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Comparative study of Relative Gut Length of *Labeo rohita* and C*hanna striata* from Sangrun Pune, Maharashtra

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Abstract

The intestinal length of any organism is directly related to food preferences and during evolution there have been structural changes embedded in the alimentary canal. Request research is being done to understand Relative abdominal length (RGL) of freshwater fish *i.e.. Labeo rohita* and *Channa striata* were collected from Sangrun, Pune Maharashtra. It was observed that the correlation between total length, normal length and intestinal length varies according to fish eating habits. *Labeo rohita* feeding habit shows omnivorous eating habits. There are major differences in the design and functioning of a digestive system in terms of species, habitat, and eating habits of any living organism. Fish feed behavior is a key factor responsible for their nutrition and development, mutations in the environment such as eutrophication and anthropogenic activities affect fish species differently and affect food availability. The eating habits of the *Channa striata* shows a carnivorous habit. the length of the intestines increases with the total length of the fish. The relative gut length was examined and the total normal length of *Labeo rohita* was recorded at 26.7 cm, the average length of the gut was 21.6 cm and the average gut length was recorded at 9.9 cm and the average gut length (RGL) was recorded at 0.51 cm. respectively. In *Channa striata* total recorded length of 41.3 cm, average normal length recorded 36.4cm and average intestinal length recorded 15.8 cm and average intestine length recorded 0.42 cm respectively.

Key words : Relative gut length, comparative study, carnivorous, herbivorous, omnivorous, fishery, *Channa striata, Labeo rohita.*

India is the third largest producer of fish and the second largest producer of marine fish. The country is also home to more than 10% of the world's fish species[19]. The Western Ghats of Maharashtra is one of the most popular biodiversity hotspots from India that caters for a wide variety of flora and fauna. Fish show great diversity in size, shape, shape

and habitat. Sangrun is located at latitude 18.50305, longitude 73.86735. It is a small town is located on the Mutha River in Pune, Maharashtra.

The relative intestinal length of vertebrates lengthy studied and compared within within and between species of animals[3]. Gut morphology is known as plastic and vary between individuals between species in relation to different foods. Feeding has a direct impact on increasing fish production, as consumption is a key factor in the fish life cycle[2]. The sound performance of living organisms depends entirely on the type of nutrients that we receive in the environment and its use in the growth and well-being of any environment. As with animal species, precise variations within the experimental structure and structure of the body are seen in fish[12]. The ability to feed when fish are ultimately dependent on their age, sex, living conditions and chemical status of habitat. The fish's alimentary is a long tube that begins in the mouth followed by the throat, stomach, intestines, and ends with the rectum, in some cases the diameter of the intestines varies[6]. The abdomen is made up of many long folds, abdominal glands, abdominal cavities, columnar striated epithelium, lamina propria, and microvilli that make the abdominal function special[9]. The Esophagus performs the function of transferring food from the buccal cavity to the stomach[6,18]. Fish digestion occurs in the stomach[20]. Knowledge about organic food is often very important in researching your nutritional needs, your interactions with other organisms and cultural strengths. Feeding activity contributes to the growth and production of aquatic species. As the fish grew, more food was desired by the little ones; hence, fish size is related to feed capacity[14]. Morphological research at the digestive tract of fish is considered one of the handiest tools. As an example, with the availability of food and eating habits, the digestive system promotes significant variability in body shape and function.

Labeo rohita in an area known as 'rohu'. It is commonly found on the banks of many rivers in North, central, and Easter India and is found in Pakistan, Vietnam, Bangladesh, Nepal and Myanmar. an economically important carp widely used in integrated fish culture[7,15]. Rohu belongs to the family cyprinidae and the genus Actinopterygii. Rohu is enriched with a good amount of protein. Freshwater fish contain omega 3 fatty acids as well as vitamins A, B, and a rich source of vitamin C. which is widely used in rearing aquatic animals. Rohu has some popular types of food for different stages of life. It usually eats zooplankton and phytoplankton. fish feed column[2].

C. striata in a place known as 'murrel'. The striped snakehead is a type of fish with a snake's head. It is often called the mudfish. It covers a vast area that includes India, China, Pakistan, southern Nepal, Bangladesh, Sri Lanka and most of Southeast Asia[13]. Murrel belongs to the Chanaidae family and the class Actinopterygii. It is the most important fish food in its entire range and is very important for the economy. The back and sides are black and mixed with a combination of black and white on the abdomen; a large head reminiscent of a snake's head; deep gap, mouth with perfect teeth; very large scales[4]. It is a carnivorous species of carnivorous fish are found to have a short intestine, hence the

presence of different organs that help digest food. Adults block lakes, streams and rivers, preferring stagnant and muddy water on the plains. It usually eats frogs, water bugs, and small fish[4]. Murrel is also a good source of essential nutrients such as snakehead fish which extract a rich source of albumin and Zn as well as Fe, Cu and other fatty acids[4].

