

A Study on Microbial Contamination of Broiler And Country Chickens

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Abstract- Poultry is the major source of meat in India. With the steady increase in the consumption of chickens, ensuring the microbial safety of the chicken meat is necessary. Poultry can be contaminated with a variety of microorganisms including certain food-borne pathogens which upon consumption can cause human illnesses. The aim of the study was to identify the presence of microbial contaminants in the meat of broiler and country chickens by performing standard biochemical tests for bacteria. The results revealed that meat from both broiler and country chickens is contaminated with pathogens such as *E.coli*, *Salmonella* etc.

Keywords- Chicken meat, microbial quality, biochemical tests, illness.

I. INTRODUCTION

The consumption of poultry meat is rapidly increasing throughout the world. The microbiological safety and quality of poultry meat are equally important to producers, retailers and consumers. The poultry industry suffers greater economic loss than any other livestock industries because of the greater susceptibility of their species to microorganisms than any other species. The contamination of poultry meat with food-borne pathogens causes many illnesses [1]. Food-borne disease results from eating contaminated food or beverages and is frequently referred to as food poisoning. It is caused by pathogenic virus, bacteria, parasites and chemical or natural toxins that contaminate food. It is a major health concern worldwide [2].

During the slaughter of poultry birds, the fecal contamination of the carcasses from the gut of these birds on which the pathogenic bacteria if present is spilled and is passed on as contaminants [3]. Because of the relatively high frequency of contamination of poultry with pathogenic bacteria, raw poultry products are reported to be responsible for a significant number of cases of human food poisoning [4].

Poultry meat can be contaminated with a variety of microorganisms, including those capable of spoiling the product during chill storage, and certain food-borne pathogen. The most important bacterial contaminants present in poultry

meat are *Salmonella* and *Campylobacter* which is responsible for gastroenteritis in humans. *Collibacillosis* and *Salmonellosis* are been described as the leading causes of food-borne illnesses worldwide [5]. *Escherichia coli* is another important food-borne pathogen responsible for *Collibacillosis*. *E. coli* is a natural inhabitant of the intestinal tracts of humans and warm-blooded animals and it acquires microbial resistance quicker than any other bacteria [6]. Other emerging pathogen *Aeromonas* species must also be considered. They are responsible for intestinal and extra-intestinal infections in humans [7].

While poultry is not the only source of the pathogenic organisms, it is widely recognised as a major reservoir due to symptomless carriage in the live bird. The problem is exacerbated by the modern conditions poultry farm like intensive rearing, where large numbers of birds are kept together, and high-rate processing, in which carcasses remain in close proximity throughout the operation. Such conditions favour the spread of any pathogens that may gain access to the flock. Moreover, the use of antimicrobials in poultry production, whether for therapeutic or for performance-enhancing purposes like weight gain contributes to the development of resistance in pathogens, which is increasing, and have serious consequences for the treatment of human illness from these organisms [8].

The native microflora of processed poultry is composed of many types of bacteria and yeasts, most of which are the part of the microflora of live poultry. For example, the bacteria *Campylobacter* and *Salmonella* inhabit the intestines of healthy birds, and can cause disease in humans, depending on their pathogenicity and the number and concentration of bacteria on the product. The sum of these factors will determine whether the consumer is at risk at the time of consumption. Further, the contamination of carcasses and meat with poultry bacteria is not the only health risk to humans since the bacteria carried by poultry workers can also be transferred to the carcasses and subsequently to consumers [9].

Hence, this study was performed to analyse the microbial contamination in the fresh broiler and country

chicken meat which can be the reflection of the hygienic condition of the meat consumed and possible hazards in the public health.

II. MATERIALS AND METHODS

Processing of Samples

Raw chicken meat was collected from a retail outlet in Coimbatore. The samples were aseptically cut into smaller pieces using a sterile knife. The analytical portions were placed in separate sterile plastic bags to which 250 ml of buffered peptone water was added. The bags were shaken vigorously and after 30 minutes the sample rinsate was collected and used for the following biochemical tests to characterize the bacteria present [2].

Biochemical Characterisation

Biochemical characterisation of the bacteria was done by performing specific tests such as catalase, Indole, Methyl red, Voges- Proskauer and citrate tests. The medium prepared for the following tests was inoculated by adding 3.0 ml of the prepared rinsate.

Indole Test

The indole test screens for the ability of an organism to degrade the amino acid tryptophan and produce indole. The inoculated tryptophan broth that was incubated for 24 hours at 37°C was treated with 1.0 ml of Kovac's reagent. The positive result was indicated by the formation of cherry red coloured ring [10].

