
BRIEF REPORT

Poisonous fish stings on the coast of Malaga, Spain: summertime incidence

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CONFLICT OF INTEREST:

None.

Objective: To estimate the incidence of poisonous fish stings on the coast of the province of Malaga.

Material and methods: Data were collected from case records and by surveying the staff at emergency rooms and other public and private health care facilities during the summers of 1998 through 2000. Descriptive statistics were compiled for the middle portion of that period, the summer of 1999.

Results: Fifteen fish stings per 100 000 population were estimated to have been treated at emergency services. The incidence was higher in the eastern portion of the province.

Conclusion: The risk of fish stings is not negligible and, given the severity of some lesions, this type of poisoning warrants consideration when summertime emergency health care services are being planned for coastal areas. [Emergencias 2008;20:00-00]

Key words: Ichthyotoxism. Stings, poisonous fish. Incidence.

Introduction

The first epidemiological study performed in Spain in 1978 among professional fishermen found 184 cases of ichthyotoxism or poisonous fish stings in the province of Cadiz¹. The present epidemiological work provides additional objective data on incidence and risk groups.

Method

Firstly, we determined the proportions of age and sex of the affected population, time, day and month of maximum cases, as well as anatomic sites involved. To determine the geographic area distribution of these accidents, in order to obtain a general risk map, we considered the hydrologic and demographic characteristics of the area. Data on cases of fish stings along the 164 km coastline of the province of Malaga was obtained from public and private hospital Emergency Departments (EDs) near the

coast, between 1998 and 2000. The study period was limited to the months June-September, due to high seasonality of this type of lesion. Estimation and analysis of incidence and geographic distribution was performed at the middle of the study period (1999). Two different sampling strategies or methods were designed to obtain the case reports: (a) questionnaire-based surveys distributed to EDs for completion by medical or nursing staff, and (b) review of a random sample of health centres ED records. In order to avoid data duplication, case reports obtained by the first method were cross-checked against those obtained by the second method.

We controlled for the following possible confounding factors: (a) error due to absence of medical staff participation in questionnaire completion, and (b) error due to misdiagnosis, confusing fish stings with lesions produced by urchins, jelly fish or inert objects, etc. This latter error was negligible, given the particular characteristics of fish stings making confusion by health staff highly unlikely.

Table 1. Data and estimated number of fish-sting patients attended at Emergency Departments near the coast of the province of Malaga

Areas	Emergency Department	Stings summer 1998		Stings summer 1999		Stings summer 2000		Estimation
		Surveys	Records	Surveys	Records	Surveys	Records	
Eastern	Hosp. Axarquía**	6	14	6	9	5	–	14
	C.S. Nerja**	1	6	3	–	3	–	6
	C.S. Torrox	–	8	5	–	11	–	8
	C.S. Algarrobo	0	–	2	–	0	–	3,21*
	C.S. Torre del Mar**	7	10	0	–	2	–	10
	C.S. Vélez Málaga	0	1	0	–	0	–	1*
	C.S. Rincón de la Victoria	–	18	16	–	7	–	18
	Cl. Rincón-Nerja	0	–	0	–	2	–	2
	Cl. Salus Nerja	3	–	0	–	0	–	3
	Artzemtrum Cl. (Torrox)	–	–	1	–	2	–	2
	C. El Morche	1	–	0	–	3	–	3
	C. Algarrobo	0	–	1	–	0	–	1
	Cl. Rincón (T. del Mar)	0	–	0	–	2	–	2
Bay of Málaga	Hosp. Carlos Haya**	2	3	0	2	4	–	3
	Hosp. Clínico**	2	3	2	8	2	10	10
	Hosp. Materno	2	–	0	–	0	–	3,21*
	Hosp. Civil	–	5	–	–	0	–	5
	Cl. El Ángel	0	–	1	–	1	–	1,60*
	C.S. El Palo	–	–	11	–	1	–	17,63*
	C.S. Puerta Blanca	0	–	1	–	1	–	1,60*
	C.S. Barbarela	–	3	0	–	2	–	3*
	C.S. Limonar	–	4	–	–	–	–	4
	C.S. Torremolinos	–	8	2	–	7	–	8
	Protección Civil El Palo (Socorrista)	–	–	–	–	2	–	2
	C.S. Las Delicias	–	–	1	–	–	–	1
	Cl. Santa Elena	1	–	1	–	1	–	1
Western	Hosp. Costa del Sol**	3	9	2	6	5	–	9
	C.S. Arroyo de la Miel**	–	5	5	6	3	–	6
	C.S. Los Boliches	0	–	2	–	4	–	6,41*
	C.S. Las Laguna	13	–	16	–	10	–	25,64*
	C.S. Fuengirola Oeste	0	–	2	–	1	–	3,21*
	C.S. Albarriza	6	–	3	–	2	–	9,62*
	C.S. San Pedro Alcántara	1	–	1	–	4	–	6,41*
	C.S. Estepota**	2	16	11	18	0	9	18
	Cl. San Francisco (Fuengirola)	0	–	1	–	1	–	1
	Cl. Angeles Nocturnos (Fuengirola)	1	–	1	–	0	–	1
	Cl. Europa (Marbella)	1	–	1	–	0	–	1
	Cl. Calahonda	1	–	0	–	0	–	1
	Cl. Virgen de la Sierra (Marbella)	1	–	0	–	1	–	1
	C. Sabinillas Costa	1	–	0	–	0	–	1

