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Short Communication

Evaluation of length-weight relationship for a native goby, *Awaous jayakari* (Teleostei: Gobiidae) in the Middle East

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Abstract: Parameters of length-weight relationship of freshwater and marine fishes have long been of interest as a longstanding theme fisheries sciences and have been estimated for many fishes around the world. In this study, for the first time, length weight relationship (LWRs) was estimated for a native fish, the long nose goby, *Awaous jayakari* (Gobiidae) collected from the inland waters of Oman in 2020. The parameter of *b* for male and female specimens based on standard length (SL) was within the range of 2.666-4.377 and 2.852-3.374, respectively. As proposed for different fishes there was high and significant correlation coefficients with $r^2 \geq 0.97$ between length and weight (0.970-0.983). Bailey's 't' test revealed that *b* value significantly deviated from 3 for both males and females showing their positive allometric growth pattern.

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Introduction

Parameters of length-weight relationship of freshwater and marine fishes have long been of interest as a longstanding theme fisheries sciences and have been estimated for many fishes around the world. Length-weight relationships (LWRs) have been implemented to assess status of fish populations in fisheries since the beginning of the 20th century (Froese, 2006; Jellyman et al., 2013; *Purrafee Dizaj et al., 2020*). LWRs of fishes act as a significant tool in fisheries science (Esmaeili and Ebrahimi, 2006; Esmaeili et al., 2014, 2015; Hossain and Sultana, 2014; Sadeghi and Esmaeili, 2018; Mouludi-Saleh and Eagderi, 2019; Al-Jufaili et al., 2021) and be able to convert length into weight, since during field studies the weight cannot always be determined accurately. Also, in conjunction with several other parameters (e.g. sex ratio, age at first maturity, longevity, fecundity), population dynamics can be investigated. Length and weight are biometric data easily taken and available in most datasets from monitoring studies (Zuchi et al., 2020).

Awaous jayakari commonly referred to as the Arabian or long-snout freshwater goby, is known so far from one locality in the desert area (Wadi) of Oman, and information on its detailed morphology and molecular systematics using fresh specimens is scare (Eagderi et al., 2019; Esmaeili et al., 2020). Review of literatures revealed that no information is available on LWRs of a native goby fish of the Middle East, *Awaous jayakari* (Boulenger, 1888) (see Al-Jufaili et al., 2021). Therefore, this study was carried out to describe and discuss its LWRs.

Materials and Methods

Sampling site and procedure: The *Awaous jayakari* specimens were collected from Darsait Al Toyan, Muscat, Oman (Fig. 1) using mostly foldable shrimp and crab fishing traps (mesh size of 3*3 mm, 3 nets for overnight). The sampling was conducted twice in winter 2020. Total length (TL) and Standard length (SL) of the specimens were measured to the nearest

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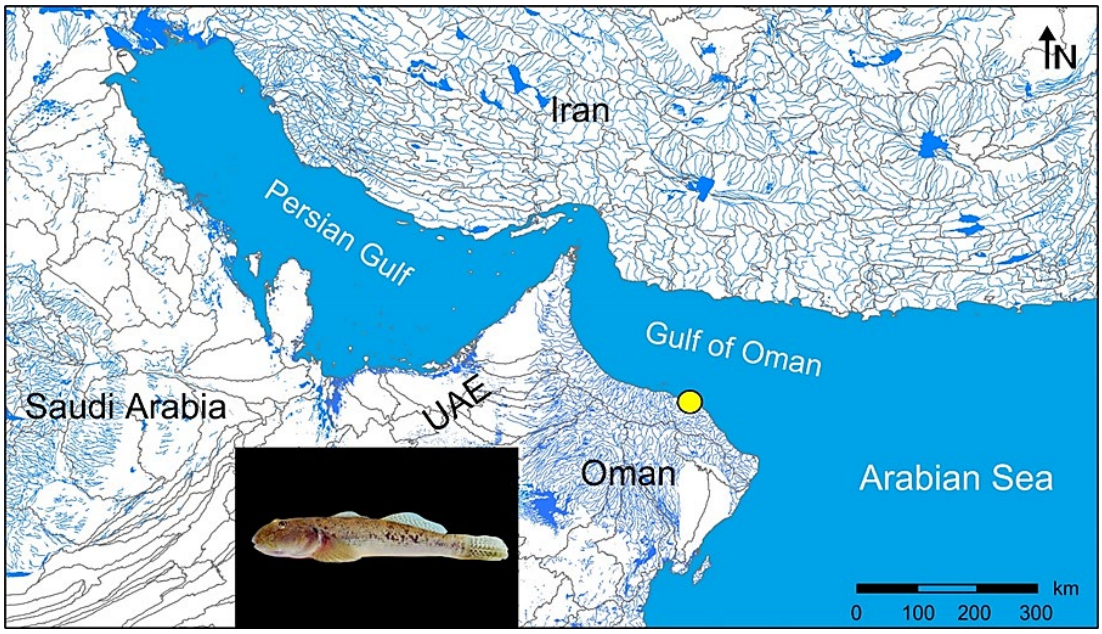

