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"A STUDY ON LENGTH-WEIGHT RELATIONSHIPS OF *SCATOPHAGUS ARGUS* (FAMILY: SCATOPHAGIDAE) FROM KARACHI COAST, PAKISTAN"

Musarrat-ul-Ain and RehanaYasmeen Farooq
Department of Zoology, University of Karachi, Karachi-75270, Pakistan.
email: musarrat-ul-ain@hotmail.com

ABSTRACT: A study on length-weight relationships of *Scatophagus argus* was carried out during January 2015 to December 2015. A total of 282 specimens of different sizes were collected from the fish harbours of West Wharf and Korangi Creek, Pakistan. The *b*-value of regression equation shows the positive allometric growth in juveniles and adults of *S. argus* while, the negative allometric growth was obtained for combined fishes. The coefficient of correlation (r) was found as 0.992, 0.985 and 0.996 showing strong correlation between length and weight of juvenile, adult and combined fishes, respectively. All results were found significant at 5% significance level.

KEYWORDS: Biology, *Scatophagus argus*, Growth, Regression, Juvenile fishes, Pakistan.

INTRODUCTION

The *Scatophagus argus* is an ornamental fish as well as a good edible fish. They are commonly found in near shore waters of Indo-West Pacific from southern India and Sri Lanka to southern Japan and northern to south eastern Australia and Philippines. *S. argus* is an euryhaline fish and can tolerate a wide range of salinity (Wongchinawit and Paphavasit, 2009). They are omnivore fishes and mainly feed on detritus, algae, fish scales, fish eggs, crustaceans, bivalves, copepods, sea anemone, sponge and polychaetes (Sivan and Radhakrishnan, 2011). *S. argus* spawns two times in a year first during June to August with peak in July and second during October to December with peak in November (Gandhi *et al.,* 2014).

Length-weight relationships are widely used in fisheries biology as; it helps to estimate the weight and biomass from length observations (Koutrakis and Tsikliras, 2003). According to Saha *et al.* (2009) length-weight relationship is a mathematical estimate which helps to obtain weight when length is available or help to compute length when weight is available. Studies on length-weight relationships can help to understand the health and gonadal development of a fish (Ayoade and Ikulala, 2007). Shadi *et al.* (2011) have been reported the significance of length-weight relationships as it contributes in stock assessment and population dynamics.

MATERIALS AND METHOD

This study was carried out during January 2015 to December 2015. Fish samples of various lengths were collected from the landing site of fish harbours of West Wharf and Korangi Creek, Pakistan. A total of 282 specimens (145 juveniles and 137 adults) were

collected for this study. All samples were identified by using FAO field guide (Bianchi, 1985; Psomadakis *et al*., 2015). Fresh samples were transferred to the laboratory. All samples were measured in cm with the help of a measuring board and weighed in gm by a digital balance.

The following equation of Le Cren (1951) was used to estimate the length-weight relationships of *Scatophagus argus*;

$W = a L^{b}$

The logarithmic transformation of above equation was used to linearize the data after Lawson *et al*. (2010);

$\text{Log } W = \text{Log } a + b \text{ Log } L$

Where, a is constant and *b* is exponent. W is weight of fish and L is total length of fish.

The Pearson correlation (r) was estimated to find the relation between length and weight after Zubia *et al*. (2014). All calculations were done by using MS Excel 2013 and Minitab version 17.

RESULTS AND DISCUSSION

The results of present investigations are presented in Table 1. The results show positive allometric growth ($b>3$) in juvenile and adult fishes while, it shows negative allometric growth ($b<3$) in combined samples of *Scatophagus argus*. The strong correlation ($r>0.90$) between length and weight of *S. argus* was obtained in juvenile, adult and combined and all results were found to be highly significant ($p<0.05$).

Table 1. Length-weight relationships of *Scatophagus argus* from Karachi coast, Pakistan.

	Length (cm)		Weight (gm)		n	a	b	S.E. (b)	r	r^2	p-value	G
	Max	Min	Max	Min								
Juvenile	11.0	4.20	35.00	2.00	145	-1.64	3.10	0.059	0.992	98.47	0.000*	A+
Adult	29.0	15.90	648.0	84.00	137	-2.12	3.39	0.099	0.985	97.06	0.000*	A+
Combined	4.20	29.00	2.00	648.00	282	-1.47	2.88	0.028	0.996	99.5	0.000*	A^-

* Significant at $p<0.005$, A+ shows positive allometric growth, A^- shows Negative allometric growth.

The coefficient of regression equation (*b*) shows the growth of fish. The ideal value of coefficient of regression equation ($b=3$) specifies the isometric growth of fish. This means that fish body shape remains same throughout its life. While, $b\neq3$ shows the allometric growth of fish. If $b<3$, then growth is negative allometric and fish become slender with increase in length. However, if $b>3$, then growth is positive allometric and

fish become rounder with increase in length (Zin *et al*., 2011). According to Tesch (1971) the *b* value in regression equation may fall between 2 to 4.

Length-weight relationship and differences in growth pattern of several fish species have been studied from Pakistan e.g., Yousuf and Khurshid (2008) have observed that the value of coefficient of regression '*b*' was close to the ideal value (*b*=3) for *Hemiramphus far,* hence, it shows an isometric growth pattern and follows the cube law. Naz *et al*. (2013) have observations on *Catla catla, Labeo rohita* and *Cirrhina mrigala* and found positive allometric growth in treated fishes with sub-lethal concentrations of lead and they have also observed positive allometric growth in controlled group of fishes. Achakzai *et al*. (2014) have reported the negative allometric growth in male, female and combined sexes of *Glossogobius giuris.* Ahmed *et al*. (2013) have suggested the positive and negative allometric growth in different size classes of *Megalaspis cordyla* during pre-monsoon and monsoon period while, positive allometric growth was recorded in different size classes of *M. cordyla* during post-monsoon period. Achakzai *et al*. (2013) have described isometric growth (*b*=3.0) in combined, male and female sexes of *Oreochromis mossambicus.* Zubia *et al*. (2014) have estimated negative allometric growth for *Liza melinoptera* and *Valamugil speigleri* while, positive allometric growth was investigated for *Mugil cephalus* and *Liza macrolepis,* hence, confirmed that these fishes change their body shape with increase in length.

There are various factors which may affects the length-weight relationship such as, maturity of gonad, sex of fish, stomach condition and wellbeing of fish (Karna *et al.,*2012). It may also fluctuate due to the physiological parameters or due to the count of sampled specimens, condition of sampling area or due to the sampling season (Sahoo *et al.,* 2012). Biria *et al.* (2014) also reported the season, sex of fish, gonadal maturity stage, diet condition and fish health as factors affecting on length-weight relationships. According to Hossain *et al*. (2011), gonadal development and feeding intensity may also effects on length-weight relationships. However, changes in values of length-weight relationship might be due to seasonal variability or different sampling sites (Isa *et al.,* 2012). Khayyami *et al*. (2014) had suggested fish health, salinity and temperature as main factors affecting on length-weight relationships.

CONCLUSION

The results of this study provide basic information about length-weight relationships of juvenile, adult and combined specimens of *Scatophagus argus* from Pakistan. Length-weight relationship gives an overview on the growth of fish. This information can help in fisheries sciences as, length-weight relationship helps to estimate weight of fish when only length observations are available.

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