

INCIDENCE OF SALMONELLA IN RETAILED POULTRY CARCASSES AND ITS PRODUCTS ON THE SHARKIA MARKETS

El-Shorbagy I. M. and Jihan M. Badr

Animal Health. Res. Inst

ABSTRACT

A total of 150 poultry meat product samples (50 each of Kofta, Luncheon and minced meat) and 400 freshly slaughtered poultry Parts (50 each of Breast, Cloaca, Wings, Neck, Liver, Gizzard, Thigh and Skin), were randomly collected from Sharkia supermarkets and examined bacteriologically for salmonella and enteric bacteria. The results declared that, salmonella Could not be isolated in the present study. The incidence of enterobacteriaceae were 42, 40 and 62% in the examined kofta, Luncheon and minced meat respectively. Meanwhile such microorganisms were detected in the examined breast, cloaca, gizzard, liver, neck, skin, thigh and wings with a rates of 22,40,26,36,32,44,28 and 32% consequently *Citrobacter freundii*, *E.Coli*, *Enterobacter spp.*, *Klebsiella*, *proteus vulgaris*, *Proteus merabilis*, *shigella flexnori*, *Shigella Sonnei* and *pseudomonas spp.* were isolated and identified from the examined samples

The public health significance of isolated bacteria as well as suggestions for improving poultry processing and meat quality were discussed.

INTRODUCTION

The overgrowth of poultry production to meet the increasing demands of the consumers had necessitated the establishment of a hygienic poultry processing plants capable of providing the safe and high quality products.

Poultry and poultry products are a common vehicle of food borne illness. Microbial risks associated with raw poultry product include salmonella species and other Enterobacteriaceae. (Bryan and Doyle, 1995).

Salmonellae and Campylobacters are by far the most important pathogens associated with poultry products, (Schmidt, 1998).

Pseudomonas organisms were the predominant bacteria on poultry meat at the onset of

its refrigeration spoilage, especially *pseudomonas fragi* and *pseudomonas lindensis* (Rollier 1998).

Therefore, the present work was designed to study the role of retailed poultry carcasses and poultry products in transmission of salmonellosis and Enterobacteriaceae to consumers at Sharkia markets.

MATERIALS AND METHODS

I. collection of samples :

A total of 150 frozen chicken products consists of chicken kofta, chicken luncheon and minced meat (50 of each product) and 400 samples of chicken parts (50 samples of each) includes Breast, cloaca, wings, Neck, liver, gizzards, thigh and skin were collected from different supermarkets in Sharkia Governorate.

II. Preparation of samples :

The sample were aseptically transferred to the laboratory with a minimum of delay. Frozen sample were allowed to thaw at room temperature and were immediately subjected to bacteriological examinations.

III. Isolation and identification of salmonella species :

For salmonella isolation, twenty-five grams of each sample were cut into pieces and placed in sterile polyethylene bag to which 225 ml of buffered peptone water were added aseptically then incubated at 37°C for 15 hours (Edel and Kampelmacher 1973). 0.1 ml of the pre-enrichment culture was transferred to 10 ml of both Rappaport vassiliadis enrichment broth (Rappaport et al., 1956 & Harvey and Price, 1981) and selenite - F- broth (Harvey and price, 1981) The tubes were then incubated at 43°C for 18-24 hours. Modified Brilliant green agar (MBG) and MacConkey agar (MA) plates were inoculated from enrichment broth and incubated at 37°C for 24 hours. Suspected colonies were picked up and isolated in pure cultures. The isolates were further identified morphologically and biochemically according to (koneman et al., 1994 and Quinn et al., 1994) The isolates that produced biochemical reactions simulating salmonella were subjected to serological identification as described by Edward and Ewing (1972) and kauffman (1972).

IV : Isolation and identification of other Enterobacteriaceae :

Isolation and identification of other Enterobacteriaceae were carried out according to Cruickshank et al., (1975), and Holt et al. (1996).

RESULTS AND DISCUSSION

The delivered results in tables (1 & 2) revealed that salmonella organisms could not be detected in the examined chicken samples. These findings agreed with the results obtained by **Refaie and Nashed (1995)** who failed to isolate salmonella from 40 minced meat and 20 luncheon samples as well as with the results obtained by **Amal and Seham (1998)** who failed to isolate salmonella organisms from a hundred random samples of meat and chicken products including 40 samples of luncheon, 30 minced meat samples and 30 frozen chicken quarters.