C.S.: "Centro de Salud" = Health Centre; Hosp.: Hospital; Cl: Private health clinic; C: (medical) Consultation.

Estimation strategy: (a) priority given to data obtained from ED records over data obtained from surveys, and (b) selecting, for each centre and sampling campaign, the year of highest number of case reports. Patients consulting more than once were only counted as one case.

*Estimation of the number of cases based on the percentage of response by health staff to the questionnaires.

**Health Centres selected to calculate the degree of physician participation in the surveys.

We designed a model to estimate the incidence of cases that allowed subsequent analysis, with the following strategy: (a) priority given to data obtained from ED records over data obtained from surveys, and (b) selecting, for each centre and sampling campaign, the year of highest number of case reports. Estimation of the index of physician participation in the surveys was carried out based on the summer of maximum case reports, for 4 health centres and 4 hospitals according to mean percentages obtained after cross-matching ED records with questionnaire data, using Chi square test. To maximally reduce the standard deviation between the two sampling

methods, maximum participation was adjusted to meet the null hypothesis limit, for an alfa value of 0.05.

$$\bar{X} = \frac{100 \times \bar{Y}}{\bar{Z}}$$

where X = percentage of estimated participation; Y = number of survey-based cases in the summer of maximum incidence (Chi square: observed cases), and Z = number of ED-based cases in the summer of maximum incidence (Chi square: expected cases).

Consequently, estimated risk of suffering a sting was as follows:

Table 2. Common ichthyotoxic species of the Spanish coastline^{1,6,7,10}

Family	Species
Trachinidae	<i>Trachinus draco</i>
	<i>Trachinus radiatus</i>
	<i>Trachinus araneus</i>
	<i>Echiichthys vipera</i>
Scorpaenidae	<i>Scorpaena porcus</i>
	<i>Scorpaena scrofa</i>
	<i>Scorpaena notata</i>
	<i>Scorpaena elongata</i>
Uranoscopidae	<i>Uranoscopus scaber</i>
Dasyatidae	<i>Dasyatis pastinaca</i>

$$\text{Estimated incidence} = \frac{\text{Estimated total number of stings}}{\text{Estimated mean population in 1999}}$$

In order to facilitate the analysis, the study area was divided into three areas according to demographic and oceanographic characteristics: western (between the municipalities of Manilva and Benalmádena, with Atlantic influence and marked tourism), bay of Malaga (comprising the municipalities of Torremolinos and Malaga, a large metropolitan area with both Atlantic and Mediterranean waters) and eastern (between the municipalities of Rincón de la Victoria and Nerja, with Mediterranean water and less tourist development). For population estimates, census data were not used due to the marked touristic nature of the area and the fact that the census includes

Table 3. Summary of symptoms due to ichthyotoxic lesions that may appear depending on severity of the lesion, and treatment applied according to the case⁷⁻¹⁵

