species, there seems to be evidence and consensus on oral/topical analgesics, hot water, and ice packs as effective painkillers and on a 30-second application of domestic vinegar (4%–6% acetic acid) to prevent further discharge of unfired nematocysts remaining on the skin [2]. Most treatment approaches are presently founded on relatively weak evidence; therefore, further research (especially randomized clinical trials) is strongly recommended.

## Case Report

A 19-year-old female presented to the Emergency Department (ED) with a history of a jellyfish sting on February 26, 2022, when she had gone swimming at a local beach. The patient complained of intense, sharp, and localized pain at the site of the stings – which was her left forearm – with tingling and numbness associated with burning pain all over her left forearm since arriving at the ED. She also developed erythematous lesions resembling the stings at the local site and complained of pain over those sites. There was no history of shortness of breath, puffiness of lips, or itching, nor any history of chest pain, palpitations, dizziness, abdominal pain, or muscular spasms elsewhere in the body. The patient received local care at a nearby centre and presented to the ED within 45 minutes of the sting. On examination, she was conscious and oriented with pallor present but no icterus, cyanosis, clubbing, lymphadenopathy, or oedema. Her heart rate was 110/min, regular; blood pressure was 100/60 mm Hg in the right brachial artery. Cardiovascular examination revealed normal heart sounds. Respiratory examination showed bilateral normal breath sounds with no wheeze or rhonchi. Abdominal examination revealed a soft, non-tender abdomen in all quadrants with no organomegaly. Neurological examination revealed cranial nerves within normal limits with no focal deficits present. Local examination revealed linear, erythematous lesions of width 2mm and of variable length present on the left forearm, encircling it. Investigations revealed platelets of 171k, Hb of 12.3 mg/dl, and TLC of 8k. Liver function tests were normal, and urine analysis showed no casts or proteinuria. TSH was 2.05 mIU/L, serum creatinine was 0.71 mg/dl, blood urea was 29 mg/dl, potassium was 4.6 mmol/L, sodium was 140 mmol/L, calcium was 8.9 mg/dl, CPK levels were 664—1100—440 U/L, magnesium was 1.9 mg/dl, troponin T was <0.003, and BNP was 546. Treatment included the administration of a tetanus injection, pheniramine injection, and intravenous hydrocortisone injection along with intravenous fluids for hydration to prevent anaphylaxis. She was then transferred to a smaller intensive care unit for further management and observation. Symptomatic treatment with intravenous fluids, adequate hydration, and analgesia with antihistamines was continued. She was admitted and remained in the hospital for a total of 48 hours, during which serial CPK levels showed a rise from 664 to 1100, followed by a subsequent fall to 480 on discharge on the third day. Serial electrocardiograms were taken at regular intervals to monitor for arrhythmias, which were normal. Renal function tests and electrolytes were normal, and troponin I was negative. There were no further complications such as shortness of breath,

palpitations, abdominal pain, nausea, or vomiting, and the patient improved on this treatment. Pain and sensory complaints settled, and she was discharged. Follow-up after 2 weeks revealed a reduction of the lesions and no further symptoms (Figure 1).

**Figure 1:** Left forearm showing site of sting with linear, erythematous lesions of width 2mm and of variable length present on the left forearm, encircling it.

## Discussion

The Indian subcontinent boasts a lengthy coastline spanning 8,000 km, rich in biodiversity that encompasses both the west coast along the Arabian Sea and the east coast along the Bay of Bengal [3]. In recent years, environmental factors such as climate variations, warm temperatures, and salinity have led to a greater abundance of jellyfish populations in these coastal regions [4]. When a human comes into contact with a jellyfish tentacle, millions of nematocysts may inject venom into the skin, resulting in adverse reactions. Nutrients are absorbed through the gastro-dermal lining of the gastro-vascular cavity [3]. Jellyfish venom consists of a mixture of toxic and antigenic polypeptides, causing both local and systemic reactions in humans [5]. Jellyfish stings induce immediate local pain for approximately 30 minutes, with residual pain lasting several days. Physalis envenoming leads to vasospasm, nerve entrapment (such as carpal tunnel syndrome), intravascular haemolysis, peripheral gangrene, and AKI. Individuals sensitized by previous stings may experience anaphylaxis upon subsequent stings. Irukandji syndrome manifests as immediate severe musculoskeletal pain, followed by delayed and persistent trembling, nausea, vomiting, anxiety, generalized sweating, headache, breathlessness, hypertension, raised troponin levels, and ECG T-wave inversion, often requiring intensive management. Immunologically, both tubular structural and functional biopolymers, as well as venom components, can initiate innate, adaptive, and immediate and delayed hypersensitivity reactions, potentially treatable with topical anti-inflammatory-immunomodulatory therapy [6]. Treatment of jellyfish envenomation primarily aims at alleviating the local effects of venom (pain and tissue damage), preventing further nematocyst discharge, and controlling systemic reactions, including shock. The crucial first step after envenomation is basic life support (ABCs), focusing on maintaining respiration and blood circulation and removing tentacles. Evidence and consensus support the use of oral/topical analgesics, baking soda, hot water, ice packs, and (for cubozoans and non-Australian Physalia) topical vinegar or seawater. However, the use of pressure bandages remains controversial and potentially dangerous. Freshwater, alcohol, methylated spirits, and pressure bandages should not be applied as first aid, as they can induce nematocyst discharge through osmosis [2]. Ongoing large trials on topical inhibitors show promise in preventing jellyfish stings. A skin inhibitor cream (Safe Sea®, by Nidaria Technology, Zemah, Jordan Valley, Israel) is already commercially available in many countries worldwide, providing practical and affordable protection for swimmers against jellyfish stings. It has undergone testing in several RCTs, including in Florida, Norway, and Belize, against various species,

demonstrating efficacy in both prevention and severity reduction [7]. Chironex fleckeri is one of the deadliest box jellyfish species, with a sting capable of inducing cardiac arrest in humans. However, a team of researchers has developed an antidote using the powerful gene-editing tool CRISPR (Clustered regularly interspaced short palindromic repeats) as reported in 2019 [8, 9]. In terms of preventive medicine, divers and swimmers in high-risk areas should wear personal protective equipment (PPE). Adequate beach signage should alert tourists to jellyfish risks, and stinger nets may be employed for larger species. In conclusion, jellyfish envenomation presents a widespread problem in coastal regions, impacting tourism and revenue and thus constitutes a significant health concern in these areas. Further research is necessary to develop a standardized protocol for managing jellyfish stings, although challenges in recruiting patients, randomization, and outcome assessment complicate this endeavour. Future trials must accurately identify the jellyfish species under study, as the same waters may harbour many distinct species; the larger the study, the greater the potential variety involved [2].

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