Abstract #: 375

A Systematic Review of Treatment Strategies for Percutaneously Introduced Marine Toxins and Venoms

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Background:

- Marine envenomations are common worldwide and can lead to severe morbidity[1-3]
- Effects of marine envenomations can range from mild to severe and can include paralysis, cardiac depression and neurological toxicity, and can be fatal[3]
- There is a rising prevalence of travel and ecotourism, thus leading to increased risk of exposure to marine stings and penetrating marine injuries
- We aim to synthesize existing evidence around diagnosis, treatment, and prevention of marine envenomations into a clinical resource

Methods:

- Five electronic databases were searched: PubMed (Medline), Medline (OVID), EMBASE (OVID), LILACS and Scopus from database inception to March 2023 using combinations of the search terms 'marine' AND 'Intoxications' AND 'envenomation' AND 'syndrome' AND 'procedure'
- The search was restricted to humans only
- We included observational studies, case reports, case series, and cohort studies, as well as clinical trials and therapeutics tolerability and efficacy
- Abstracts and full-text articles will be systematically double screened by two reviewers and subsequently by a tertiary arbitrator
- The GRADE approach will be employed to assess quality of studies reporting therapeutic interventions
- Evidence will be summarized using descriptive measures for each intervention type
- Data will be grouped and summarized for ease of clinician use by marine organism, syndrome, prevention, and therapeutic strategies, and according to geographic location and species
- Meta-analysis will be performed as appropriate with random effects model

Results: *collated from analysis of 136 abstracts selected for full text review up until April 6, 2023*

Table 1: Table of study characteristics of interim articles to be included in full-text screening

Author (Year)	Setting	N	Mean Age (SD)	Range	Sex N (F:M)	Etiology	Population	Intervention	Outcomes (mean±SD)
	Brunei	1	45	-	0:1	Stingray	1	First treatment with analgesics, tetanus toxoid injection, and oral antibiotics. Then the second treatment was the removal of calcified spine and wound dressed with calcium alginate and non-adherent adsorbent polyurethane dressing after toilet wound. 7 day course of oral amoxicillin with clavulanic acid.	**Efficacy:** First treatment did not heal wound leaving a deep ulcer with unhealthy base. Improvement of wound and decrease in swelling within 3 days after spine removal and second treatment; Wound full healed with scar after 4 weeks. **Safety:** Not mentioned. **Tolerability:** Not mentioned.
Lim (2007)[13]	Sulawesi, Indonesia	1	32	-	0:1	Sea anemone	1	The first treatment involved a course of oral cefuroxime, cloxacillin, metronidazole, and mefenamic acid. The second treatment involved oral amoxicillin with clavulanic acid, ciprofloxacin, doxycycline, and tetanus toxoid. The third treatment involved intravenous clindamycin, oral ciprofloxacin, and discharged on oral antibiotics.	**Efficacy:** Despite the first treatment, swelling and redness of right leg persisted. One week after the second treatment showed no improvement. The third treatment showed improvement with the follow-up showing a crusted plaque from before being replaced by an eschar. **Safety:** Not mentioned. **Tolerability:** Not mentioned.
	-	1	27	-	0:1	Jellyfish	1	Oral medication for pain relief. Treatment included administration of anti-tetanus toxoid injection, an oral course of amoxicillin with clavulanic acid, loratadine and topical mupirocin ointment. The wounds were dressed with absorbent polyurethane dressing.	**Efficacy**: Oedema of affected limb was reduced, and wound was healing on follow-up after 9 days. Full blood count was normal. **Safety**: Not mentioned. **Tolerability**: Not mentioned.
Zeman (1989)[15]	U.S.A.	3	19	12-55	0:3	Catfish	1	Spine removal under general anesthesia or lidocaine; 10 day course of oral cephalexin 500mg 4 times daily for adult; 4 day course of oral cefadroxil 500mg twice daily; 10 day course of oral cephalexin 250mg 4 times daily for child.	**Efficacy**: No wound culture. Persisting paresthesia after one-week, but after four months, it was barely noticeable. **Safety**: Not mentioned. **Tolerability**: Not mentioned.
Trestrail[16] (1989)	-	23	M: 29.8 F: 35	17-50	8,7%: 91.3%	Lionfish	1	Immersion of effected area in hot water at 40 degrees Celsius for 60 to 90 min, analgesics, tetanus toxoid, and antibiotics.	**Efficacy**: No deaths noted, and treatment was effective. **Safety**: Not mentioned. **Tolerability**: Not mentioned.
Mahjoubi[14] (2017)	Mayotte Island, Indian Ocean	1	24	-	0:1	Whiptail stingray	1	Surgical procedure with video-assisted thoracoscopy; Prophylactic antibodies (piperacillin-tazobactam) were continued for 1 week.	**Efficacy**: It was effective as they recovered 6 weeks later. **Safety**: Deep-penetrating lacerations should be explored surgically with debridement, irrigation, and careful removal of spine. **Tolerability**: Not mentioned.