The results obtained also disagreed with those reported by **Safwat et al., (1985)** who isolated salmonella in a ratio of 9.05% in chicken meats and with the results obtained from **Shahata (2000)** who isolated 21 isolates of salmonella microorganisms from three hundred samples of frozen poultry products including chicken breasts, chicken bread, chicken nuggets, chicken breasts, chicken balls and chicken minced meat. The failure to isolate salmonella from raw broiler chicken parts was also disagreed with **Yan (2000)** who detected salmonella spp-in a percentage of 25.9% out of 27 raw broiler samples.

This failure to isolate salmonella species from all examined samples may be due to the presence of high number of contaminants of other enterobacterial species especially proteus which overgrew on the expanse of salmonella microorganism so decreased or even eliminated the propability for salmonella isolation. Regarding to table (1), it was noticed that there were a higher percentages of contaminated Enterobacteria in the minced meat (62%) than that isolated from the other examined chicken products (40% from kofta and 42% from luncheon) and this may be due to the presence of some food aditives and preservatives in these products which may affect the microbial load on these products. From tables (1) and (2) it was noticed that the isolation percentage of Enterobacterial species was higher in case of chicken products species than that from chicken parts and these may be due to unhygienic measures during the processing and production as well as neglected hygienic supervision of the tools, workers, preservation and other production stages which is more prolonged in case of chicken products than chicken parts.

Also there was a wide range of Enterobacterial microorganisms isolated from both chicken products and parts including citrobacter spp, E. coli, Enterobacter spp., Klebsiella spp , Proteus spp., Shigella spp. And also Gram -negative microorganisms (Pseudomonas spp.). These results

agreed with **turtura (1991)** who investigated the microbial contamination of poultry samples from slaughter house and found that 34% of the samples were contaminated by Coliform bacteria at a level higher than 10 c.f.u./ml and out of 369 strain isolated 259 were coliforms and were identified as *Citrobacter freundii* (66) , *E. coli* (65), *Enterobacter agglomerans* (63) and the less frequent strains were of the genera *Klebsiella* (42), *Serratia* (21), *Proteus* (3), *Shigella sonnei* (2) and a group of 42 other gram negative microorganisms 16 were belonged to *Pseudomonas* spp. And salmonella were not found. The results were also agreed with that obtained by **Pattnaik et al., (1997)** who investigated the microflora contaminating chicken carcasses at local slaughter house and the bacterial isolates were included *Proteus*, *Pseudomonas*, *Klebsiella* and *E. coli*.

From public health of view, most of the isolated microorganisms in this study constitute public health hazard to the consumer as they have been incriminating in cases of gastrointestinal food poisoning and bacterial dysentery, fever and vomition **Akhtar et al., (1982)** , **Rufus, (1988)** therefore , these results declared the importance of application of hazard analysis critical control point system (HACCP) which control the technological line of production at all points from the farm to table including production, transportation, slaughter, processing, storage, retail and food preparation to eliminate or even decrease the microbial loads in both chicken products and parts

Also **Ivan, (2000)** found that the cooling of carcasses in 4% citric acid or in 4% tartaric acid reduces the count of microorganisms 190 times compared to the control carcasses. So we recommend Such applications to introduce poultry products and parts of high sanitary and hygienic standard for consumption. It could be concluded that salmonella species could not be detected in the present study while other enterobacteriaceae were found at different ratios. Antemortem conditions aren't as important as the postmortem condition in delaying or preventing spoilage.

Results and discussion

Table (1) Incidence of isolation of salmonella and other Enterobacteriaceae from examined chicken products (no = 50 of each)

| Chicken product | Chicken kofta | | Chicken luncheon | | Chicken minced meat | |
|----------------------|-----------------|-----|------------------|-----|---------------------|-----|
| | No. +ve samples | % | No. +ve samples | % | No. +ve samples | % |
| Solmonella spp. | 0 | 0 | 0 | 0 | 0 | 0 |
| Other spp. | | | | | | |
| Citrobacter freundii | 5 | 10 | 6 | 12% | 7 | 14 |
| E. coli | 4 | 8 | 3 | 6% | 4 | 8 |
| Enterobacter spp. | 3 | 6 | 2 | 4% | 2 | 4 |
| Klebsiella spp. | 2 | 4 | 1 | 2% | 3 | 6 |
| Shigella flexneri | 1 | 2 | 3 | 6% | 3 | 6 |
| Shigella sonnei | 2 | 4 | 0 | 0% | 1 | 2 |
| Proteus vulgaris | 4 | 8 | 3 | 6% | 5 | 10 |
| Proteus merabilis | 0 | 0 | 2 | 4% | 3 | 6 |
| Pseudomonas spp | 0 | 0 | 0 | 0% | 1 | 2 |
| No. of isolates | 20 | 40% | 21 | 42% | 31 | 62% |

