

Note

Length-weight relationship of *Johnieops sina* (Cuvier, 1830) off Cochin, south-west coast of India

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ABSTRACT

Length-weight relationship of *Johnieops sina* was estimated from 392 males and 487 females in the length range of 102-208 mm (TL), collected from fish landings at Cochin and Munambam fisheries harbours as well as Vypin fish landing centre in Kerala, on the south-west coast of India during the period from January 2008 to June 2010. The length-weight relationship equations were derived as $W = 0.000074956 L^{2.6260}$ for males and $W = 0.0000426 L^{2.7393}$ for females. Analysis of covariance showed that there is no significant difference between sexes ($p > 0.05$). Hence, common length-weight relationship using pooled data of the two sexes was derived as $W = 0.00005854 L^{2.6753}$. Results of the Student's t-test indicated significant deviation of 'b' from '3', tending towards negative allometric growth ($p < 0.05$).

Keywords: Allometric growth, Cochin, *Johnieops sina*, Length-weight relationship, South-west coast of India

Growth of a fish is usually indicated through increase in length and corresponding weight (Jobling, 2002). Studying the relationship of these growth related variables is imperative to gain insight into various biological aspects of fishery and to measure biomass in a particular fishing zone (Froese and Pauly, 1998). Besides this, length-weight relationship is a basic biological parameter for stock assessment and studying population dynamics such as growth estimation, fish mortality and age structure (Haimovici and Velasco, 2000; Valle et al., 2003; Fafioye and Oluajo, 2005).

Length-weight relationship of *Johnieops sina* (Cuvier, 1830) from different parts of the Indian coast have been investigated earlier by Jayasankar (1994) from Mandapam, Chakraborty *et al.* (2000) from Cochin, Telvekar (2006) from Mumbai waters and Manojkumar (2011) from Malabar coast. The present study is an update on the length-weight relationship of *J. sina* from Cochin.

During the period between January 2008 and June 2010, a total of 879 individuals (392 males and 487 females) in the length range of 98-208 mm were sampled weekly from trawl landings at Munambam and Cochin fisheries harbours as well as Vypin landing centre in Kerala. Total length (TL, mm) of each specimen was measured from snout to tip of upper caudal fin. Correspondingly, weight of each specimen was taken to an accuracy of 0.001 g using a digital electronic balance.

The length weight relationship was calculated separately for both sexes, as $W = aL^b$ (Le Cren, 1951)

where "W" is the total weight (g), "L" is total length (mm), and 'a' and 'b' are constants, estimated through linear regression after logarithmic transformation to the form $\log_e W = \log_e a + b \log_e L$; 'a' being the intercept and 'b', the slope of the regression line.

The association between the two variables r was determined using coefficient of determination. Variation in b values between sexes was calculated at 1% and 5% level of significance, by analysis of covariance (Snedecor and Cochran, 1967). Deviation of 'b' from isometric value of 3 was tested with Student's t-test using the test statistic 't' given by $t = (b - \beta) / S_b$, where $\beta = 3$

The length weight relationship was derived separately for male and female of *J. sina* as :

Male: $W = 0.000074956 L^{2.6260}$

Female: $W = 0.0000426 L^{2.7393}$

Analysis of covariance did not show significant difference (at 1% and 5% levels) between sexes. Therefore a common equation was derived for pooled sex as follows:

$W = 0.00005854 L^{2.6753}$

The log transformed regression of length and weight for *J. sina* is shown in Fig.1. Student's t-test indicated that the 'b' values estimated deviated significantly from the isometric value of 3, tending towards negative allometric growth.

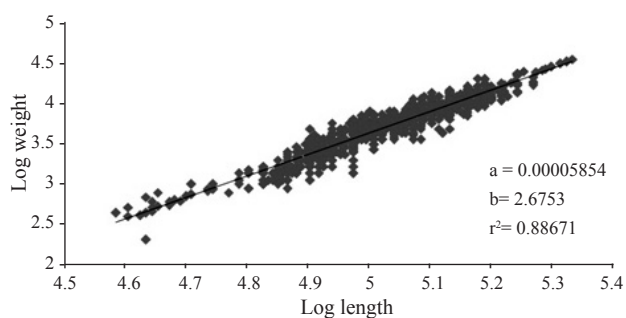


Fig. 1. Length-weight relationship of *Johnioeps sina* (sexes pooled)

Length-weight relationship of *J. sina* in the present study is closely consistent with the previous studies from Cochin and Malabar coasts (Chakraborty *et al.*, 2000; Manojkumar, 2011). The “b” value of female in the present study is similar to the results of the previous attempt by Chakraborty *et al.* (2000), while that of male is slightly lower than in earlier studies (Table 1).

Regression coefficient of *J. sina* reported from other parts of India is higher in both male and females. It is inferred that *J. sina* from the south-west coast demonstrates geographical variation in growth pattern and indicates lower weight increment per unit length than *J. sina* from the north-west and south-east coasts (Jayasankar, 1994; Chakraborty *et al.*, 2000; Manojkumar, 2011).