Study area :

Sangrun is located at latitude 18.50305, longitude 73.86735. its small town is situated on the river Mutha. This valley is near the Pune region of Maharashtra (Figure: 1). The area is rich in weeds and aquatic plants and is home to many small and large fish. In summer and winter the water flow is slightly reduced but during the rainy season it is flooded.

Figure 1: Satellite image of Sangrun Pune, Maharashtra.

Sampling :

A random collection of *Labeo rohita* (Figure: 2) and *Channa striata* (Figure: 3) were made from a local fish market near the sangrun. Fishing was practiced by local fishermen using a variety of gears, such as hooks, cables, cast nets, hand nets, and other local fishing gear. The fishing gear was kept in the river overnight and was picked up the next morning. Collected samples were tested for detailed analysis after storing them in formalin.

Figure 2. *Labeo rohita*

Figure 3. *Channa striata*

A study on *Labeo rohita* and *Channa striata* was carried out to understand the relative gut length of both fishes. Specimens were collected from the market and brought to the laboratory for further studies. Each fish dissected dorso-ventrally with the help of pair of scissors (Figure 4.) The alimentary canal of each fish was extended out and the length was measured.

Figure 4. Dissecting the fish

Analytical techniques :

The relationship between normal length and intestinal length was investigated using the method of Antoine *et al.*,[3]. Intestinal length (GL), normal length (SL) measured by sample in cm. The corresponding intestinal indications of fish are calculated using the formula:[3]

$$\text{Relative intestinal length (RGL):} = \frac{\text{Intestinal length (GL)}}{\text{Standard body length (SL)}}$$

Normal body length is measured in lengths excluding caudal fin length of fish. Intestinal length is measured from the oesophagus to the rectum. Photographs of all the fish and the length of the intestines were made using the canon DSLR 200d.

In the current study, the fish collected from the fish market were kept in ice bad and were carried to the laboratory for future analysis. The fish were dissected under laboratory condition to understand the various aspects of alimentary canal. (Figure 6) (Figure 7). The result obtained of the relative gut length of the fishes under studies were calculated and tabulated. (Table-1 & Table-2).

Figure 6: Dissected *Labeo rohita*

Figure 7: Dissected *Channa striata*

Table-1. The average of SL, GL and RGL of *L. rohita* and *C. striata* from Sangrun

L. rohita			*C. striata*		
SL	GL	RGL	SL	GL	RGL
23.5	15	0.64	38	16.5	0.43
23	10	0.45	35	14	0.40
22.5	10.8	0.48	38.5	17	0.44
22.8	14	0.61	39	19	0.48
21	10	0.47	37	15.8	0.42
19.7	9.5	0.48	37.5	16.5	0.44
24.5	15	0.61	34	14.5	0.42
18	9.2	0.51	33.7	13	0.38
22.7	10.4	0.46	35	14	0.40
19	9.4	0.49	37	17	0.45
Mean = 21.6	Mean = 11.4	Mean = 0.51	Mean = 36.4	Mean = 15.8	Mean = 0.42

Table-2. Correlation between standard body length and RGL

Fish species	N	Mean SL	Mean RGL	r	Regression coefficient
L. rohita	10	21.6	0.51	0.416	Y= 0.0153x +0.185
C. striata	10	36.4	0.42	0.426	Y = 0.0127x + -0.0372

(where, n= no. of fishes, SL= Standard length, RGL= relative gut length. r= correlation coefficient)

