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FINDING OF (PLOTOSIDAE – SILURIFORMS) AND ITS ABUNDANCE FROM PARANGIPETTAI COASTAL AREA – A REVIEW

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ABSTRACT

Venom produced by the animals consist indispensable multifarious concoction of peptides and proteins. The venom of catfish (*Plotosidae*) is unintentional for the pharmacological expediency in India and constrainedly considered in foreign countries. Fish themselves make available in the order of 1% (22204.8 tones) in the total marine landing in India, for the most part of them are catfish and to avert accidents after catching the catfish plotosidae, sting were broken and flung into the water by fishermen. The ease of use of catfish plotosidae is more in the parangipettai coast with the top figure of three species traced from Feb 2012 to April 2012. Studying the pharmacological effect of catfish venom makes worthwhile for developing imminent drug candidate for the diseases like cancer, neuromuscular, hematological and cardiovascular systems. In these studies the characteristic organisms of the chordate fauna of the Bay of Bengal and the ecological attributes are discussed.

INTRODUCTION

The genus *Plotosus* consists of a large number of species, belonging to the family plotosidae and order siluriforms. More than 37 are found distributed throught the tropical pacific and Indian Ocean. The east coast of India consists of Tamil Nadu, Pondy, Orissa, and West Bengal covering area about 1,430 km. Tamil Nadu coast includes parangipettai which is located (11°29'33.62"N79° 46'08.86"E) on the banks of vellar estuary and Bay of Bengal, where the distribution of stingrays is more and their venom properties has to be studied to treat injuries and using it as a pharmacological tool for validating it as a lead for drug development**.** Although accidents caused by these animals are considered severe, it is surprising that only a few studies have ever examined this relationship, given all the pharmaceutical benefits and health threats posed by venomous aquatic animals (Rodrigues 1972). In aquatic environment large numbers of venomous and poisonous animals were found of these more than 200 species of marine fish including stingray, scorpion fish, zebra fish, stonefish, weever fish, toadfish and some species of shark, ratfish, catfish, surgeonfish are known or suspected to be venomous (Russrell, F.E, 1996).Catfish are found in shallow tropical coasts worldwide to temperate waters including marine and fresh water species (Al-hassan 1986, 1987). In India fresh water catfish are included in *plotosidae* family, which comprise three valid genera *Plotosus lineatus* (shiomi,.et al 1986), *Plotosus canius* (Auddy., *et al*.,1994) *Plotosus limbatus* (Haddad,.2000).Fresh water catfish in India are very common in northern, central, western and southeastern rivers, and marine catfish are distributed throughout Indian ocean coast (Nelson, 1944).Many catfish have three serrated bony stings on dorsal and pectoral fins, which was used for defence against predators (Haddad 2000, Halstead 1953).venomous catfish have a sharp and stout sting immediately in front of the soft rayed portion of pectoral and dorsal fins, where stings are derived from fin rays and are covered by thin integumentary sheath (Rodrigues, R.J., 1972). In addition to venom, the skin of fish plays a passive role in protective immunity, serving as an anatomical and physiological barrier against the external environment (Cameron and Endean 1973; Shiomi 1988)

MATERIALS AND METHOD

Geographically the study area lies within the boundaries of latitudes (11° 29'33.62 "N 79° 46'08.86"E) Fig. 1 species collected were placed in labelled plastic tubs and fixed in 5 % of buffered formalin – sea water mixture . Identification based primarily on FAO sheet (David H. Eccles, 1992), a field guide to the common fishes of the east coast of India.

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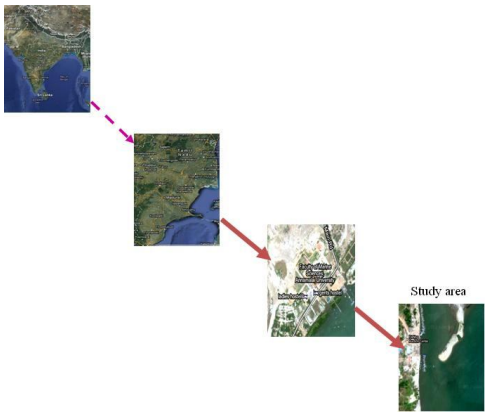

Fig. 1 Map showing the study area

Systematics

Kingdom	:	Animalia
Phylum	:	Chordata
Class	:	Actinopterygii
Order	:	Siluriforms
Family	:	Plotosidae
Genus	:	*Plotosus*
Species	:	*lineatus*

***Plotosus lineatus* (Thunberg, 1787)**

Diagnosis

Body elongate, its depth 6.2 to 7.5 times in standard length. Mouth transverse, with thick and papillose lips. Four pairs of mouth barbels. Nasal barbels do not extend beyond eyes. Maxillary extends slightly beyond posterior margin of eyes, outer mandibulars to gill opening, and inner mandibular shorter. Two dorsal fins; the first dorsal short, the second with 80 to 100 soft rays. Anal fin with 58 to 82 rays. Caudal fin bluntly pointed. Dorsal and anal fins continuous with caudal fin. A single highly venomous serrate spine at the beginning of the first dorsal and each of the pectoral fins. Dorsal spines (total): 1-1, Dorsal soft rays (total): 85-105, Anal spines: 0, anal soft rays: 70-81.

