

Research Article

Biochemical Composition of Warty Crab (*Eriphia verrucosa*) in the Post-reproductive Period in the Black Sea

Seval DERNEKBAŞI*, İsmihan KARAYÜCEL and Sedat KARAYÜCEL

University of Sinop, Faculty of Fisheries, Department of Aquaculture, Sinop, Turkey

*Corresponding author: Dr. Seval Dernekbaşı, University of Sinop, Faculty of Fisheries, Department of Aquaculture, Sinop, Turkey; E-mail: sevalyaman@hotmail.com

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Abstract

In the study, changes in biochemical composition of warty crabs, *Eriphia verrucosa* between female and male individuals after the reproductive period were evaluated. The warty crabs used as study material were freshly obtained from fishermen after the breeding season (end of July). According to the data obtained in the study where the female and male individuals were evaluated separately, the average moisture, crude protein, crude lipid and crude ash contents in female *E. verrucosa* were 77.89%, 20.96%, 0.91% and 2.66%, respectively. In male *E. verrucosa*, it was found to be 76.30%, 21.44%, 0.79% and 2.47%, respectively. In the study, it was determined that the difference between male and female individuals in crude protein and crude lipid values was significant ($p < 0.05$). Although the crude protein content was low in females, the crude lipid content was found to be higher. In other words, it was determined that while the protein ratio decreases in female individuals after the reproductive period, the lipid ratio increases. This suggests that the energy lost due to ovulation during the reproductive period may have been met by the accumulation of fat in the body.

Keywords: *Eriphia verrucosa*, Post reproductive, Biochemical

Introduction

The vast majority of crab production comes from hunting. Hunting is generally carried out with crab baskets, nets, bottom trawls, dredges and ladles, depending on the environment in which the species lives [1]. Although various parts of the body can be eaten in crabs, white meat in its pincers is most preferred. Crabs are a fishery product that finds very high value in developed countries in terms of edible meat quality and economic value. There is a crab industry in developed countries, and crabs that pass through various processing stages are produced in different products in this industry [2].

Crab meat is indicated as an important nutrient in a balanced diet because it is rich in protein, mineral substances and vitamins and low in fat [3]. Crabs contain high amounts of iron, potassium, selenium, zinc and vitamin B1, which are beneficial for human health [4]. Although sea crabs, which have become an industry loved and consumed in various countries, are among the least known fisheries in terms of human consumption in our country [5], they are consumed with pleasure and intensely by the people of the region.

However, although *Eriphia verrucosa* is a commercially used and fondly consumed fishery product in Mediterranean countries, it is not preferred in our country due to our traditional nutrition culture [6]. In this study, by investigating the post-reproduction biochemical composition of warty crab (*E. verrucosa*), which is not economically evaluated in our country but has high economic and nutritional value, and it aimed to promote the increase of the consumption and use of this species in Turkey.

Materials and Methods

Thirty female (average 62 g and 50 cm) and male (average 85 g and 53 cm) warty crabs used in the study were freshly obtained from fishermen at the end of July. The samples were transported immediately to Sinop University, Faculty of Fisheries, Feed Technology and Aquaculture laboratory in ice-filled containers. After length and weight measurements were made, the meats in the pincers were separated manually, homogenized and stored at -80°C until analyzed.

All biochemical analyses in crab meats were made on a wet basis. All analyses [Dry matter (DM), crude protein (CP), crude lipid (CL), and crude ash (CA)] were performed according to the standard methods of the Association of Official Analytical Chemists [7]. Dry matter was detected by drying the samples at 105°C until a constant weight was achieved. Crude lipid (CL) content was determined according to the procedure of the Soxhlet method. Crude protein (CP) content was determined as total nitrogen content by the Kjeldahl method. Crude ash content was measured after samples were treated in a muffle furnace at 550°C for 6 h. All analyses were performed in triplicate.

All analysis results were presented as mean values \pm SE. Anderson-Darling and Levene's tests were used for homogeneity of variances and equality of variance of groups, respectively. The differences between the results were analyzed using one-way analysis of variance (ANOVA), followed by Tukey's method for multiple comparisons. Arcsine square root transformations of percentage data were conducted for homogeneity of variances before statistical analysis. Differences were

considered significant when $p < 0.05$. Statistical analysis was done by using the Minitab 17 statistical software for Windows.

Results and Discussion

In the study, it was aimed to determine the post-breeding biochemical properties of crabs. In the research, male and female crabs were taken from fishermen in July, and biochemical analyzes were made and evaluated. Proximate composition of female and male warty crabs (*E. verrucosa*) used in the study are given in Table 1. Changes in moisture, protein, fat and ash contents (%) of female and male wart crabs are shown in Figure 1.