No. = the number of examined samples

% = percentage of positive samples

Table (2) : Incidence of isolation of salmonella and other Enterobacteriaceae from chicken parts.(No. = 50)

| Isolated Microorganisms | Breast | | Cloaca | | Gizzard | | Liver | | Neck | | Skin | | Thigh | | Wings | |
|-------------------------|--------|----|--------|----|---------|----|-------|----|------|----|------|----|-------|----|-------|----|
| | P | % | P | % | P | % | P | % | P | % | P | % | P | % | P | % |
| Salmonella spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other spp | | | | | | | | | | | | | | | | |
| Citrobacter freundii | 3 | 6 | 4 | 8 | 3 | 6 | 4 | 8 | 5 | 10 | 6 | 12 | 2 | 4 | 4 | 8 |
| E. coli | 0 | 0 | 3 | 6 | 1 | 2 | 3 | 6 | 2 | 4 | 2 | 4 | 1 | 2 | 2 | 4 |
| Enterobacter spp. | 2 | 4 | 3 | 6 | 1 | 2 | 0 | 0 | 1 | 2 | 2 | 4 | 3 | 6 | 1 | 2 |
| Klebsiella spp. | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 0 | 0 |
| Proteus vulgaris | 3 | 6 | 5 | 10 | 4 | 8 | 3 | 6 | 3 | 6 | 4 | 8 | 3 | 6 | 4 | 8 |
| Proteus mirabilis | 2 | 4 | 1 | 2 | 2 | 4 | 4 | 8 | 2 | 4 | 3 | 6 | 1 | 2 | 1 | 2 |
| Shigella flexneri | 1 | 2 | 2 | 4 | 2 | 4 | 3 | 6 | 2 | 4 | 1 | 2 | 2 | 4 | 2 | 4 |
| Shigella sonnei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 4 | 1 | 2 | 0 | 2 |
| Pseudomonas spp | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | | 0 |
| No. of isolates | 11 | 22 | 20 | 40 | 13 | 26 | 18 | 36 | 16 | 32 | 22 | 44 | 14 | 28 | 16 | 32 |

N.B

the total number for each chicken parts were 50 sample

P = the number of positive samples

% = the percentage of positive samples

References

- Amal, A. Mohamed and Seham, M. Aly (1998)** : Occurrence of salmonella and yersinea enterocolitica in some meat products. Assuit Vet. Med. J. 38 (76) : 29-39.
- Akhtar, F.; Afzal, H.; Ashdaque, M. and Nasim, Z. (1982)** : Egg -shell contaminations of human importance with reference to salmonella. Pakistanvet. J., 2(1): 10-11
- Bryam, F. L. and M. P. Doyle (1995)** : Health risks and consequences of salmonella and campylobacter Jejuni in raw poultry. J. Food Prot. 58 : 326-344.
- Cruickshank, K. R.; Duguid, J. P.; Marmion, B. P. and Swain, R. H. A. (1975)** : Practice in Medical microbiology, 12th Ed., Vol. II, Churchill Living Stone Limited Edinburg, London and New York.
- Edel, W. and Kampelmacher, E. (1973)** : Comparative studies on the isolation of sublethally injured salmonella in European laboratories. Bull. of the World Health Organization, 48, 167.
- Edward, P. R. and Ewing, W. H. (1972)** : Identification of enterobacteriaceae. 3rd Ed. Burgess Publishing Minneapolis , Atlanta, USA. : 208- 337
- Harvey, R. W. and Price, T. H. (1981)** : Comparison of selenite F., Muller kauffmon tetrathionate and Rappaport medium for salmonella isolation from chicken giblets and after pre-enrichment in buffered peptone water. Hyg . Camb., 87-219.
- Holt. J. G.; Krieg N. R.; Sneath P. H. A.; Staley J. T. and Williams S. T. (1996)** : Bergey's manual of determinative bacteriology. 9th ed. William & Wilkins, 428 East Preston st, Baltimore, Maryland, 21202; USA.
- Ivan, E. I. (2000)** : Improving the sanitary quality of slaughtered chicken. Poultry International. Vol 40, No.9.
- Kauffman, F. (1972)** : Serological diagnosis of salmonella species. Kauffmann- white scheme. Munksgaard. Copenhaen.
- Koneman, E. E.; Allen, S. D.; Janda, W. M.; Schrecken Berger, P. C. and Winn, W. C. (1994)** : Introduction to diagnostic microbiology 4th ed. J.B. Lippincott Co. P.41
- Pattnaik, P.; Kar, B. C.; Pati, P. K. and Roy, P. K. (1997)** : Microbial loads on chicken carcasses processed in slaughter units of Bhubaneswar City. Indian J. of Poult. Sc., 32.1, 89-92.
- Quinn, P. J.; Carter, M. E.; Markery, B. K. and Carter, G. R. (1994)** : Clinical Vet. Microbiology. Year Book Wolfe Publishing Europe Limited, p.209-236.

