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Investigation of *Salmonella* spp. of Contamination, Infection Routes and Their Effects on Public Health in Chickhen Meat

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Abstract

Chicken is cheap, healthy and nutritious food. Chicken that having an important role in human nutrition is an important source of development of microorganisms and pathogenic microorganisms, due to the appropriate composition and environmental conditions among animal foods. Therefore *Salmonella* serotypes are the most important ones among the pathogens isolated from chicken. In our study, 40 raw chicken samples taken from food enterprises producing poultry meat in the Aegean Region were examined anaylses of *Salmonella* spp. by using the Vidas *Salmonella* (Biomeriux) kit procedure by the mini VIDAS instrument. *Salmonella* species of the production stages are transmitted to chicken meat in different ways and these microorganisms can pass to humans and cause important health problems with the consumption of these products by causing various infections or intoxications (poisoning) in person. In this respect, the complete fulfillment of all hygiene rules, from production to sale, of these products will also eliminate the risks that may arise from public health.

Keywords: Chicken, VIDAS, *Salmonella*, Public health

INTRODUCTION

Today, it that increase in consumption of chicken meat and its products is a known fact. Because chicken meat which has high protein and low fat content and exhibits an appropriate unsaturated fatty acid composition enhances nutritional value. Chicken meat is also easy to prepare and market as food and hence widely used especially in fast-food restaurants (Mead, 2000). Chicken which having an important place in human nutrition is an important source of degradation of microorganisms and pathogenic microorganisms due to the appropriate composition and environmental conditions among animal foods.

Therefore, removal of microbial contamination sources or minimization of microbial contamination are one of the important points to be considered when producing a quality and safe product in the food industry.

Among the pathogens isolated from chickens are the most important and most important ones are *Salmonella* serotypes (Jørgensen et al., 2002). *Salmonella* that cause diarrheal disease in humans is a group of bacteria. Generally, it spreads through food contaminated with animal. There are many different types of *Salmonella*.

The most common *Salmonella* serotype was *Salmonella enteritidis*, followed this *S. paratyphi* B and *S. typhimurium*. Today, *S. enteritidis* that among the main causes of foodborne infections in *Salmonella* is the most common *Salmonella* serotype present in Turkey (Jørgensen et al., 2002).

Salmonella serotypes have been shown to be susceptible to commonly used antibiotics, but they have been shown to develop resistance to nalidixic acid, ampicillin, tetracycline and streptomycin (Bailey et al., 2001). Poultry is the most important source of *Salmonella* in animals. Transmission of chicken meat which has a high risk for *Salmonella* is caused by the passage of *Salmonella* intestinal flora directly or indirectly into the operating environment and hence to the poultry carcasses during the removal of the intestines and deeply excised and disposable parts of the poultry slaughterhouses. Decontamination methods for the removal of microorganisms from chicken carcasses are generally applications with a limited effect and purpose of reducing the microbial population. The proportion of *Salmonella* that is transmitted to carcasses in cutting of chickens grown on farms where *Salmonella* has become a native flora is naturally high (Chang, 2002).

In our research, it was aimed to carry out *Salmonella* analysis in the samples obtained from companies that produce chicken meat and to investigate ways of transmission of these microorganisms to chicken meat and to examine these products in terms of public health.

MATERIAL and METHOD

In our study, 40 raw chicken samples were used as material from different white meat production and sales companies in the Aegean Region and analyzes of *Salmonella* spp were performed. Samples were taken into sterile sample bags as reported in ISO 18593 (2004), brought to the laboratory in the cold chain and analyzed in the same day. Samples were stored at +4° C until analysis resulted. *Salmonella* assays for chicken samples were performed by using the Biomerieux Vidas SLM protocol of AOAC OMA (2004). AOAC OMA (2004) of VIDAS *Salmonella* is an enzyme linked fluorescence immuno assay used tecnique of ELFA (enzyme linked fluorescence assay) for the detection of *Salmonella* antigens in VIDAS devices. According to the protocol, 25 g of food samples were aseptically transferred to 225 mL Buffered Peptone Water (Merck-107228), homogenized and incubated at 37±1° C for 16-22 hours. After the incubation, 0.1 mL was taken and incubated for 22-26 hours at 41.5±1° C, transferred to 10 mL SX2 Broth (Biomeriux-1170250). After the incubation, 500 µL of SX2 Broth was inoculated into the Vidas *Salmonella* stribe and placed in the device.

