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## Four types of neoplasms in Asian sea bass (*Lates calcarifer*)

Ramalingam Vijayakumar, Kuzhanthaivel Raja, Vijayapooopathi Singaravel, Ayyaru Gopalakrishnan\*

Centre of Advanced Study in Marine Biology, Faculty of Marine Science, Annamalai University, Parangipettai Tamil Nadu, India

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### ABSTRACT

**Objective:** To describe and observe four types of neoplasms on different parts (external and internal organs) of an Asian sea bass (*Lates calcarifer*).

**Methods:** The sample was collected from local fish landing center (south east coast of India). Histopathology of normal and tumour tissues were analyzed.

**Results:** A total of 83 tumour masses (neoplasm) were recorded on the fish skin, also the neoplasms were recorded in internal organs of fish such as liver, stomach and ovary.

**Conclusions:** Aetiology of such neoplasm's are unknown, further more researches need to confirm the causative agent for this type of neoplasm.

## 1. Introduction

Occurrence of fish in the marine environment with tumors is often viewed as an indicator of grossly polluted conditions[1]. Tumours have been reported in numerous organs and tissues of animal including skin, heart, lungs, joints and bone[2]. Tumour is a common disease in fish. It caused by both viruses and non-infectious (chemicals) carcinogens[3]. In additional, some of the reports contributing to tumour formation in fishes include viruses, bacteria, chemical or biological toxins and physical agents[4]. More than 50% of fish tumours are related to the papilloma[5]. The etiology of most of the tumours remains unknown[6]. Fish tumour studies are very less in worldwide, having some reports in Indian costal water[7-9].

The Asian sea bass *Lates calcarifer* was known as barramundi, native of coastal Australia, South East and Eastern Asia[10]. This species are farmed in cages, as well as in fresh and estuarine

water[11]. In recent years, sea bass has gained growing importance in aquaculture both as recreational and commercial fish with a high and fairly stable price[8]. More mortality in farmed barramundi is caused by bacterial infections[12], but this present report described the unusual occurrence of neoplasm's in adult Asian sea bass (*Lates calcarifer*).

## 2. Materials and methods

### 2.1. Sample collection

Live specimen was collected from a local fish landing center (11° 42' 21" N, 79° 46' 42" E) on south east coast of India. The specimen was brought to the laboratory for further investigation. Specimen was identified in the laboratory, based on FAO fish identification sheet[13]. Measured length and weight of the specimen were count total numbers of tumour on external body surface of specimen. Specimen was carefully dissected with sterile surgical knife to examine the internal organs and recorded the nature of tumour.

### 2.2. Histology

The tumour tissues were fixed in 10% neutral buffered formaldehyde solution for 24 h, then rinsed several times in tap

\*Corresponding author: Ayyaru Gopalakrishnan, Centre of Advanced Study in Marine Biology, Faculty of Marine, Sciences, Annamalai University, Parangipettai-608502, Tamil Nadu, India.

Tel: +91-4144-243388; +91-9443537538

Fax: +91-4144-24388

E-mail: [aquagopal@gmail.com](mailto:aquagopal@gmail.com)

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water before being dehydrated through a graded series of ethanol, cleaned in xylene and embedded in paraffin wax. Thin sections (3 µm) were cut with a rotary microtome, stained with Harris hematoxylin and counter-stained with eosin[14]. The stained tissues were examined under a microscope (40× magnification), and digital images of histological features were obtained using the Lucia (Laboratory Imaging, www. forensic. cz/ en/ products) screen measurement system.

### 3. Results

The infected fish was female; length and weight of fish were 40.1 cm and 8.2 kg respectively. A total of 83 tumour masses were observed on entire fish body surface, it was raised as much as 2.5 cm from body surface. Apart from the skin neoplasm, internal organs also infected with tumours such as liver, stomach and ovary. The neoplasm in stomach; total weight and length were 236 g and 12.5 cm respectively, that the entirely was occupy the stomach region it's fully made by hard muscle with irregular surface (Figure 1). The neoplasm of liver tissue was enlarged with dark reddish colour, totally four neoplasms were observed on the liver, one large and one small size neoplasm was observed on the right side liver lobe, remaining two small size tumours were observed on the left side lobe. The neoplasm in ovary was observed in the central interior of left site ovary lobe and it was look like white color jelly form, the right side ovary lobe was not infected by tumour (Figure 2).

