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MICROBIOLOGICAL STUDY OF SOME COOKED CHICKEN PRODUCTS AT AL-TAIF, KSA

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ABSTRACT

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This Study was carried out on 40 random samples of cooked chicken products Luncheon and Shawerma (20 of each). They were collected from different super-markets at Al-Taif Governorate. The results revealed that the mean value of total Aerobic plate, were Aerobic plate, *Enterobacteriacae spp.*, *E.coli*, *Staph.spp.* (other than *Staph.aureus)*, *Staph.aureus*, *Moulds* and *Yeasts* count in Luncheon (1×10^4, 3×10^4 ,4×10, 4×10^2, 1×10^3, 8×10^2, 4×10^3 respectively) while in Shawerma were (1×10^5, 2×10^4, 4×10^2, 6×10^3, 00, 6×10^4, 5.2×10^5 respectively). The isolation percentages of *Staph.aureus*, *E.coli*, *Moulds*, *Yeasts* in Luncheon were (10%, 25%, 50% and 65% respectively) while in Shawerma were (00%, 20%, 65% and 70% respectively).

Key words: *Luncheon, Shawerma, Enterobacteriacae*

INTRODUCTION

Chicken and chicken products provide animal protein of high biological value for consumers at all ages, where they contain all the essential amino acids required for human growth, higher proportion of unsaturated fatty acids and less in cholesterol value. Moreover, poultry meat is good source of different types of vitamins as niacin, riboflavin, thiamine and ascorbic acid as well as Sodium, Calcium, Iron, Phosphorus, Sulpher and Iodine (Ahmed and Abou Hussein, 2007).

Staph.spp., *E.coli*, and *Salmonella spp.*, on meat, sea foods, vegetable ingredients, chicken Shawarmas, raw and cooked foods, raw chicken, beef burger sandwiches, ready-to eat salad vegetables, commercial mayonnaise, frozen chicken, poultry products and on the hands of food workers (Kaker and Udipi, 2002).

In processing plants, contamination of poultry meat products can occur throughout processing, packaging and storage until the product is sufficiently cooked and consumed. Heavy bacterial loads enter the processing operations with the living birds and these bacteria can be disseminated throughout the plant during processing. Diseases can also result when these products not properly cooked and post-processing contaminated (Zhang *et al.*, 2001).

Staph aureus is the most prevalent contagious pathogens, which rapidly and easily transmitted, as well as it cause a zoonotic disease which transmitted to human being, due to the permanent interchange of *Staph.aureus* from human to animals the reverse occurs as a result of the close ecological relations between man, environment and animals (Forbes *et al.*, 2002).

Poultry are known to harbor a large number of bacteria that are pathogenic to human being. Typically, these occur in low sanitation levels, and only pose a threat to the consumer if the product is not handled in a safe manner, therefore, the production, transportation and sale of meat products must be performed with the almost care and preferably be subjected to hazard analysis critical control point (HACCP) evaluation, to prevent the presentation of any undue hazard (Madden, 1994).

Therefore, the present study was planned out to secure Aerobic plate count, *Enterobacteriaceae spp.*, *E coli*, *Staph.spp.*, *Staph.aureus* and total *Moulds* and *Yeasts* counts.

MATERIALS and METHODS

- **Collection of samples:** A total of 40 random samples of cooked chicken products represented by chicken Shawerma and Luncheon (20 of each) were collected from different supermarkets at Al-Taif, KSA. Weight of each sample was 100g and aseptically transferred, without delay, in an insulated ice box to the laboratory and then subjected to the following examinations.
- **Bacteriological examination (A.P.H.A., 1992):** Twenty five grams of the examined samples were homogenized with 225ml. of sterile buffered peptone water (0.1%) to give a dilution of (10^{-1}). One ml of the clear homogenate was mixed with

9ml of buffered peptone water (0.1%), and then decimal serial dilutions were prepared.

