



Research Article

Spawning Periodicity of Catfish, *Ompok pabda* (Hamilton 1822) from River Indus, Sindh, Pakistan

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Abstract | The spawning periodicity of *Ompok pabda* from Indus River was elucidated for collection on monthly basis during February 2017 to January 2018. The measurement of egg size, somatic index of gonads and productive potential (fecundity) was considered of the fish under study. Size of the egg increased from March (0.81 mm) to May (1.05 mm) with one spawning peak in May. Somatic index percentage of gonads in both sexes also increased simultaneously from 0.95% (March) to 1.2% (May) for male, and from 3.18% (March) to 5.1% (May) for female. The value of both factors reflects that the fish possess only one spawning season during the year in the month of May. The enumeration of fecundity was based upon ten mature fish ranging from 15.5 to 30.0 cm in length and from 18.18 to 148.0g in weight. High potential of eggs production i.e. (1020 eggs) was recorded for fish with 30.0cm length and 148.0 g weight. The low fecundity (300 eggs) was recorded for fish with 15.5cm in length and 18.8g weight. Production potential (fecundity) and its association with other factors like total length of fish, weight of fish, length and weight of gonads were enumerated and the fecundity found to be dependent with gonads weight as compared to other factors.

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Keywords | Catfish (*Ompok pabda*), Production potential, River Indus, Spawning periodicity



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Introduction

Commonly, fish is a member of vertebrate which possess various characteristics that make them distinctive among others due to adaptation, nature, behavioral, physiological and morphological activities (Narejo, 2003). Fish morphological characteristic is an important key to understand the biological nature

of particular species, classification, stock assessment and evolution. Although, food and feeding habit of particular fish can reveal the ecological nature of the target species. However, preference of food can vary species to species and also change during different stages of their life (Narejo *et al.*, 2003). *Catfish, Ompok pabda* (Hamilton, 1822) is a native fish of Pakistan and commonly called “Pahari Pafta” while locally

named “pabda” means butter fish, belonging to the family Siluridae. It is a small sized fish and found in normal water bodies like Rivers, streams, beels, and floodplains of Pakistan, India and Bangladesh (Mirza and Hussain, 1988). It is easily adaptable in shallow, warm and saline lentic and lotic water. Currently, reported 2600 species and 33 families of catfish globally. They have high commercial value due to their taste and considered as an important species among various freshwater fishes of Pakistan. Morphologically, their body shape is longitudinal and compressed on a lateral side with dorso-ventrally flattened head, round snout and 2 pairs of barbells is present surrounded the mouth. Whereas, the caudal fin is bifurcate with rounded lobes and having pectoral fin with plane spines. This species is a patamodromous and carnivorous in nature (Narejo *et al.*, 2005). They can easily survive in a harsh environment like hostile water quality condition. These potentials qualifies them to adjust in low surface water, minimum oxygenated water, high turbulence in water and a low productive water. It is also a suitable candidate for the freshwater aquaculture in our country. *Ompok pabda* is normally found in a bottom dwelling area, nocturnal in nature, usually spawn during monsoon period and once in a year make this species can be a great candidate for aquaculture. On the other hand, due to its lower population size and poor larvae survival, make this species difficult to rear and/or culture at early stages but proper larval management could help to produce this species because it has experienced a critical decay due to over misuse and consequently set in near threatened category by IUCN. So far no published information is reported from Pakistan on the biology, gonadal assessment, breeding and production potential of *catfish*, *Ompok pabda*, which is very useful to conserve and stock management of this species.

Materials and Methods

Sample collection

The experimental fish *Ompok pabda*, were procured from railway crossing of Jamshoro, adjacent to Indus River. A total of sixty mature fish of mixed sexes, varying from 15.5 to 25.0cm in length and from 60 to 120g in weight were procured from February 2017 to January 2018 (5 fish in each month). After collection, the fish samples were stored in 10% formalin in bags, and then transported to the laboratory for data collection and analysis. The samples were gently washed, and data was recorded for weight, length, sex

and gonad condition. Finally, gonads were dissected out and fixed with 10% buffer formalin for more investigations like calculation of somatic index, egg size and production potential fecundity (Narejo *et al.*, 1998).

