J Krishi Vigyan 2020 (Special Issue) : 214-217 DOI : 10.5958/2349-4433.2020.00107.5

Occurrence of Saddle Back Syndrome in *Pampus argenteus* from North-West Coast of India

Shashi Bhushan*, Sri Hari Murugesan, Vikas, Suman Nama and Shahana S

Department of Fisheries Resource Management
ICAR-Central Institute of Fisheries Education, Mumbai – 400 061 (Maharashtra)

ABSTRACT

Pampus argenteus plays a vital role in the aquatic ecosystem. It forms a major share in pomfret fishery along the Indian coast. Caudal fin deformities are commonly observed in pomfret that might have been caused due to predation but saddle back syndrome (SBS) in fishes are rarely observed. An abnormal specimen of *P. argenteus* was recorded with saddle back syndrome along with lateral line deformity from North-West coast of India, where it forms a major fishery. It was characterised by a depression in the dorsal fin and lacking 10^{th}-16^{th} dorsal fin rays. The causative agents of SBS are discussed in this paper.

Key Words: Abnormality, Irregularity, Predation, Radiograph, Skeletal.

INTRODUCTION

Saddle Back Syndrome (SBS) is normally characterized by the partial or complete abnormality of the dorsal fin or the loss of one or more hard spines of the dorsal fin and also changes in the shape, number and position of the pterygiophores which support the dorsal fin (Koumoundouros *et al,* 2001). It was first described in *Surotherodon aureus* (*Tilapia auera*) (Tave *et al,* 1983). SBS has been reported in wild and cultured fish species such as *Acanthopagrus australis* (Diggles, 2012; Pollock, 2015), *Dentex dentex* (Koumoundouros *et al,* 2001), *Sparisoma cretense* (Koumoundouros, 2008), *Etroplus suratensis* (Jayaprabha *et al,* 2016), *Epinephelus akaara* (Setiadi *et al,* 2006), *Pagellus erythrinus* (Jawad *et al,* 2017). Unlike in aquaculture systems, the occurrence of SBS in the wild is relatively rare and may be caused by predation (Almatar and Chen, 2010; Jawad *et al,* 2017), physical injuries (James and Badrudeen, 1968), environment pollution (Jawad and Al-Mamry, 2012), escape or release during fishing operation (Pollock, 2015) and swim bladder inflammation (Iwasaki *et al,* 2017).

Pampus argenteus is a high-value commercial fish, commonly known as silver pomfret and distributed along the Indo-west pacific region (Froese and Pauly, 2011). It forms a major share in pomfret fishery of India waters, major landings of silver pomfret are from North-West coast and North-East coast (Divya *et al,* 2015). Satpati is the important landing of *P. argenteus* in Maharashtra and most of the landings are contributed by mechanised gillnetters (Gladston *et al,* 2017). Saddle Back syndrome in *P. argenteus* was reported in Arabian Gulf, Oman Coast (Al-Hasan, 1982; Jawad and Al Mamry, 2012). This present communication reports the first occurrence of Saddle back syndrome in wild *P. argenteus* form Indian waters.

MATERIALS AND METHODS

This study was based upon an abnormal and normal specimen caught by the bottom drift gillnet locally called as "*dalda*" with a mesh size of 110-130 mm, collected from Satpati landing centre, Maharastra, India (19°25′895″N to 20°30′424″N latitude and 70°43′530″E to 72°32′231″E longitude) in the month of December 2017. Soaking time of net

*Corresponding Author's Email: shashi@cife.edu.in

in the fishing ground was for four hours with a depth of operation ranged from 35 to 50 m. Morphological examination of the species was done to study the fin deformities in both the fish samples. Morphometric measurements and total weight were measured to the nearest of 0.01 mm and 0.01 g, respectively. The fish were photographed on both the sides to study the irregularity of lateral line and the examination of skeletal deformities was done by the X- Ray radiograph. The abnormal specimen was preserved and stored in departmental laboratory.

RESULTS AND DISCUSSION

The normal and abnormal specimens were 206.17 mm and 187.66 mm in total length and 172 g and 144 g of weight, respectively. The morphometric and meristic characters of both the specimens where found to be in range as described by Haedrich (1984). The gross morphological examination of abnormal specimen revealed the occurrence of SBS, which was characterized by the depression in the middle portion of the dorsal fin. The width and depth of the SBS was found to be 8.7 and 3.39 per cent of total length of the abnormal specimen. The specimen which showed SBS lacked dorsal fin rays from 10-16 and it had a shorter body profile of 46.63 per cent of total length when compared to normal specimen which had 44.22 per cent of total length**.**

Right lateral side of the abnormal specimen was also noted with a lateral line which bent upwards on the site of SBS. The radiograph of abnormal specimen showed a complete lack of pterygiophore of 10^{th}–16^{th} dorsal fin ray. While comparing the previous cases of SBS in *P. argenteus*, the degree of deformity was less while analysing the external appearance Jawad and Al-mamry (2012) found the similar kind of deformity with lack of pterygiophores. Among the group of fish landed, only one specimen was identified with SBS. Thus, occurrence of SBS in this case may be due to the physical injury caused during the early life stage of the fish by predators or might have escaped from the gear which is used to catch the fish. Pollock (2015) suggested that SBS in *A. australis* may be caused due to the escapement from the fishing gear.

