THE INDIAN CATFISH, *Heteropneustes fossilis* (BLOCH, 1794) ENVENOMATION- A REPORT OF FOUR CASES FROM BASRAH AND MAYSAN, SOUTH OF IRAQ

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**Abstract**

Venomous catfish stings are a common environment hazard worldwide. Although these stings are often innocuous, significant morbidity may result from stings, including severe pain, retained foreign bodies, infection, respiratory compromise, arterial hypotension, and cardiac dysrhythmias. Treatment included hot water immersion, analgesia, wound exploration, and prophylactic antibiotics. In this article, three cases of stings by the Indian catfish, *Heteropneustes fossilis* were referred to the emergency Department, Republican Hospital at Basrah and Mysan Provinces, south of Iraq and their treatments have been reported.

**Keywords:** catfish, stings, venomous animals, poisonous glands, frenzy feeding
1. Introduction


The Indian catfish is found throughout south and southeast Asian countries including Bangladesh, India, Laos, Myan-mar, Nepal, Pakistan, Sri Lanka and Thailand (Talwar and Jhingran, 1991). It has been introduced into Iraq in the late 1950s (FAO, 1997) and recorded from the freshwaters of southern Iraq in 1960 by Khalaf (1961) and from the marine waters of Khor Al-Zubair, northwest Arabian Gulf (Al-Hassan and Muhsin, 1986). The control of the snail Bulinus truncatus, the vector for the human parasite causing schistosomiasis, was the aim of its introduction into Iraqi freshwater system, but which proved to be ineffectual (Jawad, 2003). This species was reported from other parts of the Middle East like the rivers and marshes in Khuzestan, Iran (Coad and Abdoli, 1993; Coad, 1996; Abdoli, 2000), the Tigris River watershed in Turkey (Ünlü et al., 2011), and recently it was recorded from the first time from Al-Khabur River, Al-Hasaka, Syria (Ali et al., 2015).

Indian catfish has an elongate and laterally compressed body with depressed head and terminal mouth. The dorsal fin is very small, with no leading spine and located in the anterior third of body, almost coinciding with the pelvic fin level. Presence of 4 pairs of barbels. Eyes are small and lateral. The body color of the fish is gray through to brown or black. Presence of two tubular air sacs extending from the gill cavity almost to the caudal peduncle. It uses two breathing systems and can respire aerially by taking in air at various intervals when oxygen content of the water reaches minimum level of requirement (Munshi, 1993). As a result, this catfish can live in conditions not suitable to other fishes.

Although it has not been taken as food species in Iraq and the Middle East, *H. fossilis* is commercially and aquaculturally is considered a significant fish in many Asian countries (Hossain et al., 2015). It is heavily fished for its energizing meat quality that includes taste, nutritional, and medicinal values (Jha and Rayamajhi, 2010). There are high amounts of protein
in its muscles, iron (226 mg/100g) and calcium (Saha and Guha, 1939; Alok et al., 1993). Being a lean fish (fat content only 2.57 ± 0.24%), it is conducive to people on low-fat diets (Rahman et al., 1982).

This species of catfish is dangerous to human. A venom glands are present near the spine of the pectoral fin of the males. Fishermen are aware of the dangerous stings of this fish and if they catch it in their nets, they remove it with a piece of cut-off net, with great care (Satora et al., 2015). Several instances where this fish became in contact with human delivering a single sting were reported from the inland water of Iraq and the other countries (Zakaria, 1964; Coad, 1979; Berra, 2001).

In the present cases, a report for the first time about four cases (5 persons) of severe attack by the fish giving multiple stings to the same victim from Shatt Al-Arab River, Basrah Province and Majar Al-Kabir River, Mysan Province, Iraq.

2. Cases Reports

Cases of Basrah Province-

1. A 30-year-old male was admitted to the Emergency Department (ED) of the Republican Hospital at Basrah City, Iraq in July 2004 with a painful leg wound caused by a Stinging Catfish (*Heteropneustes fossilis*). According to the victim, a group of the stinging catfish, *Heteropneustes fossilis* actively gave him four stings in his thigh and two in his leg during swimming in Shatt Al-Arab River at Al-Ashar area. There were medium bleeding and severe pain that prevent the victim from normal walk and received assistant from friends. The victim declared that he was swimming after throwing pieces of bread into the water. For the next 15 minutes there was a serious progression of the pain and there was no response to the nonsteroidal anti-inflammatory agent (ibuprofen) which he had taken.

