MICROBIOLOGICAL QUALITY OF THE STRIPED VENUS (*CHAMELEA GALLINA)* AND WEDGE CLAM (*DONAX TRUNCULUS)* HARVESTED IN MARMASA SEA, TURKEY

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Abstract

Microbiological quality of the economically important striped venus (*Chamelea gallina*) and wedge clam (*Donax trunculus*) were investigated in the Marmara Sea. In this purpose, total coliform, fecal coliform, *E. coli, Vibrio parahaemolyticus,* and *Salmonella* spp. of the clams were examined. In *C. gallina* total coliform, fecal coliform, and *E. coli* were below the limits of the Turkish Fisheries Regulations and EC Shellfish Hygiene Directive. Similar results were obtained for *D. trunculus*, except for one station in summer where *E. coli* were at the limit value. Although no *Salmonella* spp. were observed in both of the clams, *V. parahaemolyticus* was found in clams during the summer season. As a result, *E. coli* and *V. parahaemolyticus* in the clams, regular microbial monitoring of these species should be conducted in the Marmara Sea.

Keywords: Bivalves, Bacteria, Marmara Sea

Introduction

C. gallina and *D. trunculus* are the two most harvested and consumed bivalve species in all over the world that are more abundant in Marmara Sea and western Black Sea in Turkey. Bivalves are filter feeding and therefore tend to contain microorganisms in their body. Due to different factors that may contaminate the water column, pathogenic microorganisms may be harmful for human after consumption of these clams. For the assesment of the risk for human, *C. gallina* and *D. trunculus* were investigated for total coliform, fecal coliform, *E. coli, V. parahaemolyticus,* and *Salmonella* spp. between February 2008 and January 2009 in southern Marmara Sea.

Material and Method

Samplings were conducted between February 2008 and January 2009 seasonally from stations where natural stocks are found. *C. gallina* were sampled from five stations namely Sevketiye (SV), Kemer (KM), Karabiga (KB), Gelibolu (GB) and Bolayiralti (BA). *D. trunculus* were sampled from Karabiga (KB), Denizkent (DK) and Cardak (CR). The samples were collected along the littoral zone at 5 to 10 m depth using a mechanical dredge. Samples were stored at +4^{o}C and transported to the laboratory. Microbiological analysis of total coliform (TC), fecal coliform (FC), *E. coli*, and *Salmonella* spp. (Sal) were conducted according to FDA (1998)(1) and the analysis of *V. parahaemolyticus* (Vib) were conducted according to FDA(2004)(2).

Result and Discussion

The results for *C. gallina* and *D. trunculus* are provided in Table 1 and Table 2. Because of the risks to human health, many countries developed regulations based on the microbiological analysis of the clams. According to the EC Shellfish Hygiene Directive (91/492/EEC) and Turkish Fisheries Regulation (Annex 7), tolerance levels for fecal coliform and *E. coli* in bivalves should be below 300 MPN/100g and 230 MPN/100g (3). According to FDA (US Food and Drug Administration) and EPA (US Environmental Protection Agency) regulations, the limit risk level for *E. coli* or fecal coliform is provided as 230 MPN/100g (4). *Salmonella* spp. and *V. parahaemolyticus* should not be any present in shellfish meat and fluid inside the shell. In this study *D. trunculus* had a *E. coli* value (230EMS/100g) which is exactly as the limit value during summer in Denizkent station and in the same station. Again, in summer, fecal coliform value (290EMS/100g) was close to the limit value. When considering the other seasons and bacteria groups, the bacteriological contents of clams were significantly ($p<0.05$) higher in Denizkent station. In all stations and seasons the indicator bacteria values in *C. gallina* were below the given limit values (3,4). Although the pathogenic bacteria *Salmonella* spp were not found in any of the samples, *V. parahaemolyticus* were found in *D. trunculus* speciesinthe Karabiga, Denizkent, and Çardak stations during summer. In *C.gallina* species *V. parahaemolyticus* was found in the Sevketiye and Kemer stations only once. As a result, in both clam species microbial values increased with the increasing water temperatures in summer. The reason of the increase during the summer season is due to the domestic and industrial sewages besides the increase of human activity on the shorelines. Although in most of the samples the increase of microbiological values are not reaching the critical limits for human consumptions, the *E.coli* and *V. parahaemolyticus* value observed at Denizkent for *D. trunculus* was reaching the critical limit and therefore regular microbiological monitoring of the species is suggested.

Tab. 1. Levels of microorganisms determined in *D. trunculus* at different seasons and stations

		TC	FC	*E.coli*	Vib.	Sal.
		Log N MPN/100g			Detected / 25 g	
Spring'08	KB	3,04±0,01	0,60±0,01	---	-	-
	DK	2,38±0,01	0,48±0,01	---	-	-
	CR	1,32±0,01	0,60±0,01	---	-	-
Summer'08	KB	3,04±0,01	2,32±0,01	2,17±0,01	+	-
	DK	3,04±0,01	2,46±0,01	2,36±0,01	+	-
	CR	3,04±0,01	0,85±0,01	---	+	-
Autumn'08	KB	2,18±0,01	0,60±0,01		-	-
	DK	2,18±0,01	1,18±0,01		-	-
	CR	1,97±0,01	---		-	-
Winter'09	KB	0,95±0,01	---	---	-	-
	DK	0,95±0,01	---	---	-	-
	CR	0,95±0,01	---	---	-	-

Tab. 2. Levels of microorganisms determined in *C. gallina* at different seasons and stations

		TC	FC	*E.coli*	Vib.	Sal.
		Log N MPN/100g			Detected / 25 g	
Spring'08	GB	2.18±0.01	1.18±0.01	0.94±0.10	-	-
	BA	2.38±0.01	---	---	-	-
	ŞV	2.38±0.01	0.95±0.01	0.54±0.06	-	-
	KM	1.97±0.01	0.60±0.01	---	-	-
	KB	1.36±0.01	---	---	-	-
Summer'08	GB	2.38±0.01	---	---	-	-
	BA	2.38±0.01	---	---	-	-
	ŞV	3.04±0.01	1.18±0.01	0.72±0.12	-	-
	KM	3.04±0.01	1.18±0.01	1.04±0.01	-	-
	KB	3.04±0.01	2.18±0.01	2.03±0.01	+	-
Autumn'08	GB	2.38±0.01	0.60±0.01	---	-	-
	BA	2.66±0.01	1.18±0.01	1.00±0.04	-	-
	ŞV	3.04±0.01	0.85±0.01	0.60±0.01	+	-
	KM	3.04±0.01	0.95±0.01	0.60±0.01	-	-
	KB	0.48±0.01	---	---	-	-
Winter'09	GB	1.97±0.01	1.36±0.01	1.15±0.01	-	-
	BA	1.36±0.01	0.95±0.01	0.30±0.30	-	-
	ŞV	2.89±0.19	1.83±0.14	0.94±0.10	-	-
	KM	2.78±0.54	1.52±0.17	0.78±0.18	-	-
	KB	1.36±0.01	0.95±0.01	---	-	-

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References

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