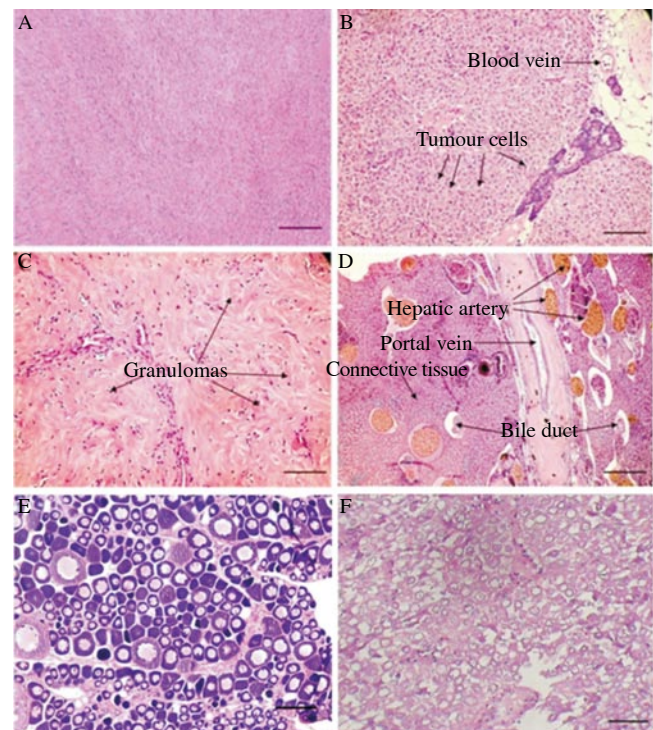


**Figure 1.** A: Fish skin neoplasm with wound; B: Close-up view of multiple skin neoplasm; C: Stomach tumour tissue isolated from the infected fish it presenting hard muscles with irregular surface.



**Figure 2.** A: Liver presenting different size of neoplasm; B: Before dissection of ovary presenting the tumour; C: After dissection of ovary presenting tumour tissue.

The histopathological investigation of skin neoplastic lesions were present much differentiated cells when compared with normal skin lesion, the dermis are covered with a thin attenuated layer of epidermis, the connective tissue was reduced and mostly small round densely basophilic osteocyte cells dominated. Irregular and numerous intracellular space tissue structures often have small, short finger like extensions with undifferentiated cell nuclei, much more cellular and populated largely with eosinophilic connective tissue permeated with canals lined with small basophilic cuboidal cells. Stomach neoplastic tissue showed more granulomas with irregular tubular structure. In liver histological segment have hepatocytes, bile ducts and anaplastic large cells were evident, adenomas were circumscribed intrahepatic masses of well differentiated bile ducts. The ovary neoplastic tissue showed the undifferentiated cells and tissue fibers with immature egg formations (Figure 3).



**Figure 3.** Histopathology of normal and tumour tissues of adult Asian sea bass.

A: Normal epithelial tissue; B: Skin neoplasm showing enlarged irregular cell structure comparing with normal epithelial tissue and presenting large epithelial cell nucleus; C: Stomach tumour tissue presenting well defining granulomas; D: Liver tissue showing hepatic artery, portal vein, connective tissue and bile duct; E: Normal ovary; F: Ovary neoplastic tissue shows the undifferentiated cells and tissue fibers with immature egg formations; Scale bar 25 µm.

### 4. Discussion

Occurrence of tumours in estuarine fish and purpose of this communication is to be a first report in India that is four types of tumours on a commercial fish, this confirmation based on the histopathology analysis. Histological examination is usually used as a tool to evaluate the health of organisms, since this is reflected by the morphological structure of the cells and tissue[15]. Previously three types of papilloma have been reported on flatfishes in Germany[16]. At the same time, fish tumour studies are very meager in India, over a period of three years we have monitored

a large number of fishes for the presence of tumour at south east coast of India. Hence, this we have been reported the tumours from two marine fishes which is papilloma in *Sardinella longiceps*[17] and odontoma in *Sphyreana jello*[18].

The skin tumour was occurred entire fish body with different size some places occurred complex tumour most of the tumour on the neck region, the arrangements of the fish scales were changed by tumour masses. The tumour epidermis were composed with two types of layer an upper layer was block in color and an inner layer was white color, inside of the tumour tissue was together with sponge like appearance, almost six or eight wounds were observed with reddish color on the fish body. A skin neoplasm has been reported in brackish water fish of *Mugil chephalus* from the same coast[19]. Some reports were revealed that contaminated sediment has been strongly associated with skin tumors[20]. The present study also revealed probably that the kind of neoplasms on this fish resulted by accumulation of water pollution, because that infected fish was caught from highly polluted area, nearly locating many industries to the river[1].

List a number of abnormalities among fish taken in polluted areas[1]. In additional the prevalence of tumours in pelagic fish is generally low, however, when compared with benthic species, probably because of a more dilute level of environmental carcinogens or exposure to infectious agent[3]. Many researchers have reported the skin neoplasms among the other neoplasms in fish and their relationship to environmental pollution, although the liver neoplasms, some of which was reported due to pollution. The presence of liver tumour in a feral fish, revealed that some environmental pollution had played a role in liver tumorigenesis[21]. Kelller *et al.* have reported in fish stomach, mass tissue covered with darkly pigmented and irregular, but intact epithelium, on cut section, the tumour was homogenously firm and white with a slight clear gelatinous mucoid consistency[22]. The present study observed and reported neoplasm in stomach as well as in the ovary of the fish for the first time. From the neoplasms on the skin and liver, the neoplasms of this fish probably caused by pollutions. Hence, further study need to be done to confirm the etiology of neoplasm's.

### Conflict of interest statement

We declare that we have no conflict of interest.

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