

Jellyfish stings on Langkawi Island, Malaysia

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ABSTRACT

Introduction: Jellyfish stings are the most frequently reported marine animal envenomation worldwide. However, data on jellyfish sting from Malaysia remains obscure due to inadequate research.

Methods: We investigated the epidemiology, clinical features and treatment of patients presenting at the emergency department of Langkawi Hospital between January 2012 and December 2014. Secondary data on the nature of the incident, patient demographics, clinical presentation, and treatment were retrieved from the patients' medical records. Descriptive statistics were presented for all patient variables.

Results: A total of 759 patients presented with jellyfish stings during the 3-year study period, with highest number of visits in July, October, November, and December. The mean patient age was 26.7 years (SD: 12.14), 59.4% were men, 68.1% were foreigners or international tourists, and 40.4% were stung between 12.00 p.m. and 6:59 p.m. At least 90 patients presented with mild Irukandji or Irukandji-like syndromes. Most of the jellyfish stings occurred at Chenang Beach (590 reported cases), followed by Tengah Beach and Kok Beach. Most patients were treated symptomatically, and no deaths following a jellyfish sting was reported during the study period.

Conclusion: There is a need for public health interventions for both local and international tourists who visit Langkawi Island. Preventive steps and education on initial treatment at the incident site could elevate public awareness and decrease the adverse effects of jellyfish stings.

KEY WORDS:

Bathing beaches; Cnidaria; emergency care; jellyfish stings; Malaysia

INTRODUCTION

Many reports of severe jellyfish stinging incidents have been published, including the massive incidence that occurred on Australia's east coast in 2006 where more than 30,000 people were stung by the blue jellyfish.¹⁻⁶ Smaller numbers of jellyfish envenomations also have been recorded on the Aquitaine coast of France; 154 cases in 2010 and 885 in 2011.⁴ The effect of jellyfish venom on humans varies depending on the species involved. Some of the systemic symptoms that occur

frequently are gastrointestinal (mainly caused by *Physalia physalis* and *Pelagiidae* spp.), muscular, cardiac, and neurological (*Physalia* and *Cubozoa* spp.), and allergic manifestations (*Pelagiidae* and *Cubozoa* spp.).⁷ Death from jellyfish envenomation is not uncommon.^{2,8,9}

Cases of fatal and severe jellyfish stings have been reported in our neighbouring country Thailand since the year 2001.¹⁰ Box jellyfish have been identified as the potentially deadly jellyfish in Thai waters, and this species can be divided into two subgroups; multi-tentacles (chirodropids) and single-tentacle (carybdeids) group.^{6,9} Box jellyfish are known for their venomous stings and venom released by the carybdeid group is known to cause Irukandji syndrome.¹¹ This syndrome consists of severe low back pain, muscle cramps, abdominal and chest pain, restlessness, headache, palpitation, uncontrolled hypertension and pulmonary oedema. If severe, the patient may require intensive care management. Other species have also been reported in this region, but they are considered to be less life-threatening as compared to the box jellyfish.⁹

Published data on jellyfish stings in Malaysia are scanty even though the country has a tropical climate and is surrounded by ocean water. We are aware of only one journal report on jellyfish envenomation in Malaysia, by Lipmann *et al.* and published in 2011.¹² It described three fatalities, one each on Langkawi Island, Kota Kinabalu, and Pangkor Island; and five cases of near fatal envenomation that were reported on Langkawi Island. All were in tourists who were admitted to the local hospital for treatment. The lack of information prompted us to carry out this investigation of the epidemiology, clinical features, and treatment of jellyfish stings in patients presenting to the emergency department of Langkawi Hospital. It is also our interest to study the presence of carybdeid jellyfish in the Langkawi waters based on the specific symptoms as reported by patients.

