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Relative gut length and gastro-somatic index of *Pethia conchonius* (Hamilton, 1822) and *Trichogaster fasciata* Bloch & Schneider, 1801, Tripura

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Abstract

The Relative gut length (RGL) and Gastro-somatic index (Ga.SI) of *Trichogaster fasciata* and *Pethia conchonius* were observed and the correlation 'r', regression constant 'a' and 'b' and coefficient of determination 'R²' were also analyzed to find out the relationship between gut length and body length. The regression equation for both the species is $Y=124.868+8.205SL$ (*T. fasciata*) and $Y=84.747+4.104SL$ (*P. conchonius*). The highest value of RGL and Ga.SI was observed in large size group fishes, except in *T. fasciata*. The present study reveals that both the species changes their feeding habits from carni-omnivorous to herbi-omnivorous as it increase in size but in *P. conchonius* it is found that feeding habit again changes from herbi-omnivours to carni-omnivorous. The feeding intensity is inversely related with the gonadal development which means that the Ga.SI decreases accordingly.

Keywords: RGL, Ga.SI, *Trichogaster fasciata* and *Pethia conchonius*

1. Introduction

Ornamental fish keeping is one of the most popular hobbies of the hobbyist next to photography. *Pethia conchonius* (Hamilton, 1822) and *Trichogaster fasciata* Bloch & Schneider, 1801 are also among the species that the hobbyist wants to keep in aquarium because of its hardy nature commonly they are known as rosy barb and banded gourami. The *T. fasciata* belongs to family Belontiidae and order Perciformes and *P. conchonius* belongs to family Cyprinidae and order Cypriniformes. These fishes are not only exploited for ornamental purpose but also for its nutritive value in North East region. Knowledge on the food organism of the fish is essential for the prediction and exploitation of its stock in nature [16]. The food preferences mainly depend on the nature of food available in the living habitat, environmental conditions, size or sexual stages of fish as well as inter and intra specific competition [21, 15, 28, 4]. Further, the fundamental information about the feeding habit of species is also necessary for its culture, rearing and larval control [19]. In order to determine the feeding habits such as herbivorous, carnivorous, omnivorous, herbi-omnivorous or carni-omnivorous RGL is widely used [9, 18, 14, 7]. The RGL of some species such as *Channa punctatus*, *Ompok pabda*, *Notopterus notopterus*, *Barilius bendelysis* and *Pethia ticto* changes according to their life stages during its development [11, 5, 14, 23]. The gastro-somatic index (Ga.SI) was used to determine the feeding intensity of fish [20, 24, 25]. There is no information regarding the RGL and Ga.SI of *P. conchonius* and *T. fasciata* which is necessary to determine their feeding habits as the population of these fishes are declining in North East region. Keeping in mind their commercial importance it will be necessary to know their feeding habits which help to raise them in captivity. Thus the present emphasis has given to add the knowledge of feeding biology of economically important fish viz. *P. conchonius* and *T. fasciata* from North East India.

2. Material and Methods

1. Study Area: Monthly sampling was conducted from April 2017 to February, 2018 in the morning hours from 5:00-7:30 AM from the river Gomti a tributary of Barak-Meghna drainage system at Kemtaly (Latitude: 23°37'49", Longitude: 91°18'14"), Tripura. The sampling has also been done from local fish market of Tripura (Udaipur and Agartala).

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- 2. Sampling:** Random collection of *Pethia conchonius* 45 number (35-65mm of SL) and *Trichogaster fasciata* 39 number (25-70 mm of SL) was done by using diverse gear like hook and line, cast net, gill net, and some local fish trap i.e. Anta, Benta, Singhchia, Deur etc. The collected sample were preserved in 10% formalin for detail analysis.
- 3. Methodology:** Relative gut length (RGL) is used for the classification of different sized fish as a carnivore, herbivore and omnivore as a main morphological variable and as for feeding intensity determination Gastro-somatic index (Ga.SI) is used. The RGL of the fish was determined by using the formula $RGL = \frac{\text{Total Length of Gut}}{\text{Total length of the Fish}}$ [2] and that of for Ga.SI; $Ga.SI = \frac{Wt \text{ of Gut}}{Wt \text{ of Fish}} * 100$ [3] has been used. The morphometric measurements of the fish were recorded as per the criteria of the Jayaram [13].
- 4. Analytical techniques:** The least square equation $Y = a + bX$, where X = standard length (SL) and Y = gut length has been used to draw relationship between standard length and gut length. The grouping of the various sized fish was done based on SL, which was used as X to

