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DETETION OF SPOILAGE AND FOOD POISONING BACTERIA IN SOME READY TO EAT MEAT PRODUCTS IN DAKAHLIA GOVERNORATE.

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ABSTRACT

The aim of this work was to examine the presence of spoilage and food borne pathogens in most popular ready to eat meat products available in Dakahlia Governorate. Eighty random samples (20 each of luncheon, beefburger, sausage and shawerma) collected under aseptic condition for counting its Aerobic Plate Count *(APC)*, counts of *Staph. aureus, E. coli and Coliforms*. Also the incidence of *Salmonella spp.* and enterotoxigenic strains of *Staph. aureus* reconducted. The mean count of *APC* were 3.6±1.3,3.5±1.8,3.6±2 and 3.5±1 log cfu/gm, *Staph. aureus* count were 3.4±1.7,3.3±2,3.1±1 and 3.2± 1.6 log cfu/gm with incidence rate of 25%,15%,20% and 15%, while the count of *E. coli* were 3±1.5,3±1.6,3±1.7and 2.9±1log cfu/gm with incidence rate of 20% ,10% ,10% and 10% and the *MPN* of Coliforms were *3.1±1.3,2.9±1.5,3±1* and *2.8*±1 log cfu/gm with incidence rate of 20%,15%,10% and 10% in luncheon, beefburger, sausage and shawerma respectively, Salmonella spp. haven't been detected in any of the investigated samples. The control measures and hygienic requirement needed to produce a safe and high quality meat products were discussed and clarified to be employed.

Key words: *Food poisoning bacteria, Aerobic Plate Count, Ready to eat meat.*

INTRODUCTION

Meat products are ideal sources of protein when perfectly produced as well as has enough amounts of vitamins and minerals, therefore handling of meat and its products with improper heating act as an important vehicle of infection and may cause human food poisoning. Stewart *et al.* (2002); Gibbons *et al.* (2006) concluded that the possible sources of pathogens contaminated ready to eat meat products were inadequate sanitary practices or insufficient heat treatment with presence of pathogens on different surfaces occasionally contaminated the final product, Bystron *et al.* (2002) approved that the primary reservoirs of *Staph. aureus* were human skin and mucosa of nasopharyngeal cavity while Matossian and Kingcott (1979) detected food poisoning outbreak from dona kebab (a product similar to shawerma) and so Ayaz *et al.* (1985) added that shawerma responsible for food poisoning episodes. The occurrence of enterotoxigenic *Staph. aureus* in ready to eat food products has been reported in various parts all over the world (Chomvarin *et al.*, 2006; Oh *et al.*, 2007 and Chiang *et al.*, 2008). Enterotoxins are groups of heat stable single protein and proteolytic enzymes produced by *Staph. aureus* which produce several types of enterotoxins (A,B,C,D and E) which cause symptoms of intoxications as vomiting, diarrhoea and abdominal cramping Kozacinski *et al.* (2005), however the enterotoxication generally is not lethal and the elderly are more susceptible than the younger individuals, the amount of enterotoxins required for intoxication about 94-184ug (Erol and Iseri,(2004) meanwhile Bergadol (1989) added that *E. coli* and *Staph. aureus* to be a major cause of food borne intoxication and its presence in food conistitute an important hygienic problem for food processors, handling and consumers. Shalaby and Zaki (2008) could isolate 3, 5 and 4 enterotoxigenic strains of *Staph. aureus* from shawerma, sausage and beefburger respectively and Ali and Abd-EL-Aziz (2011) could isolate *Staph. aureus* producing enterotoxins from shawerma. The aim of this work was to evaluate the bacterial quality of most popular ready to eat meat products available in Dakahlia Governorate to investigate their hygienic significance.

MATERIALS and METHODS

Collection of samples:

A total number of 80 random samples from ready to eat meat products (20 each of luncheon, beefburger, sausage and shawerma) were collected from different localities in Dakahlia governorate under aseptic condition, they were sent without delay to the laboratory for bacteriological examination upon receipt.

Preparation of the samples:
Twenty five gm each of examined samples were homogenized with 225ml 0.1% peptone water in a stomacher for 2.5 minutes at 3000 rpm and filtered through a sterile cheese cloth filter, followed by ten fold six serial dilutions in 0.1% peptone water and examined to determine the following:

1- Aerobic plate count according to *APHA (2001).*
2- Staph.aureus count according to *APHA (2001).*
3- Enumeration of Coliforms by using Most Probable Number (MPN) and Escherchia coli counts according to *FDA (2005).*
4- Detection of Salmonella spp. according to *FDA (2005).*
5- Detection of enterotoxigenic strains of Staph. aureus: It was done according to *Donelly et al. (1967); Oda et al. (1979)* and *Shingaki et al. (1981)* using the SET-RPLA kit for the detection of Staphylococcal enterotoxins A, B, C and D.