MATERIALS AND METHODS

This cross-sectional study evaluated data collected between January 2012 and December 2014 from patients seeking medical treatment at Langkawi Hospital following jellyfish stings. Langkawi Island is a popular tourist destination in northern Malaysia, and is known both locally and internationally for its sparkling, sandy beaches and natural beauty. In 2014, approximately 3.6 million tourists visited this island.¹³ Langkawi Hospital is the only hospital on the

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Table I: Demographic characteristics of patients presenting with jellyfish stings

Characteristic	n	(%)	Mean	(SD)
Age (years)*			26.7	(12.14)
0-9	68	(9.1)		
10-19	127	(17.0)		
20-29	277	(37.2)		
30-39	142	(19.1)		
40-49	64	(8.6)		
50-59	39	(5.2)		
60-69	23	(3.1)		
70-79	5	(0.7)		
Nationality				
Resident/local tourist	242	(31.9)		
Foreigner/international tourist	517	(68.1)		
Gender				
Male	451	(59.4)		
Female	308	(40.6)		
Time of incident				
7:00 am-11:59 am	75	(9.9)		
12:00 pm-6:59 pm	307	(40.4)		
7:00 pm-11:59 pm	286	(37.7)		
12:00 am-6:59 am	91	(12.0)		

* Data on patients' age was normally distributed. Information on age was not available for 14 patients.
n = number of patients; % = percentage; SD = Standard Deviation

Table II: Clinical presentation and treatment received following jellyfish sting

Variable	n	(%)
Body region*		
Lower limb	581	(76.5)
Upper limb	411	(54.2)
Chest and abdomen	59	(7.8)
Back	28	(3.7)
Head and neck	19	(2.5)
Common complaints following jellyfish sting^		
Red skin marks	693	(91.3)
Chest tightness	90	(11.9)
Abdominal discomfort	78	(10.3)
Muscle cramps	53	(7.0)
Back pain	47	(6.2)
Nausea and vomiting	14	(1.8)
Treatment received		
Corticosteroid (Hydrocortisone)	646	(85.1)
Antihistamine (Piriton)	635	(83.7)
Pain reliever	583	(76.8)
Histamine H2-blocker (Ranitidine)	134	(17.0)
Non pharmacological remedy used by patient#		
Vinegar	191	(25.2)
Ice pack	72	(9.5)

* More than one body region can be stung at one time.

^ More than one complaint can be presented at one time. Only the six most common complaints are listed.

Applied by patient at the site of incident before arriving at the hospital.

n = number of patients; % = percentage of patients.

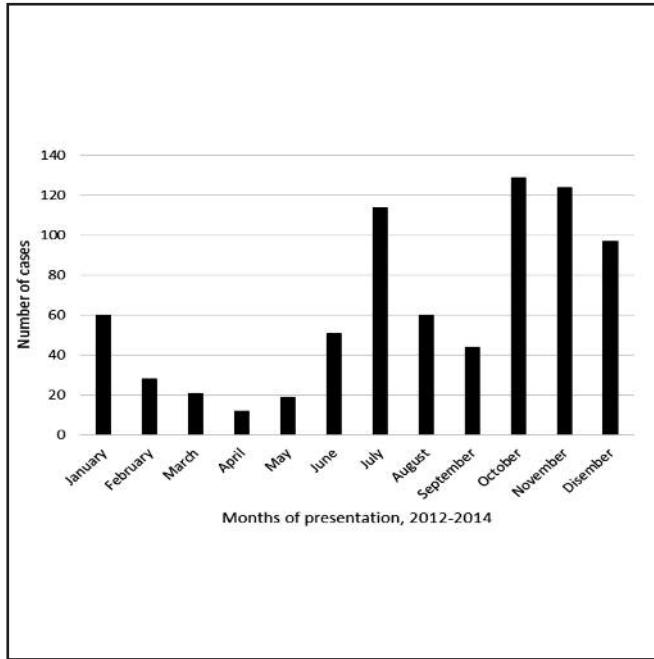


Fig. 1: Cumulative number of patients treated for jellyfish sting from 2012-2014, presented according to month.