Figure 1. Collection site of *Awaous jayakari*.

0.1 mm using digital calipers attached to computer. The specimens were weighed to the nearest 0.01 g (total weight, TW) using a digital electronic balance. Fish individuals were classified according to sex based on the shape of urogenital papilla. To do this, urogenital papilla was examined under a stereo microscope (Zeiss Stemi SV8).

The parameters of the length–weight relationships were calculated using formula of $W = aL^b$ and expressed by linear regression of the log-transformed weight and length which gives the linear equation (Koutrakis and Tsikliras, 2003). LogW = Log$a$ + b LogL where W = total weight in grams, L= length in cm, a = a constant being the initial growth index, and b = growth coefficient. Prior to regression analysis, log–log plots of length and weight values were performed for visual inspection of outliers (Froese, 2006).

The significance of the regression between LWRs of fishes was tested by ANOVA. The regression coefficients for male and female specimens were compared using Students 't' test to study the variations in the b values between sexes (Zar, 1974). Bailey's t-test was used to find out whether 'b' value significantly deviated from the expected cube value of 3. Data were analyzed statistically by using IBM SPSS (Version 22) statistical software package.

Results and Discussion

The length–weight parameters for *A. jayakari* are given in Table 1 including the length range and weight ranges, as well as the equation parameters a and b together with their 95% confidence intervals and the correlation coefficients. LWR was significant (P<0.001) with a high correlation coefficient with $r^2 \geq 0.97$. Bailey's 't' test showed that b value significantly deviated from 3 in both sexes showing positive allometric growth pattern (P<0.05).

In the present study, the data on length-weight relationship for the fish *A. jayakari* is presented to clarify some characteristics of its population dynamics. The mean b value of length-weight relationships based on TL was 3.723 for males and 3.282 for females, being within the expected range of 2 to 4 (Tesch, 1971). The mean b value based on SL was 3.521 for males and 3.113 for females being within the expected range. Higher b value for males might be due to low number of available specimens (see Froese, 2006). However, different in the b value in sexes in high number of specimens, indicating that one sex might be heavier than another one with the same length which might be due to difference in fatness, gonadal development and less metabolic activity as stated by Hossain and Sultana (2014). It has been already reported that variation in b value in fishes might be due to several factors, including season,

Table 1. Descriptive statistics and parameters of LWRs for Awaous jayakari from Oman.

Sex	N	TL/SL range (cm)	W range (g)	*a*	95% CI of *a*	*b*	95% CI of *b*	r^2
TL.F♀	19	5.73-13.03	1.40-19.74	0.0052	0.0027-0.0099	3.282	2.987-3.577	0.970
SL.F♀	19	4.55-10.90	1.40-19.74	0.014388	0.0086-0.0242	3.113	2.852-3.374	0.974
TL.M♂	5	6.08-12.50	1.79-21.92	0.002183	0.0003-0.0174	3.723	2.778-4.668	0.981
SL.M♂	5	4.84-10.27	1.79-21.92	0.007244	0.0013-0.0396	3.521	2.666-4.377	0.983

M, male; F, female; N, number of specimens; TL, total length; SL, standard length; W, weight; *a*, intercept; *b*, regression slope; r^2, correlation coefficient.

species, habitat, sex, gonad maturity, diet, stomach fullness, health, preservation techniques and locality (Esmaeili, 2001; Le Cren, 1951; Sadeghi and Esmaeili, 2018; Purrafee Dizaj et al., 2020; Eagderi et al., 2020; Al Jufaili et al., 2021). Differences in the LWRs could be due to the combination of one or more of the above factors. In conclusion, this study provides the first basic information on LWRs of *A. jayakari* from the Middle East which will be useful in their fisheries and conservation management.

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