Fecundity and its relation with body parameters of *Schizothorax niger* from Kashmir

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ABSTRACT

The present study provides the relationship between fish length, fish weight, ovary weight and ovary length. The fish is an early spring spawner and also spawns once and in full. Gonad growth coincides with gradual increase in water temperature and day length.30 specimens were collected from Dal (Srinagar) and Wular (Sopore) lakes from March 2021 to July 2022 with the help of local fisherman. The specimens ranged from 100.00 gm to 424.20 gm in weight, 200mm to 325 mm TL .The fecundity varied from 1069 in a fish measuring 200mm TL to 21196 in a fish measuring 325mm TL. The relationship of fecundity with other parameters such as total length ,total weight, ovary length and ovary weight were found to be linear and positive correlation was obtained.

Keywords: Fecundity, Allometric relationship, *Schizothorax niger,* Kashmir.

INTRODUCTION

The study of fish fecundity form an important aspect of fishery science and also help in fish management and conservation knowledge . Fecundity is important in stock size assessment,stock discrimination (Holden and Raitt,1974) and rational utilization of stock (Morales,1991) and in explaining the variation of population as well as to make efforts for the increasing the amount of fish yield.Fecundity is an important parameter for determining the reproductive potential of fish species (Zin et al.,2011).Thorough knowledge on the fecundity of the fish is essential for evaluating the commercial potentialities ,stock study,life history and management of fishery(Lagler ,1956a;Zin et al,2011).

The water bodies of Kashmir valley are blessed with various endemic (*Schizothorax sp.*) and exotic (Various carps and trouts) fish species. The endemic fishes of Kashmir have shown tremendous decline in population as well as body size(Yousuf,1996;Bhat et al.,2013).Among Schizothorax fishes, *Schizothorax niger* is a valuable fish of Kashmir region but in stiff competition with exotic fishes like *Cyprinus carpio.* The fish is a lacustrine fish, occurring in lake of Kashmir (Dal-lake and Wular- lake) in good numbers. Among Schizothorax species *Schizothorax niger* does not show any spawning migration and spawns in the shallow peripheral areas of the lakes(Vass and Raina,1979).The present study is aimed to determine the fecundity and its relation with other parameters which are of utmost importance in increasing the yield of fish species, stock management and assessment in water bodies.

MATERIALS AND METHODS

During the present study 30 specimens of *Cyprinus carpio communis* were procured from Dal and Wular lakes. Each fish was eviscerated after taking various morphometric measurements. The total length(TL),total weight(TW)Ovary length(OL) and ovary weight were measured from the procured specimens. For determining the fecundity the ovaries were removed and pat dried and weighed to thenearest gram. The ovaries were then placed in jars containing Gilsons fluid. The fluid facilitated the break down and fixation of ovarian tissue.A sample of 1gm of ovary was placed in 4-5%formalin after clearing with a stream of water. The samples to be counted were placed in a petridish and by means of pointed fine dissection needle the ova were counted under the low power stereoscopic binocular microscope. The total fecundity was calculated by taking a fraction of the ovary weighing it andcounting the mature ova from the weighed portion of the ovary by random sampling method. The totalnumber of eggs in each ovary was then calculated by multiplying the number of eggs in the ovarian samplebytotalovary/ the weight o ftheovarianfraction. The relative fecunditty was detected by the ratio of total number of ova to total weight of fish.

RESULTS

The ovaries are two elongated structures fused caudally. The ovaries are attached to the air bladder by thin mesovaria. The ovaries of the fish are not covered by means of black peritoneum as in other fish species but instead by a thin membrane of peritoneum. The ova remain attached to the thin folds of ovigerous lamellae. The size,shape and colour as well as the volume and weight of the ovaries changes seasonally according to the degree of maturity of the fish .
The fecundity varies from 1069(F) in a fish measuring 200 mm (TL) to 21196(F) in a fish measuring 340mm (TL).

