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DETERMINATION OF MICROBIOLOGICAL QUALITY OF KOKOREÇ SOLD IN ISPARTA

Birol KILIÇ[1]

[1]Suleyman Demirel University, Faculty of Engineering, Department of Food Engineering, Isparta, Turkey

Corresponding author email: birolkilic@sdu.edu.tr

Abstract

In this study, a total of 30 kokoreç samples (10 raw, 10 cooked and 10 cooked-seasoned) collected from 10 different restaurants in Isparta district of Turkey were investigated for microbiological quality. The raw, cooked and seasoned kokoreç samples were subjected to total aerobic bacteria count, total coliforms, yeast and mould. The results of this study revealed that raw kokoreç samples had 10^5-10^8cfu/g aerobic mesophilic viable bacteria, 10^4-10^5cfu/g total coliforms, 10^3-10^6cfu/g yeast and molds. On the other hand, cooked kokoreç samples had 10^2-10^5cfu/g aerobic mesophilic viable bacteria, $<10^1$cfu/g coliforms, $<10^1$cfu/g yeast and molds. Furthermore, cooked-seasoned kokoreç samples had 10^5-10^6 cfu/g aerobic mesophilic viable bacteria, 10^4-10^5cfu/g coliforms, 10^3-10^4cfu/g yeast and molds. This study results showed that even though cooking process decreased the microbial load significantly, the use of seasonings resulted in a significant increase in the microbial load of cooked kokoreç samples. This study indicated that kokoreç sold in Isparta market is not at the desired level as far as microbiological quality is concerned and the necessary measures should be taken for protection of consumer health and satisfaction of consumer expectations.

Key words*: Kokoreç, microbiological quality, food market.*

INTRODUCTION

Hygienic quality problems of foods cause food borne diseases. Worldwide, many people die each year due to food-borne diseases. Food-borne diseases remain one of the major public health problems in our country as well as all over the world. Besides, deficiencies in the quality of food causing malnutrition negatively affect the health of society as well as adversely affect the sale of products leading to economic losses. Thus food safety and quality are an important factor. Therefore, scientific studies about foods sold in market have an important functionality for protection of consumer health and satisfaction of consumer expectations.

Kokoreç is a dish of the Balkans, Greece, Azerbaijan, Iranian Azerbaijan and Turkey consisting of lamb or goat intestines wrapped around seasoned offal, and typically cooked on a griddle. The intestines of suckling lambs are preferred. The ingredients are sliced and seasoned with lemon, olive oil, oregano, salt, and pepper. The intestine is cleaned especially thoroughly. The filling meats are threaded onto a long skewer and wrapped with the intestine to hold them together. Kokoreç is usually roasted on a horizontal skewer over a coal, gas, or electrical burner. A quite different preparation mixes the chopped innards with chopped tomatoes and green peppers, and then cooks them on a large griddle with hot red pepper and oregano added. When done, kokoreç can be served in half a baguette or in a sandwich bun, plain or garnished, almost always with oregano and red pepper.

There is no doubt that foodborne pathogenic bacteria are the cause of illness and death for many people each year, at great economic cost and human suffering. Any outbreak of food borne illnesses triggers recalls and can cause consumers to decrease their meat purchases. That domino effect can have exhausting consequences on the meat production industry. As a result, meat processors constantly research for inventions to eliminate potential bio-hazards. As the consumers are wary of chemical solutions being used on products, natural inventions are especially appealing for consumers. Two major sources of bacteria causing foodborne disease in meat and meat products may be identified. The living animal

carries pathogenic bacteria while the processing environment harbours them. In addition, the human being is also an important source of pathogenic bacteria, most frequently indirectly by cross contamination. Limiting the contamination and subsequent inactivation of occurring pathogenic bacteria is decisive to the safety of meat and meat products.

Food market studies have the essential function of providing insight into consumer purchasing patterns and provide directions to researchers and regulatory agencies for controlling safe and nutritious food production. Several studies have been conducted to determine microbiological quality of kokoreç sold in Turkish markets. These studies revealed that there are variations in microbiological parameters of kokoreç samples sold in the market.

In the present study, the objective was to determine microbiological quality of raw, cooked and seasoned kokoreç samples collected from 10 different restaurants in Isparta district of Turkey.

MATERIALS AND METHODS

Samples

Ten samples (about 100 g) of raw kokoreç samples, ten samples (about 100 g) of cooked kokoreç samples and ten samples (about 100 g) of seasoned kokoreç samples were collected from ten different restaurants in Isparta district of Turkey. Each kokoreç sample was placed in an individual sterile plastic bag and transported on ice to the laboratory immediately after collection. Kokoreç samples were tested upon arrival for microbiological quality.