analyze the regression line, by using five summary statistics \bar{X} , SD_x , \bar{Y} , SD_y and r (i.e. the mean and standard deviation of X, the mean and standard deviation of Y, and the Pearson correlation between X and Y.). The slope 'b' and intercept 'a' were calculated as $b = r * \frac{SD_y}{SD_x}$, $a = \bar{Y} - b\bar{X}$. The significance for correlation 'r' was employed by using an equation as $t = \frac{r\sqrt{(n-2)}}{\sqrt{1-R^2}}$ where 'r' is correlation coefficient, 'R²' is coefficient of determination and (n-2) is degree of freedom. In order to analysed and interpret the results the statistical data was evaluated by using Microsoft Office (11.0.8173.0) service pack.

3. Results and Discussion

The RGL (fig 1 and 2) and Ga.SI of *Pethia conchonius* and *Trichogaster fasciata* of different size groups were analyzed and plotted graphically (Fig. 3-6). The correlation 'r', regression constants 'a' and 'b', coefficient of determination 'R²' were also analyzed for each fish group of these two species (Table 1).

Table 1: Correlation between standard length and gut length

Fish Species	n	a	B	R	R ²	t-test	P value	95% of CI
<i>Trichogasterfasciata</i>	39	124.868	8.205	0.842	0.710	9.508	1.8	6.457- 9.954
<i>Pethiaconchonius</i>	45	84.747	4.104	0.681	0.464	6.101	2.6	2.456-5.460

n= number of fish, a, b= regression coefficients, r= correlation, R²= coefficient of determination, 95% of CI = 95 % of Confidence interval

Table 2: Range of RGL and Ga.SI of *Trichogaster fasciata* and *Pethia conchonius*

Fish	Range SL	RGL	Ga.SI
	Min-Max (mm)		
<i>Trichogasterfasciata</i>	25-70	2.10-4.94	2.94-6.08
<i>Pethiaconchonius</i>	35-65	1.36-2.14	1.08-3.03