- Rappaport, F.; Kanforti, N. and Novon, B. (1956)** : New enrichment medium for certain salmonellae. *Journal of Clinical Pathology*, 9, 261.
- Refaie, R. S. and Nashed, S. M. (1990)** : Bacteriological studies on Enterobacteriaceae in some meat products. *Assuit Vet. Med. J.* 23 (45) : 110-115.
- Rollier, I. C. A. (1998)** : Contribution to the characterization of pseudomonas flora in poultry meat. *Dissertation Abs. Intern.*, 58 (3) : 862-863.
- Rufus, K. Guthrie (1988)** : Food sanitation , 3rd Ed. An avi book published by van No strand Reinhold, New York.
- Safwat, E. E. A.; Shouman, M. T.; Eissa, I. A. M.; Wassaf, N. A. and EL- Sawah, H. M. (1985)** : Incidence of salmonellae and their serotypes contaminated the frozen imported poultry meats. *Assuit Vet. Med. J.* 14 (28) : 45-50
- Schmidt, K. (1998)** : Situation of food borne disease in Europe 1992- 1996 p.262 in proceeding of the 4th world congress on food borne infection and in toxication 7-12 June, Berlin.
- Shahata. A. A. (2000)** : Salmonellae in frozen poultry meat products. *J. Egypt. Vet. Med. Assoc.* 60, 4. 61-65.
- Turtura, G. C. (1991)** : Enterobacteriaceae and other gram-negative bacteria in slaughtered poultry, *microbiology , Aliments , Nutrition*, 9 (2) : 139-146
- Yun, H. E. E. Chan G. (2000)** : Prevalence of salmonella spp. In poultry broilers and shell eggs in Korea. *J. food- prot.* 63 (5) : 655-658.

الملخص العربى

مدى تواجد ميكروبات السالمونيلا فى لحوم الدواجن وأجزائها المباعة بأسواق الشرقية

المشتركون فى البحث

إبراهيم محمد إسماعيل الشورى جى جيهان مصطفى بدر

معهد بحوث صحة الحيسران

أجريت هذه الدراسة على مائة وخمسون عينة من مصنعات الدجاج (٥٠ عينة من كل كفتة الدجاج ، واللاتشون واللحم المفروم) و ٤٠٠ عينة من أجزاء الدجاج المذبوح طازجاً (٥٠ عينة من كل الصدر ، فتحة المجمع ، الأجنحة ، العنق ، الأكياد ، القوانص ، الأفخاذ ، الجلد) تم جمعها من الأسواق المختلفة بالشرقية ونقلت للمعمل لفحصها بكتريولوجيا لكل السالمونيلا والميكروبات المعوية ولم تتمكن فى هذه الدراسة من عزل ميكروبات السالمونيلا بينما تم عزل الميكروبات المعوية فى منتجات الدجاج بنسب ٤٢ ، ٤٠ ، ٦٢٪ فى كل من الكفتة واللاتشون واللحم المفروم وكانت نسبة المعزولات فى أجزاء الدجاج المختلفة ٢٢ ، ٤٠ ، ٢٦ ، ٣٦ ، ٣٢ ، ٤٤ ، ٢٨ ، ٣٢٪ على التوالى فى كل من (الصدر ، فتحة المجمع ، القوانص ، الأكياد ، والرقبة ، والجلد ، الأفخاذ الأجنحة) على التوالى.

هذا وقد تم عزل وتصنيف عترات من البكتريا المعوية بنسب مختلفة من منتجات الدجاج وأجزائه المختلفة ومنها (الستيروباكتير فرونداي ، الايكولاى ، الأنتيروباكتير ، الكليبسيلا ، البروتيس فلجاريس ، البروتيس ميريليس الشيجيلا فليكسنيرى ، الشيجيلا سوناي وأنواع السيدونوناس) هذا وقد تمت مناقشة الأهمية الصحية للميكروبات المعزولة والإجراءات الواجب اتخاذها للحصول على منتج صحى سليم.