



Research Article

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Comparative Histology of Liver in Pangusius Pangusius (Herbivore Fish) And Notopetrus Chitals (Carnivore Fish)

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ABSTRACT

Liver is one of the most important organs in alimentary tract and is a marker of health in body of fish, and is completely affected by food composition. This study was carried out to compare the effect of food diet on histology of liver in fish, ten specimens from every specimen. Pangusius (an herbivore fish) was fed with algae and sea plant and Notopetrus chitals (a carnivore fish) was fed with shrimp, insects, and mollusks in cage were provided. The liver tissue was fixed in Boin's solution for 24 h and slides were provided from routine hematoxylin eosin method. Light microscopic observations showed that liver tissue in carnivore fish had larger hepatocytes with clear nucleus and internal organelles and many fat cells in comparison to those of herbivore fish

Keywords: *liver, histology, fish*

INTRODUCTION

Demand for fish as food stuff is driving expansion of farming operation all over the world. This necessitates the investigation on different aspects of biology of fishes, especially Histology and Pathology. Fish alimentary tract shows numerous differences according to food diet, feeding habit, body shape, weight and sex [1,2,3,23].

Liver is a biomarker of a healthy body that has an important role in metabolic function, malfunction of liver affects metabolites such as Glucose, amino acids and fatty acid which have direct or indirect effect on other organ tissues such as brain and kidney. Gulsen & colleagues used Lentinula edods medicinal mushroom extract in rainbow trout food diet and found severe infiltration of lipid in hepatocytes of fishes [4]. Hougo suggested use of medium chain fatty acid profile in Japanese sea bass food diet inducing lipid metabolism disturbance in fish liver and causing hepatic tissue disorder with indistinguishable hepatic cell outline and even fracture of nuclei and dissolved ion [3, 6, 7]. Moreover, even consumption of cotton seed meal as 54% of food diet in common carp demonstrated shrinkage of hepatocytes and increase in number of hepatic cells with smaller size [5,8,9]. Thayappan & colleagues (2014) investigated the toxic effect of cypermethrin as pollutant from agricultural and domestic washout on intestine and liver tissue in tilapia. High concentration of cypermethrin for long term induction of disintegration of hepatocytes and decrease in size of nucleus [5,10,11].

Pangusius pangusius has elongated body shape with 2 dorsal spines and 7 dorsal soft rays, 29-32 anal soft rays and bright yellow caudal fin in adults. Maxillary barbell extends to gill aperture.

Notopetrus chitals has 9 dorsal soft rays and 117-127 anal soft rays with maximum length of 122cm, and live in fresh water in Asia [12].

This study was carried out to compare liver histology of two aquarium fish, pangusius pangusius with herbal food diet as herbivore fish and notopetras chitals with fleshy diet as carnivore fish. Recently, a major problem of fish farming is fatty liver, and it is vital that a solution be provided for it.

MATERIAL & METHOD

Ten mature pangusius pangusius fish of both sexes, weighing 1.5 to 2.5 kg and 30-40cm in length, were provided from a fish farm aquarium around Shiraz city, Fars province, Iran which were fed with herbal diets such as alga- sea plant and chopped vegetables and weighing 1.5 to 2.5 and 20-35 in length. Ten Notopetrus chilats which were fed with insects, mollusks and shrimps and worms were provided, after being taken to laboratory, fishes were killed by decapitation, they were then dissected and their livers were exposed. After washing with phosphate buffer, 0/5 × 0/5 pieces of liver tissue were fixed in Bouin's solution. After fixation, specimens were dehydrated in ethanol solution from (50% to absolute) and embedded in paraffin, 7 μ sections were obtained and stained with routine hematoxilin eosin method. Sections were observed and micrograph technique was provided by video camera that was connected to microscope (Olympus, Japan).

RESULTS & DISCUSSION

Liver is a large organ in the body of fish which is located in the anterior part of the body cavity. Liver color in herbivore fish is pale brown compared to carnivore fish [16]. Live color in Pangusius pangusius was pale brown compared to the other.

Vessel arrangement of this organ as well as other vertebrates is composed of hepatic artery, portal vein and a hepatic vein [21]. Liver tissue is composed of two sections of hepatic, parenchyma and stroma. Parenchyma is 80% of the total liver tissue. Stroma is composed of connective tissue and blood vessels. [20]

Pattern of hepatic parenchymal arrangement has been described in both fresh water and marine fish [14], in which hepatocytes have tubular pattern and are arranged in rings around a central vein, in this arrangement base of cells is located in sinusoid directly, this pattern facilitates absorption [19,25,22].

In this study both specimen's hepatocytes were arranged as cords, generally, two cells in thickness around the central vein (Figure 1 and Figure 2). Bile canaliculi of most species are located inter cellular and the center of the tubular units could be either the bile canaliculus or hepatic sinusoids depending on the function of the unit.

