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Note

Musculoskeletal abnormalities in hatchery reared silver pompano, *Trachinotus blochii* (Lacépède, 1801)

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ABSTRACT

Musculoskelatal deformities in hatchery-reared silver pompano *Trachinotus blochii* (Lacépède, 1801) are reported here. In a batch of hatchery-reared silver pompano juveniles, 6.9% had deformities of musculoskeletal tissue. While majority (97.9 %) of these deformities were manifested in the form of a depression in the musculoskeletal tissue anterior to dorsal fin, 1.3% of juveniles had the depression exclusively anterior to anal fin and 0.8% juveniles had the depressions anterior to both dorsal and anal fins. Radiographic images revealed that some fish had deformities limited exclusively to the muscle with no involvement of the skeletal tissues. However, other affected fish had deformities involving both muscle and the skeletal tissues resulting in fusion of the vertebrae, lateral and ventral curvatures of the vertebral column, shortening of neural spines and underdevelopment of radial bones.

Keywords: Deformities, Musculoskeletal tissue, Silver pompano, *Trachinotus blochii*

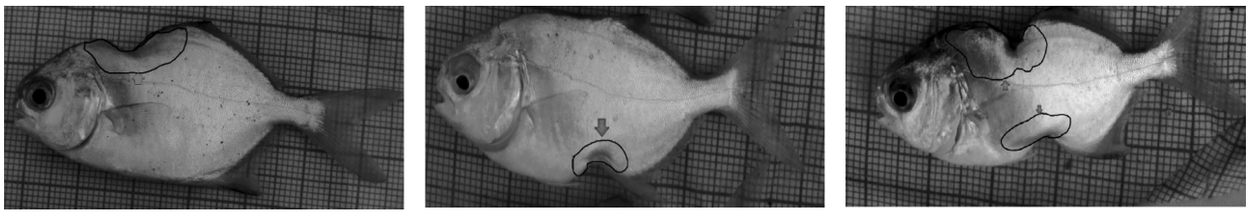
Silver pompano, *Trachinotus blochii* (Lacépède, 1801) is a high-value marine finfish which has been recently bred and hatchery reared successfully in India (Abdul Nazar *et al*., 2012; Gopakumar *et al*., 2012; Kalidas *et al.,* 2012). This species is progressively being adapted for coastal marine cage and pond aquaculture in India. Body deformities have been reported from many finfish species (Barahona-Fernandes, 1982; Favalaro and Mazzola, 2000; Silverstone and Hammel, 2002; Udey *et al*., 2002; Aydın, 2012; Tong *et al*., 2012). Body deformities are more prevalent in hatchery reared fish when compared to their wild counterparts (Boglione *et al*., 2001). In this study we report the incidence of musculoskeletal abnormalities of hatchery reared silver pompano for the first time from India.

In a batch of silver pompano juveniles hatched from the eggs of two females, each mated separately with three different males, there appeared a perceivably high proportion of deformed juveniles. A total of 7496 specimens were examined from the hatchery produced juveniles of this batch out of which 515 numbers had morphological abnormalities. The major abnormalities noted were, depression in front of the dorsal fin, depression in front of the anal fin and depression in front of both dorsal and anal fins. The specimens with each type of abnormalities were quantified. The mean body weights of the normal as well as the abnormal fishes were recorded and compared and the data were statistically analysed using t-test in SPSS version 20.0.

The prevalence of the abnormal juveniles was estimated to be 6.9%. The statistical analysis revealed that the mean body weight of the abnormal fish (3.31g±0.956) did not differ significantly from that of normal fish (3.42g ± 0.829). Among the 515 abnormal fish examined, the following types of deformities were observed: (i) Depression in front of the dorsal fin in 504 fishes (97.9%), (ii) Depression in front of the anal fin in 7 fishes (1.3%), (iii) Depression in front of both dorsal and anal fins in 4 fishes (0.8%)

The deformities were limited to the area adjoining the dorsal and/or anal fin. Grossly, the abnormal part appeared as a depression having incomplete muscle development in the vertical axis of the body whereas the edges of the depression showed muscular hypertrophy in the lateral direction (Fig. 1). This probably explains the lack of difference in body weight between the abnormal and apparently normal fish.