Fig. 2 Plotosus *lineatus*

Common name: striped eel catfish.

Habitat: found on reefs, along open coasts in estuaries, and in tidal pools.

Colour: brown or black above , whitish below ,with 2 or 3 stripes ; 2 of the stripes extend from snout to near caudal peduncle ;third stripe extends from belly backward to caudal peduncle.

Size: 25 cm – 32 cm.

Feeding: They feed on small crustaceons , molluscs , prawn and small fishes

Distribution: Found along entire coastal line of fishing area, Indo-Pacific, Red sea, East Africa, South Korea, India and also in fresh water coastal area.

Local name: Mudhu hunga, kanja kalutti, irung – keleru, kadal - changuan

Venom gland: they are highly venomous serrate spine of the first dorsal and each of pectoral fins are dangerous.

Family: Plotosidae

Genus: *Plotosus*

Species: *lineatus*.

***Plotosus limbatus* (Valenciennes, 1840)**

Diagnosis: Elongate body with a large head. On dorsal side, an arch develops from the tip of snout to dorsal fin. Mouth is transverse. 4 pairs of barbels are present, out of which nasal barbels are the shortest. Eyes are large and its diameter is 1/7th of head length. Gill rakers are 22 in number. Head moderately large, profile arched from tip of snout to dorsal fin origin; 4 pairs of barbels (1 nasal, 1 maxillary, 2 mental), the nasal barbels extending to middle or posterior borer of eyes, 20 to 25 gillrakers on anterior edge of first arch; 0 to 10 ridge-like rakers on rear face, confined to upper limb; papillae rarely present on gill arches. First dorsal fin with 1 spine and 4 to 6 soft rays, the last ray double at base; pectoral fins with 13 to 16 soft rays; pelvic fins with 12 to 16 rays; dorsal procurrent caudal fin (second dorsal fin) with 106 to 133 rays; caudal fin with 9 to 11 rays; anal fin with 87 to 126 soft rays; total number of rays in confluent fins 210 to 243. Dendritic organ present posterior to anus.

Fig. 3 Plotosus *limbatus*

Common name: Dark eel catfish.

Habitat: It is an inshore species, inhabiting a variety of habitats, such as lagoons, sandy substrate, reefs, found along open coasts in estuaries, tidal pools.

Colour: Body reddish brown, sometimes fading to a lighter browns ventrally, their fins are often blackish brown with black border.

Size: 30 cm – 41 cm.

Feeding: They feed on small crustaceons, molluscs , prawn and small fishes

Distribution: Found within in area, Aldabra and along south west coasts of India and Srilanka, and also found on south east coast of India.

Local name: Kelletee, keduthal
Venom gland: Dorsal and pelvic fins are venomous.
Family : Plotosidae.
Genus : *Plotosus.*
Species : *limbatus.*

***Plotosus canius* (Hamilton – Buchanan, 1822)**

Diagnosis: Snout about thrice as long as eye. Nasal barbels extending to the nape of the neck or at least two eye diameters behind hindmargin of eye. Maxillary barbels reaching a little farther, mandibulary barbels to branchial opening. Mental barbels much shorter. First dorsal as long as snout and eye, its spine about 2/5 of head, serrated on both edges. Second dorsal lower, of uniform height, similar to anal. Caudal rounded. Ventrals shorter than snout. Pectorals as long as or a little longer than first dorsal, their spine similar to that of the first dorsal. Maxillary band of teeth 3 times broader than its antero-posterior length, its conical teeth in about 3 rows, each mandibulary band semicrescentic, mesially with 4-5 rows of teeth, narrowing laterally to one row. Crescentic vomerine band, in the middle with about 4 rows of molar teeth, narrowing to two and finally to one row of teeth. About 20 gillrakers on the total first branchial arch, the 4 most ventral ones very short.