Along Mumbai coast, there is a specific gear called *daldajal* (Bottom drift gill net) with reduced mesh size of 110- 130 mm used to catch pomfrets (Gladston *et al,* 2017). SBS may be associated with the escapement of the fish after being caught by the bottom drift gill net in the juvenile stages. Koumoundourous *et al* (2001) reported the correlation between the dorsal fin abnormalities which was attributed to the early abnormalities of the primordial marginal fold in *Dentex dentex*. Abnormalities in the dorsal fin may be due to the disturbances in the ontogenic process due to a range of physical, chemical and biological factors (Tutman *et al,* 2000). Even though several studies related SBS with the nutritional imbalance in their early life stages (Koumoundourous *et al,* 2001; Sfakianakis *et al,* 2003; Setiadi *et al,* 2006), this hypothesis doesn't suits well with the open water environment where there is meagre or less chance of nutritional imbalance since most of the nursery ground and tropical fishes are near estuarine area.

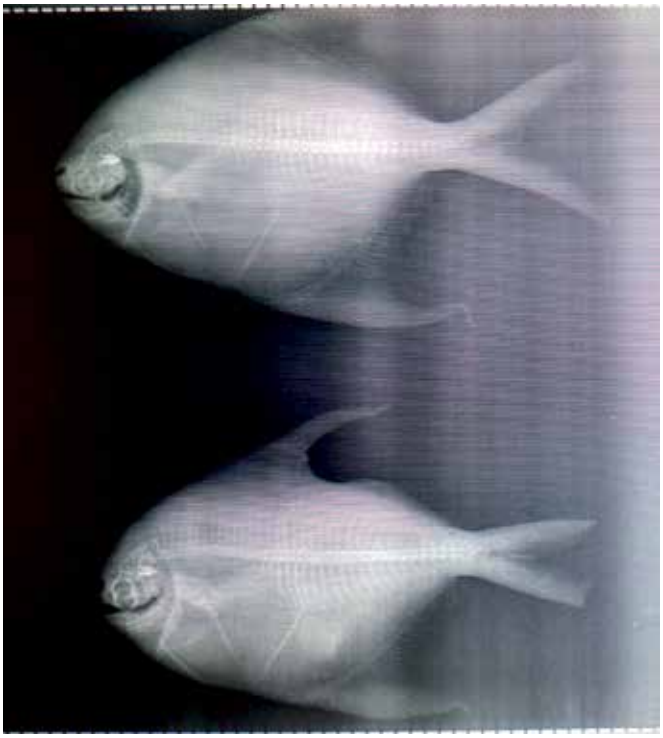
Carrillo *et al* (2001) reported the lateral line abnormalities in zig zag patterns and missing section in *Sparus aurata*. Sfakianakis *et al* (2013) reported the lateral line deformity in *S. aurata* and *Diecntrachus labrax*. Lateral line deformities associated with the SBS have been reported in *D. labrax* (Fragkoulis *et al,* 2017) and *A. australis* (Pollock, 2015). Fragkoulis *et al* (2017) stated that cause of lateral line abnormalities may be similar to that SBS i.e., epidermal abnormalities during ontogenic development. Only in few cases, the exact cause of the SBS has been described like heritability in *Oreochromis aures* (Tave *et al,* 1983 and Tave, 1986) and in natural populations due to the selenium pollution (Lemly, 1993). Since, most of the SBS from the wild is reported from wild fishes, it does not affect the wellbeing of the fishes in the wild. But more research is needed in the area of SBS to identify the exact causative agent in the case of wild fishes.

Fig 1. Comparison of Normal specimen (A) with abnormal specimen (B)

I (A)

1(B)

Fig 2. X-Ray radiograph of normal and abnormal specimen (showing SBS)



ACKNOWLEDGEMENT

The authors wish to thank the Director of ICAR-Central Institute of Fisheries Education, Mumbai and the Head, Fisheries Resource Harvest and Post-Harvest Management Division for the support and facilities provided for conducting this study.

REFERENCES

Almatar S and Chen W (2010). Deformities in silver pomfret *Pampus argenteus* caught from Kuwait waters. *Chin J Oceanol Limnol* **28**: 1227–1229.

Al-Hassan L A (1982). Vertebral abnormalities in fishes from Iraq and UAE, Arabian Gulf. *Iraqi J Marine Sci* **1**: 13-23.

Carrillo J, Koumoundouros G, Divanach P and Martinez J (2001). Morphological malformations of the lateral line in reared gilthead sea bream (*Sparus aurata* L. 1758). *Aquaculture* **192**: 281–290.