- **Determination of Aerobic Plate Count (APC) (Swanson *et al.*, 1992):** Nutrient agar (Oxoid CM 485) plates were dried, then 0.1ml quantities of each dilution was spread over the medium using sterile glass spreader in backward and forward movement, while rotating the plates then the plates were covered and left to dry for a period of 1-2hrs before being inverted and incubated at 30°c for 48hrs. Colonies were counted in countable plates (30-300) to get the count in 1ml of the homogenate, the total aerobic bacteria/gram was calculated.
- **Determination of *Enterobacteriaceae spp.* Count (ICMSF, 1978):** T surface plate technique was applied using Violet red bile glucose agar (Oxoid CM 485). Inoculated plates were incubated at 37°c for 24hrs. All purple colonies surrounded by purple zone were counted and the average number of *Enterobacteriaceae spp.*/gram of the sample was calculated and recorded.
- **Estimation of *E.coli* count (MPN) (FAO, 1992):** Three tubes of Lauryl Sulphate Tryptose broth containing inverted Durham's tubes were inoculated with 1ml of the previously prepared homogenate 1:10 and 3 tubes of dilution 1:1000 were inoculated, then the (LST) tubes were incubated at 37°c for 24-48hrs. Test tubes that showed collected gas in Durham's tubes were recorded after 24hrs, as positive result, the negative tubes were re-incubated for further 24hrs, the positive one recorded. A loopful from each gas- negative tube of (LST) was transferred to *E.coli* broth (*EC*). The inoculated tubes were incubated at 45.5°c in water bath for 24-48hrs. Positive tubes showed gas production density in Durham's tubes were recorded and the bacterial density was estimated according to the MNP table.
- **Dtermination of *Staph.spp.* count (FAO, 1992):** Accurately, 0.1ml from each of previously prepared serial dilutions was spread over a duplicated plate of Baird Parker agar using a sterile bented glass spreader. The inoculated control plates were incubated at 37°c for 48hrs. Shiny black colonies were enumerated and the total *Staph.spp.* count/g was calculated. The colonies appear as black, shiny colonies with narrow white margin and surrounded by a clear zone were enumerated and *Staph.aureus* count/g was calculated. The suspected colonies of *Staph aureus* were stabbed into semisolid agar tubes for further biochemical identification according to (ICMSF, 1978).
- **Mycological examination:** Total *Moulds* and *Yeasts* counts (Cruickshank *et al.*, 1975): From each of the previously prepared serial dilutions 0.1ml was inoculated into duplicate Petri dishes of Sabouraud Dextrose agar medium supplemented with Chloramphenicol and Tetracycline (100 mg/L of each) (Koburgur and Farahat, 1975). The inoculated plates were incubated at 25°c and examined daily for "star like shape" colonies. The total *Moulds* and *Yeasts* count/g was calculated and were recorded.

RESULTS

Table 1: Mean count of bacteria isolated from chicken meat products in Taif.

Samples Count	Aerobic plate count	*Enterobacteriacae* count	*E.coli* count	*Staph.spp.* count	*Staph.aureus* count	*Moulds* count	*Yeasts* count
Luncheon	1×10^4	3×10^4	4×10	4×10^2	1×10^3	8×10^2	4×10^3
Shawerma	1×10^5	2×10^4	4×10^2	6×10^3	00	6×10^4	5×10^5

Table 2: Incidence of *Staph.aureus, E.coli, Moulds* and *Yeasts* isolated from chicken meat products in Taif *(Total number = 20)*

Samples	*Staph.aureus*		*E.coli*		*Moulds*		*Yeasts*	
	NO. of positive samples	%	NO. of positive samples	%	NO. of positive samples	%	NO. of positive samples	%
Luncheon	2	10%	5	25%	10	50%	13	65%
Shawerma	00	00%	4	20%	13	65%	14	70%

DISCUSSION

Microbiological examination is a sensitive measure collectively verifying the quality of raw material used the perfection of processing, as well as the proper storage of the results. Tables 1&2 revealed that the APC of examined cooked chicken Product samples was 1×10^4 for Luncheon and 1×10^5 for Shawerma , the recorded results were nearly similar to those obtained by Capital *et al.* (2002); Hashim (2003); Essa *et al.* (2004).

While *Enterobacteriacae* count was 3×10^4 for Luncheon and 2×10^4 for Shawerma, similar results were reported by Essa *et al.* (2004); Goksoy *et al.* (2004). *E.coli* count for Luncheon was 4×10 and 4×10^2 for Shawerma, the frequency distribution of *E.coli* of positive samples of both Luncheon and Shawerma was 25% and 20% respectively. Lower results were recorded by Hefnawy and Moustafa (1990) (10% *E.coli* of ready- to eat products), Soriano *et al.* (2000).