On admission the patient was alert, with good verbal response. The heart rate varied from 92 to 104 b/min. and the arterial blood pressure was 120/70 mmHg. All biochemical results as well as ECG did not show any abnormalities.

On the arm, hand and leg there were a puncture wounds about 1-3 mm in diameter with medium edema and erythema at the position of each sting. After irrigating and debriding of
retained spine fragments and necrotic tissue the patient was given tetanus anatoxin (AT) and prophylactic antibiotic course (ciprofloxacine). The X-ray of the upper and lower limbs did not reveal any abnormalities and residual spine. The opioid analgesia (dolargane) and local anesthesia with lidokaine had to be provided to relieve the pain.

After 24 hours of observation the patient was discharged. The follow up after 2 weeks showed healed wound of the hand and no subjective complaints of the patient.

2. A 10 years old young male was taken to the Emergency Department of the Republican Hospital at Basrah City in June 2005 suffering from severe multiple stings in his bottom and on his back. These stings were caused by a stinging catfish (Heteropneustes fossilis). The victim admitted that he swam across a large number of stinging catfishes feeding on the surface on pieces of bread. The fishes seem to turn to attack frenzy when they found the young man in the middle of their feast. Due to the large number of stings, the victim lost consciousness and he was taken to the hospital by friend’s car. There were five stings on his bottom and another three on his back. The patient complained of numbness, dizziness, and quite intense pain at the site of the injury progressively extending into the surrounding areas. At the base of each sting, there was a puncture wound about 2 mm in diameter with medium edema and erythema. On admission, his temperature was 37.8°C, with a heart rate of 96 and blood pressure of 110/70. Tests were made for the following: ESR, complete blood count, electrolytes, enzymes, and coagulation profile. All of them were normal. The area of wound was infiltrated with 1% lidocaine and examined carefully. Any remains of the broken spines were removed. The wound was thoroughly irrigated and cleansed with antiseptic solution and left open. A plain radiographic study of the injured area confirms the absence of any foreign material. The affected area was covered with pads wetted with hot water (45°C) for approximately 45 minutes to inactivate venom in the wound. The patient received a prophylactic short course of oral antibiotic therapy with Trimethoprim-sulfamethoxazole. After 24 hours of observation, the patient was discharged from the hospital at his own request under the care of his father. Over the period of three weeks, the wound healed slowly and after two months, the wound appeared to be completely healed without any complication.
Cases of Mysan Province

1. The affected persons were two young women age 25 and 27 years old, and envenomation occurred during washing some cutlery on the Majar Al-Kabir River Bank in rural area on 23 May 2004. The two young women taken to the Emergency Department at the Republican Hospital in Mysan. Each victim received six stings in each leg. The wounds were near the ankles. The injury was accompanied by intense pain, numbness of the site, dizziness, local oedema and erythema. In addition, symptoms such as tachycardia, weakness, arterial hypotension, loss of consciousness, respiratory distress and unusual sensations (tingling, pricking) were observed. I consider these envenomation as moderately serious accidents. The first aid treatment for stinging catfish stings was removal of all foreign material and irrigating the site with whatever clean liquid is available, warm water immersion and pain management. Radiographs aimed at the inspection for foreign bodies was used in all cases. The patients received a prophylactic short course of oral antibiotic therapy with trimethoprim-sulfamethoxazole. Tetanus prophylaxis was given when indicated. They were observed for 24 hours. No residual deficits in motor or sensory functions were noted. In 6 weeks’ time, the wounds healed slowly.

2. A 35-year-old fisherman operate at the edge of the marsh area in Mysan Province presented to the emergency department 2 hrs. after tolerating an injury to his hand while trying to clear the fishing net from the unwanted catfish, *Heteropneustes fossilis*. There was a persistent cutaneous oedema, erythema, intense burning or throbbing pain that appeared at the wound site. Paresthesias, weakness, localized sweating, and muscular fibrillation can be accompanied by cyanosis and inflammation around the puncture site. The attack was performed by at least 10 fishes based on the number of spines found inside the wounds. The spines were imbedded in the volar aspect of the hand, and after numerous failed attempts to shake the offending fishes loose, the victim broke the spines with his other hand. He felt numbness to the elbow, and slight dizziness. Initial examination revealed a 2 X 2-mm foreign bodies imbedded in the soft tissues midway between the fourth and fifth metacarpal bones. Motor and sensory functions were grossly normal and capillary refill was preserved. A plain radiograph of the hand showed a 3 mm long foreign bodies with dense retroflexed barbs projecting perpendicular to the shaft. Treatment
consisted of warm water immersion for 30 min, tetanus prophylaxis, pain management with meperidine/promethazine, and 1 g intravenous cefazolin. The spine was successfully removed after a minor operation and the patient was discharged on a 7-day course of cephalexin 500 mg. The wound was healing well but slowly. Wound cultures obtained on initial presentation grew no organisms. No residual deficits in motor or sensory functions were noted.