Fig 1: Gut of *T. fasciata*



Fig 2: Gut of *P. conchonius*

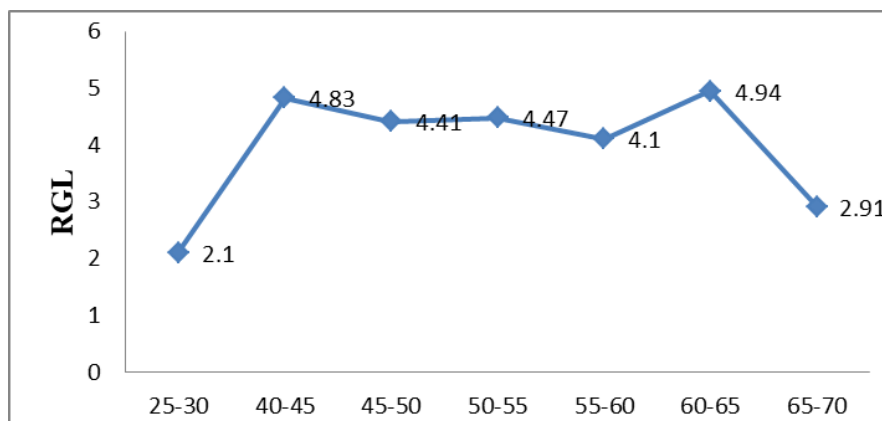


Fig 3: RGL at different size group base on SL of *Trichogaster fasciata*

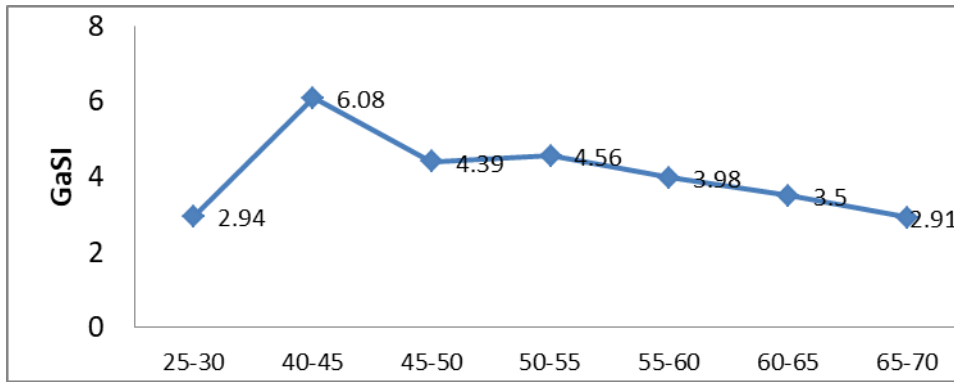


Fig 4: Ga.SI at different size group base on SL of *Trichogaster fasciata*

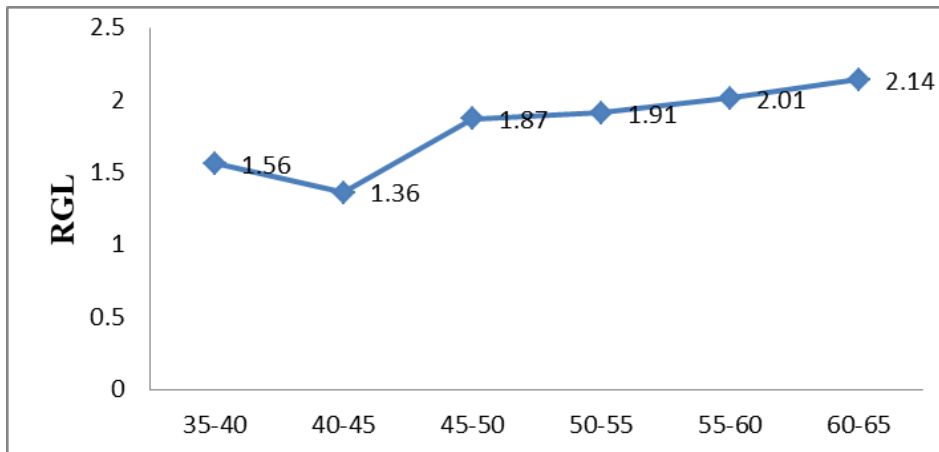


Fig 5: RGL at different size group base on SL of *Pethia conchonius*

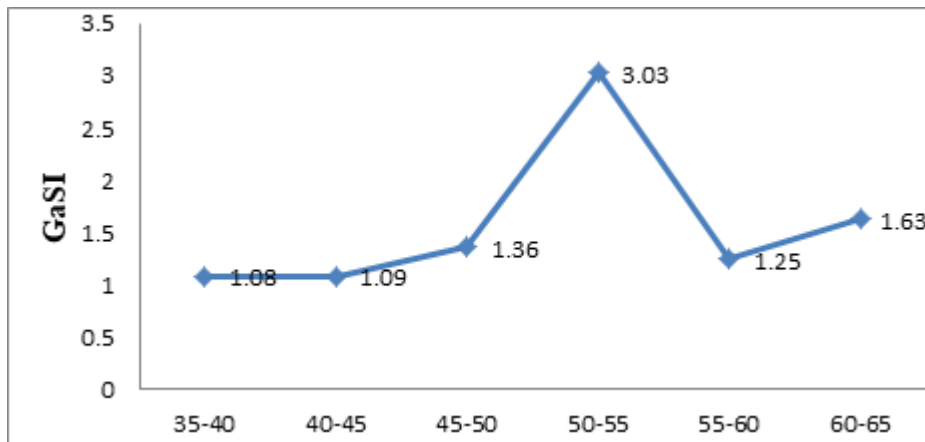


Fig 6: Ga.SI at different size group base on SL of *Pethia conchonius*

The correlation coefficient ‘r’ between standard length and gut length (0.842 and 0.681) was found to be significant at 0.5% level in *Trichogaster fasciata* and *Pethia conchonius* respectively. The regression equation was obtained as $Y = 124.868 + 8.205SL$ and $Y = 84.747 + 4.104SL$ for *Trichogaster fasciata* and *Pethia conchonius* respectively which indicate that a unit increment in the size SL increase the gut length by 8.0205 and 4.104 (Table 1) in both the species. The extent of variation in gut length was 71.0 and 46.4 percent.

In *Trichogaster fasciata* gradual increase in RGL was observed from 25-30mmSL with a little variation up to 60-65mmSL and there is a sudden decrease in 65-70mm SL of size group. The highest peak (4.94) was observed in size group ranging from 60-65mmSL while lowest (2.1) was seen in 25-30mmSL which is the lowest size group (fingerling stage) (Fig.3). The overall value of RGL ranges between 2.1-4.94 (Table 2). Though variation of RGL is less between size

group 40-45mmSL to 60-65mmSL and after that there is a drastic decrease in largest size group which may be due to its maturity stage. The same opinion has been reported by a number of workers [6, 26, 22, 1]. However the lowest value of RGL in smaller group is indicative of its carni-omnivorous habit and the higher value in different size group viz. 40-45, 45-50, 50-55, 55-60mmSL inferred its herbi-omnivorous feeding habits. Similar observation has been reported in many fresh water fishes by [11, 5, 14, 22].

