LENGTH-WEIGHT RELATIONSHIP OF _ODONUS NIGER_ (RUPPELL, 1836)

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ABSTRACT

Length-weight relationship was studied in _Odonus niger_ collected from the reef islands of Gulf of Mannar by SCUBA diving for a period of six months from January 2004 to June 2004. The slope value \( b \) estimated for _Odonus niger_ male was found to be 2.1601 and for female 2.2508. The regression equation calculated for female was \( \log W = -2.8161 + 2.2508 \log L \), and for male was \( \log W = -2.6605 + 2.1601 \log L \). The level of significance was tested and was found to be significant between sexes at 5 % level. The slope values of other balistid species were also compared and discussed.

Key words: _Odonus niger_ – length-weight relationship – regression analysis

INTRODUCTION

The Gulf of Mannar marine biosphere reserve has 21 reef islands extending between 08° 47’N 78° 12’E and 09° 15’N 79° 14’E from Pamban to Tuticorin. Among finfishes, this marine province harbours 120 marine ornamental species which finds a good place in domestic aquarium and also for export (Venkataramani et al. 2004). The precious of ornamental fishes such as clown fish, butterfly fish, wrasse, damsel fish, rabbit fish, scorpion fish and leather jackets were recorded in large numbers in coral reef islands of Gulf of Mannar. About 36 species of balistids are known to occur in the tropical seas across the globe. The study on length-weight relationship of this species in Indian waters has not been attempted so far. This study will be of immense use in estimation of yield per recruit in prediction models, and in the estimation of biomass from length observations.

MATERIALS AND METHODS

Length-weight relationship study was carried out in 122 specimens of _Odonus niger_ ranging from 75 to 254 cm in total length. The specimens were collected from Van island and Kaswari islands 08° 50’N 78° 15’E and 08° 52’N 78° 15’E of Tuticorin coast by undertaking SCUBA diving. The diving was made for six months (thrice in a month - once in 10 days) from January 2004 to June 2004. The total-length was measured from the tip of the snout to the tip of the upper lobe of caudal fin in mm and weight was recorded to the nearest 0.1 gm. Specimen where the tails are broken are rejected. The length-weight relationship was calculated by the method of least squares using the equation \( \log W = \log a + \log b \log L \) where \( W \) = weight in gm, \( L \) total length in mm and ‘a’ and ‘b’ are the two constants.

RESULTS AND DISCUSSION

To find out the significant differences in the regression equations of both the sexes, analysis of covariance was used (Snedecor and Cochran, 1967). The linear equation was also fitted separately for males and females. The correlation coefficient derived for the length-weight relationship for males and females are given in Table 1. The regression
equations derived for both the sexes are presented below

Female Log \( W = -2.8161 + 2.2508 \log L \),
Male was Log \( W = -2.6605 + 2.1601 \log L \).

The results showed significant difference between sexes of the species and the ‘F’ values was found to be significant at 5 % level (Table-1). The correlation coefficient \( r \) derived for males and females were 0.90 and 0.95 respectively showing a high degree of significance between length and weight. The observed total length plotted against total weight for males and females are presented in Figure 2 & 3. Comparison of the slope of the regression equation revealed significant differences between sexes of Odonus niger. The calculated slope value was 2.16 for males and 2.25 for females. Randall et.al (1990) studied the length-weight relationship of Odonus niger and Balistapus undulates and reported the slope value of 3.0 and 3.6 for both the sexes. In the present study, slope value was higher in females compared to males. Robins (1986) reported a slope value of 2.87 and 2.93 for both the sexes of Balistes vetula and Xanthichthys ringens. A good correlation was consistently observed between length and weight by Matsuura (2001) for Rhinecanthus rectangulus. Myers (1991) studied more length gain and the recorded a slope value of 2.96 for both sexes. Thus comparing the slope of Odonus niger with other species of the balistids, it could be concluded that the slope value is less than 3 for both the sexes of Odonus niger.

REFERENCES


### Table 1

**Statistics in the length-weight relationship of males and females of *Odonus niger***

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>SX</th>
<th>SY</th>
<th>SX²</th>
<th>SY²</th>
<th>SXY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>70</td>
<td>156.2218</td>
<td>151.2223</td>
<td>375.6456</td>
<td>316.6015</td>
<td>349.9881</td>
</tr>
<tr>
<td>Male</td>
<td>52</td>
<td>114.8759</td>
<td>112.127</td>
<td>281.1056</td>
<td>235.2308</td>
<td>259.8469</td>
</tr>
</tbody>
</table>

N = Number of fish  
SX², SY², SXY = Sum of squares and product  
SX, SY = Sum of logarithmic values of length and weight respectively.

### Table 2

**Regression data for the length-weight relationship of males and females of *Odonus niger***

<table>
<thead>
<tr>
<th>Sex</th>
<th>DF</th>
<th>X²</th>
<th>XY</th>
<th>Y²</th>
<th>B</th>
<th>DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>70</td>
<td>375.6456</td>
<td>349.9881</td>
<td>316.6015</td>
<td>2.1601</td>
<td>69</td>
</tr>
<tr>
<td>Male</td>
<td>52</td>
<td>281.1053</td>
<td>259.8469</td>
<td>235.2308</td>
<td>2.2508</td>
<td>51</td>
</tr>
</tbody>
</table>

DF: Regression freedom  
B: Regression Co-efficient  
SS: Sum of Squares

### Table 3

**Test of Significance**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Square</th>
<th>Mean Square</th>
<th>Observed F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deviation from individual with in sexes</td>
<td>1</td>
<td>692.2471</td>
<td>692.2471</td>
<td>160.8829</td>
</tr>
<tr>
<td>Difference between Regression</td>
<td>120</td>
<td>516.3361</td>
<td>4.3028</td>
<td></td>
</tr>
<tr>
<td>Deviation from Total Regression</td>
<td>121</td>
<td>1208.5832</td>
<td></td>
<td>Significant at 5% level</td>
</tr>
</tbody>
</table>
Figure 1
Logarithmic relationship between length and weight of male *Odonus niger* (Ruppell, 1836)

Figure 2
Logarithmic relationship between length and weight of female *Odonus niger* (Ruppell, 1836)