In staining with hematoxilin eosin, in both specimens' hepatocytes have a polygonal shape and contain a single spherical nucleus, but around the nucleus cytoplasmic staining is denser than peripheral part, which is due to the accumulation of RER around the nucleus and glycogen in peripheral. Internal organelles of hepatocytes depend on species, age, sex and spawning time is different. [27]. These alterations were completely clear in both specimens (Figure 1 and Figure 2).

Non parenchymal cells in liver tissue includes endothelial cell, fat cells, Kupffer cell & fibroblast. Endothelial cells which line the sinusoid wall and vein were squamosal in shape and were observed in both specimens [15,24,18] (Figure 1 and Figure 2).

Kupffer cell as a characteristic of mammal's liver was not observed in these specimens.

Occurrence of Kupffer cell in sinusoids and vein is a sign of phagocytic function [21].

But fat storing cell that was present between sinusoids and parenchymal hepatocytes containing a droplet of fat was frequently observed in carnivore specimen compared to other herbivore specimens, which is influence of food diet. No exocrine pancreatic cell, bile ducts or portal veins were observed in the lobules examined in these two specimens [13] (Figure 1 and Figure 2).

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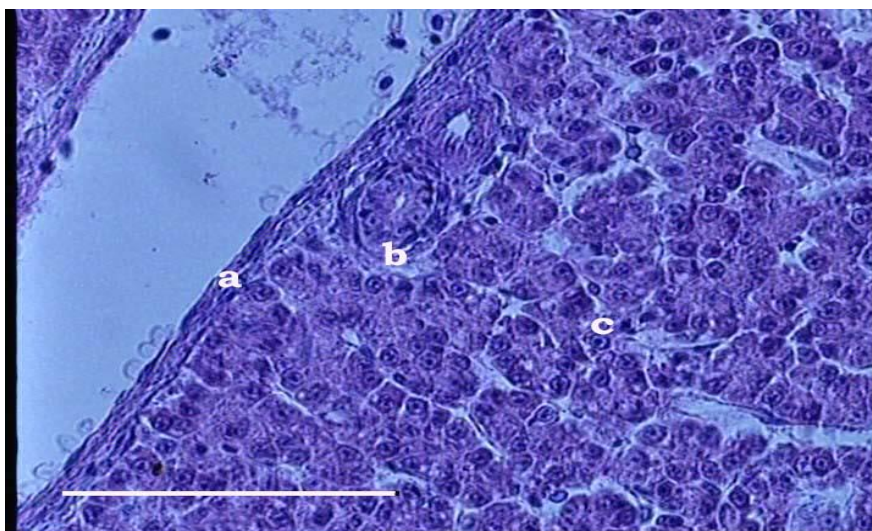


Figure1: *Pangasius pangasius* liver: 40x a:vein b: liver portal c: hepatocytes
Scale:100µm

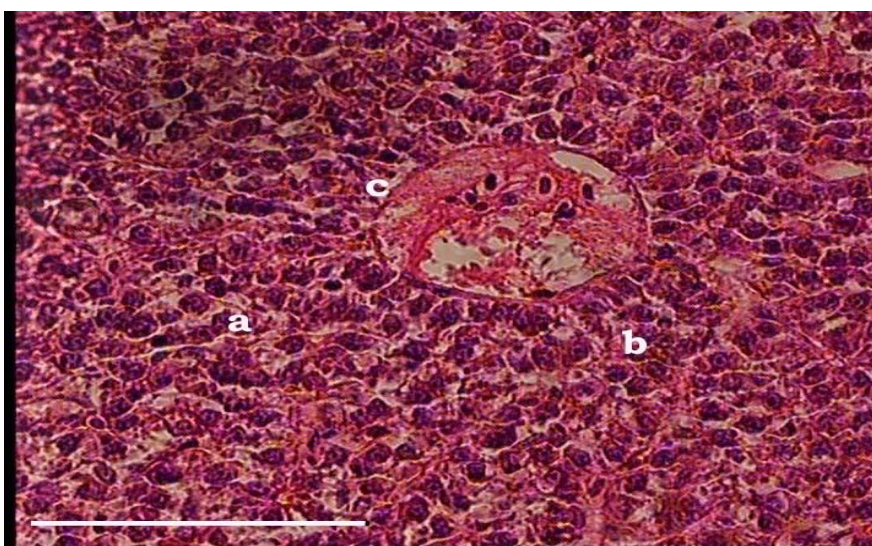


Figure: 2 *Notopetrus chitalis* liver: 40x a: fat cell b: hepatocyte C: sinusoids
Scale 100µm