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## Study on length-weight relationships and condition factor of *Capoeta trutta* from Kangir and Seimare Rivers, Western Iran

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### Abstract

Length-weight relationships and condition factor were calculated for 62 fish specimens from populations of *Capoeta trutta* from Kangir River (42 specimens) and Seimare River (20 specimens) in Iran. In the present study, total length of fish ranged from 60.3 to 210.3 mm and weight ranged from 3.52 to 93.52 g. The all linear regression was statistically significant with all  $r^2 \geq 0.94$ . The LWR shows the obtained b values for Kangir and Seimare populations were 2.69 and 2.85 respectively, which indicated a negative allometric growth for two populations. Also, the mean values of condition factor (K) were calculated 1.06 for Kangir River and 1.17 for Seimare River. The findings of this study are useful for biologist and fisheries managers.

**Keywords:** Length-weight relationship, Condition factor, *C. trutta*, Kangir River, Seimare River

### 1. Introduction

Length-weight relationship (LWR) gives information on the condition and growth patterns of fishes [1]. It is also used as an indication of fatness in fishes [2]. LWR data is necessary for management and conservation of the wild populations of fish [3]. These studies are useful tools for evaluating the life history of fish [4]. The condition factor also is useful index of condition of fish. The condition factor in fish serves as an indicator of physiological state of the fish [5]. It is an index of feeding and growth in fishes [6].

*Capoeta trutta* (Heckel, 1843) belongs to the family Cyprinidae and is one of the most common Cyprinid species in the Euphrates and Tigris River systems [7]. It is found in the Tigris-Euphrates basins including Dez River, Dezful, Gheslagh Dam Lake and Sanandaj in Iran. This fish species feeds on green algae and diatoms [8]. Its biology is too poorly known in Iran. Therefore, the biology of this species needs work.

The present study was carried out to determine the length-weight relationships and condition factor of *C. trutta* from Kangir and Seimare Rivers in Iran and could be considered as very useful tool in the fisheries management.

### 2. Materials and Methods

A total of 62 samples of *C. trutta* were collected from Kangir River (42 specimens) in (E: 46° 35', N: 33° 46') and Seimare River (20 specimens) in (E: 47° 12', N: 33° 39') on August 2014 using Electrofishing and fishing net. For each specimen, total length (mm) and body weight (g) was measured. The relation between total length and weight can be expressed as  $W = aL^b$ , the logarithmic transformation of which gives the linear equation:  $\log W = a + b \log L$  where L= length of fish (mm), W= weight of fish (g), a and b are constants [5, 9]. The condition factor was best expressed by the equation  $K = 100W/L^3$  for *C. trutta*, where, W = Fish weight (g), L = Fish length (cm) and K= condition factor [9, 10].

### 3. Results

In this study, total length ranged from 60.3 to 210.3 mm and weight ranged from 3.52 to 93.52 g. The average length and weight of Kangir fishes were 143.2 mm and 34.80 g, respectively. Also, the average length and weight of Seimare population were 136.8 mm and 35.13 g, respectively.

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The relationship between total length and body weight was determined according to the regression model. The all linear regression was statistically significant ( $P < 0.01$ ) with all  $r^2 \geq 0.94$  (Table 1). The values of 'b' of LWRs equations were

obtained as 2.69 for Kangir population (negative allometric) and 2.85 for Seimare population (negative allometric). In this study, the mean values of condition factor (K) were calculated 1.06 for Kangir River and 1.17 for Seimare River.

**Table 1:** Estimated parameters of the length-weight relationships for two populations of *C. trutta* in Kangir and Seimare rivers.

Population	n	Total length (mm)			Body weight (g)			Relationship parameters		
		min	max	mn±SD	min	max	mn±SD	a	b	r <sup>2</sup>
Kangir River	42	60.3	210.3	143.2±2.84	3.52	83.04	34.80±5.72	0.0227	2.69	0.96
Seimare River	20	91.5	205.0	136.8±3.62	7.91	93.52	35.13±8.62	0.0173	2.85	0.94

n= sample size, min= minimum, max= maximum, mn= mean, SD = Standard Deviation, b= slope, a= intercept of regression line, r<sup>2</sup>= regression coefficient.

#### 4. Discussion

The length-weight relationship (LWR) of fish has significant importance in studying the growth and general well-being of fish population<sup>[11]</sup>. LWR is used for comparison of growth of fishes between different regions<sup>[12]</sup>. In the present study, the b values for two populations of *C. trutta* were ranging from 2.69 to 2.85. In terms of growth type, the results showed that two populations had negative allometric ( $b < 3$ ) which means they tend to become thinner as they grow larger. The growth pattern of fish species can be defined according to the b value<sup>[1]</sup>. The value of "b" usually ranges between 2.5 and 4.0 for different fishes<sup>[13]</sup>. In this study the b values were in this range. Qasim (1973)<sup>[14]</sup> indicated that the values of b and a differed between different populations of fish. The b value depending on different factors including sex and feeding<sup>[15]</sup>. In addition to, fish growth also depends on environmental factors (such as food and temperature) and genetic properties<sup>[16]</sup>. Thus, changes in growth are related to environmental variables. The growth of individual fish of the same length may differ depending on several factors, including the stage of maturity, liver weight and body condition<sup>[16, 17]</sup>.

The many studies carried out about the LWR in fish species. For example, Esmaili *et al* (2014)<sup>[18]</sup> studied the length-weight relationship of *C. trutta* in Tigris River basin. In their study, the b value was 2.83 and growth pattern of *C. trutta* was negative allometric. Also, they reported the allometric growth pattern ( $b = 2.84$ ) for *Capoeta capoeta* in Caspian Sea basin from Iran. These results were similar to our findings in this research. In addition to, Mousavi-Sabet *et al* (2014)<sup>[19]</sup> also reported the length-weight (LWR) for the seven endemic species namely *Alburnus chalcoides*, *Alburnus filippii*, *Alburnus caeruleus*, *Alburnus atropatense*, *Alburnus mossulensis*, *Alburnus zagrosensis* and *Alburnus hohenaekeri* in Iran. In this study, the b values ranged from 2.67 for *A. chalcoides* to 3.31 for *A. atropatense* and the r<sup>2</sup> values ranged from 0.85 to 0.99.

The differences in growth and weight for all the sampled fish may be due to the different condition factor<sup>[20]</sup>. In the present study, the condition factor (K) was calculated for two populations. The K values obtained for *C. trutta* in Kangir and Seimare Rivers were greater than one which suggests that the fishes were in favorable condition. Condition factor seemed to be influenced by feeding, gonadal development and environmental factors<sup>[21]</sup>. Yousuf and Pandit (1989)<sup>[22]</sup> indicated that condition factor of *Schizothorax niger* varied seasonally in close association with feeding intensity and gonadal development.

The present study provides information about length-weight relationships and condition factor of *C. trutta* in Kangir and Seimare Rivers from Iran. The findings of this study are useful for biologist and fisheries managers.

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