Detection of Pathogen Candida spp. Isolated from Butter

Tereyağında Patojen Candida spp. Varlığının Araştırılması

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Abstract: Yeasts may affect food safety and quality causing spoilage in foods. Also, yeasts can be used as starter culture in the production of traditional and industrial products. But, Candida species are important for hospital infections which have been able to infect to humans via food in recent years. The aim of this study was to evaluate the incidence of pathogen Candida spp. in butter. In this study, 100 butter samples were analyzed from public bazaars. Candida spp. was detected 10 % of butter samples. C. albicans, C. albicans and C. krusei, C. tropicalis, C. krusei were isolated 4%, 3%, 2%, 1% from positive butter samples for Candida spp., respectively. According to this data, presence of pathogen Candida spp. in butter samples can cause significant problems for public health. In order to ensure food safety, it is necessary to determine the rate of yeast and mold and the detection of pathogen yeasts in microbiological analyses.

Keywords: Butter, Candida spp., public health, yeast and mold


Anahtar Kelimeler: Candida spp., halk sağlık, maya ve küf, tereyağ
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Introduction

Yeasts are spoilage microorganisms that affect the quality and safety of a wide range of foods (Betts et al., 1999). Yeasts are used traditionally in bread, beer and wine production. In addition, yeasts are used as starter culture during to ripening periods of the cheeses in order to give some special characteristical properties (Loretan et al., 1998). The genus Candida are commensal eukaryotic yeast species of phylum Ascomycota group member and can be found in the environment, human and other mammals (McManus and Coleman, 2014). In mammals, Candida species are the member of normal commensal mucosal surfaces of gastrointestinal and genitourinary tracts (Kumamoto, 2011). In addition, yeasts can adversely affect food safety and cause infections as an opportunistic pathogen (Fleet, 2007). More than 17 species of Candida can cause human
infections. Besides, Candida albicans, Candida glabrata, Candida parapsilosis, Candida tropicalis, and Candida krusei are the aetiological agents of invasive infections (Pfaller et al., 2007). C. albicans is the main reason of the oral and systemic candidiasis (Akpan and Morgan, 2002; Thompson et al., 2010).

Butter is a dairy product which is made of milk or cream (El-Diasty and Salem, 2009). Butter is highly nutritive and beneficial for the consumers (Kwak, H. S., Ganesan, P., & Al Mijan, 2013). The microbial quality in butter may be affected by the processing methods, storage conditions and packaging (Karagözli and Ergönül, 2008). Candida species can affect the foods as starter cultures and spoilage microorganisms (Hommel, 2014). There are numerous reports on the occurrence of pathogenic yeasts in dairy products (El-Sharoud et al., 2009; Sagdic et al., 2010; Wanderley and Andréia, 2013; Mohamed et al., 2017). Pathogen Candida spp. is a problem in human medicine. In veterinary medicine, Candida spp. have been isolated as a cause of mastitis (Crawshaw et al., 2005). The consume of contaminated milk without heat treatment or dairy products may create the risk of Candida spp. (McManus and Coleman, 2014). The presence of pathogen Candida species in foods can cause infections to human. The aim of the study was to evaluate the incidence of pathogen Candida spp. in butter.

Material and Methods

Sampling

In this study, one hundred butter samples were collected between October 2016 and December 2017 from public bazaar in Burdur. Butter samples were transported to the laboratory under refrigeration and aseptic conditions. Samples were investigated for the presence of Candida spp. Butter (10 g) samples were diluted with 90 mL of 0.1% peptone water and homogenized for 2 minutes with a Labblender 400 stomacher (Seward Laboratory, London, UK) for the enumeration of Candida spp. Serial dilutions were prepared with 9 mL sterile peptone water and 0.1 mL of each dilution was spreaded on agars. Acidified potato dextrose agar (PDA) was incubated at 25°C for 5-7 days for enumeration of yeasts and molds (Koburger and Marth, 1984; Tourmas et al., 2001). CHROMagar Candida (CHROMagar Candida Company, Paris, France) was prepared according to the instructions of manufacturer. All plates were incubated at 30°C for 48 h aerobically, as recommended by the manufacturer (Pfaller et al., 1996). The appearance of colonies, including color, size, and textures on CHROMagar Candida, was analyzed. The color of colonies on CHROMagar Candida was similar as given by the manufacturer, green colonies of C. albicans, metallic blue colonies of C. tropicalis and by purple colored colonies of C. krusei.

