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Short Communication

Length-weight relationshisp and relative conditions factor for the halfbeak *Hemiramphus far* Forsskål , 1775 from the Karachi coast

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Growth of an organism means a change in length or weight or both with the Increase of age. Increment in size is due to conversion of the food matter into building mass of the body by the process of nutrition. A vector diagram known as growth curve is obtained, when length or weight of an individual are plotted against a specified time period. The curve appears as a sigmoid one, which may vary for the same fish from different localities or for the same fish at different seasons. The rate of growth may easily be influenced by many physical and physiological factors. Different organs of body or have different rates of growth. Theoretically, it is expressed by the formula of cube law (LeCren, 1951), $W = KL^3$, where, W = weight of fish, L = length of fish, K = constant. This formula is true when the fish showing symmetrical or isometric growth throughout the growth stage. However, in nature, the body proportion of a fish continuously changes with ageing. So the simple cube law expression therefore does not found properly throughout the life history of fish, as the value of K is not constant but subject to great variation. Therefore, a more satisfactory formula is given as follows:

$W = aL^n$, or (Log W= log a + n Log L)

Where, W = weight of fish, L = length of fish. The values of constant **a** and **n** are determined empirically from data, as the coefficient of condition (Richer, 1975). These values may change with age, sex, seasons and system of measurement. In fisheries practice, knowledge of length-weight relationship is very useful.

A lot of work on length-weight relationship and conditions have been done on the fishes found in the Indo-Pakistan sub-continent, some of which are, Khan & Hussain (1941 Indian major carps), Narasimham (1970 *Trichiurus lepturus*), Majumdar (1971 catfish), Sinha (1972 *Clarias batrachus*), Murty (1979 *Johnius* spp.,1980 *Atrobucca nibe*), Nautiyal (1985 Himalayan Mahseer), Kaliyamurthy *et al*. (1986 *Gerrus lacidus*), Salam & Mahmud (1993 *Catla catla*), Atiqullah & Hoda (1997 *Euryglossa orientalis*), Subba & Pandey (2000 *Botia lohachata*), Atiqullah (2001 *Euryglossa orientalis*). However, such data on *Hemiramphus far* is unavailable.

The halfbeak (*H. far*, Hemiramphidae) fishery along the Arabian Sea Coast of Pakistan is of great economic importance. For proper management of this fishery, it is felt to investigate the biology of this species thoroughly. Knowledge on the length-weight and of condition factor relationship is very useful in studying biology and growth of fish species. The present study was aimed focus on the length-weight relationship and condition of this economically important fish of Pakistan.

Fish samples of *H. far* were collected from commercial landing at Karachi Fish Harbour during September to December, 2007. Gill-net (length 19m, width 3m and mesh size 33mm) were used for the sampling. The gill-net was operated twice a month from boat for 40–60 min. Thus total 10 samples, which included 63 specimens of *H. far*, were collected during the study period. After collection the specimens were taken to the laboratory of the department of Zoology, University of Karachi. The monthly samples were kept separately.

Fishes were identified with the help of FAO identification sheets (Fischer & Bianchi, 1984).

In the laboratory specimens were sorted by sex by an internal examination of gonads. Total length (TL) of the fishes were measured to the nearest cm, from the tip of the snout to the tip of the caudal fin, and weighed (W) to the nearest 0.

The data were analysed using computer software.

The length-weight equations for the studied *H. far* were obtained as the follows and represented in Table 1:
(i) for males as log W = -2.67 + 3.06 log L,
(ii) for females log W = -2.45+2.98 log L.

The co-efficient of correlations were determined as 0.82 (male) and 0.961 (female), In fish, the weight is considered to be a function of length (Weatherley & Gill, 1987). The exact relationship between length and weight differs among species of fish according to their inherited body shape, and within a species according to the condition (robustness) of individuals, sometimes reflected by the food availability and growth with in the weeks prior to sampling. Condition is variable and dynamic in individual fish within the same sample. An average condition of each population varies seasonally and yearly in between the sex, developmental stages of the gonad, especially the ovary affect the weight considerably (Weatherly, 1972; Hile, 1936). The exponent 'n' may have value significantly lower or higher than 3.0, depending on the aforementioned

factors In the present collection both the male and female *H. far* were found to be similar in size and weight (Table 1). The length-weight relationships of males and females of this species showed values for exponent 'n' as 3.06 and 3.207, which confirms that their growth was isometric and follows the cube law.

Table 1. Mean± standard deviation of total length and weight, length-weight relationship and Condition Factor of *H. far*

Sex	Total length (cm) (range)	Weight (g) (range)	Value of 'a'	Value of 'n'	Relative Condition Factor (K)
Male (N=40)	21.05 ± 5.035 (17.6 – 21.05)	24.5 ± 1.35 (15 – 30)	-2.67	3.06	0.86 ± 0.037 (0.2-1.02)
Female (N=23)	21.6 ± 0.073 (17.6 – 23.4)	23.6 ± 0.16 (15 – 29)	-2.264	3.207	0.961 ± 0.33) (0.19-1.22)

In *H. far*, the condition factor (K) was ranged from 0.2-1.02 (mean of 0.86± 0.037) in males and 0.19-1.22 (mean of 0.961±0.33) in females (Table 1). *H. far* attained 100% maturity at the length of 137-140 cm in males and 131-134 cm in females as marked by maximum values of 'K' during November and December. This percentage of maturity is suggestive of the spawning time of *H. far*. High 'K' value of males and females of *H. far* suggests that condition factor increased with increasing length and weight of the fish. In this study, the K values are useful in predicting the modal size of *H. far* impacted by a given mesh size of gill-net used to exploit them. The correct interpretation of the parameters resulting from the length-weight relationships of the species will disclose information that is useful to the study of fishing biology and management. In this case it should be kept in mind that the application of the results of the above mentioned regression should be restricted to specimens of the respective species that present total length within the range of values described in this study. Such information could also be of interest in case the some adults of *Hemiramphus* are stocked in man-made water body at the study site to develop marine aquaculture industry.

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