Staph.spp. count was 4×10^2 for Luncheon and 6×10^3 for Shawerma, the frequency distribution of *Staph.spp.* count of positive samples of both Luncheon and Shawerma was 80% and 70%, high incidence of *Staph.spp.* organisms in chicken products indicative of unacceptable level of contamination during handling (Lotfi *et al.*, 1990), these obtained results were agree with Kaker and Udipi (2002); Gad (2004).

The epidemiological data of *Staph.aureus* showed that continued to be a major cause of food borne intoxication and its presence in food constitute an important problem for food processors, food service workers and consumers. Tables 1&2 showed low incidence of *Staph.aureus* 2 (10%) for Luncheon and 00 (00%) for Shawerma, *Staph.aureus* count was 1×10^3 for Luncheon and 00 for Shawerma. The obtained results nearly agree with Gad (2004), while relatively higher results were obtained by Essa *et al.* (2004), the low incidence of *Staph.aureus* in examined samples may be attributed to exposure of those products to high temperature during processing (Ahmed, 2004).

Chicken Luncheon was the most contaminated product and this may due to inadequate cooking, post processing contamination, cross contamination through slicing machines or cutting knives used in food serving centers in addition to raw material and spices introduced during manufacture (Varnam and Evans, 1991).

Moulds and *Yeasts* contamination of chicken products may lead to their spoilage, in addition to some *Moulds spp.* Which were incriminated in human mycosis (Mossel, 1975), in this study , *Moulds* count was 8×10^2 for Luncheon and 6×10^4 for Shawerma, the positive product samples were 50%for Luncheon and 65% for Shawerma. The obtained results were similar to Edris *et al.* (1992); Gad (2004). *Yeasts* count for luncheon was 4.3×10^3 and 5.2×10^5 for shawerma; the positive product samples were 65%for Luncheon and 70% for Shawerma. The obtained results were agreed with Ahmed (2004). *Moulds* and *yeasts* contamination usually occurred due to handling, deboning, processing, packing, and washing with polluted water, may due to dust, flies, air, workers, equipments and fluctuation of temperature during transportation and storage (Refaie *et al.*, 1991; Farghaly, 1998).

Results of our study are indicative for contamination and inadequate hygienic conditions in production and processing of chicken meat products. Finally to improve the hygienic quality of chicken meat products to be safe for human consumption the contamination must be reduced by implementing satisfactory manufacturing practices and effectively training plant workers in hygiene, safety and quality assurance, application of strict hygienic measures during handling preparation and serving the products.

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دراسة ميكروبيولوجية لبعض منتجات الدجاج المطبوخ في الطائف بالمملكة العربية السعودية

إيمان محمود شرف ، شريفة مصطفى صبر

أجريت الدراسة الميكروبيولوجية على ٤٠ عينة من اللانشون والشاورمة (اختبار ٢٠ عينة من كل نوع) بمنطقة الطائف، المملكة العربية السعودية، تم تجميعها من سوبر ماركت مختلفة. بينت التحاليل الميكروبيولوجية أن متوسط عدد البكتيريا الهوائية 1×10^4 من الشاورمة و1×10^5 من اللانشون، العدد الكلي لجنس الأمعائيات 3×10^4 من الشاورمة و 2×10^4 من اللانشون، *الاشريكية القولونية* 4×10 من الشاورمة و 4×10^2 من اللانشون، جنس العنقوديات 4×10^2 من الشاورمة و6×10^3 من اللانشون، العنقودي الذهبي 1×10^3 من الشاورمة و 00 من اللانشون، العفن 8×10^2 من الشاورمة و 6×10^4 من اللانشون، خمائر 4×10^3 من اللانشون و5×10^5 من الشاورمة. كانت نسبة تواجد العنقودي الذهبي 10% من اللانشون و00% من الشاورمة، الاشريكية القولونية 25% من اللانشون و20% من الشاورمة، العفن 50% من اللانشون و 65% من الشاورمة، خمائر 65% من اللانشون و70% من الشاورمة.