Original Article

Survey on microbial quality of chicken meat in Kolkata, India

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Abstract

The present study was undertaken to determine the microbial quality of chicken meat and its public health implications. The standard plate counts and coliform counts from chicken meat procured from urban markets were higher than those from semi-urban markets. The Staphylococcal counts were higher in chicken meat from urban markets. All the positive isolates of E. coli and Staphylococcus spp. have been studied morphologically, physiologically and biochemically which proved to be confirmatory.

Key words: Microbial quality, Chicken meat, Coliform counts, Staphylococcal counts

In addition to pathogenic bacteria, special attention should also be given to the hygienic production and storage of chicken meat. Total count of aerobic mesophilic bacteria (Standard Plate Count), enterobacteria and Escherichia coli are considered indicators of microbiological quality (Capita et al., 2002). Total count of aerobic mesophilic bacteria in ground chicken meat is always high and consequently, the risks of spoilage in the sense of microbiological disintegration are higher. E. coli is a normal inhabitant of birds which causes colibacillosis, colisepticaemia, coligranuloma, pericarditis, peritonitis, synovitis, omphalitis and air sac disease in poultry under predisposing conditions. In the present study, total bacterial count by standard plate count (SPC) and population density of E. coli and Staphylococcus spp. have been found out in fresh chicken meat procured from commercial markets.

50 gm samples of chicken carcass were collected in UV sterilized sample vials and transported in ice at 4°C to laboratory till processed for microbial analyses. All the samples were processed for microbial analyses within 24 h of collection.

10 gm of meat sample was weighed and transferred in sterilized mortar and minced in sterilized Ringer’s solution with the help of sterile pestle and then transferred to sterile conical flask aseptically and then total volume was made up to 100 ml. The subsequent ten-fold dilutions were prepared for determining the group of microflora.

Isolation of Staphylococcus spp. and E. coli were attempted (Finegold and Martin, 1982). Samples were put in 10 ml nutrient broth for isolation of Staphylococcus spp. and E. coli. These were then incubated at 37°C for 18-24 h.

After 18-24 h of incubation, one loopful of culture was inoculated into Mc Conkey’s agar plate and salt agar plates respectively and incubated at 37°C for 24 hours. Inoculated salt agar plates were incubated for 48 hours. Typical large (2-3 mm) lactose fermenting pink colonies on
Mc Conkey’s agar plates were Gram stained and were streaked on Eosin-methylene blue agar plates. Colonies showing characteristic metallic sheen suggestive of E. coli were picked on nutrient agar slants in duplicate and stored at 4°C for further study.

Salt agar plates were checked after 24-48 h of incubation and circular, smooth colonies (2-3 mm dia) were Gram stained and picked up and inoculated in Mannitol salt agar. The colonies showing yellow and red colonies were picked up in nutrient agar slants in duplicate and stored at 4°C for further study.

All the pure isolates in Nutrient agar slants were put to systematic studies for identification. Those were studied on the basis of morphology, cultural characteristics, biochemical and sugar fermentation reactions (Cruickshank et al., 1975).

The isolates were identified on the basis of Gram’s staining, motility, cultural characteristics and biochemical screening by indole test, methyl red (MR) test, Voges Proskauer (VP) test, citrate utilization test, urease production test, TSI agar test, H₂S production test and nitrate reduction test Suggestive isolates of E. coli were identified by IMViC reaction, TSI test, H₂S production test, nitrate reduction test and other fermentative and non-fermentative sugar reactions (Edwards and Ewing, 1972).

SPC for total aerobic bacterial count in chicken meat procured from semi-urban and urban markets ranged from 51-55 x 10⁴ and 4-250 x 10⁵ CFU/g of chicken meat respectively. Mean SPC of chicken meat of semi-urban and urban markets were 243.90 x 10⁴ CFU and 69.60 x 10⁵ CFU/g of chicken meat respectively. Coliform count of poultry meat ranged from 4-70 X 10² and 1-17 X 10⁵ CFU/g of chicken meat from semi-urban and urban markets respectively. Mean coliform count per gram of poultry meat from semi-urban and urban markets were 32.30 x 10² CFU/g and 6.50 x 10⁵ CFU/g of chicken meat respectively.

Staphylococcus count from semi-urban and urban markets ranged from 12-82 x 10⁵ CFU/g and 9-32 x 10² CFU/g of chicken meat respectively. Mean Staphylococcus count per gram of poultry meat from semi-urban and urban markets were 49.70 x 10² CFU/g and 21.20 x 10² CFU/g of chicken meat respectively. The findings of the study correlated with Yashoda et al. (2001) who examined dressed broiler chickens for microbiological quality.

Enterotoxin produced by Staphylococcus spp. at favorable temperature is the common cause of food-borne human illnesses throughout the world (Do Carmo et al., 2004).

All the strains showed positive reactions to indole test, MR test and negative reactions to VP test and citrate utilization test. All were positive to nitrate reduction test and TSI test and negative to urease and H₂S production test. All the strains produced acidic slants in TSI slants. There were no variant strains found (Sharma et al., 1981). All E. coli isolates were subjected to fermentation of six different sugar solutions viz. glucose, sucrose, salicin, adonitol and inositol of which all the strains fermented glucose and lactose with production of acid with or without gas formation within 24 h, seven strains fermented salicin within 24 h, one strain fermented salicin in 48 h, one strain fermented adonitol in 48 h and none of the strains fermented inositol (Babila and Akcadag, 1992).

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References


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