Microbiological Evaluation of Imported Frozen Mussels and Locally Harvested Black Sea Mussels

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Abstract

Mussels are increasing in popularity and availability throughout the world, becoming a part of the international menu, in various forms, leading to a growing interest in their food safety profiling, which remains in the spotlight of current research.

The microbiological quality of frozen mussels sold in retail stores was compared with that of locally harvested, fresh mussels.

Samples of frozen, processed mussels and Black Sea mussels were analyzed in terms of coliforms and aerobic plate count (APC), according to the national standards for APC and coliforms' enumeration method (SR ISO 4833/2003 and SR ISO 4832:2009, respectively). The results were statistically analyzed using univariate un-paired t tests. We considered $p < 0.05$ to be statistically significant. SPSS statistical software was used for data analysis.

The aerobic plate counts were higher for processed, frozen mussels than for the samples of locally harvested Black Sea mussels. The difference is considered to be extremely statistically significant ($p < 0.0001$, $t = 5.7465$, $DF = 9$). The coliforms' counts were also higher for the frozen mussel samples, than for the samples of locally harvested Black Sea mussels, but the difference was not statistically significant ($p = 0.0641$, $t = 1.9724$, $DF = 9$).

The overall results indicate that locally harvested Black Sea mussels are less contaminated than imported, processed, frozen mussels.

Keywords: APC, coliforms, mussels.

INTRODUCTION

Mussels are an increasingly appreciated food available on the market as processed frozen product, fresh harvest of seashore areas and even street food. Research regarding the microbiological pathogens and contaminants in such seafood is being intensively communicated aiming the evaluation of the food safety profile. The covered topics discussed by researchers vary from the microbiological evaluation of stuffed mussels, marketed as street food, at high temperatures (Kışla and Uzgün, 2008; Ates *et al.*, 2001), the microbiological quality of raw oysters harvested from different cost sites (Changchai and Saunjit, 2014; Mannas *et al.*, 2014) etc.

AIMS AND OBJECTIVES

The microbiological quality of frozen mussels sold in retail stores was compared with that of locally harvested, fresh mussels.

MATERIALS AND METHODS

Ten samples of frozen, processed mussels (commercial packs) and ten samples of Black Sea mussels (*Mytilus galloprovincialis*) harvested by local fishermen from Constanta county seashore waters, were analyzed in terms of coliforms and aerobic plate count (APC). The microbial hazard laboratory analysis was performed according to the national standards for APC and coliforms'

Tab. 1. The results of the coliforms and APC contamination investigation in locally harvested and frozen mussels, statistically analyzed using the univariate un-paired t test .

	APC (log CFU/g)		coliforms (log CFU/g)	
	frozen	local harvest	frozen	local harvest
1	3,54	2,71	1,8	1,2
2	4,2	2,4	1,59	0,65
3	3,21	1,98	1,24	1,14
4	4,2	2,59	2	0,8
5	3,96	2,83	1,86	0,69
6	3,42	3,1	1,32	2,3
7	2,9	2,7	0,94	1,18
8	3,8	1,4	2,1	0,4
9	4,52	2,25	1,78	0,52
10	3,32	1,8	1,39	2,3
STD	0,514027	0,521775	0,370849	0,681645
AVG	3,707	2,376	1,602	1,118
p value	p < 0.0001		p= 0.0641	

enumeration method (SR ISO 4833/2003 and SR ISO 4832:2009, respectively). The results were statistically analyzed using univariate un-paired t tests. We considered $p < 0.05$ to be statistically significant. SPSS statistical software was used for data analysis.

RESULTS AND DISCUSSION

The aerobic plate counts were higher for processed, frozen mussels (average of 3.7 log CFU/g, SD=0.514) than for the samples of locally harvested Black Sea mussels (average of 2.3 log CFU/g, SD=0.521). The result analysis revealed that the difference is considered to be extremely statistically significant ($p < 0.0001$, $t = 5.7465$, $DF=9$). The coliforms' counts were also higher for the frozen mussel samples (average of 1.6 log CFU/g, SD=0.37) than for the samples of locally harvested Black Sea mussels (average of 1.1 log CFU/g, SD=0.681), but the difference was not statistically significant ($p = 0.0641$, $t = 1.9724$, $DF=9$).

Many authors reveal significant levels of bacterial or viral contamination in raw frozen mussels or oysters (Changchai and Saunjit, 2014; Mannas *et al.*, 2014), advising to proper cooking of such foods, whilst insufficient data is available on the effect of freezing and retail stores marketing

on the overall microbiological quality of mussels. Therefore this study is relevant for comparing the microbiological quality of freshly harvested mussels with that of frozen, packed mussels and revealing lower contamination levels in Black Sea freshly harvested mussels.

CONCLUSION

The overall results of this investigation indicate that locally harvested Black Sea mussels are less contaminated than imported, processed, frozen mussels.

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