Symptoms
One to three very small skin punctures
Intense lacerating pain (24 to 48 hours)
Perilesional edema and distal cyanosis
Increased local temperature
Prostration, headache, nausea, vomiting, anxiety
Hypotension, sweat, dry mouth
Cramp and muscular paralysis, convulsions
Lymphangitis, capsular fibrosis and paresthesia
Infection by vibrio species
Raynaud's reaction
Disorder of Cardiac rhythm
Respiratory distress
Shock
Gangrene
Treatment
Immersion in hot water
Calcic gluconate (20 % intravenous injection)
Local infiltration with procaine (1%)
NSAI Analgesics (ketorolac and methamizol)
Anti-tetanus prophylaxis
Peripheral nerve block (bupivacain 0.5%) for persistent pain
Antibiotics in cases of infection

non-residents. We therefore estimated the population indirectly from urban waste solid residue, assigning a ratio of 1.2 Kg of waste per inhabitant for the tourist areas².

Results

We recorded a total 414 cases of ichthyotoxism, of which 6.3% required repeated emergency service attention. After finding no significant differences in results between survey and ED records ($\chi^2 = 7,08$, gl = 7, p = 0,41), mean survey participation was $56 \pm 21\%$, and after standard deviation adjustment this was $62 \pm 19\%$. The estimated number of fish-sting cases attended in summer 1999 was 225, distributed as follows: western area 90 cases (40%), bay of Malaga 61 cases (27%) and eastern area 73 cases (31%) (Table 1). Mean number of inhabitants on the coast of Malaga during summer 1999 was estimated at 1.512.565, with maximum density of 1.651.288 in August 1999, distributed as follows: western area 616.643 (41%); bay of Malaga 682.868 (45%) and eastern area 213.055 inhabitants (14%). Estimated incidence of fish stings during summer 1999 was therefore 15 stings/100.000 inhabitants (14.6, 8.9 and 34.4 stings/100.000 inhabitants for each area, respectively).

The greatest number of cases occurred in July and August (34.6% and 37.6% respectively). The greatest number of cases was attended between 13:00 h and 19:00 h, affecting mainly males (71%), with ages ranging from 2 to 72 years (mean 32 years). The adolescent group between 11 and 19 years clearly presented the greatest risk of stings, followed by people between 25 and 37 years. Regarding activity, the most affected were bathers (56%), followed by fishermen (33%) of whom 74% were recreational and 26% professional. Less frequent activities were fish cleaning (7%) and sub-aquatic activity (3%). Anatomic regions most affected were feet (50%) and hands (43%), followed by arms (2%), legs (2%), back (1%), and other areas (2%) occasionally being serious cases.

Discussion

The high percentage of non-resident population (and therefore the need for estimating numbers) represented a difficulty in this study, as was the scarcity of data and sampling by surveys and

records, which impedes extrapolation and analysis. On the Atlantic coast of France during the summer of 1996, 1.500 fish stings were recorded; the Department Landas alone had an incidence of 9 stings/100.000 inhabitants^{3,4}, somewhat less than that observed for the province of Malaga. The reasons may be related to sampling methodology, reduced presence of causal agents or lower exposure by the different risk groups. Conclusions from the data observed were that the highest risk group was fishermen, followed by bathers. The high frequency of adolescents affected contrasts with the low percentage of victims older than 60 years who nevertheless presented complications associated with elderly pathologies that required special attention. The greater incidence of ichthyotoxism found in the eastern area is consistent with greater abundance of at least one of the poisonous fish species belonging to the family Trachinidae, *T. draco*⁵. However, *E. vipera*, also present in the area and inhabiting shallow water near the coast, was responsible for a large number of stings in bathers, while *T. draco*, found in somewhat deeper water⁶ affected mainly fishermen (Table 2). Symptomatic treatment applied was usually sufficient for pain relief, so the number of patients requiring a second visit was low, but some of these cases were severe and needed specific treatment⁷⁻¹⁰ (Table 3).

Addendum

The present study forms part of the Doctoral Thesis of Andrés Portillo Stempel (Universidad de Málaga; 2002) and has been presented at diverse congresses.

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Incidencia de picaduras de peces venenosos en la costa de Málaga, España, durante la época estival

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