Diggles (2012). Saddleback deformities in yellowfin bream, Acanthopagrus australis (Gu¨nther), from South East Queensland. *J Fish Dis* https://doi.org/10.1111/jfd.12021

Divya P R, Gopalakrishnan A, Basheer V S, Swaminathan R, Mohitha C, Joy L, Kumar R, Manoj P and Jena J K (2015). Mitochondrial ATPase 6/8 genes to infer the population genetic structure of silver pomfret fish *Pampus argenteus* along the Indian waters. *Mitochondrial DNA* **26**(2): 189-194.

Fragkoulis S, Paliogiannis H, Kokkinias P, Chiers K, Adriaens D and Koumoundouros G (2017). Saddleback syndrome in European sea bass *Dicentrarchus labrax* (Linnaeus, 1758): anatomy, ontogeny and correlation with lateral-line, anal and pelvic fin abnormalities. *J Fish Dis* **40**(1): 83-95.

Froese R and Pauly D (2011). Fish Base, WorldWide Web electronic publication. Available at: www.fishbase.org,version 06/2011 (Accessed on 12 January, 2018).

Gladston Y, Devi M S, Xavier K M, Kamat S, Chakraborty S K, Ravi O P K and Shenoy L (2017). Design and gill net selectivity of *Pampus argenteus* along the Satpati coast, Maharashtra, India. *Reg Stud Mar Sci* **9**: 156-161.

Haedrich R L (1984). Stromateidae, In:FAO species identification sheets for fishery purposes,W Fischer and G Bianchi (Eds.). Western Indian Ocean (Fishing Area 51). Vol. 4. FAO, Rome. pag. var. (Ref. 3517)

Iwasaki T, Teruya K, Mizuta S and Hamasaki K (2017).Swim bladder inflation as a possible cause of saddleback-like syndrome malformation in hatchery-reared red spotted grouper *Epinephelus akaara*. *Fish Sci* **83**(3): 447-454.

James B R and Badrudeen M (1968). Certain anomalies in the fishes of the family Leiognathidae. *J Mar biol Ass India* **10**(1): 107-113.

Jawad L A, Akyol O and Aydin D (2017). First records of saddleback syndrome and Pughead deformities in the common Pandora *Pagellus erythrinus* (Linnaeus, 1758) (Teleostei: Sparidae) from wild population in the Northern Aegean Sea, Turkey. *Int J Mar Sci* **7**: 122 - 129

Jawad L A and Al-Mamry J M (2012). Saddleback syndrome in wild silver pomfret.*Croat J Fish* **70**(3): 135-142.

Jayaprabha N, Purushothaman S and Srinivasan M (2016). First record of saddle back syndrome in wild species, *Etroplus suratensis* (Bloch, 1790) from the southeast coast of India. *Indian J Mar Sci* **45**: 1536-1539.

Koumoundouros G (2008). First record of saddle back syndrome in wild parrot fish *Sparisoma cretense* (L.1758) perciformes scaridae. *J Fish Biol* **72**: 737-741.

Koumoundouros G, Divanach P and Kentouri M (2001). The effect of rearing conditions on development of saddleback syndrome and caudal fin deformities in *Dentex dentex* (L.). *Aquaculture* **200**: 285–304.

Lemly AD (1993). Teratogenic effects of selenium in natural populations of freshwater fish. *Ecotoxicol Environ Saf* **26**: 181–204.

Pollock B R (2015). Saddleback syndrome in yellow fin bream (*Acanthopagrus australis* (Günther, 1859) in Moreton Bay, Australia: its form, occurrence, association with other abnormalities and cause. *J Appl Ichthyol* **31**: 487-493.

Setiadi E, Tsumura S, Kassam D and Yamaoka K (2006). Effect of saddleback syndrome and vertebral deformity on the body shape and size in hatchery-reared juvenile red spotted grouper, *Epinephelus akaara* (Perciformes:Serranidae): a geometric morphometric approach. *J Appl Ichthyol* **22**: 49–53.

Sfakianakis D G, Katharios P, Tsirigotakis N, Doxa C K and Kentouri M (2013). Lateral line deformities in wild and farmed sea bass (*Dicentrarchus labrax*, L.) and sea bream (*Sparus aurata*, L.). *J Appl Ichthyol* **29**(5): 1015-1021.

Sfakianakis D G, Koumoundouros G, Anezaki L, Divanach P and Kentouri M (2003). Development of a saddleback-like syndrome in reared white seabream *Diplodus sargus* (Linnaeus, 1758). *Aquaculture* **217**: 673–676.

Tave D (1986). Genetics for fish hatchery managers. AVI Publishing Co., Inc. Tave D, Bartels J E and Smitherman R O (1983). Saddleback: a dominant, lethal gene in *Sarotherodon aureus* (Steindachner) (*Tilapia aurea*). *J Fish Dis* **6**: 59–73.

Tutman P, Glamuzina B, Skaramuca B, Kožul V, Glavic N and Lučić D (2000). Incidence of spinal deformities in natural populations of sandsmelt, Atherinaboyeri (Risso, 1810) in the Neretva River Estuary, middle Adriatic. *Fisheries Research* **45**: 61-64.

Received on 15/06/2020 *Accepted on 20/08/2020*