

COMPARISON OF FATTY ACID, TRACE ELEMENT AND PROXIMATE COMPOSITIONS OF MALE AND FEMALE OF BLUE CRABS AND SWIM CRABS FROM MERSIN BAY, TURKEY

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Abstract

Fatty acid, trace element and proximate compositions of male and female of blue crabs and swim crabs caught in Mersin Bay were investigated. The results of proximate analysis showed that there were variations in protein and moisture content of both female crabs and male crabs' meat of these two crab species ($p < 0.05$). Saturated fatty acid (SFA) content was detected as 23.3%-24.8% in blue crabs whereas it was 24.7%-24.9% in swim crabs. Monounsaturated fatty acid (MUFA) content in the body of blue crabs (26.6%-29.6%) was higher than swim crabs (24.1%-25.9%). Besides, polyunsaturated fatty acid (PUFA) content of swim crabs (43.8%-45.3%) was higher than blue crabs (39.2%-42.8%) ($p < 0.05$). It was also found that crab meat was rich in terms of trace element content, especially Cu, Zn, and Fe.

Keywords: *Decapoda, Metals, Nutrients*

Introduction

Poturnid crabs, *Callinectes sapidus* and *Portunus pelagicus*, are the most important members of the estuarine food chain as while they feed on fish, aquatic vegetation, molluscs, crustaceans and annelids, they serve as preys to mammals, birds and fishes [1]. Seafood lipids are rich in n-3 PUFAs such as EPA and DHA. These fatty acids have a variety of health benefits, including prevention of sudden cardiac death [2] and chemopreventive effects of cancer [3]. The fat and fatty acid compositions of fish can vary depending on fish species, diet, gender, location and season of capture [4,5]. The objective of this study was to determine and compare trace element, fatty acid and proximate compositions of male and female blue crabs and swim crabs in Mersin Bay.

Materials and Methods

Poturnid crabs, *C. sapidus* and *P. pelagicus*, were caught by dip net from Mersin Bay, the coast of Northeastern Mediterranean, in March, 2008. In the fishing procedure, dip net which had mesh size of 32 mm was used. The morphometric measurements [carapace length (CL), carapace width (CW) and weight] of all samples were carried out. The morphometric measurements of crab carapace were done using a caliper. The mean CW and CL were 183.4-214.0 mm and 79.0-95.6 mm for blue crabs and 172.8-183.0 mm and 90.3-111.0 mm for swim crabs, respectively. The mean weights of blue crabs and swim crabs were between 180.8-238.6 g and 174.3-177.8 g, respectively. Crab samples were analysed in triplicate for proximate composition. Lipid content by the Bligh and Dyer [6] method, moisture content by AOAC [7] method, total crude protein by the Kjeldahl method [8] and ash content by the AOAC [7] method. Fatty acid profiles of fat extracted from the blue crab samples were determined by gas chromatography (GC) of methyl esters. Methyl esters were prepared by transmethylation using 2 M KOH in methanol and n-heptane according to the method described by Ichibara et al. [9] with minor modification. All samples were analysed three times for each metals with ICP-AES (Inductively Coupled Plasma Atomic Emission Spectrometry, Varian® model- Liberty Series II). The standard addition method was used to correct for matrix effects. The metal concentration (Cd, Cr, Pb, Cu, Fe and Zn) in tissue was recorded as µg metal/g dry weight [10]. Statistical analysis of data was carried out with the SPSS statistical program. ANOVA (Analysis of Variance) was used to evaluate the effect of gender on the fatty acid and proximate composition and trace element levels.

Results and Discussion

The results showed that the protein, lipid, moisture, and ash contents of female blue crabs and female swim crabs were not significantly ($P > 0.05$) different. Protein contents of female blue crabs and female swim crabs were significantly higher ($P < 0.05$) than those found in male blue crabs and male swim crabs. Moisture contents of male blue crabs and male swim crabs were significantly higher ($P < 0.05$) than those found in female blue crabs and female swim crabs. This study shows that crabs caught from the Gulf of Mersin have high protein (21.4-22.5% for *C. sapidus* and 20.9-23.2% for *P. pelagicus*) and low fat contents (1.0-1.1% for *C. sapidus* and 1.2-1.3% for *P. pelagicus*). In this study, lipid values were higher than those reported by Gökoglu et al. [11] for the both crab species. Fatty acids composition; SFAs, MUFAs, PUFAs, PUFA/SFA, n-3 acids, n-6 acids and the n6/n3 ratio of male and female swim crabs and blue crabs' meat are presented in Table 1. The dominant SFAs were palmitic acid (12.8%-14.2%), and stearic acid (6.4%-9.0%) for both of the

crab species. Oleic acid (13.3%-14.8%) was the major MUFA in all crab meats, followed by palmitoleic acid (5.0%-8.7%) and octadecenoic acid (4.0-4.7%). The total PUFA value was the highest in meat of female swim crabs (43.75%), the lowest amounts (39.15%) were in meat of female blue crabs. EPA (20:5) and DHA (22:6) were PUFAs having maximal values. Statistically, there were no significant differences in Eicosapentaenoic acid (EPA) concentrations in body meat of male and female blue crabs ($P > 0.05$). Besides, EPA concentrations in meat of female swim crabs were higher than those of the males ($p < 0.05$). Trace element contents; the trace element contents of female and male of blue crab and swim crab are listed in Table 2. Cu, Zn, Fe contents of female blue crabs were significantly higher ($P < 0.05$) than those found in male blue crabs. Cd, Pb, Zn contents of female swim crabs were significantly higher ($P < 0.05$) than those found in male swim crabs. The concentrations of metals for muscle of crab are below those likely to cause a public health problem: 4 µg Cd/g (wet weight), 1.7 µg Pb/g according to the U.S. Food and Drug Administration [12] and 20 µg Cu/g and 50 µg Zn/g according to the Turkish Food Codex [13]. High Cu level doesn't directly affect human health. But the excess copper ve zinc is carried via the food chain to the upper trophic levels and creates important ecological problems.

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