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Original Research

Microbiological quality of pastrami and associated surfaces at the point of sale in Kayseri, Turkey

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ABSTRACT

Objective: The aim of this study is to trace the possible relations between the hygienic status of slicing utensils and the microbiological quality of pastrami.

Study Design: A total of 75 pastrami retail markets were visited in Kayseri, Turkey, where the pastrami (a ready-to-eat meat product) is commonly produced and consumed. Sliced pastrami, the cutting board and knife surface swabs were collected from each pastrami retail point to trace possible sources of contamination.

Methods: Samples were analysed for the presence of total viable counts (TVC), total coliforms, *Escherichia coli*, members of Enterobacteriaceae, *Staphylococcus aureus* and *Listeria* spp. In addition, pastrami samples were analysed for sulphite-reducing *Clostridium* spp. and *Toxoplasma gondii*.

Results: When compared with the target values of related literatures, a total of 6 (8%) pastrami samples were found unsatisfactory as a result of TVC (5.3%), Enterobacteriaceae (5.3%), *E. coli* (2.6%), *S. aureus* (2.6%), *Listeria* spp. (2.6%) and *Listeria monocytogenes* (1.3%) contaminations. No *T. gondii* positivity was observed among the pastrami samples. None of the cutting board and knife surface swabs were found to harbour TVC level >10^3 cfu/cm^2, *E. coli* and *L. monocytogenes*. For the total coliforms, 7 (9.3%) and 5 (6.6%) of cutting board and knife surface swabs were found to exceed the target value (<2.5 cfu/cm^2), respectively. No statistically significant correlation was detected between the organisms on pastrami and slicing utensils indicating that pastrami were not cross-contaminated by the contact surfaces.

Conclusion: More emphasis needs to be placed for training of food handlers and to apply good hygienic practices at the point of pastrami sale. The conditions at retail points must be monitored and inspections should be tightened to protect public health.

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Introduction

Pastrami is an uncooked, dry-cured, dried, pressed, edible paste coated and non-fermented popular ready-to-eat (RTE) meat product commonly consumed in Turkey. It is mostly produced from whole muscle cuts of cattle and water buffalo.[1] The production process of pastrami takes over a month period.[2]

During preparation and sale, uncooked sliced meat products can be contaminated by pathogenic bacteria causing illness to consumers if effective doses are reached at the time of consumption.[3] Cross-contamination during the production process, handling at the point of sale and the bacterial growth during storage are the main causes of the product contamination. In retail markets, food preparation utensils, in particular cutting boards and knives, are incriminated for being the important vehicles of contamination.[4,5] Many foodborne pathogens have the ability to attach and form biofilms on food contact surfaces posing a potential threat to public health.[6] Lack of consistent training programs, financial concerns and inadequate food safety awareness can affect hygiene practices in retail establishments.[7]

Total viable counts (TVC), total coliforms, *E. coli*, members of Enterobacteriaceae and *S. aureus* are the indicator organisms widely used to assess hygiene practices. Food safety depends on understanding the contamination sources to prevent them.

Assessment of the bacteriological quality of food contact surfaces has critical consideration to control the spread of foodborne pathogens as the level of organic matter can provide pathogen survival. Therefore, the present study is planned to determine the microbiological quality of pastrami and to trace the possible sources of potential foodborne pathogens at the point of sale.

Methods

Sampling

A total of 75 retail points were visited in Kayseri, Turkey, for the purpose of collecting samples from pastrami, cutting board and knife surface swabs. Samples were purchased during the working hours without prior notification. A total of 225 samples (75 pastrami, 75 cutting boards and 75 knives) were collected from the pastrami retail markets. Samples were kept and transported to the laboratory in a cool box under 2 °C.

Sampling of pastrami consisted of purchasing 150 g of pastrami being sliced at the time of sale.

Swab samples were taken from the cutting board surfaces and the knives. A 15-cm^2 sterile template was used to border the sampling surface. A premoistened sterile swab in 10 mL of sterile 0.1%-peptone water was used to wipe the board and knife surfaces three times in three directions.[8]

Microbiological analyses

Each pastrami sample was blended to ensure a homogeneous sample preparation. A total of 10 g of homogenized sample was transported to the stomacher bag containing 90 mL of 0.1%-peptone water to be additionally homogenized for 2 minutes. Serial dilutions were prepared in 0.1%-peptone water where necessary. The swab samples from cutting boards and the knives were plated on the related agar plates for the evaluation of bacterial agents to be analysed.

TVC were determined in Plate Count Agar (Merck, 105463) incubated at 30 °C for 48 h. Total coliforms, *E. coli* and members of Enterobacteriaceae family were enumerated in Chromocult Coliform agar (Merck, 118441) plates after incubating at 35–37 °C for 24 h where typical coliforms were salmon to red in colour, *E. coli* colonies were dark blue to violet in colour and Enterobacteriaceae colonies were colourless.[9,10] Iron Sulphite Agar (Oxoid, CM 0079) was used for the enumeration of sulphite-reducing bacteria (considering the black colonies) after 48-h incubation at 37 °C.[11] Enumeration of *S. aureus* was carried out by Baird-Parker agar plates (Merck, 105406) after incubating at 35 °C for 24–48 h considering black colonies with white margins surrounded by clear zones. The colonies were confirmed by coagulase test.

Listeria spp. and *Listeria monocytogenes* were determined by EN/ISO 11290-1 and EN/ISO 11290-2, respectively.[12,13] For identification of *Listeria* spp., five presumptive colonies from Oxford and PALCAM Listeria Selective agar (Oxoid, CM0877) were subcultured on tryptone-soya agar (TSA, Merck 105458) at 37 °C for 24 h. The following tests were performed on colonies isolated from tryptone-soya agar: catalase, motility in SIM medium and Gram staining, following the directions of the EN/ISO 11290-1 detection method. Afterwards, the obtained isolates were biochemically identified at spp. level by Microbact test kit (Oxoid, MB1128A) according to the manufacturer's instructions.

Genomic DNA isolation of Toxoplasma gondii

Genomic DNA (gDNA) isolations from the pastrami samples were performed according to the described protocol by Eggleston, Fitzpatrick & Hager (2008) by using a tissue DNA isolation kit (AxyPrep Multisource Genomic DNA Miniprep Kit, Axygen).[14] The isolated gDNA was stored at −20 °C until molecular analysis. The DNA concentrations of the samples were measured in NanoDrop Spectrophotometer (ACT Gene ASP-3700) before molecular analyses to adjust the optimum amount of gDNA used in the polymerase chain reaction (PCR) mastermix.

Molecular analysis for T. gondii

Both TaqMan real-time PCR and conventional PCR–targeted repeat element and B1 gene regions, respectively, were simultaneously used for the detection of *T. gondii* in gDNA extracts with the related primers and probe (Table 1) according to the described protocols.[15,16]

Primers and probes, genomic DNA extracted from the samples, positive reference DNA and negative control (deionized water) were processed with proper PCR Master Mix in real-time PCR and conventional PCR analyzes. *T. gondii* reference gDNA isolate was obtained from the tachyzoites of *T. gondii* stored in the cryobank of Parasitology Department of Faculty of Veterinary Medicine, Erciyes University. Real-time PCR analyzes were performed using Mx-3005P instrument

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