Prevalence of *Escherichia coli* and *Salmonella* on Different Cuts of Retail Chicken Meat in Badulla District

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Abstract— The present study was undertaken to determine the Escherichia coli and Salmonella contamination on different cuts of retail chicken meat from Badulla district. Twenty retail shops were randomly selected from seven secretary divisions in Badulla district. Two whole chicken samples were collected from each retail shop. Collected samples were screened for bacteria by selective culture procedure and presumptively positive colonies were bio-chemically confirmed. Prevalence of Salmonella in thigh, breast, back and wing cuts were 28.92 %, 20.48 %, 19.28 % and 13.25 % respectively. Prevalence of Salmonella in whole chicken sample was 18.07 %. No significance association was observed for the prevalence of Salmonella with different chicken meat cuts (P >0.05). Prevalence of Escherichia coli in thigh, breast, back and wing cuts were 20.99 %, 25.93 %, 24.69 % and 11.11 % respectively. Prevalence of Escherichia coli in whole chicken sample was 17.28 %. There was a significance association between chicken part and the prevalence of Escherichia coli in retail chicken meat in Badulla District. The highest occurrence of Salmonella was reported in Badulla division (19.28 %). An incidence of Escherichia coli (24.05 %) was significantly high in Bandarawela division. Prevalence of Salmonella in retail chicken meat in Badulla district is in high level and contamination of E. coli indicate the improper handling and storage of raw chicken meat and poor level of hygienic condition in retail outlets.

Keywords—Prevalence, Chicken, retail market

I. INTRODUCTION

Food safety is a global challenge for most developing countries. Microbes are developing resistant and able to survive many food productions and processing stages. Moreover they act as a potential threat to human health by occurring food borne illnesses (Akahtar *et al.,* 2012). Reported food borne diseases are mainly caused by bacteria such as *E.coli, Salmonella* and *S.aureus*. Animal originated foods are identified as an important source for transmission of these pathogens to human (Thilakarathna *et al.,* 2012).

Poultry industry in Sri Lanka has developed into a commercial industry over the past three decades from the back- yard system mainly due to active participation of the private sector. About 70% of the contribution to livestock sub-sector in Sri Lanka comes from chicken meat and the industry is capable of producing all local requirements of chicken meat (Ministry of Livestock & Rural Community Development, 2012). Chicken meat is relatively cheap compared to other animal products. Due to this, these products become the most consumed animal protein sources in the average Sri Lankan diets. Chicken meat is available throughout the country, in supermarket chains in the main cities and also small retail shops in rural areas. Current per capita availability of chicken meat estimated to be 4.8 Kg. Chicken meat is marketed from 15 large and medium scale broiler processors. Still four broiler processors and five further processing companies have obtained certification under internationally accepted HACCP system (Ministry of Livestock & Rural Community Development, 2012).

Small scale farmers send poultry carcasses without processing. People who handle the carcasses have not enough knowledge about proper hygienic practices during slaughtering and carcasses handling at retail market. Above factors are affect for the contamination of chicken carcasses at different stages. Incidence of diseases by contaminated food is in considerable level in Badulla district. According to the statistical data, there are 20% reported cases on food poisoning cases in Badulla district. Also the symptoms and signs involving the digestive system and abdomen are coming under top ten causes of hospitalization (Annual report of Provincial General Hospital -

Badulla, 2010). Therefore Inspection of food borne pathogens in different cuts of chicken meat in small scale retail shops in Badulla District are important to indicate the hygienic quality and the safety of such meat for human consumption.

II.   MATERIALS AND METHODS

A. Sample Collection

Samples were collected during April to August 2013. Twenty (20) retail shops were randomly selected from seven (7- Badulla, Ella, Bandarawela, Haliela, Haldummulla, Passara and Welimada) Divisional Secretary's Divisions in Badulla District to collect the samples. Two (2) whole chicken samples were collected from each retail shop and packed separately and immediately transferred to the laboratory under refrigerated condition.

B. Preparation of Samples

Collected meat samples under refrigeration were thawed under aseptic condition at the laboratory. Then the whole chicken was separated in-to parts such as breast, back, thigh, wings and whole. 25 g of meat from each separated parts were taken to analyse the microbiological quality.

C. Isolation of E. coli and Salmonella

Each meat sample was pre enriched with 225 ml of buffered peptone water and placed in incubator at 37 °C for 24 hours. Loops full of pre enriched samples were streaked on Eosin Methylene Blue agar and Brilliant Green agar to isolate *E. coli* and *Salmonella* respectively. Inoculated plates were incubated at 37 °C for 24 hours. Presumptive colonies on each agar plate, sub cultured on nutrient agar plates and incubated at 37 °C for another 24 hours.