Logarithmic relation in *Schizothorax niger* are expressed as:

1. **Relationship between Fecundity (F) and Fish Length (TL):** Table (1) provides data for the two variables i.e. fecundity and total length. For a fish measuring 340 mm (TL), the maximum number of ova was estimated to be 21196, while the minimum was 1069(F) for a fish of 200 mm (TL) in length.
     The equation expressed as:
          Log F = 1.8775 + 0.1346 Log TL
Where f = fecundity and TL = Total length in mm.
               R^2= 0.4682
The relationship between fecundity and total length was found to be linear and the correlation coefficient r= 0.68 which shows significant correlation (Fig.1).

2. **Relationship between fecundity (F) and fish weight (TW):** Table (1) provides data for the two variables i.e. fecundity and fish weight. The number of ova varied from 21196 at a weight of 422.20gm to 1069 at 100gm.
     The equation is expressed as:
          Log F=0.9247+0.3278 LogTw
               R^2=0.371
The number of eggs per female is directly proportional to fish weight. The correlation coefficient was found to be r =0.6099

3. **Relationship between fecundity (F) and ovary weight (OW).** Table (1) provides data for the two variables i.e. fecundity (F) and ovary weight. The fecundity(F) ranged from 21196 in an ovary weighing 27.88g to 1069 in an ovary of 10.22 gm. The equation is expressed as:
Log F = 0.554+ 0.4897Log OW
     R^2= 0.3164
Where F = fecundity and OW= ovary weight.
 The relationship between fecundity and Ovary weight was found to be linear and the correlation coefficient was found to be r =0.562

4. **Relationship between fecundity (F) and ovary length (OL)**: Table (1) provides data for fecundity and ovary length. The fecundity ranged from 21196 with an ovary length of 136.09 mm to 1069 with an ovary length of 81.21 mm.
The equation is expressed as:.
          Log F = 0.6335+ 0.364Log Ol
               R^2=0.194
Where F = fecundity and OL = Ovary length
The relationship between fecundity and Ovary length was found to be linear and the correlation coefficient (r) was found to be r= 0.44

5. **Relationship between fish weight and ovary weight:-** Table (1) provides data for fish weight and ovary weight. The fish weight (TW) ranged from 422.20gm in a fish having ovary weight 27.88gm while the minimum was 100gm (TW) for a fish having 10.22gm ovary weight.
The equation is expressed:
          Log w=-0.8992+1.0263 Log OW
               R^2=0.4018
The relationship between fish weight and Ovary weight was found to be linear and the correlation coefficient (r) was found to be r = 0.633

DISCUSSION

In the present study, absolute fecundity in *S. niger* varied from 1069 to 21196. Absolute fecundity in *S. niger* was in conformity with the result obtained by Saba (2016) and Shafi et al. (2013) in the same fish with absolute fecundity values ranging from 5691 to 17,645 and 1550-3444. Yadav et al. (2014) estimated the relative and absolute fecundities of *Schizothorax richardsonii* to be 12,000 and 30,000 eggs/kg, while as Ali et al. (2020) reported values of absolute

fecundity ranging from 3559 to 15712 Ova and relative fecundity (Per gram of body weight) ranging from 3052 to 63.45 ova in *Schizothorax niger*.

Fecundity exhibits positive correlation with length and weight of fish and also with ovary length and ovary weight in *S. niger*.Similar results were obtained by Wani (2021) in the same fishes. Jan et al. (2014) recorded correlation coefficient of 0.972 between fecundity and ovary weight in *Schizothorax plagiostomus*. During the present study absolute fecundity of fish had a strong correlation with ovary weight than total length and body weight. These results are in conformity with the results obtained by Wani (2021) in *Cyprinus carpio* and Qadir et al. (2009) in *Botia birdi*.Ali et al. (2020) reported strong correlation of fecundity with total weight, total length and ovary weight with coefficient of correlation values of 0.63, 0.53 and 0.58 while low correlation was observed with ovary length.