RESULTS

Table 1: Statistical analytical results of the examined samples expressed as cfu/gm(n=20).

Microbial count cfu/gm ±S.E.	*luncheon*	*beefburger*	*sausage*	*shawerma*
APC	3.6±1.3	3.5±1.8	3.6±2	3.5±1
Staph. aureus count	3.4±1.7	3.3±2	3.1±1	3.2±1.6
E. coli E. coli	3±1.5	3±1.6	3±1.7	2.9±1
MPN of Coliforms	3.1±1.3	2.9±1.5	3±1	2.8±1

Table 2: Incidence of the tested bacteria in the examined +ve samples. Staph. aureus count

+ve samples	*luncheon*		*beefburger*		*sausage*		*shawerma*	
microorganisms	No	%	No	%	No	%	No	%
Staph. aureus	5	25%	3	15%	4	20%	3	15%
E. coli	4	20%	2	10%	2	10%	2	10%
MPN of Coliforms	4	20%	3	15%	2	10%	2	10%
Salmonella spp.	ND	0%	ND	0%	ND	0%	ND	0%

APC=aerobic plate count, MPN=most probable number of coliforms, ND=not detected

Table 3: Disribution of enterotoxins produced by some strains of Staph. aureus isolated from the examined samples

product	*No of isolated strains*	*No of strains producing enterotoxins*		*Types of Produced enterotoxins*			
	No	No	%	A	B	C	D
luncheon	5	2	40	-	1	-	1
beefburger	3	2	66.6	-	1	1	-
sausage	4	2	50	1	-	1	-
shawerma	3	1	33.3	-	1	-	-

DISCUSSION

Bacterial agents were incriminated in food borne infection and intoxication outbreaks in industrial and developing countries, which increased gradually Stevenson and Bernard (1995), where the revealed results gave a profile about the hygienic and microbiological status of some ready to eat meat products and showed that these products could harbor the food poisoning microorganisms easily, so the achieved results must give more attention to follow up the hygienic rules in the processing, handling and storage of such products.

Table (1) showed that the mean of *APC* in luncheon, beefburger, sausage and shawerma were 3.6±1.3, 3.5±1.8, 3.6±2 and 3.5±1 log cfu/gm respectively similarly with results achieved by Essa and Makar (2004) found *APC* $2.3x10^3$ cfu/gm for beef burger and Tudor (2010) who detected *APC* in meat products including sausage $1.2x10^2$-$4.8x\ 10^4$ cfu / gm while higher results recorded by EL-Mossalami (2009) where the *APC* of sausage, beefburger and shawerma sandwiches were $3.2±1.6x10^4$,$2.3±1.2x10^4$ and 4.2± $2.1x\ 10^4$cfu/gm and lower one recorded by Bezerra *et al.* (2010) found the *APC* were 1.8 log cfu/gm in hamburger.

The obtained results in table (1&2) declared that the mean count of *Staph. aureus* were 3.4±1.7, 3.3±2, 3.1±1 and 3.2±1.6 log cfu/gm with incidence rate of 25%,15%, 20% and15%, respectively, in this respect many researchers could isolated *Staph. aureus* from different meat products as AL-Cherif (1983) who found count of $10.942x10^3$±$4.376x10^3$ and $98.941x10^3$± $57.20x10^3$cfu/gm for hamburger and luncheon; Gab-Allah (1990) found $5.51x10^3$ ±$2.64x10^3$ cfu / gm in luncheon, Mousa (1993) detected $2.3x\ 10^4$cfu/ gm *Staph.* count in luncheon and coagulase positive *Staph. aureus* could be isolated from 18%, Shalaby and Zaki (2008) detected *Staph. aureus* count in shawerma, sausage and beefburger were $9.8x10^2$± $0.12x10^2$,$1.2x10^3$± $0.24x\ 10^2$and $8.3x10^2$± $0.09\ x10^2$ cfu/gm, EL-Mossalami (2009) could isolate *Staph. aureus* from sausage, beefburger and shawerma sandwiches by $3.25±6x10^3$, 2.8± $1.4x10^2$ and 4.1± $2x10^3$cfu/gm, Ibrahim (2009) detected 22.85%and 31.85%of luncheon and sausage contains *Staph. aureus* and Saleh (2010) found $1.14x10^3$±$3.32\ x10^2$, $2.17x10^3$±$4.31x\ 10^2$ and $2.2x10^3$±$4.45x10^2$ with incidence rate of 4%,12% and16%in luncheon, beef-burger, and sausage, Ali and Abd-EL-Aziz (2011) isolate *Staph. aureus* from 30% of shawerma with average count of $8.98x10^3$cfu/gm, while lower results recorded by Essa and Makar (2004) $1.5\ x10^2$ cfu/gm for beef burger, Lidija Kozacinski *et al.* (2008) can't found *Staph. aureus* in fermented sausage this attributed to the application of strict hygienic measures during processing, cooking, handling and storage of these products. Table (1&2) declared that the mean count of *E. coli* were 3±1.5,3±1.6,3±1.7 and 2.9±1 log cfu/gm with incidence rate of 20%,10%,10% and 10% for luncheon, beef-burger, sausage and shawerma respectively, our results were in accordance with Edris (1993) could isolate *E. coli* from 20%, Mousa (1993) found *E. coli* in 14% and Ibrahim (2009) found *E. coli* in 5.71% of examined luncheon samples, while AL-Cherif (1983) couldn't isolate *E. coli* from hamburger and luncheon.