Laboratory analysis

The external characteristics to identify gonads, either testes or ovary, was done and their weight was recorded in relation to body weight as suggested by (Narejo *et al.*, 1998). The following formula was used to determine gonado- somatic index.

$$GSI = \text{weight of gonad} / \text{weight of fish} \times 100$$

Enumeration of fecundity

Fecundity estimation in the present study was based upon 10 mature female fish of *O. pabda* (total length ranged from 14.8 to 30cm and 18.18 to 148.0 g). The small portion as sub sample of 1.0g was taken from upper, middle and lower region of both the ovaries. The egg found in sub sample was enumerated and multiply with ovary weight in this manner total potential of production (fecundity) was estimated. The counting of egg was done according to procedures given by (LeCren, 1951) by formula:

$$F = N \times \text{weight of ovary} / \text{sub sample weight}$$

Results and Discussion

Measurement of egg size

The 100 eggs were measured as standard procedure under the microscope fitted with micro-meter during the study period and found that all the eggs were uniform in size. It suggests that fish shed and all their eggs during the spawning season in the month of May. The egg size found to be increasing during the month of March (0.81 mm) and reached at the maximum (1.05 mm) in the month of May (Table 1).

Gonadosomatic index analysis

The percentage of gonadosomatic index of *Ompok pabda* from River Indus was determined for both the sexes for the period of 01 year from February 2017 to January 2018. It was observed that the values of GSI in both the sexes showed significant increasing trend similar to that of egg size from the month of March (0.95% and 3.18%) respectively and reach to maximum during the month of May (1.2% and 5.1%) for male and female. It was recorded from the egg size

development and GSI values follow the similar trend of increasing simultaneously which indicated that experimental fish spawns once in a year during March to May with peak spawning season in the month of May (Figure 1).

Table 1: Showing the month-wise changes of ova diameter February 2017 to January 2018.

S.N.	Months	No. offemales (5 fish in each month)	Egg Size (mm)
1.	February (2017)	05	0.54±0.01
2.	March	05	0.81±0.03
3.	April	05	0.95±0.02
4.	May	05	1.05±0.03
5.	June	05	0.06±0.002
6.	July	05	0.05±0.001
7.	August	05	0.00±0.00
8.	September	05	0.10±0.02
9.	October	05	0.35±0.05
10.	November	05	0.40±0.03
11.	December	05	0.48±0.04
12.	January (2018)	05	0.50±0.06

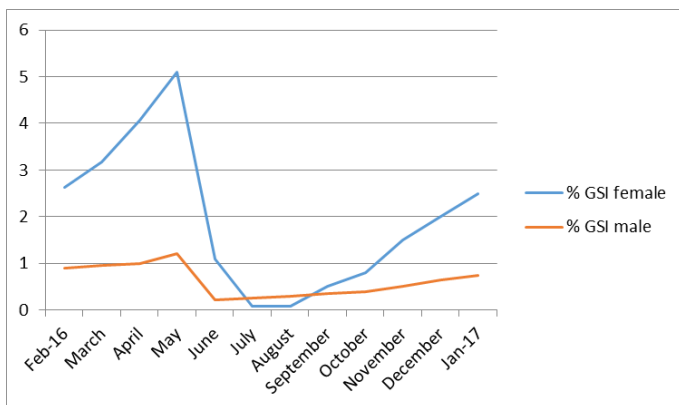


Figure 1: Showing monthly deviation in the values of Gonadosomatic Index in both the sexes of *Ompok pabda* from River Indus.

Fecundity enumeration

The enumeration of fecundity was based upon ten mature fish ranging from 15.5 to 30.0 cm in length and from 18.18 to 148.0 g in weight. The high production potential (1020 eggs) was noted from fish with 30.0 cm and 148.0 g in length and weight. The low fecundity (300 eggs) was counted from fish of 15.5 cm in length and 18.1 g in weight (Table 2).

Production potential (fecundity) and its association with other factors like total length of fish, weight of fish, weight and length of gonad were enumerated as under. The fecundity found to be dependent with

gonad weight as compared to other factors. Water quality criteria is also imperative to protect the fish population (Tsai, 1973).

During the observations, it was seen that gonads start progressing from March to May months as the egg size and somatic index values of gonads were recorded high. It indicates spawning period of experimental fish *Ompok pabda*. More or less identical reports are available like Chakrabarti and Ghosh (2009, 2010) investigated spawning behavior and production potential of *Ompok pabda* from India and Bangladesh and commented that the fish spawn during the months of May to August (Monsoon) from India and once in year during early April, May to July from Bangladesh. Banik et al. (2012) elucidated breeding biology of *Ompok pabda* from India and stated that the length at first maturity of female is 17.0cm while it is 16.3cm in male. Maximum gonadosomatic index has been 2.195 and it is 15.582 for female. First maturity stage is noticed May to June and peak in July the age attains great diameter two early August at peak period. Narejo et al. (2002; 2003) observed spawning potential and breeding habit of *Mastacembelus armatus* and *Monopterusuchia* and stated that the spiny and mud eel spawn once in calendar in summer time. They also reported that the large egg size and somatic index values prominent in the months of May to July. Lashari et al. (2007) in *Cirrhinus reba*, Mastoi et al. (2008) in *Labeo calbasu*, Narejo et al. (2015) in *Channa stratus*, Jalbani et al. (2015) in *Heteropnuestes fossilis*, Jalbani et al. (2018) in *Rita rita*, Chandio et al. (2020) in *Notopterusnotopterus* and Bakht et al. (2020) in *Cyprinus carpio*. All above authors also reported alike information with regards to the present investigations in various fish species.

