Research Article

Prevalence of Salmonella in Some Chicken Meat Products

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Abstract

Chiken meat long established as an important dietary source of protein and essential nutrients that needed by human, But meat exposed to contamination with several pathogenic microbs during slaughtering, transportation, manufacturing, storage and distribution to shops that making the meat a risk for human health.

This study was designed to throw spot lights upon the pathogenic bacteria that could affect the fresh chicken and chiken meat products.

So the present study was carried out on a total of ninety random samples of different chicken meat products were collected from different markets in Menoufia governorate, Egypt classified into 30 samples of fresh chicken cuts-up (skinless and boneless breast and thigh) (15 of each) 30 samples of frozen breaded half cooked chicken products (chicken nuggets and chicken panne) (15 of each) and 30 samples of cooked chicken products(Shawerma and Fahita sandwiches) (15 of each). The mean values of APC (cfu/g) in the examined samples chicken breast, thigh, panne, nuggets, shawerma and chicken fahita, were $5.5 \times 10^6 \pm 1.51 \times 10^6$, $6.8 \times 10^6 \pm 1.3 \times 10^5$, $3.1 \times 10^5 \pm 1.7 \times 10^4$, $4.5 \times 10^5 \pm 1.2 \times 10^4$, $2.2 \times 10^4 \pm 1.5 \times 10^4$ and $4.9 \times 10^4 \pm 1.5 \times 10^4$, respectively at the same time the Total Enterobacteriaceae count were $3.5 \times 10^4 \pm 1.7 \times 10^4$, $7.8 \times 10^4 \pm 1.4 \times 10^4$, $4.8 \times 10^3 \pm 1.5 \times 10^2$, $6.5 \times 10^3 \pm 1.7 \times 10^1$, $3.8 \times 10^2 \pm 1.5 \times 10^2$ and $4.1 \times 10^2 \pm 1.0 \times 10^2$ respectively.

Salmonella Typhimurium was detected in 13.3%, 20% and 6.7% of breast, thigh and panne samples respectively while Salmonella Anatum was detected in 7% of nuggets samples. On the other hand, Salmonella enteritidis was detected in 13.3% of breast samples and in 6.7% ofboth thigh and panne samples. Salmonella Heidelberg, Salmonella Muenster and Salmonella Kentucky were isolated from 6.7% of some of examined samples.

The present study concluded that there is a need to educate consumers, food handlers and all others who have access to food about the importance of hygiene.and it is necessary to cooking food property.

Keywords: Enzymes; Poultry; Diet

Introduction

Chicken meat and chicken meat products are very popular food throughout the world since they are delicious, nutritious, characterized by good flavour and easily digested [1].

In Egypt, chicken meat products are winning popularity because they represent quick easily prepared meat meals and solve the problem of the shortage in fresh meat of high price that is not within the reach of large numbers of families with limited income.

The intact tissues of healthy slaughtered birds and animals are mostly sterile but the meat may be contaminated during processing from the hands, workers, clothes, knives, the hide, the gut or from the environment resulting in an underling or even unfit quality for human consumption. Contaminated chicken, and chicken products may compose a public health hazard [2].

The most important bacterial pathogens in chicken meat that cause infection of food-borne infections is Salmonellae [3].

Salmonella are found worldwide and universally recognized as zoonotic agent Many foods particularly of animal origin and those subjected to sewage pollution had been identified and must be taken into considerations as a vehicle for transmitting this pathogen to human being.The primary habitat of Salmonella is intestinal tract of animals andhumans. Additionally, Salmonella cause illness by means of infection, as it multiplies in the small intestinal, colonizies and subsequently invades the intestinal tissues, producing an enterotoxin and causing inflammatory reaction and diarrhea [4].

Persons infected with S. Enteritidis usually has fever, abdominal cramps and diarrhea beginning 12 to 72 hours after consuming contaminated food. The illness usually lasts 4 to 7 days and most persons recover without antibiotic treatment. However, in the elderly, infants and persons with impaired immune systems, diarrhea can be severe and the persons may be ill enough to require hospitalization. In such patients, infection may spread to other body organs and can cause death if prompt antibiotic treatment is not administered [5].

The purpose of this study was planned to evaluate the hygienic status of chicken cuts-up (breast and thigh), half cooked chicken products (chicken nuggets and chicken panne) and full cooked chicken products (chicken fahita and shawrma) according to the following topics:

- Determination of aerobic plate count (APC).
- Determination of Enterobacteriaceae count.
- Isolation and identification of Salmonella species.