D. Confirmation of E. coli and Salmonella

Presumptively positive colonies of *E. coli, Salmonella* on nutrient agar plates were bio-chemically confirm with Simmons Citrate agar. Presumptive colonies of *E. coli* and *Salmonella* on nutrient agar media were slightly inoculated on simmons citrate agar slant and incubated at aerobic condition at 37 °C for 24 hours. *Salmonella* are positive for citrate test and it will change the colour of agar media. But *E. coli* are negative and there is no any colour change of the agar media.

E. Data Analysis

Collected data were analyzed using Minitab 14 statistical software and the level of significance was set at 0.05.

III.   RESULTS AND DISCUSSION

Out of 200 analyzed samples, prevalence of *E. coli* and *Salmonella* in different cuts of retail chicken meat in Badulla district is presented in Table 1.

Table1. Contamination rate of bacteria on different chicken cuts

part of the chicken	E. coli		Salmonella	
	no of positive samples	%	no of positive samples	%
breast	21	25.93	17	20.48
back	20	24.69	16	19.28
thigh	17	20.99	24	28.92
wings	9	11.11	11	13.25
whole	14	17.28	15	18.07

Total number of chicken meat samples that was positive for the *Salmonella* was 83 and it was 41.50 %. From that 28.92 % were thigh samples. It was the highest. Prevalence of *Salmonella* in breast part was 20.48 %. Prevalence of *Salmonella* in back and whole parts were 19.28 % and 18.07 % respectively. 13.25 % was belongs to prevalence of *Salmonella* in wing samples. It was the lowest. No significance association was observed for the prevalence of *Salmonella* with different chicken meat cuts.

Contamination rate of *E. coli* was 40.50 %. From that highest prevalence of *E. coli* belongs to breast part. It was 25.93 %. Prevalence of *E. coli* in back, thigh and whole parts were 24.69 %, 20.99 % and 17.28 % respectively. From the total positive samples 11.11 % belongs to wing samples. It was the lowest. There is a significance association between chicken part and the prevalence of *Escherichia coli* in retail chicken meat in Badulla District.

The highest occurrence of *Salmonella* was reported in Badulla division and it was 19.28% from positive

samples (16/83). An incidence of *E. coli* (24.05%) was significantly high in Bandarawela division.

According to the above results prevalence of *Salmonella* in retail chicken meat in Badulla district is higher than the prevalence of *E. coli* in retail chicken meat in Badulla district. There are several reasons affecting for the higher prevalence of *Salmonella* in retail chicken meat in Badulla district. In Badulla district there are 290 broiler farms and from that 249 broiler farms are coming under small scale farms (Department of census and statistic, 2012). During slaughtering of birds in small scale slaughter house, birds are killed and then scalded in hot water. The carcasses are then plucked and eviscerated, mostly by hand. Before and after evisceration, carcasses are often washed it is contribute to the prevalence of bacteria on and among carcasses. Also at the slaughtering cross contamination can be happen between positive and negative flocks, residual contamination from unclean equipments and through carrier workers and pests. The workers haven't knowledge about proper hygienic practices during carcasses handling it is also affect the contamination of   carcasses.

There have been a number of studies on meat hygiene in different countries. According to Adesiji *et al.,* 2011, contamination rate of *E. coli* and *Salmonella spp* were   26% and 2% respectively in Nigeria. The findings by Lidija *et al.,* 2006 with regard to microbiological quality and contamination of chicken meat, *Enterobacteria* (34.84%) and *Salmonella spp*. (10.60%) contamination rate in considerable level. Above results express the more contamination of *E. coli* and *Salmonella* on retail chicken meat in some countries. They used modern equipments for slaughtering process but hygienic practices are not well established.

Although, there is no significance association between prevalence of *Salmonella* in different chicken cuts, it is high in thigh (28.92 %) cut. Thigh part is proximity to the point of evisceration and due to improper evisceration it is highly prone to contamination of gut content. Similar results were found by Wilfred *et al*., (2010) .The prevalence of *E. coli* indicates poor hygienic condition and working practices of the meat handlers during carcass handling and lack of sterilization of utensils and working surfaces of the retail market (Adesiji *et al.,* 2011).

Different levels of contamination were observed in different divisions of Badulla district. Contamination rate of raw meat at retail shops differ with the climatic condition, storage temperature, refrigeration condition during transportation and the way of handling of raw meat (Van *et al.,* 2007). Undeveloped slaughter facilities in country, large number of small scale retail businesses, lack of rules and regulations and lack of knowledge may be the barriers for hygienic chicken meat production in retail outlets.

IV.   CONCLUSIONS

Prevalence of *Salmonella* in retail chicken meat in Badulla district is higher than the prevalence of *E. coli* in retail chicken meat in Badulla district. The contamination of *E. coli* in retail chicken meat due to improper handling and storage of raw chicken meat and poor level of hygienic condition in retail outlets. Undeveloped slaughter facilities, large number of small scale retail businesses, lack of rules and regulations and lack of knowledge are barriers for the hygienic chicken meat production at retail outlets.

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