Reference strains used in testing

ATCC 97012 C. albicans, ATCC 2011 C. tropicalis, ATCC 610 C. krusei strains were used in this study.

Other tests

Several tests were applied to the suspicious colonies for the isolation of Candida spp. as Gram staining, germ tube test, carbohydrate fermentation tests (glucose, maltose, sucrose, and galactose), and urease tests (Cooper and Margarita, 1985; Konemann et al., 1997).

Results and Discussion

One hundred butter samples were evaluated for the existence of pathogen Candida spp. in this study. Candida spp. was detected 10% of butter samples. C. albicans, C. albicans and C. krusei, C. krusei, C. tropicalis were isolated 4%, 3%, 2%, 1% from Candida spp. positive butter samples, respectively. Moreover yeast and mold counts of 100 butter samples were detected ranged from min. 2.00 log cfu/g to max. 4.30 log cfu/g and average 2.68±0.79 log cfu/g. El-Diasty and Salem (2009) studied on lyplolitic and proteolitic fungi in dairy products and they reported that
10% of the butter samples contaminated with C. tropicalis.

In this study, pathogenic Candida spp. were isolated from butter samples. The microflora of the butter reflects the qualities of the cream, the sanitary conditions of the equipment used to produce the butter, the environmental and hygienic conditions during the packaging and transport of the butter are important factors effecting butter quality (Pal, 2014). Previous studies were reported higher levels of molds and yeasts contamination in butter as $1.7 \times 10^4$, $9.0 \times 10^5$, $5.5 \times 10^6$, and $6.99 \times 10^4$ kob/g by Yalçın et al. (1993), Patır et al. (1995), Sancak et al. (2002) and Henin and Kalves (1992), respectively. Also, Bakirci et al. (2000) were analysed the microbiological properties of 33 culinary types of butter samples, and as a result of the study yeast and molds were found as 2.12 cfu/g in family businesses and 5.25 cfu/g in dairy farm. In another study Hayaloglu and Konar (2001) were reported that enumeration of yeast and mold of 25 butter samples as $1.0 \times 10^3$ - $7.3 \times 10^5$ cfu/g in Malatya region. Karagözlu and Ergonul (2008) were observed the counts of yeast and mould in butter as $< 1.0$-6.66 log cfu/g. In our study, yeast and mold counts were detected as minimum 2.00 cfu/g, maximum 4.30 cfu/g, and mean $2.68 \pm 0.79$ cfu/g. In our study, results were lower than previous studies.

Although there are many studies on hygiene and presence of pathogenic microorganisms in butter, it seems that there are just a few studies on the analysis of the pathogen Candida spp. Total number of yeast and molds does not refer to pathogenic Candida spp in microbiological analysis of foods. Pathogen Candida spp. constitutes major health problems in humans by developing resistance and it can cause diseases by taking contaminant foods (Wanderley and Andréia, 2013). Chromogenic media is effective for the isolation and identification of pathogen Candida spp. (Devi and Maheshwari, 2014).

Finally it could be said, microbiological analysis of food samples should be made not just for determining the total number of yeasts and molds, but the samples should also be tested for detecting the presence of pathogenic yeast, which would be very crucial for the public health. We suggest that to be aware of the presence of pathogenic Candida spp. in foods, relevant legislation should be regulated to decrease the possible risk of pathogenic Candida spp.

References


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