Material and Methods

Collection of samples

A grand total of ninety random samples ofchicken cuts-up and chicken meat products, classified into 30 samples of fresh chicken cuts-up (skinless and boneless breast and thigh) (15 of each) were collected from different local slaughter poultry shops, 30 samples of frozen breaded half cooked chicken products of different brands (chicken nuggets and chicken panne) (15 of each) and 30 samples of cooked chicken products(Shawerma and Fahita sandwiches) (15 of each) were collected from different markets in Menofia governorate. The collected samples were transferred in an ice box to the laboratory without undue delay.

Preparation of the samples [6]

A 10 g portion of each sample was aseptically weighted into 90 ml of 0.1% peptone water in a sterile plastic bag, andthen blended in a Stomacher 400 Lab Blender(Seward Medical, London, UK) for 30 seconds.Ten-fold serial dilutions were used for bacteriological examination.

Bacteriological examination

- Aerobic Plate Count and enterobacteriacea Count were carried out according to APHA [6].
- Isolation and identification of Salmonellae was carried out according to ISO [7].
- Serological identification of Salmonellae according to Kauffman, (1974).

Results

Items	Minimum	Maximum	Mean ± SE	Accepted samples		Unaccepted samples	
Samples				No.	%	No.	%
A-Raw products							
1- Breast	2.2×10^5	4.9×10^7	$5.5 \times 10^6 \pm 1.51 \times 10^6$	0	0	15	100
2- Thigh	4.8×10^5	7.1×107	$6.8 \times 106 \pm 1.3 \times 105$	o	0	15	100
B-Half cooked				5	33.3		
3- Panne	2.5×10^3	5.3×105	$3.1 \times 105 \pm 1.7 \times 104$			10	66.6
4- Nuggets	3.8×10^3	7.8×105	$4.5 \times 105 \pm 1.2 \times 104$	4	26.6	11	73.3
C-Cooked Products							
5-Shawerma	2.1×10^3	3.2×105	$2.2 \times 104 \pm 1.5 \times 104$	11	73.3	4	26.6
6 - Fahita	2.3×10^3	5.4×105	$4.9 \times 104 \pm 1.5 \times 104$	11	73.3	4	26.6

Table 1: Statistical analytical results of Aerobic Plate Count (APC) (cfu/g) in the examined samples of poultry products (n=15).

S.E = Standard error of mean.

The P value is 0.0014, (P<0.01) considered significant Variation among.

Permissible Limit not exceed 10^s cfu/g according to ES [8] for raw poultry products and 10^4 cfu/g for heat treated poultry meat products.

Items	Minimum	Maximum	Mean ± SE
Samples			
A-Raw Products			
1- Breast	3.9×10^2	5.2×10^5	$3.5 \times 10^4 \pm 1.7 \times 10^4$
2- Thigh	5.1×10^2	6.2×10^5	$7.8 \times 10^4 \pm 1.4 \times 10^4$
B- Half cooked			
3- Panne	4.2×10^2	5.9×10^4	$4.8 \times 10^3 \pm 1.5 \times 10^2$
4- Nuggets	5.6×10^2	8.0×10^4	$6.5 \times 10^3 \pm 1.7 \times 10^1$
C-Cooked Products			
5-Shawerma	$2.1 \times 1^0 2$	4.1×10^3	$3.8 \times 10^2 \pm 1.5 \times 10^2$
6 - Fahita	2.2×10^2	6.5×10^3	$4.1 \times 10^2 \pm 1.0 \times 10^2$

Table 2: Statistical analytical results of Enterobacteriaceae count (cfu/g) in the examined samples of chicken meat products (n=15). The P value is 0.0058, (P<0.05) considered significant.

Samples	Raw Products				Half cooked				Cooked Products			
Isolated Bacteria	Breast		Thigh		Nuggets		Pane		Fahita		Shawerma	
	No	%	No	%	No	%	No	%	No	%	No	%
Salmonella Typhimurium	2	13.3	3	20	1	6.7	-	-	-	-	-	-
Salmonella Enteritidis	2	13.3	1	6.7	-	-	1	6.7	-	-	-	-
Salmonella Heidelberg	1	6.7	1	6.7	-	-	-	-	-	-	-	-
Salmonella Muenster	-	-	1	6.7	-	-	-	-	-	-	1	6.7
Salmonella Kentucky	-	-	1	6.7	-	-	1	6.7	1	6.7	-	-
Salmonella Anatum	-	-	-	-	1	7	-	-	-	-	-	-
Total	5	33.3	7	46.6	2	13.3	2	13.3	1	6.7	1	6.7

Table 3: Incidence of identified Salmonella serotypes isolated from the examined samples of chicken meat products (n=15).

Discussion

Chicken meat products are subjected to the risk of contamination with various pathogens from different sources, primary during pre¬processing and processing steps and secondary after processing through packaging, marketing and storage. Such contamination may render these food articles unfit for human consumption or even harmful to consumers.