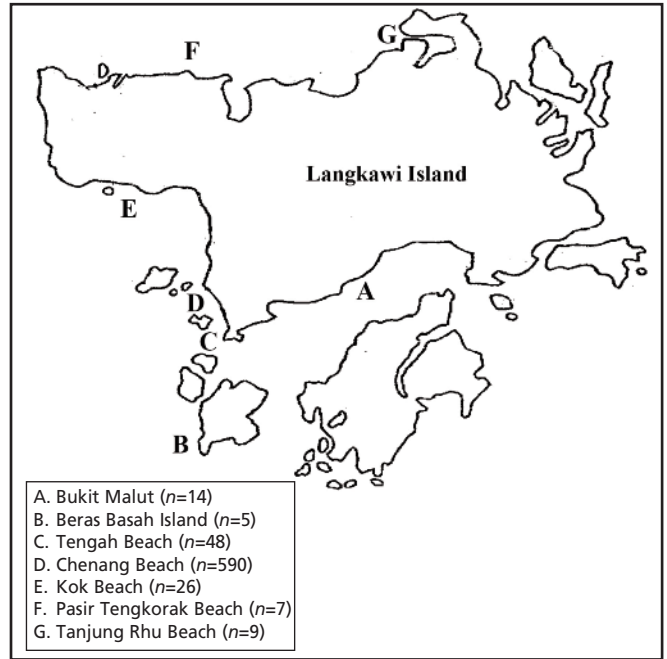


Fig. 2: Map of Langkawi Island showing the locations of the jellyfish stings. n = total number of cases reported during the 3-year study period (2012-2014). The location of the jellyfish stings was unavailable for 60 patients.

island and caters to the needs of both local residents and tourists who require medical attention. Consequently, the data on incidence of jellyfish stings were collected from this hospital.

Patients presenting with suspected jellyfish stings were treated by a medical team consisting of an emergency physician and several medical staff. The diagnosis of jellyfish sting was based on a history of jellyfish encountered while in the sea, and the presence of suggestive symptoms and complaints such as red marks on the skin. The case records of all patients treated for jellyfish stings at this hospital throughout the study period were retrieved. The data collected for each sting event included the age, sex and nationality of the patient; the place where the incident occurred, body region involved, the primary complaint on arrival at the hospital, the treatment received, and occurrence of any adverse complications. We attempted to categorise the clinical presentation as Irukandji syndrome or Irukandji-like syndrome based on clinical criteria used in other studies.^{9,14}

The retrieved data were entered in a spreadsheet (Microsoft EXCEL 2007) and presented as numbers and percentages or medians and range. We also analysed the monthly numbers of patients and the locations of the jellyfish stings. The Medical Research Ethics Committee of Malaysia approved this study (NMRR-14-829-22021).

RESULTS

A total of 759 patients presented with jellyfish stings during the three year study period. Figure 1 shows the numbers of patients who presented to the emergency department during each month of the year as a cumulative total for the three years (2012–2014). There was a seasonal pattern, with the highest number of cases reported in July, October, November and December and the lowest in April. The mean age of patients was 26.7 years (SD 12.14), 59.4% were men, 68.1% were foreigners or international tourists, and 40.4% were stung between 12:00 p.m. and 6:59 p.m. (Table I). Most stings (76.5%) were on the lower limbs; only 2.5% were on the head and neck. On arrival at the emergency department, the most frequent patient complaint was red skin lesions (91.3%), followed by chest tightness (11.9%), abdominal discomfort (10.3%), and muscle cramps (7.0%). At least 90 patients presented with mild Irukandji or Irukandji-like syndromes. Most of the patients were treated symptomatically (Table II) and all were eventually discharged from the emergency department without being admitted as inpatients. Most of the jellyfish stings occurred at Chenang Beach (590 reported cases, Figure 2), followed by Tengah Beach (48 cases) and Kok Beach (26 cases). None of the patients’ medical records had any information about the jellyfish (e.g. size, shape, colour, or tentacle length). No illustrations or photographs of the jellyfish were available.

DISCUSSION

Most data analyses of previous published articles of jellyfish stings in Malaysia were based on case reports from media searches.^{12,15} To the best of our knowledge, this is the first

report that used data from patient medical records, which provide a better insight on this marine envenomation problem. The results from this study reveal a pattern of jellyfish sting incidence over three cumulative years in which the number of events was higher toward the end of the year. The large number of tourists who visit the island during the local school holidays during November and December could explain why more people encountered jellyfish at that time of year. It is also possible that changes in climate and seawater temperature at the end of the year may stimulate the influx of jellyfish colonies.^{16,17} However, data on an association of the incidence of jellyfish stings with seawater and weather conditions are not available, and that will be an area for future study.

Because the majority of seawater activities take place during daylight hours, it is not surprising that the highest incidence of jellyfish stings was between 12:00 p.m. and 6:59 p.m. Nevertheless, there were also patients in our cohort who were stung at night; between 7:00 p.m. and 11:59 p.m., and between 12:00 a.m. and 6:59 a.m. Many people thus entered the sea after sunset without knowing the risk of being stung by jellyfish. Our results are similar to those of Ping and Onizuka who reported that 61% of jellyfish envenomation cases presented at a Honolulu, Hawaii hospital emergency department at night between 10 p.m. and 2 a.m.¹⁸ In Thailand and Australia, protective nets surrounding swimming areas have been used to reduce the risk of jellyfish envenomation.^{9,19,20} Local authorities on Langkawi Island might adopt this preventive measure to ensure that swimmers can continue enjoying their sea activities in a protected environment regardless of the time of day.

