Bacteriological Quality of Market Chicken Meat in Jaipur City

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ABSTRACT

The aim of the present study was to evaluate the bacteriological quality and prevalence of Staphylococcus aureus, Escherichia coli and Salmonella spp. in raw chicken meat marketed in retail shops of Jaipur city in Rajasthan, India. A total of 50 raw chicken meat samples were collected aseptically from different retail meat shops and analyzed for the total viable count (TVC) along with the isolation of the above mentioned pathogens. The log_{10} TVC in chicken meat samples was found between the range of 5.52-7.97 with the average (Mean±S.E.) of 7.14±0.11 log_{10} cfu/g. The results of TVC revealed high bacterial contamination of chicken meat and only 40% samples were in acceptable category. E. coli was the most predominant pathogen with 68% prevalence rate, followed by S. aureus (38%) and Salmonella spp. (6%).

Keywords: Bacteriological quality, chicken meat, E. coli, S. aureus, Salmonella

Meat is one of the most nutritious foods for human consumption, but on the other hand, it is also prone to variety of exogenous and endogenous contamination and act as important vehicle for transmission of a number of microorganisms which cause foodborne illness in humans (Bachhil, 1985).

Freshly slaughtered animals may harbour few bacteria but in most of cases, during evisceration and other post slaughter operations meat surface invariably comes in contact with contaminated hands of butchers, tools, equipments, and get easily contaminated (Price and Schweigert, 1971; Narasimha Rao and Ramesh, 1988). The safety and hygienic quality of meat are largely determined by the load of microorganisms, which are ubiquitous in nature (Gill et al., 1999). Therefore, the present study was planned to determine the bacteriological quality of chicken meat sold in and around Jaipur city from public health point of view.

During a six-months study, from March, 2011 to August, 2011, a total number of 50 chicken meat samples were collected from retail meat shops situated in and around Jaipur city. All the samples were put in sterile polythene bags and transported in refrigerated conditions to the laboratory within 2 h of collection under aseptic and sterile conditions. All the samples were kept at 4°C till further bacteriological examination.

All the samples were processed for total viable counts as per APHA (1984). In addition, all the samples were also processed for the isolation, identification and confirmation of E. coli, S. aureus and Salmonella spp. Baird-Parker agar (Himedia, Mumbai) was used for the isolation of S. aureus for the isolation of E. coli, MacConkey’s lactose broth was used as enrichment broth and eosin methylene
blue agar (Himedia, Mumbai) as a selective medium. For the isolation of *Salmonella* spp., buffered peptone water (BPW) was used as pre-enrichment medium, tetraethionate broth as a selective enrichment broth and brilliant green agar (BGA) (Himedia, Mumbai) as a selective plating medium.

Preliminary identification of the different isolates was done on the basis of cultural (colony) characteristics and Gram’s staining, followed by different standard biochemical tests for confirmation as described by Cruickshank *et al.* (1975).

Acceptability of chicken meat samples was categorised as per the standards laid down by ICMSF (1986) and PFA (1955).

During the present study, the bacteriological quality of raw chicken meat as revealed by log_{10} TVC between the range of 5.52 - 7.97 (Average 7.14 ± 0.11 log_{10} cfu/g). Nearly similar results for raw chicken meat samples were obtained by Amara *et al.*, (1994) and Cohen *et al.* (2007), who reported the TVC in range of 6.55 - 7.15 log_{10} cfu/g. As per the standards prescribed by ICMSF (1986), in present study, only 40% of chicken meat samples found to be within acceptable range. However, Gupta and Gupta (2009) reported low microbial load and considered 53% chicken meat samples in acceptable range.

Total viable counts/aerobic plate counts are widely accepted to assess the hygienic conditions of processing plants (Department of Agriculture, Animal health and product, 2004). The higher TVC in the examined chicken meat samples reported here indicate that the contamination of the product could be attributed to unsatisfactory sanitation during handling, processing, storage and distribution.

The prevalence of *S. aureus* in chicken meat samples was 38%. Contrary to the findings of the study, 7.5% incidence of *S. aureus* in chicken meat has been reported by Gupta and Gupta (2009), 10.4% by Cohen *et al.* (2007) and 0% by Iroha *et al.* (2011). However, almost 100% prevalence rate of *S. aureus* from chicken meat has been reported by Kamat *et al.* (1991). The results of present study are in agreement with the findings of Amara *et al.* (1994) and Capita *et al.* (2002), who also reported the presence of *S. aureus* in raw chicken meat.

The reason for the high prevalence of *S. aureus* could have been the poor personal hygiene of the workers and the technique of hand evisceration with infrequent hand washing, which is predominantly practiced in the traditional retail meat shops.

The prevalence of *E. coli* in chicken meat samples was 68%. Nearly similar observations were obtained by Deka *et al.* (2008). In contrast, lower prevalence rates of *E. coli* in chicken meat samples have been reported, 22.5% by Gupta and Gupta (2009), 43% by Cohen *et al.* (2007) and 2% by Iroha *et al.* (2011), in studies conducted at Durg (C.G.), Morocco and Nigeria, respectively. The findings of study are in agreement with the reports of Amara *et al.* (1994) and Capita *et al.* (2002) who also reported the presence of *E. coli* in raw chicken meat. It is important to notice that the presence of *E. coli* in any chicken meat samples is indicative of faecal contamination.

Six per cent raw chicken meat samples were positive for *Salmonella*. The result is in accordance with findings of Iroha *et al.* (2011) who reported the prevalence rate of 6% among chicken meat samples. Nearly similar results for raw chicken meat were reported; 8% by Deka *et al.* (2008), 5.5% by Dhawale *et al.* (2010) and 5% by Bhattacharya *et al.* (2004). Lower prevalence of *Salmonella* spp. in chicken meat have been reported in different studies like 3.5% by Gupta and Gupta (2009), 2.8% by Manickam and Victor (1991), 4% by Nair *et al.* (1990), 2.1% by Cohen *et al.* (2007) and 0% by Vaidya *et al.* (2005). However, higher prevalence rates of *Salmonella* spp. from chicken meat also have been reported by different workers like 24% by Vijaya kumar *et al.* (2009), 9.9% by Chaiba *et al.* (2009), 45.10% by Mir *et al.* (2010), 10.6% by Kozacinski *et al.* (2006), 32% by Cardinale *et al.* (2003), 69% by Bajaj *et al.* (2003) and almost 100% by Kamat *et al.* (1991).

Differences in recovery rates of *Salmonella* organisms from chicken meat samples in various studies including present study may be attributed to multiple factors like variation in poultry densities,
geographical and seasonal variations, and hygienic conditions during production and processing of chicken meat and due to differences in the sensitivity and specificity of different isolation methods used.

Any numbers of Salmonella are not permissible as per BIS standards in food and their mere presence is enough to reject the food samples (Bachhil and Jaiswal, 1988).

On the basis of present investigation, it was concluded that the raw chicken meat samples collected from the retail meat shops in and around Jaipur city were contaminated and had unacceptable bacterial load. Moreover, most of the raw chicken meat samples showed the presence of pathogenic and food poisoning organisms like S. aureus, E. coli and Salmonella, which is a matter of great public health concern.

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References