According to the protocole of AOAC OMA (2004), the results are automatically analyzed by the device when the test is completed. The fluorescence is measured twice in the reading bath of the reactive styrene for each tested sample. The first reading is the background reading of the substrate bath before the Solid Phase Sorter (SPR) enters the substrate. The second reading is taken after the incubation of the substrate with the remaining enzyme inside the SPR. The RFV value (Relative Fluorescence Value) is calculated by subtracting the empty arrow from the final result. The RFV values that obtained for each sample were evaluated by the device as in Table 1.

Table 1. Vidas *Salmonella* threshold value and evaluation

Test Value	Evalution
<0.23	Negative
≥0.23	Posivite

Results that test values lower than the threshold value show there is no *Salmonella* antigen in the sample or is below the detection limit of the concentration of *Salmonella* antigen. Samples that test values equal to or greater than the threshold value have been shown to be contaminated with *Salmonella* (6). In this case, the verification of the positive results was carried out according to the verification steps in (AOAC OMA, 2004).

RESULTS and DISCUSSION

Salmonella analysis results of raw chicken samples are shown in Table 2.

Table 2. The results of Vidas *Salmonella* analysis of chicken samples

Sample No	Result	Sample No	Result	Sample No	Result	Sample No	Result
1	<0.23	11	<0.23	21	<0.23	31	<0.23
2	<0.23	12	0.55	22	<0.23	32	<0.23
3	<0.23	13	<0.23	23	<0.23	33	<0.23
4	<0.23	14	<0.23	24	<0.23	34	2.78
5	<0.23	15	<0.23	25	<0.23	35	<0.23
6	1.36	16	<0.23	26	<0.23	36	<0.23
7	<0.23	17	2.55	27	0.83	37	<0.23
8	<0.23	18	<0.23	28	<0.23	38	<0.23
9	<0.23	19	<0.23	29	<0.23	39	<0.23
10	<0.23	20	3.41	30	<0.23	40	<0.23

Note: <0.23: *Salmonella* spp. was notdetected, ≥0.23: *Salmonella* spp. was detected

6 out of 40 raw chicken samples were tested *Salmonella* spp. as a result of analysis. According to the results in Table 2, 6 samples which are found to be *Salmonella* are not in compliance with the limits specified in Turkish Food Codex Microbiological Criteria Regulation (2011) (Table 3).

Table 3. *Salmonella* limit value according to the Turkish Food Codex Microbiological Criteria Regulation in raw poultry meat

Food	Microorganism	Limits
Raw poultry meat	*Salmonella*	0/25g-mL

Especially, the dangerous organisms, such as *Salmonella* cause serious health problems like bloody diarrhea, fever and abdominal cramps in humans. In our study, *Salmonella* spp. was detected in 6 out of the 40 raw chicken samples, species of *Salmonella* spp. contamine to chicken meat that affect consumers` health seriously.

Efe et al. (2005) performed a total of 50 chickens, skin and breast samples of 18%, 26% and 16% of *Salmonella* spp. in Ankara, in *Salmonella* studies on chicken meat. In addition, Sezen (2009) performed *Salmonella* spp. in 6 samples of analysis of 175 poultry meat samples in a study in Istanbul.

CONCLUSION

As a result, it that to reduce or prevent the food-borne pathogens or the microorganisms the controls to be made at critical control points in food enterprises is very important for the public health. Therefore, in order to reduce the risk of contamination in poultry cuttings should be taken into consideration to raise healthy and *Salmonella*-free poultry. Starving chicken before slaughter, cleaning and disinfection of tools and materials at every step of the cutting process, controlling constantly the temperature of the required areas, attention to personnel hygiene, observing slaughterhouse sanitation, establishing a laboratory for autocontrol in every slaughterhouse can prevent contamination of *Salmonella* species to chicken meat.In this way, this food contamination which constitutes a significant risk agent in terms of public health can be passed.

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