Count of egg in the present studies was found to be deviated from 300 to 1020. (Gupta et al., 2013) studied fecundity of *Ompok pabda* from Gomti River and it was varied from 2460 to 5986 eggs. The egg production and range reported by Gupta et al. (2013) from India bit higher than that of present study, it may be due to different environmental conditions, availability of food and population dynamics of the experimental fish. Fecundity varies from species to species and different individuals within given specie may exhibit variation in fecundity depending on the size, age, nutritional status and environmental factors Azadi et al. (1987). The production potential (fecundity) of *Ompok pabda* in the present investigations

was reported low comparatively with other catfish. Alike information has been reported by various research authors such as [Gupta and Banerjee \(2013\)](#) estimated fecundity of *Mystus tengara* and they revealed it ranged 6770-21708 with an average of 13365.84 ± 7260.40 ; thus representing the highly fecund nature. [Malla et al. \(2015\)](#) egg count in *Ompok bimaculatus* from India was varied from 151-257 eggs. [Jalbani et al. \(2016\)](#) in *Rita rita* found varied between 980 to 15450 egg.

Table 2: Data of fecundity in relation to gonad length and weight and body length weight in *Ompok pabda* from River Indus.

S.N.	Length of fish (cm)	Weight of fish (g)	Gonad weight (g)	Gonad Length (cm)	Fecundity in thousand
1.	15.5±1.3	18.1±1.7	4.5±0.03	2.1±0.04	300±5.3
2.	14.8±1.0	15.6±0.9	3.8±0.01	2.0±0.02	295±3.6
3.	18.5±1.4	35.1±1.3	5.6±0.06	2.3±0.01	590±3.8
4.	22.8±2.1	80.8±2.7	6.7±0.08	2.5±0.03	670±4.5
5.	30.0±2.5	148.0±2.8	9.9±0.09	2.8±0.05	1020±6.8
6.	27.2±1.6	120.0±3.5	9.0±0.05	2.6±0.01	980±5.5
7.	25.2±1.4	104.0±2.9	8.8±0.07	2.5±0.03	880±2.9
8.	29.0±2.2	138.0±3.6	9.7±0.04	2.7±0.02	1000±6.8
9.	20.3±1.5	100.0±3.7	7.5±0.06	2.5±0.02	889±5.4
10.	20.3±1.4	90.0±2.8	7.0±0.06	2.5±0.03	805±5.0

Fecundity showed positive relationship with other body parameters, but comparison of coefficient correlation of fecundity with above said parameters indicate that the fluctuation in the fecundity can be explained better in terms of weight of ovary, length and total body weight respectively. Relationships of diverse factors of fish body in relation to fecundity designated better with ovary size relationship. [Ahmet et al. \(2004\)](#) determine periodicity of egg lying of *Silurus glanis* and of the opinion that the fecundity displayed better correlation with mass of the ovary. The relationships of different body characters with egg potential indicated well with the present studies. Present study revealed the fecundity of *Ompok pabda* varied from 300 to 1020 eggs in fish collected from Indus River near Jamshoro, Sindh.

Conclusions and Recommendations

Therefore, it was concluded that the fish under study spawns once in a year with peak in the month of May as the values of both egg size and somatic index in-

creased simultaneously. The full grown *Ompok pabda* could produce 1000 eggs during the breeding season.

It is recommended that the histological studies of the gonad of the experimental fish should be carried out to confirm the development of gonads and their stages like preparatory season, spawning season and post spawning periods.

Novelty Statement

This research has been reported for the first time in Pakistan on the biology, gonadal assessment, breeding and production potential of catfish, *Ompok pabda*.

Author's Contribution

Dharti Shahnawaz Thebo: Conducted research and analysis of the sampled fishes.

Naeem Tariq Narejo: Supervised this research, helped relevant literature and manuscript preparation

Muhammad Hanif Chandio: Helped literature and data acquisition.

Saddar Faheem: Collected fish and eggs samples, did analysis in fresh water biology and fisheries

Shahnaz Rashid: Helped in composing, formatting and updating bibliography.

Asma Fatima: Assisted in primary productivity, composed the document with data acquisition.

Ghulam Abbas: Helped in manuscript proofreading and composed the document with data acquisition.

Conflict of interest

The authors have declared no conflict of interest.

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