In the present study, moisture and ash contents of female and male crabs were determined as $77.89 \pm 0.12\%$, $2.66 \pm 0.09\%$ and $76.30 \pm 0.07\%$, $2.47 \pm 0.17\%$, respectively. In terms of moisture content, it was determined that the statistical difference between female and male individuals was significant ($p < 0.05$), while the difference between ash contents was not statistically significant ($p > 0.05$). [4] found that warty crabs had a lower moisture content of 74.4% and ash content of 1.8% than the findings of the present study. [8] found moisture and ash contents of warty crab as 78.03% and 1.81%, respectively, in the comparative analysis of biochemical compositions of warty crabs, blue crabs (*Callinectes sapidus*) and crabs (*Cancer pagurus*). In terms of moisture, although they show similarity with the present study, reported that the ash content was lower. [9] reported warty crabs moisture and ash contents as $76.13 \pm 0.04\%$ and $2.35 \pm 0.01\%$, respectively, and similar results were obtained. [10] determined the moisture and ash content of female and male warty crabs as 75.44%-2.08% and 75.44%-3.41%, respectively. While showing similarities

with the present study in terms of moisture content, it was determined that ash content was lower in female individuals and higher in male individuals. Again, [11] reported that female and male warty crabs determined the moisture and ash content as 74.30%-2.00% and 75.47%-1.85%, respectively. [5] reported that in their study comparing the nutritional composition between male and female members of blue crab (*Callinectes sapidus*) and sand crab (*Portunus pelagicus*), moisture and ash contents in female and male individuals of blue and sand crabs was 82.03%-2.20% and 80.35%-1.68%, and 80.13%-2.66% and 79.84%-2.36%, respectively.

In the present study, the protein contents of female and male crabs were determined as 20.96%, and 21.44%, respectively. In terms of protein content, the difference between male and female individuals was determined to be statistically significant ($p < 0.05$). [10] reported that they determined the protein contents in female and male wart crabs as 21.29% and 20.80%, respectively. [9] reported that the amount of crude protein was 19.66 ± 0.02 g/100 g in their studies to determine the nutritional composition of 20 warty crabs (154.91 g), regardless of gender. [6] determined the protein content as 17.12% in their study in which they determined the close composition of wart crab during cold storage. [4] reported the crude protein amount as $21.30 \pm 0.01\%$ in July in a study they conducted on 113 crabs in order to determine the biochemical compositions of the crabs they obtained from the Karakum region of Sinop during the reproductive period. It has been determined that the findings of this study are consistent with the findings of the present study. [11] reported that female and male warty crabs determined the protein contents as 22.45% and 21.40%, respectively. When the values they obtained were compared with the findings of our study, it was determined that the amount of crude protein was high. This difference is thought to be due to the difference in the research area and the number of samples. [5] reported that the protein contents of male and female blue and sand crabs were 14.26%-16.81% and 15.83%-17.55%, respectively. The difference between the current study and the study is thought to be due to differences in the research region and species.

In the present study, the crude lipid content of female and male crabs was determined as 0.91% and 0.79%, respectively. In terms of lipid content, the difference between female and male individuals was determined to be statistically significant ($p < 0.05$). Ayas and Özoğul [11] reported that female and male warty crabs determined the lipid contents as 0.96% and 1.11%, respectively. Durmus et al. [10] reported that they determined the lipid contents in female and male wart crabs as 0.95% and 0.92%, respectively. Kaya et al. [9] the amount of crude oil 0.66 ± 0.01 g/100 g, Demirbaş et al. [4] determined the amount of crude lipid as $0.40 \pm 0.01\%$ in July. It was determined that the lipid contents determined in both studies were lower than in the current study. It is thought that the difference determined between the current study and the study of Demirbaş et al. [4] may be related to the method of obtaining the material to be analyzed. Türeli et al. [5] reported that the protein contents of male and female blue and sand crabs were %1.51-%1.16 and %1.38-%1.33, respectively. The difference between the current study and the study is thought to be due to differences in the research region and species.

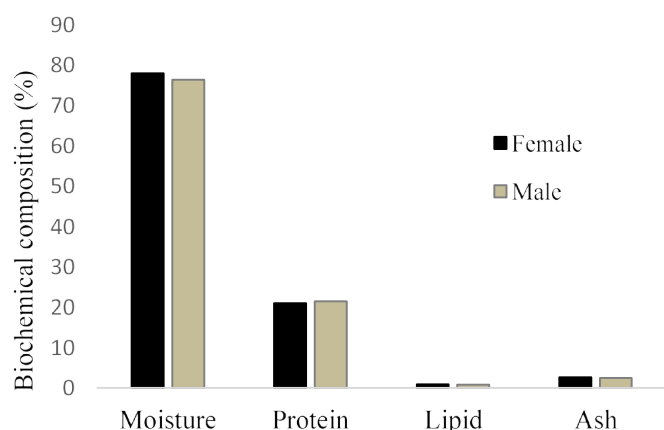


Figure 1: Changes in moisture, protein, fat and ash contents (%) of female and male warty crabs.

Table 1: Proximate composition (%) of female and male warty crabs (*E. verrucosa*) (wet weight).

	Female	Male
Moisture (%)	77.89 ± 0.12^a	76.30 ± 0.07^b
Protein (%)	20.96 ± 0.53^b	21.44 ± 0.31^a
Lipid (%)	0.91 ± 0.13^a	0.79 ± 0.01^b
Ash (%)	2.66 ± 0.09^a	2.47 ± 0.17^a

Data are reported as mean \pm standard errors of three replicate (3). Rows values with the same superscript or no superscript are not significantly different ($p > 0.05$).

Conclusion

As a result, these creatures, which have an important place in the ecosystem and are an important food source due to their high protein value and low fat ratio, need to be investigated more in today's world where food sources are decreasing day by day and alternative food sources are tried to be created. Efforts should be made to introduce and spread these creatures, which are consumed only in coastal areas in our country, to consumers in every region as food. In addition, basic research should be done about our natural resources in terms of sustainable fisheries and these studies should be made widespread.

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