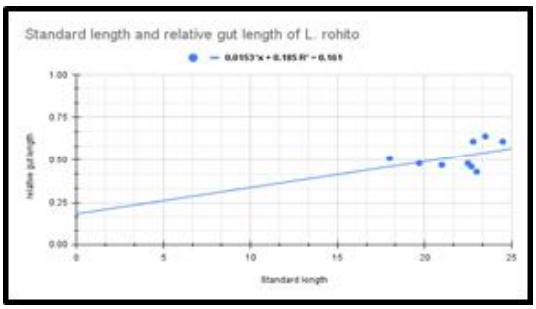

Figure 8: RGL vs SL of *L. rohita*

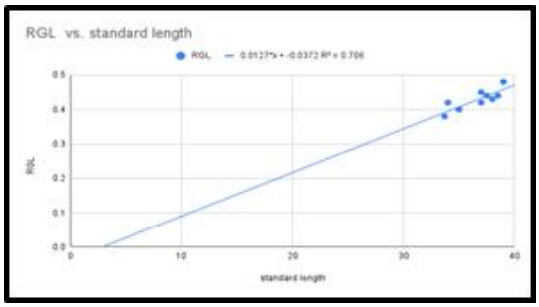

Figure 9: RGL and SL *C. striata*

The relative intestinal length differences were slightly different between the fishes under study (table-1). Intestinal length and average intestinal length to normal length are tabulated in Table-1. The correlation coefficient between 'r' between normal length and alimentary canal length of 0.416 and coefficient of determination of 0.161 was found in *Labeo rohita*. The gradual increase in intestinal length (GL) values can be seen in the increase in normal length (SL) and leads to an increase in the relative intestinal length (RGL) (table-1). The maximum intestinal height was observed to be 15cm with a normal length (SL) of 24.5cm. Also, the length of the intestines decreases with a decrease in the average length of the lower intestine 9.2cm with the average length of 18 cm. The highest associated intestinal length was 0.61 and the lowest was 0.43. The regression equation of *Labeo rohita* is 0.0153x + 0.185 [Figure 8]. while in *Channa striata* the coefficient of correlation 'r' between the normal length and length of the alimentary canal is 0.840 and the coefficient of determination 0.706 is found in *Channa striata.* The gradual increase in intestinal length (GL) values can be seen in the increase in normal length (SL) and leads to an increase in the relative intestinal length (RGL) (table-1). The maximum intestinal height was observed to be 19cm with a normal length (SL) of 39cm. Also, the length of the intestines decreases with a decrease in the average length of the lower intestine 13cm and the average length of 33.7 cm. The highest associated intestinal length was 0.48 and the lowest was 0.38 (table-1). retrospective figure for *Channa striata* is 0.0127x + 0.0372 recorded (figure 9).

Many studies have produced responses to changes in dietary tests as well as growing season, especially when changing diets. As a major variant of specialized comparison, however, the associated intestinal length has long been widely accepted as an important definition of gut morphology and an index of food composition[23]. Intestinal length seems to be a useful predictor of a typical fish diet[1]. In

the present study the highest gut gut (RGL) length in *Labeo rohita* is 0.64 and in the *Channa striata* is 0.48, there is a slight increase in RGL values in *Labeo rohita* which is an omnivorous fish than is seen in the carnivorous *Channa striata*. fish. And the length of the intestines (GL) increases with the increase in the normal length (SL) of fish. We have recorded that the omnivorous small fish have longer intestines compared to the long carnivorous fish here our work is in conformity with Sandhya, *et al*.,[24]. The most common definition of long intestines compared to omnivores focuses on the chemical protection of plants, the digestion of plant fiber. If plants are considered "low-fat" food, then an increase in intestinal length in green or omnivorous animals can serve as a way of adapting to a few possible ways[22,23] and / or increase the amount of space available for drainage[17]. They also feed on a variety of small fish and zooplankton, after which the amount of RGL increases as the length of the fish increases showing the eating habits of the omnivores in the fish. Foods grew as fish lengths increased in the diet from small to large in size[24]. The digestive tract is relatively long compared to the common omnivorous fish. long-term fish may be needed for omnivorous fish[17]. Some authors also point out that carnivorous fish have shorter intestines than omnivorous or green fish[8,10,11]. The (RGI) studies of Wen *et al*.,[25] and Lenny[16] show an association between RGI and fish species. Index (RGL) deviates from fish species and development stage[5].

In the present study it has been concluded that the intestines of fish 'intestines change according to their maturity and size. It also depends on the availability of food in the water. In our study the related gut diameter of *Labeo rohita* is 0.45 - 0.65 and the average gut length of *Channa striata* 0.35- 0.50. According to Reinthal[22], the omnivorous range is 0.8 - 0.1 and in carnivores the RGL is 0.6-0.8. Current activity corresponds to observation. Omnivorous fish have longer intestines compared to carnivorous. This research could assist the fishing unit, planning strategies for the conservation of fish found in their natural habitat. The availability of food resources can be organized thus providing a sustainable source of food for the fish in their natural habitat. As food availability is directly related to the reproductive capacity of fish.

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