Conclusion: In *S. niger* the fecundity varies from 1069 in a fish measuring 250mmTL to 21196 in a fish measuring325mmTL. The relationship between fecundity and fish length ,fish and ovary weight have been established and it has been noted that the fecundity is directly related to the ovary weight (r=0.824) and fish weight (r =0.609) in *S.niger*.

**Table 1:Data for Absolute fecundity with other body parameters for gravid females of *Schizothorax niger***

| S.No.	Total length of Fish (mm)	Weight of Fish (g)	Ovary length (mm)	Ovary wt (g)	Absolute fecundity
1	239.01	140.00	100.00	25.20	9654
2	299.00	220.00	120.00	33.14	17649
3	200.00	100.00	81.21	10.22	1069
4	230.00	110.00	85.54	16.25	6863
5	215.00	112.00	96.61	18.60	8137
6	220.10	125.00	92.61	16.54	7569
7	278.00	150.00	90.55	15.59	6139
8	235.00	105.00	86.65	13.50	5840
9	222.00	112.80	101.00	24.60	20091
10	236.00	130.10	82.56	23.50	4243
11	250.00	205.00	95.10	20.19	3607
12	290.00	210.00	95.10	20.19	18521
13	310.00	270.00	130.09	27.85	19439
14	325.00	424.20	136.09	27.88	21196
15	340.10	328.90	133.10	26.61	20099