The largest number of stings occurred at Chenang Beach, probably because of the large proportion of local and international tourists who choose to visit this sandy beach. The public, including tourists, may not be aware of the danger of jellyfish stings on Langkawi Island. Pamphlets on jellyfish stings should be available at the airport and ferry terminal, which are the main points of entry. Mitchell *et al.* also suggested that such written travel advice should include where to seek medical assistance if an emergency occurs, to swim at patrolled beaches, and avoid swimming alone.²¹ In this era where information can be readily accessible, the authors also recommend that such reminder on jellyfish stings can be made available online, especially on the websites of the island authorities, travel agencies and hotels. Beaches with a high incidence of jellyfish sting should have warning signs posted to alert the general public and swimmers about the presence of jellyfish. As suggested by Lippmann *et al.*, the signs should be multilingual.¹¹ Hotels located near the beach should also be urged to be proactive in educating their guests on the dangers of jellyfish stings. A simple reminder at check-in would suffice.

Following contact with jellyfish, nearly all patients presented with red marks on their skin. Other common complaints were chest tightness, abdominal discomfort and muscle cramps. A variety of effects of jellyfish sting have been reported. These include cutaneous inflammation, marks, localised irritation, and pain in the skin surrounding the sting.^{6,7} As the venom enters the blood circulation, systemic symptoms become

more apparent, with gastrointestinal, cardiac, neurological, and allergic manifestations.²² Although they are not common, more severe symptoms such as cardiac arrest and respiratory failure can occur because of cardiotoxins and neurotoxins present in the venom.²³ Fortunately, no deaths from jellyfish stings was reported during the study period.

As mentioned above, we were unable to identify the species of jellyfish involved. However, the recorded case histories and clinical presentations were consistent with the effects of stings of carybdeid and chirodroid jellyfish. We found at least 90 patients with mild Irukandji or Irukandji-like syndrome symptoms, which is not surprising as those two subgroups of box jellyfish have been seen and caught in the seawater surrounding Malaysia and neighbouring Thailand.^{9,10,12}

Despite the possibility of serious adverse events, most of the treatments necessary were symptomatic. Nearly every patient in our cohort received antihistamines, corticosteroids, and pain relievers when brought to the hospital. Although the use of vinegar to treat jellyfish stings is controversial, there were patients who reported applying vinegar or ice packs to the sting as a first aid treatment before coming to the hospital. Studies of box jellyfish stings in Australia report use of vinegar to prevent stinging cells adherent to the skin from discharging and application of hot water and topical lidocaine for symptomatic relief.²³ It is recommended that beach hotels keep first aid remedies on the premises to facilitate early treatment because initial treatment at the location of the incident may help to prevent adverse health outcomes. With the high number of jellyfish encounters reported each month, it is also imperative to continuously educate medical staff on identification of symptoms and train them on proper treatment of jellyfish stings. This will help them to be familiarised with various presentations following jellyfish stings.

This study has several limitations. We were unable to confirm the species of jellyfish encountered by patients because their medical records did not include documentation or photographs of the jellyfish. The emergency department of Langkawi Hospital is in the process of including additional items on the characteristics of jellyfish to the medical forms to enhance data capture for future analysis. Secondly, the study data was obtained from a single treatment centre. Patients with minor symptoms following a jellyfish sting may not have required or sought medical treatment, or just went to a nearby clinic. Thus, we cannot comment on the true incidence of jellyfish stings on Langkawi Island. A study involving our hospital plus local clinics would provide a more complete picture. Nevertheless, the results of this study can serve as a reference for local authorities when planning preventive strategies to reduce the number of jellyfish sting cases, especially among tourists.

CONCLUSION

This study identified a pattern of variables among patients treated for jellyfish stings that showed most were young adults, foreigners or international tourists, and involved in daytime sea activities. Concerted efforts by local authorities and hotel operators are much needed to minimise the

incidence of jellyfish stings. Suggestions to improve public awareness include informative pamphlets, warning signs on the beaches, and safety nets surrounding swimming areas. First aid remedies should be made available at beach hotels to reduce the severity of this marine animal envenomation.

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