M: Male; **F:** Female

Table 2: Breakdown of abstracts by database

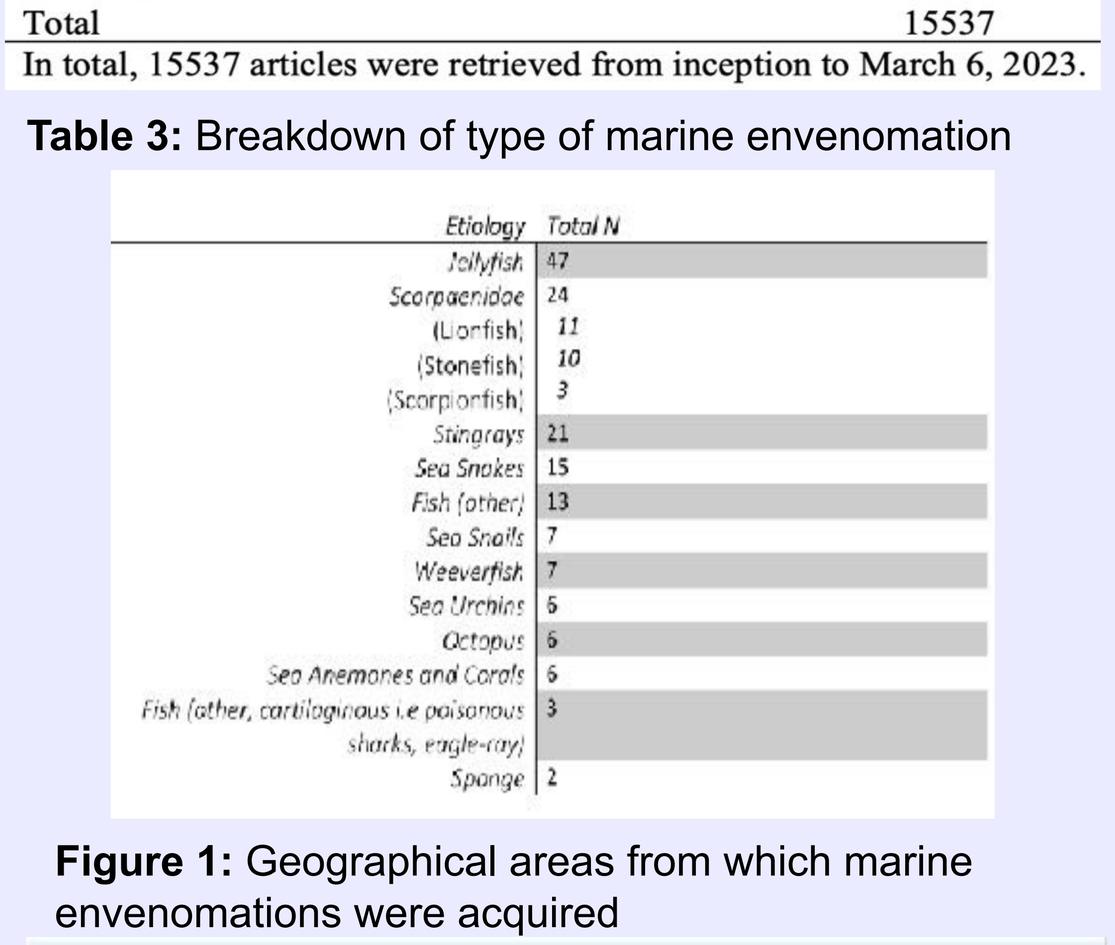
Database	Articles
EMBASE	1383
MEDLINE	686
PUBMED	5609
SCOPUS	5388
LILACS	2471
Total	15537

In total, 15537 articles were retrieved from inception to March 6, 2023.

Table 3: Breakdown of type of marine envenomation

Etiology	*Total N*
Jellyfish	47
Scorpaenidae	24
(Lionfish)	*11*
(Stonefish)	*10*
(Scorpionfish)	*3*
Stingrays	21
Sea Snakes	15
Fish (other)	13
Sea Snails	7
Weeverfish	7
Sea Urchins	6
Octopus	6
Sea Anemones and Corals	6
Fish (other, cartilaginous i.e poisonous sharks, eagle-ray)	3
Sponge	2

Figure 1: Geographical areas from which marine envenomations were acquired



Discussion and Conclusion:

- With increased globalization and the rising number of clinicians electing to train or work in areas where marine envenomations are common, it is important to synthesize the current evidence around clinical epidemiology, presentation, and management for marine envenomation's
- There are huge pressures on global fisheries leading to mariners being exposed more frequently
- Thus far in our search, jellyfish, scorpaenidae, and stingrays are the leading etiological agents for marine envenomations, and geographical areas of interest for the envenomations include North America, Australia, and Europe
- This synthesis will subsequently help to develop updated clinical health protocols to ensure timely and effective medical intervention for marine envenomations

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