$y = 0.1346x + 1.8775$
$R^2 = 0.4682$
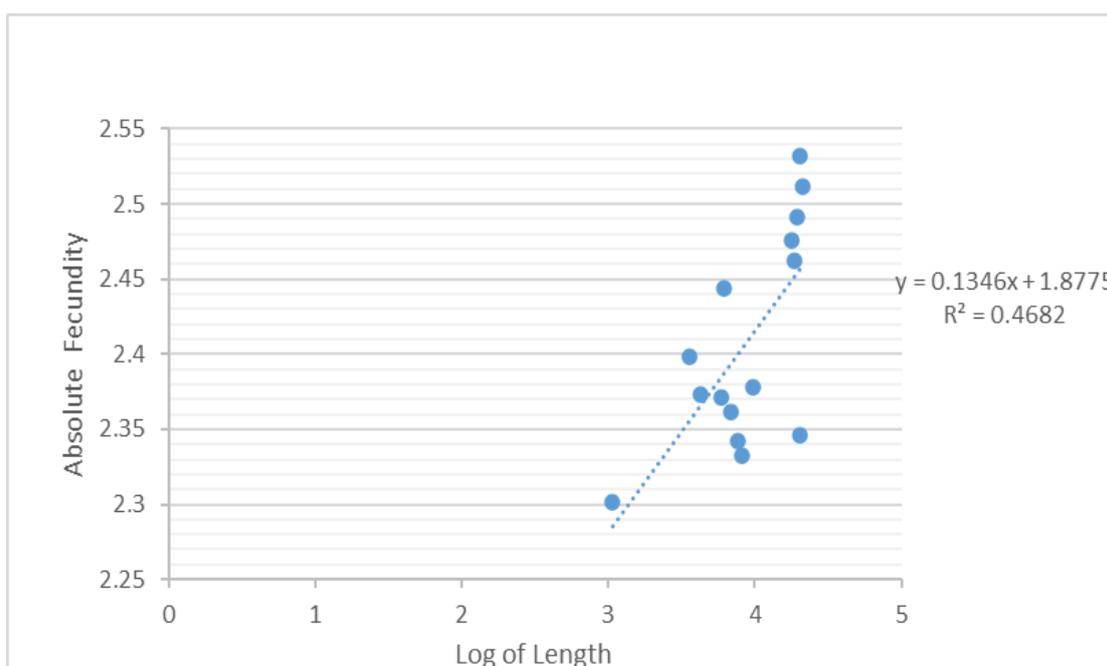
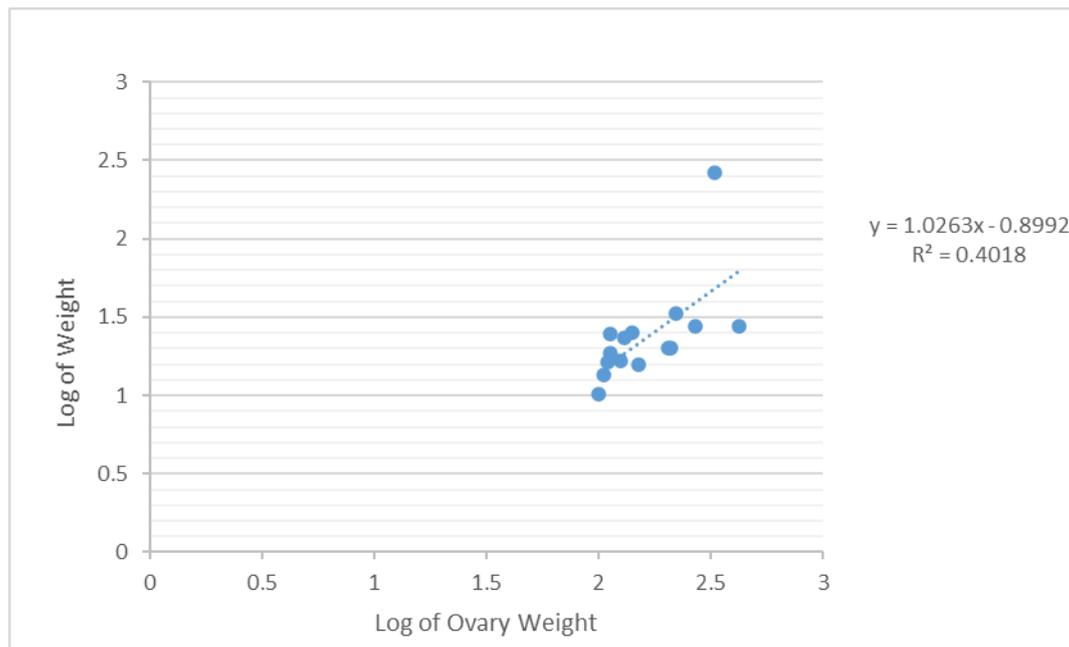**Fig 1: Logarithmic relationship between fecundity and fish length of *S.niger***
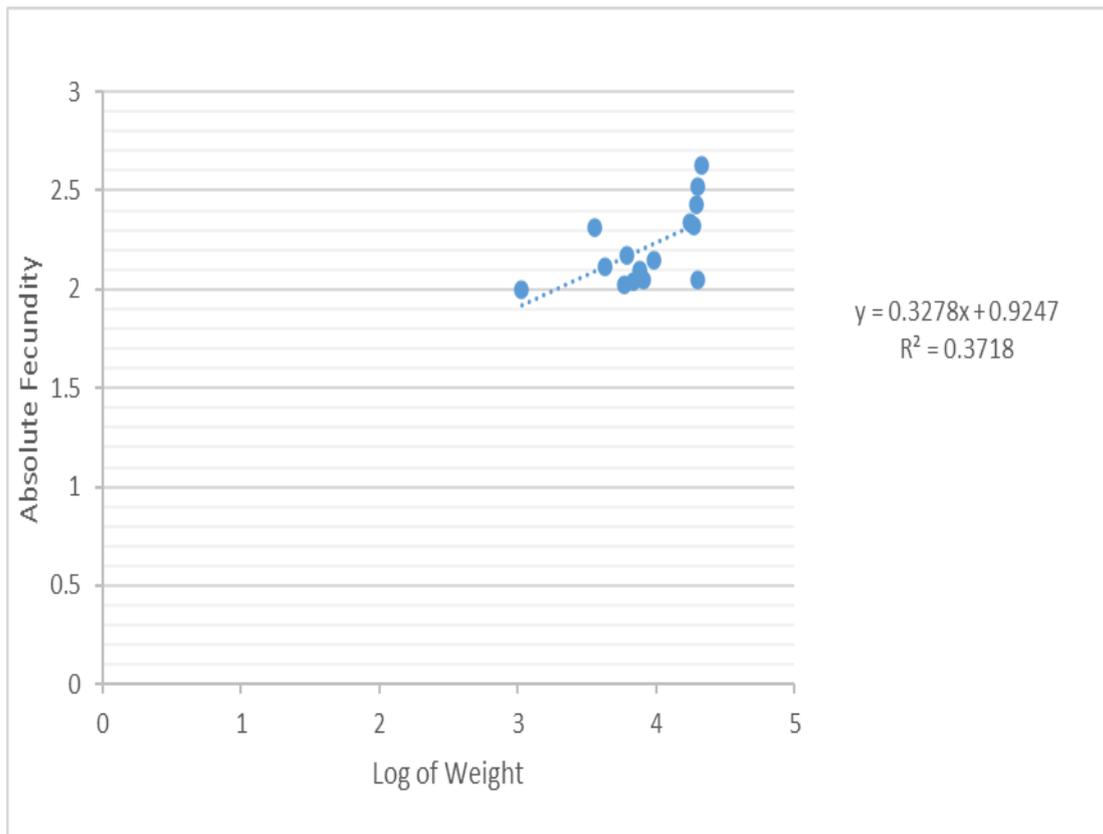