The total aerobic plate count gives an idea about the hygienic measures applied through processing. So, it is the most reliable method for detection of sanitary levels of proper processing, storage and marketing of food products [9].

It is evident from the result recorded in table (1) that the mean values of APC (cfu/g) were $5.5 \times 10^6 \pm 1.51 \times 10^6$, $6.8 \times 10^6 \pm 1.3 \times 10^5$, $3.1 \times 10^5 \pm 1.7 \times 10^4$, $4.5 \times 10^5 \pm 1.2 \times 10^4$, $2.2 \times 10^4 \pm 1.5 \times 10^4$ and $4.9 \times 10^4 \pm 1.5 \times 10^4$ for the examined samples of chicken breast, thigh, panne, nuggets, shawerma and chicken fahita, respectively. In other words, there were significant differences (P < 0.01) between the examined samples.

According to the safe permissible limit stipulated by ES (2005) No. (1090-2005) for APC in complete poultry carcass, poultry parts and raw poultry products (not exceed 10^5 cfu/g) and No. (3493-2005) for heat treated poultry meat products (not exceed 10^4 cfu/g),

it was indicated that 100%, 100%, 66.6%, 73.3%, 26.6%, 26.6% of the examined samples ofchicken breast, thigh, panne, nuggets, shawerma, chicken fahitarespectively were not in accordance with this limit (table 1).

Our results near to that recorded by [10] they were tested 80 random samples of poultry thigh and breast (40 of each) collected from El- Gharbia governorate and revealed that the mean value of APC (cfu/g) were $1.4 \times 10^6 \pm 4 \times 10^5$ and $6 \times 10^5 \pm 2 \times 10^4$, respectively. And higher than that recorded by Oumokhtar (2000) who recorded that the mean value of APC in chicken meat was 2, 9×10^4cfu/g and higher than that recorded by [11] who recorded that the mean value of APC in raw chicken meat was $3.6 \times 10^4 \pm 2.1 \times 10^3$. The prevalence of Salmonella spp in chicken meat was 3.12%.

Enterobacteriaceae group has an epidemiological importance [12].

Table (2) indicated that the mean values of total Enterobacteriacae count (cfu/g) were$3.5 \times 10^4 \pm 1. 7 \times 10^4$, $7.8 \times 10^4 \pm 1. 4 \times 10^4$, $4.8 \times 10^3 \pm 1.5 \times 10^2$, $6.5 \times 10^3 \pm 1.7 \times 10^1$, $3.8 \times 10^2 \pm 1.5 \times 10^2$ and $4.1 \times 10^2 \pm 1.0 \times 10^2$for the examined samples of chicken breast, thigh, panne, nuggets, shawerma, chicken fahita respectively. Moreover, significant differences were recorded between the examined samples (P < 0.05).

these results for Enterobactereaceae count is nearly similar results for chicken products were obtained by Shaltout [13], But this results are higher than that recorded by Saikia and El-Deeb., *et al*. [14] who was recorded higher results for heat treated chicken meat products and also higher results obtained by [15] who recorded that the mean value of total enterobactereacea count in chicken Panne and chicken Nuggets were $5.47 \times 104 \pm 1.80 \times 104$ cfu/g and $6.58 \times 104 \pm 1.98 \times 104$cfu/g, respectively.while lower Enterobactereacea count in chicken meat were obtained by Nawar [16].

Incidence of identified salmonella serotypes isolated from the examined samples of chicken meat products:

Salmonella Typhimurium wasdetected in 13.3%, 20% and 6.7% of breast, thigh and pane samples respectively whileSalmonella Anatum was detected in 7% of nuggets samples. On the other hand, Salmonella enteritidis was detected in 13.3% of breast samples and in 6.7% of both thigh and panne samples. Salmonella Heidelberg, Salmonella Muenster and Salmonella Kentucky were isolated from 6.7% of some of examined samples.

Among the examined chicken samples higher incidence of Salmonella is present in thigh samples (46.6%) while lower incidence were present in fahita and shawerma.

The presence of Salmonella in chicken meat may be attributed to contamination during slaughtering and/or processing from workers' hands [17]**.** Organic matters scattered on the bird surface may harbor Salmonellae and act as a source of contamination to scalding tanks therefore, facilitate cross contamination between chicken. Rubber fingers of plucking machine may have several cracks carrying organic matter and act as source of cross-contamination between chickens Moreover, during evisceration step cross-contamination may occur through escape of gut content [18].

Result demonstrates the fact that the unhygienic and poor sanitary conditions under which the meat are handled not acceptable fromsanitary point of view. It has further evidenced that the undesirable levelof contamination which might have acquired from the environment andto obtain wholesome, safe and sound meat, the Hazard Analysis andCritical Control Point (HACCP) must be adopted [19-23].

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