Fig. 4 *Plotosus canius*
Common name: Canine eel catfish

Habitat: Found mostly in estuaries and lagoons, sometimes in nearly freshwater, brackish water and in coastal sea area.
Colour: Moderate to dark brown above, light below and their fins are with dark borders.
Size: 80 cm – 150 cm.
Feeding: They feed on small crustaceons, molluscs, prawn and small fishes
Distribution: Found within the area along the west and south coasts of India and Srilanka and also along the coasts of Bangladesh, Burma and Philippine islands found chiefly in esturaries and lagoons sometimes in rivers in nearly fresh water.
Local name: Kalapu magura, kana magura, irung – kelletee, keduthal
Venom gland: Spines associated with anterior fins have potent venom.
Family : Plotosidae
Genus : *Plotosus*
Species : *canius.*
Catfish

Catfish (sub-order siluroidei) are multifariously located across pelagic zone from sea shore and scattered around worldwide but being largely concentrated in tropical areas .The most important catfish families are the Ariidae, Doradidae and Pimelodidae, many of which are found in rivers of south America. In aquatic environment, large numbers of venomous and poisonous animals exist out of which more than 200 species of marine fish *vis a vis* stingray, scorpion fish, zebra fish, stonefish, weever fish, toadfish and some species of shark, ratfish, catfish, surgeonfish are known or suspected to be venomous (Russrell FE, 1996). The Ictaluridae family found in the rivers and estuary; the plotosidae family members that are frequently found in brackish, coastal and fresh water environments (Nelson etal 1994). In India fresh water catfish are included in *Plotosidae* family, which comprise three valid genera *Plotosus lineatus* (Shiomi *et al.*, 1986), *Plotosus canius* (Auddy *et al.*, 1994) *Plotosus limbatus* (Haddad, 2000). Many catfish have three serrated bony stings on dorsal and pectoral fins, which was used for defence against predators (Haddad, 2000; Halstead, 1953). Venomous catfish have a sharp and stout sting immediately in front of the soft –rayed portion of pectoral and dorsal fins, where stings are derived from fin rays and are covered by thin integumentary sheath (Rodrigues, R.J., 1972). In addition to venom, the skin of fish plays a passive role in protective immunity, serving as an anatomical and physiological barrier against the external environment (Cameron and Endean, 1973; Shiomi, 1988). *Plotosidae*, one of the most abundant species of catfish in sea shore of India and Srilanka. Envenomation by catfish is relatively common among fisherman, anglers, bathers, and swimmers in which injuries may be very painful causing complication such as erythema, edema, pain, sudoresis, fever, nausea, vomiting and secondary infection.

Table 1 Availability of catfish *(plotodsidae*) in parangipettai coastal area

Sl no	Catfish species	Abundant	Common	Rare
1	*Plotosus lineatus*	+		
2	*Plotosus limbatus*		+	
3	*Plotosus canius*		+	

Venom composition

Animal studies indicate that some of catfish (Plotosidae) venoms contain hemolysins, lethal factors, edema – producing substance. The skin secreations of some catfish species are also contain toxin. Analysis of crude skin toxin from catfish demonstrated a variety of substance including hemolysin, hyaluronidase and lipase alongwith smaller amount of phospholipase A_2. Choline esterase, proteinase, 5'-nucleotides. (Fahim, Esmat AY, 2002). A substance crinotoxin may account for the pain associated with direct contact with skin rather than the spine (Birkhead WS 1972).

Venom apparatus

The catfish have a single spine of dorsal fin and spine on each of the pectoral spines that are capable of passing trauma to the human skin. The cartilaginous, serrated spines are held erect when the catfish is disturbed (Calton GJ, Burnett JW 1975). In some catfish species, a integumentary sheath covers a spine. Penetration of the skin by spine tears the integumentary sheath exposes the venom gland and releases the venom into wound (Isbister GK 2001). Many of the spine contain sharp serrated teeth that inhibit the removal of spine from surrounding area. The severity of the envenomation ranges from mild following exposure to the fork – tailed catfish (Ariidae) to potentially serious envenomation by some marine catfish such as oriental or striped catfish (*Plotosus lineatus*, *Plotosus limbatus* and *Plotosus canius*) and Arabian gulf catfish (Netuma halassina Ruppell).

The fish contributes approximately 1% (22204.8 tonnes) in total marine landing in India. In parangipettai coastal area about three Plotosidae species were recorded from February 2012 to April 2012 and identify Table 1 (Fishbase; FAO fish identification sheet). After catching the fish Plotosidae species, the spines were removed from the body and thrown out by fishermen to avoid injury because it will cause severe local pain, tissue necrosis and secondary bacterial infection. The following catfish Plotosidae species are available in Parangipettai coastal area, fig. 2: *Plotosus lineatus*, fig. 3: *Plotosus limbatus* and fig. 4: *Plotosus canius*.

CONCLUSION

Venomous animals have evolved a vast array of toxins for prey capture and defense. These toxins are directed against a wide variety of pharmacological targets, making them an invaluable source for treatment of human diseases. Only few percentage of venom is validated for their therapeutic usefulness. Catfish (Plotosidae) venom is not extensively studied for their pharmacological property so it has to be studied in detail. Previous studies shows catfish venom is active in cardiovascular and nervous system. The venom of catfish has to be studied in detail to give first aid, developing anti venom and to isolate pharmacologically active compounds. Isolation and purification of the specific compounds are nifty for validating them as a contender drug for the treatment of various human diseases.

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