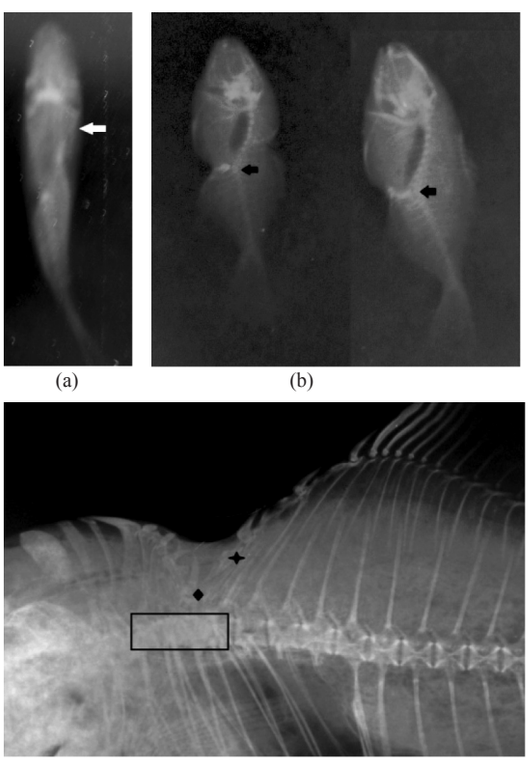
For detailed analysis of the skeletal deformities, five juvenile fish (one normal, two with dorsal abnormality, one with ventral abnormality and one with both dorsal and ventral abnormality) were subjected to radiography



(a) (b) (c)

Fig. 1. Gross appearance of the body deformities in front of (a) dorsal fin, (b) anal fin and (c) both dorsal and anal fins in juvenile pompano

by following the method of Fisher *et al.* (2003). One larger fish having dorsal abnormality from the grow-out cage was also radiographed for getting a clear picture of skeletal abnormalities. The abnormalities of skeletal development consisted of both lateral and ventral scoliotic curvature of the vertebral column (Fig. 2). Additionally, shortening of neural spines, fusion of vertebrae and shortening of radial bones were also observed (Fig. 2c). It was noted that the muscular abnormality was not always followed by skeletal abnormality. In certain cases only muscular depression was noted whereas in other cases both muscular and skeletal abnormalities were seen.



(a) (b)

(c)

Fig. 2. Radiographic images of skeletal deformities in juvenile pompano. (a) Lateral deviation of the vertebral column, indicated by white arrow; (b) Ventral deviation of the vertebral column indicated by black arrows; (c) Fusion of vertebrae indicated in box, shortening of neural spine indicated by black diamond and shortening of the radial bones indicated by black star.

Fish with deformities appeared to be normal in their feeding and swimming behaviour in comparison to the unaffected juveniles. The negative impacts of body deformities on swimming efficiency (Silverstone and Hammel, 2002), production efficiency (Aydin, 2012), reproductive ability, disease resistance, market acceptability, and fish welfare (Conte, 2004) have been reported. On the other hand, it has also been reported that body deformities do not always affect the performance of the fish (Murakima *et al*., 2004). In the present case, despite various musculoskeletal deformities, the affected fish coexisted successfully with normal fish and their growth was also comparable with the normal fish.

Various factors including suboptimal and harmful environmental parameters (Kumar and Ansari, 1984; Divanach *et al*., 1997; Kessabi *et al*., 2009; Fraser *et al*., 2013;), nutritional deficiency and toxicity (Cahu *et al*., 2003) and genetic abnormalities (Andrades *et al*., 1996; Evans and Neff, 2009) have been attributed as etiological factors for the deformities in muscoloskel *et al.* system in finfish. The exact cause for such deformities in each individual case may differ and may be difficult to predict. However, the cause can be ascertained to some extent under controlled breeding and rearing conditions. Present observations on skeletal deformities were incidental and no planned experiments on the impact of inbreeding, malnutrition and environmental parameters were conducted. Hence, it was not possible to ascertain the exact reason of the abnormalities in the juveniles of silver pompano. It is also probable in certain cases that such abnormalities can lead to production of unhealthy and non-viable seed. Thus future studies for diagnosing the cause and exploring the mechanism of the development of the abnormality will help to prevent the incidence of deformities in hatchery reared marine finfish and to eliminate any potential loss due to low performance and/or lack of acceptability by the consumers.

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