Microbiological analysis

To analyze raw, cooked and cooked-seasoned kokoreç samples, kokoreç samples (10 g) were aseptically weighed, added to sterile buffered peptone water (90 ml) and homogenized in a stomacher at room temperature. Decimal dilutions in buffered peptone water were prepared. Aerobic plate counts (TVAC) were measured using the spread plate method on aerobic plate count agar (Merck, Darmstadt, Germany). The Petri dishes were incubated at 30°C for 24–48 h. Mould and yeast counts were measured using the spread plate method on Potato Dextrose Agar (Merck, Darmstadt, Germany). Petri dishes were incubated at 25°C for 2–5 days. Total coliform bacteria counts were carried out using the spread plate method on Eosin Methylene Blue Agar (Merck, Darmstadt, Germany). Petri dishes were incubated at 37°C for 24–48 h (Karahan et. al., 2002; Maturin & Peeler, 2001).

RESULTS AND DISCUSSIONS

The microbiological count in raw, cooked and cooked-seasoned kokoreç samples are shown in Table 1. The results indicated that there were a significant differences for total aerobic bacteria count, total coliforms, yeast and mould among in raw, cooked and cooked-seasoned kokoreç samples.

The results of this study revealed that raw kokoreç samples had 10^5-10^8cfu/g aerobic mesophilic viable bacteria, 10^4-10^5cfu/g total coliforms, 10^3-10^6cfu/g yeast and molds. On the other hand, cooked kokoreç samples had 10^2-10^5cfu/g aerobic mesophilic viable bacteria, $<10^1$cfu/g coliforms, $<10^1$cfu/g yeast and molds. Furthermore, cooked-seasoned kokoreç samples had 10^5-10^6cfu/g aerobic mesophilic viable bacteria, 10^4-10^5cfu/g coliforms, 10^3-10^4cfu/g yeast and molds.

Table 1.Microbiological count (cfu/g) in raw, cooked and cooked-seasoned kokoreç samples

		Raw	Cooked	Cooked-seasoned
Total aerobic bacteria	Minimum	$7.3x10^5$	$2.4x10^2$	$2.1x10^5$
	Average	$2.5x10^7$	$5.3x10^3$	$1.1x10^6$
	Maximum	$1.5x10^8$	$1.2x10^5$	$3.5x10^6$
Total coliform bacteria	Minimum	$3.0x10^4$	$<1.0x10^1$	$6.7x10^4$
	Average	$1.3x10^5$	$<1.0x10^1$	$5.7x10^5$
	Maximum	$4.0x10^5$	$<1.0x10^1$	$7.1x10^5$
Mould and yeast	Minimum	$7.0x10^3$	$<1.0x10^1$	$1.0x10^3$
	Average	$1.5x10^5$	$<1.0x10^1$	$5.5x10^3$
	Maximum	$1.6x10^6$	$<1.0x10^1$	$1.6x10^4$

The study results revealed that the microbiological quality of raw materials used for kokoreç manufacture is not appropriate and hygienic conditions for kokoreç production was not achieved as shown on Table 1. Similar observations on microbiological quality of kokoreç samples manufactured in Ankara were reported by Yentür et. al. (1989). This results showed that the intestines used in production during the preparation of kokoreç did not meet the required the microbiological criteria and might contain potential pathogenic bacteria.

As far as cooked kokoreç samples are concerned, results indicated that thermal process resulted in a decrease in the number of microbial load in kokoreç samples. However, the results of the study showed that reduction in a number of microorganisms due to cooking process was not sufficient. This may be the indication of insufficient thermal process.

The addition of seasonings to kokoreç resulted in a significant increase in microbial load. This results showed that seasonings used kokoreç manufacture have a significant contribution for a contamination. In this study, microbial load of seasonings were also determined and the results indicated that seasoning was one of the main reasons for kokoreç samples with high microbial load. Therefore it is important to take an action to control microbial load in seasonings used for kokoreç manufacture (Aksu et.al., 1997; McKeen, 1995; Geeta and Kulkarni, 1987).

CONCLUSIONS

The results suggest that changes such as improving the hygienic properties of the intestines and seasonings used in the production of kokoreç and more effective cooking process in kokoreç manufacture should be applied to improve safety traits. Even though there is no official report, possible food borne illnesses are major concerns surrounding kokoreç. Therefore, further research and a broad control system are needed to improve safety of kokoreç.

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