Voges- Proskauer Test

Voges–Proskauer or VP is a test used to detect acetoin in a bacterial broth culture. The inoculated MR-VP broth that was incubated at 37°C for 24 hours was treated with 0.6 ml of α - naphthol followed by 0.2 ml potassium hydroxide. The tubes were allowed to stand for 30 minutes. The positive reaction was indicated by the formation of pink colour [11].

Methyl Red Test

The test measures the final acidity of a culture in buffered medium containing dextrose and peptone. The inoculated MR-VP broth that was incubated at 37°C for 24 hours was added with 5 drops of methyl red indicator. The positive reaction was indicated by the formation of a stable red

colour. The development of an intermediate red or yellow colour indicates a negative reaction [11].

Citrate Utilisation Test

The test is used to check the ability of microorganisms for utilization of citrate. The citrate agar was dispensed into test tubes and autoclaved at 121°C for 15 minutes. It was inoculated with the rinsate and then incubated at 37°C for 48 hours. The positive reaction was indicated by the colour change from green to blue [11].

Catalase Test

The test is done to check the production of catalase by the organism. A drop of hydrogen peroxide was taken on a clean slide and a part of the bacterial colonies was transferred into it. The effervescence formation indicates a positive result [11].

III. RESULTS AND DISCUSSION

Poultry and poultry products are frequently contaminated with bacterial pathogens which reach the carcasses from the intestinal tract or from the faecal material. This remains an important public health issue because it can cause illness leading to human suffering, loss of productivity and it may also cause mortality [1].

The meat samples from both broiler and country chickens reacted positive for indole test by the formation of cherry red ring. This indicates the presence of Enterobacteria including *E.coli*, *P. vulgaris*. The broiler and country chickens gave a stable red colour with methyl red indicator which indicates the presence of *E.coli*, *Klebsiella* and *Yersinia* species.

Voges- Proskauer test determines the ability of bacteria to digest glucose to acetoin. The meat samples from broiler and country chickens reacted positive for the test since a red colour was formed on addition of alpha- naphthol and potassium hydroxide. It indicates the presence of Streptococci, *Listeria*, *Klebsiella*. Citrate test determines the ability of the microorganisms to utilize citrate as a sole carbon source. The meat samples included in the study reacted positive for the test which indicates the presence of *Salmonella*, *Citrobacter*, *Klebsiella*.

Catalase test is based on the ability of the microorganisms to produce catalase. Both the meat samples reacted negative for the test which indicates the presence of *Streptococcus* and *Enterococcus*.

The results of assessment of microbial content in broiler and country chickens are presented in the table 1

Table -1: Assessment of Microbial Content in Broiler and Country Chickens

S.No	Biochemical Test	Results	
		Broiler Chicken	Country Chicken
1.	Indole test	Positive	Positive
2.	Methyl Red Test	Positive	Positive
3.	Voges- Proskauer Test	Positive	Positive
4.	Citrate Utilisation Test	Positive	Positive
5.	Catalase Test	Negative	Negative

The above results are similar to those obtained by Gayathri and Anu, 2015 [2]. These bacteria are pathogenic in nature and contribute to other globally important diseases, such as Pneumonia, which can be caused by bacteria such as Streptococcus, foodborne illnesses which can be caused by bacteria such as E. coli, Shigella and Salmonella. E.coli, the etiologic agent of colibacillosis in chickens, causes diverse infections in humans, including urinary tract infections, neonatal meningitis, and sepsis [12]. Salmonella contamination is a major concern because they are the most incriminated pathogenic microorganisms of bacterial food poisoning. Salmonella infections are manifested as Salmonellosis in humans and it is characterized by self-limiting gastroenteritis syndrome [13]. Staphylococcus or Streptococcus are conditionally pathogenic and are also part of normal human flora, they usually exist on the skin or in the nose without causing diseases [14].

IV. CONCLUSION

The presence of bacteria in chicken meat has been widely reported from different parts of the world. Most of the pathogens that play a role in food borne diseases in humans have a zoonotic origin. It can be concluded that the organisms, like Escherichia coli, Enterobacter aerogenes, Klebsiella pneumoniae were the most prevalent microorganisms in the meat samples and they cause a variety of illnesses. These contaminants possess health hazards to consumers exposed to consumption of such meats. These contaminants in the retail chicken meats need to be taken care of to prevent the health hazards on consumers by adopting proper and hygienic slaughtering, sanitation, storage and retail practices.

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