The feeding intensity as indicated by Ga.SL value revealed decreasing trend after 40-45mmSL size group which may be due to the development of ovary but there is increasing trends from 25-30mmSL to 40-45mm SL size group which is indicative of voracious feeding habit (Fig 4). The highest value (6.08) was observed in 40-45mmSL groups and after that Ga.SI decreases with slight increase in 50-55mmSL size group (4.39). However, the Ga.SI value ranges from 2.91-

6.08(Table2) which shows the voracious nature of the fish. The smaller size fish is exhibited more voracious nature as compare to larger size group.

In *Pethia conchonius*, the RGL value varies from 1.08-3.03(Table2) the least value was observed in the group size of 35-40mmSL (1.08) and the highest in 50-55mmSL (3.03) (Fig 5). It is observed that the RGL value increases with increase in size which shows the change in feeding habits i.e. from carni-omnivorous to herbi-omnivorous but sudden decline trend in 60-65mm SL indicated its carni-omnivorous habit which perhaps may be due to the availability of food in habitat. This result inferred the selectivity in the diet and coincides with view of ^[10] in *P. bimaculatus* and *P. titteya*. Whereas, based on the RGL value the *P.ticto*, *P.shalynius*, *P.sarana* and *P.sophore* were reported as of omnivorous ^[27, 8, 14, 16].

As for the feeding intensity there is slight decrease in the size group of 40-45mmSL after that it increases and remains almost constant up to 55-60mm SL size group(Fig 6) which may be due to first maturity stage of fish, similar findings has been reported by ^[12] in *P. sophore*. The personal observation also inferred that the ovary development started 40mm SL onward. The Ga.SI ranges from 1.36-2.14, with the highest value in the group60-65mmSL and least in the group of 40-45mmSL. The slight variation in the Ga.SI indicated that the feeding rate is almost same for the entire size group and as for the decrease in the Ga.SI is due to the spawning period of the fish as reported by other workers ^[23, 17, 1].

Therefore it is inferred that the feeding habits change with the size of the fish's i.e. from carni- omnivorous to herbi-omnivorous. As such the present study coincides with the finding that the RGL value changes according to their life stages ^[11, 5, 14, 15] and that that the feeding habits decrease as the gonadal development start respectively.

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