The aforementioned results in table (2) indicated that the mean MPN of *Coliforms* were *3.1±1.3*,*2.9±1.5*,*3±1* and *2.8*±1 log cfu/gm with incidence rate of 20%,15%,10% and 10% for luncheon, sausage, beefburger and shawerma respectively these results were nearly in accordance with Lotfi *et al.* (1990) found $9.3x10^2$cfu/gm *Coliforms* in cooked meat, Francina and Alexander (1999) detected 2.5±0.3log cfu/gm *Coliforms* in the examined cooked meat products and Essa and Makar (2004) found $5.8x10^2$ cfu/gm *Coliforms* for beef burger. These results declared that higher counts were due to postcooking contamination or unefficient cooking and improper handling. The results in table (2) declared that *Salmonella spp.* could n't be detected in the examined ready to eat meat product samples these results were similar to AL-Cherif (1983); Saleh (1991); Edris (1993); Mousa (1993); Kozacinski *et al.* (2005); Lidija Kozacinski *et al.* (2008); Ibrahim (2009); Bezerra *et al.* (2010); Saleh *et al.* (2010) and Tudor *et al.* (2010).

The results in table (3) declared that the distribution of enterotoxigenic strains of *Staph. aureus* were (40%) one strain type B (20%) and the other type D (20%) in luncheon, in beefburger were (66.6%) one strain type B(33.3%) and the other type C (33.3%), in sausage were (50%) one strain type A(25%) and the other type C (25%) and in shawerma were one strain type B(33.3%) *Staph.* enterotoxins, these results were in accordance with those reported in different parts of the world by Bergadol (1989); Erol and Iseri (2004); Kozacinski *et al.* (2005); Shalaby and Zaki (2008) and Ali and Abd-EL-Aziz (2011).

In conclusion, the implementation of good hygienic practices along the meat products manufacture and retail chain to ensure its safety hygienic awareness should be applied for persons whom involved in handling, preparing , processing and cooking of ready to eat meat products. Finally, Hazard Analysis Critical Control Point (HACCP) system is the suitable precaution procedure to be implemented during manufacturing and retailing of meat products to produce safe and high quality products and ensuring compliance with legalization.

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معرفة تواجد البكتيريا المفسدة والممرضة فى بعض منتجات اللحوم المعدة للاكل فى محافظة الدقهلية

حاتم فتحي احمد الدسوقي ، صالح شفيق محمد ، وئام محمد باهر

اجريت هذه الدراسة علي عدد ثمانون عينة من منتجات اللحوم المعدة للاكل والمباعة في اماكن متفرقة بمحافظة الدقهلية بواقع عشرون عينة لكل من اللانشون، البرجر، السجق والشاورمة حيث اظهرت الدراسة ان متوسط العد الكلي للميكروبات الهوائية كان ٣,٦±١,٣، ٣,٥± ١,٨ ، ٣,٦±٢ و٣,٥±١/ جم علي الترتيب ، متوسط العد الكلي لميكروب المكور العنقودي الذهبي كان ٣,٤±١,٧، ٣,٣± ٢ ، ٣,١±١ و٣,٢±١,٦/جم ومعدل تواجده ٢٥%،١٥%،٢٠% و١٥% علي الترتيب، متوسط العد الكلي لميكروب الايشريشيا القولونية كان ٣±١,٥، ٣± ١,٦ ، ٣±١,٧ و٢,٩±١/جم ومعدل تواجده ٢٠% ، ١٠%،١٠% و١٠% علي الترتيب وكان العد الاحتمالي للميكروبات القولونية ٣,١±١,٣، ٢,٩ ± ١,٥ ، ٣±١ و٢,٨±١/جم ومعدل تواجدها كان ٢٠%، ١٥%،١٠% و١٠% لكل من اللانشون، البرجر، السجق والشاورمة علي الترتيب بينما لم يتم عزل ميكروب السالمونيلا من العينات السابقة وقد نوقشت الاهمية الصحية للمعزولات وكذالك كيفية الاقلال من تواجدها وحماية المستهلك.