This type of geographical variation has been observed in other species (Sparre *et al.*, 1989). Several investigations correlate this variation with habitat as well as prevailing environmental conditions (Battacharya and Acharya, 1985; Mommsen, 1998; Jaiswar and Kulkarni, 2002). The variation in “b” value of *J. sina* from different parts of the Indian coast may also be attributed to different ecological conditions.

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Table 1. Length-weight relationship in *J. sina* reported from different regions in India

Geographical region	Location	Sex	Regression coefficient	Correlation coefficient
South-west coast	Off Cochin (Present study)	Male	2.6260	0.87842
		Female	2.7393	0.89044
		Pooled	2.6753	0.88671
	Off Cochin (Chakraborty <i>et al.</i> , 2000)	Male	2.4187	
		Female	2.7575	
		Pooled		
Malabar coast (Manojkumar, 2011)	Male	2.8215	0.9167	
	Female	2.8114	0.9512	
	Pooled	2.8313	0.9494	
North-west coast	Mumbai coast (Telvekar, 2006)	Male	3.2582	0.9167
		Female	3.1769	0.9510
		Pooled	3.2352	0.9442
	Ratnagiri coast (Tarkeshwar <i>et al.</i> , 2012)	Male	3.1342	0.9413
		Female	3.1646	0.9335
		Pooled	3.1751	0.9393
South-east coast	Off Mandapam (Jayasankar, 1994)	Male	3.2285	0.96
		Female	3.3064	0.98
		Pooled	3.2616	0.97

References

- Bhattacharya, D. and Acharya, P. 1984. A note on the length-weight relationship of *Polynemus heptadctylus*. *Geobios*, 3: 62-64.
- Chakraborty, S. K., Devadoss, P., Manojkumar, P. P., Feroz Khan, M., Jayasankar, P., Sivakami, S., Hamsa, K.M.S., Badrudin, M., Livingston, P., Ramalingam, R., Dareswar, C. V., Chavan, B. B. and Seetha, P. K. 2000. The fishery biology and stock assessment of Jew fish resources of India. In: Pillai, V. N. and Menon, N. G. (Eds.), *Marine fisheries research and management*. Central Marine Fisheries Research Institute, Cochin, p. 604 - 616.

- Fafioye, O. O. and Oluajo, O. A. 2005. Length-weight relationships of five fish species in Epe lagoon, Nigeria. *African J. Biotechnol.*, 4: 749-751.
- Froese, R. and Pauly, D. 1998. Fish Base 98: Concepts, design and data sources. World Fish Centre. Manila. www.fishbase.org
- Haimovici, M. and Velasco, G. 2000. Length-weight relationships of marine fishes from Southern Brazil. *Naga, ICLARM Q.*, 23(1): 19-23.
- Jaiswar, A. K. and Kulkarni, B. G. 2002. Length-weight relationship of intertidal molluscs from Mumbai. *Indian J. Fish. Ass.*, 29: 55-63.
- Jayasankar, P. 1994. Observations on the biology of some sciaenid fishes from Mandapam region. *Indian J. Fish.*, 41 (2): 80-86.
- Jobling, M. 2002. Environmental factors and rates of development and growth. In: Hart, P. J. B. and Reynolds, J. D. (Eds.), *Handbook of fish biology and fisheries*, Vol. 1. Blackwell Publishing, p. 107-109.
- Le Cren, E. D. 1951. Length-weight relationship and seasonal cycle in gonad weight and condition of the perch (*Perca fluviatilis*). *J. Anim. Ecol.*, 20: 201 - 219.
- Manojkumar, P. P. 2011. Fishery of sciaenids with some observations on the biology and stock assessment of *Johnnieops sina* (Cuvier, 1830) exploited along the Malabar coast. *J. Mar. Biol. Ass. India*, 53(1): 68 – 74.
- Mommsen, T. P. 1998. Growth and metabolism. In: Evans, D. H. (Ed.), *The physiology of fishes*. CRC Press, New York, p. 65-97.
- Snedecor, C. W. and Cochran, W. G. 1967. *Statistical methods*, 6th edn. Oxford & IBH Publishing Co., New Delhi, 593 pp.
- Sparre, P., Ursine, E. and Venema, S. C. 1989. *Introduction to tropical fish stock assessment*. Part I, Food and Agricultural Organization, Rome, p. 306-337.
- Tarkeshwar, K., Chakraborty, S. K., Jaiswar, A. K., Sandhya, K. M. and Panda, D. 2012. Biometric studies on *Johnnieops sina* (Cuvier, 1830) along Ratnagiri coast of Maharashtra. *Indian J. Fish.*, 59(1): 7-13.
- Telvekar, P. A. 2006. *Biology and stock assessment of Johnnieops sina (Cuvier 1830) from Mumbai waters*. Ph. D. Thesis. Central Institute of Fisheries Education, Mumbai, p. 48-49.
- Valle, C., Bayle, J. T. and Ramos, A. A. 2003. Weight-length relationships for selected fish species of the western Mediterranean Sea. *J. Appl. Ichthyol.*, 19: 261-262.