Fig 2: Logarithmic relationship between fecundity and fish weight of *S.niger*
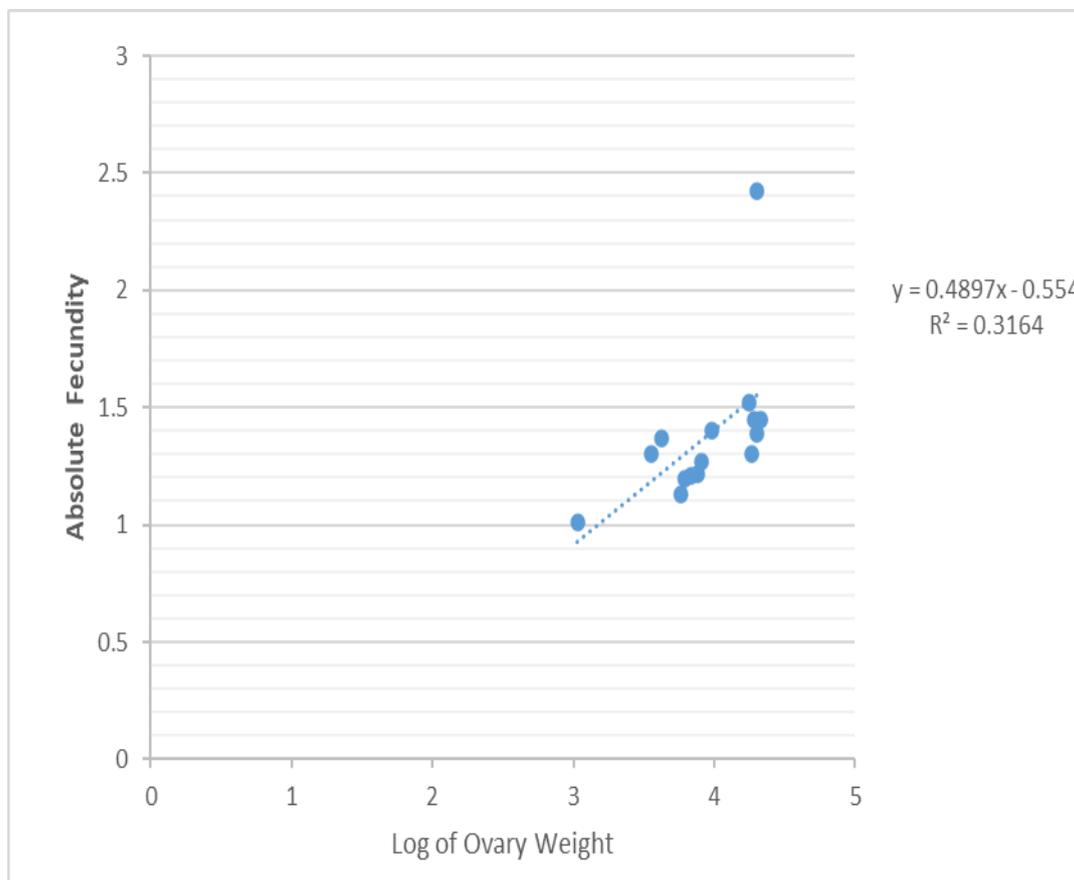
Fig 3:Logarithmic relationship between fecundity and ovary weight of *S.niger*
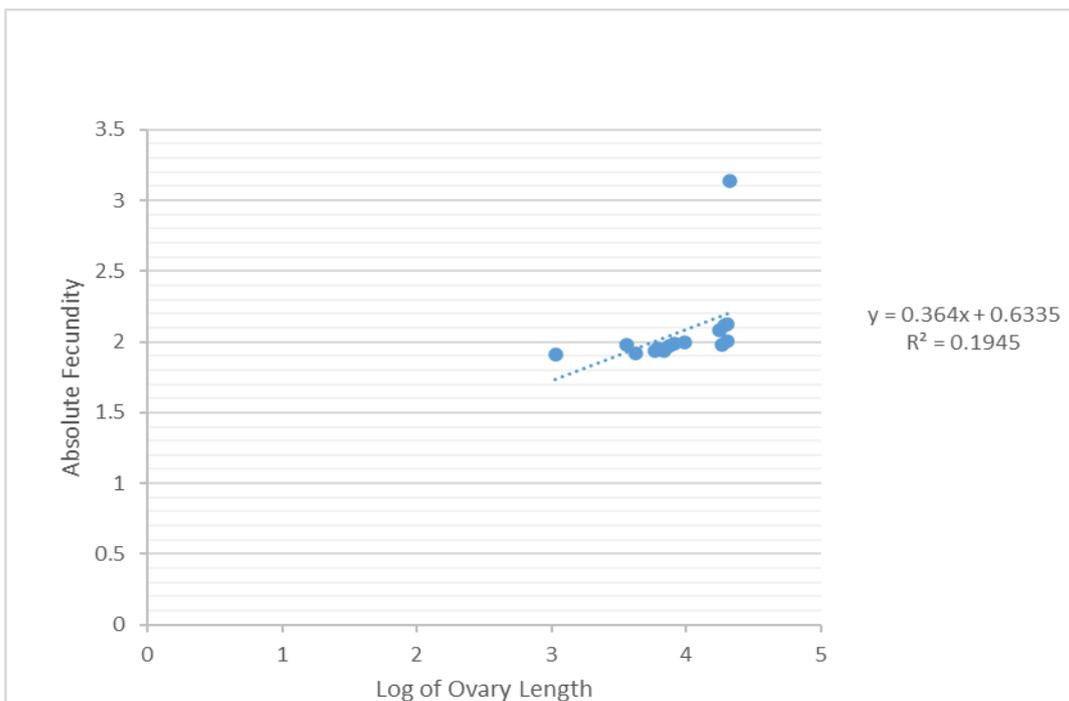
Fig 4::Logarithmic relationship between fecundity and ovary length of _S.niger_

Fig 5: Logarithmic relationship between fish weight and ovary weight of _S.niger_

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