3. Discussion

In order to evaluate the attack of the Indian catfish, *H. fossilis*, it is important to know the structure of the poison gland and the pectoral fin spine of this species. There are two toxicity mechanisms in the Indian catfish: the first is related to sting penetration and rupture of the venom glandular tissue surrounding the sting, whereas the second, called crinotoxicity, is associated with the production of toxins in the entire fish skin (Al-Hassan et al., 1986). There are several components in the venom contained in the poisonous gland of this catfish such as complex composition of hemolytic, dermonecrotic, oedema-producing, and vasospastic factors in addition to the presence of several amino acids, 5HT, 5-nucleotidase, and phosphodiesterase (Helm, 1976), whose potency is largely inversely proportional to the fish size and is a defensive mechanism (Al-Hassan et al., 1986). The Crinotoxins are proteinaceous substances found in the epidermal secretions coating the entire catfish body surface, not just the spines, and are released when the catfish is excited or threatened. If exposed to open skin, these toxins can cause similar symptoms of throbbing pain, tissue necrosis, and, possibly, muscle fasciculation (Shepherd et L., 1994; Das et al., 1995).

The transverse section of the spine showed a central canal running through the longitudinal axis of the spine. From this canal, a number of canaliculi are radiated outwards reaching the outer edge of the spine. The main canal contains fine blood vessels, lymphatics and connective tissues. The poison gland is composed of large rounded cells found on each side of the spine. These cells are derived from the basal columnar cells of the skin epidermis. This gland has no duct to convey the poison to the outside. Instead, a pressure is excreted on the wall of this gland due to the erecting of the spine and the excretion of the gland comes out through temporary rupture of the skin at the tip of the spine.
Due to the structural nature of the spine, its extraction and debridement can be difficult, as was the case with the presenting patient. The angled serrated edges prevent easy extraction of the spine and often remain behind if the spine is extracted using excessive force (Howard and Burgess, 1993).

The inflection of spine in the body of a victim comes as defense mechanism acquired by the fish. During the fast swimming, the fins and spines are lowered and they are erected when fish moves slowly (Fernando and Fernando, 1960). When the fish is disturbed, it moves quickly forward with head and trunk are displaced sideways and caudal region involved in an undulating movements. In such position, the spine becomes in a well position for stabbing (Zakaria, 1964).

All the cases reported in this study are common in one issue in that the attack of the fish became as a result of the fish has been alarmed or disturbed. For the 1st case from Basrah Province, the fishes were alerted to the presence of food and dash to the area and at the same time the victim was swimming. In the 2nd case, the food of the fish became threatened by the victim finding himself in the middle of bunch of feeding fishes. For the 1st case of Mysan Province, the fishes were alarmed by the presence of large amount of food remains thrown by women washing their cooking pans, while the 2nd case the fishes were disturbed as they were removed from the fishing nets. On the other hand, the attack of the Indian catfish in all cases discussed in this report, except for the 2nd case from Mysan province, have a feeding frenzy in nature. This feeding habit is not unusual and it is documented in several fish species (Atema, 1980; Leong and O’Connell, 1969; Powell, 2003). More interested, Olaifa et al. (2004) found that when the catfish, *Clarias gariepinus* becomes irritable and show a frenzy feeding behavior when expose to high concentration level of copper. Such feeding habit is reported for the first time for the Indian catfish, *H. fossilis* in the present study. Both Shatt Al-Arab River and Majar Al-Kabir are shown to have a polluted level of copper in their waters (Thummarukudy et al., 2012; Ghalib and Söğüt, 2014; Yasser and Naser, 2011; Al-Saad et al., 2009).

Fish stings facilitate the penetration of microorganisms across the skin into the body that are susceptible to infection (De Haro and Pommier, 2003; Harrison, 2000). Usually, freshwater catfish visit areas with standing and dirty water hereby potentially increasing the risk of infection. The bacterial flora found on the skin of the stinging fish will be the causative agent for an infection that accompany fish-inflicted wounds (De Haro and Pommier, 2003).
Antibiotic therapy is recommended in all cases of wound infections caused by fish; the choice should be based on the most probable etiological factor related to the specific fish species (De Haro and Pommier, 2003).

4. References


