Microbiological Profile of Some Meat Products in Menofia Markets

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A B S T R A C T

A total of one hundred random samples of different meat products of fresh meat, minced meat, sausage and burger (25 of each) were collected from different super markets in Menoufia governorate. The mean values of APC (cfu/g) in the examined samples fresh meat, minced meat, sausage and burger were $2.15\times 10^7 \pm 5.36\times 10^6$, $2.89 \times 10^6 \pm 5.89 \times 10^5$ $1.23\times 10^5 \pm 5.88\times 10^4$ and $2.99 \times 10^5 \pm 6.52 \times 10^4$,respectively .At the same time , *Enterobacteriacea* count were $2.89 \times 10^4 \pm 6.99 \times 10^3$, $7.35 \times 10^4 \pm 3.75 \times 10^4$, $1.50\times 10^3 \pm 4.88\times 10^2$ and $1.60 \times 10^3 \pm 5.51 \times 10^2$, While *Staplyococci* count were $2.18\times 10^4 \pm 5.86\times 10^3$, $8.47\times 10^3 \pm 3.40\times 10^3$, $1.95\times 10^3 \pm 5.14\times 10^2$ and $1.36\times 10^3 \pm 5.33\times 10^2$, and mould & yeast count were $9.30 \times 10^4 \pm 3.94 \times 10^4$, $1.88 \times 10^5 \pm 6.44 \times 10^4$, $1.25 \times 10^4 \pm 4.60 \times 10^3$and $1.63 \times 10^4 \pm 5.53 \times 10^3$ in fresh meat, minced meat, sausage and burger , respectively. The incidence of *Enterobacteriacea* in the examined meat product samples of fresh meat, minced meat, sausage and burger were 21(84%), 24 (96%), 20(80%) and 23 (92%). 21(84%), 23(92%), 20(80%) and 20(80%) in Staphylococci and also, 18(72%), 19(76%), 22(88%) and 21(84%) in *Mould and yeast* , respectively. Achieved results in the present study proved that different meat products were highly contaminated that may considered a reliable index of fecal contamination and improper handling during processing.

Key words: Minced meat, sausage, burger, APC, *Staphylococci*, fungi, *Enterobacteriace*.

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1. INTRODUCTION

Meat and meat products are sources of high quality protein and their amino acid composition usually compensate for shortcomings in the food. They supply easily absorbed iron and assist the absorption of iron from other foods, they also are rich sources of B-complex vitamins. (Speedy, 2003).

Poor hygienic practices in meat processing plants may result in the contamination of meat and meat products with pathogens causing a serious risk for human health. Moreover, the complete elimination of pathogens from food processing environments is a difficult, in part because bacteria can attach to meat contact surfaces where they survive even after cleaning and disinfection (Yang et al., 2012).

Aerobic plate count (*APC*) is the most reliable index of meat quality, sanitary processing and storage life of meat products (ICMSF, 1980), high APC of mesophilic

bacteria, for example, when applied to raw products, often consists of the normal microflora, or perhaps indicate incipient spoilage, rather than any potential health hazard (ICMSF, 1978).

Enterobacteriaceae group has an epidemiological importance as some of its members are pathogenic and may cause serious infections and food poisoning. Moreover, the total number of Enterobacteriaceae considered as an indication of possible enteric contamination in the absence of coliforms *(Mercuri et al., 1978).*

Staphylococci can contaminate foods and cause illness in humans when ingested, so it is frequently implicated in food borne illness (Prange et al., 2005).

Mold and yeast comprise a large group of microorganisms which are ubiquitous in nature. Most meat spoilage by mold strains survived freezing storage of meat and produced their special effect at the favorable temperature and humidity. Contamination of meat with molds generally originated from slaughter halls and surrounding environment. Mansour et al. (1990). They are responsible for a major protein of food deterioration in developing countries. Their presence in meat is considered as an indicator of the hygienic conditions under which meat is produced and stored leading to either spoilage or food borne mycotoxicosis .

Therefore, the present study was planned out to assessment the microbiological profile of some meat products (fresh meat, minced meat, beef burger and sausage) in Menofia markets .

2. MATERIALS AND METHODS

2.1 Collection of samples:

One hundred samples of different meat products of frozen beef burger, kofta, sausage and luncheon (25 of each) were collected randomly from different supermarkets in Menofia governorate to be examined microbiologically for detection of some food poisoning microorganisms. Each sample was kept in a separate sterile plastic bag and preserved in an ice box, then transferred to the laboratory under possible aseptic conditions without undue delay and examined as quickly as possible.

2.2 Microbiological analysis:

2.2.1 Preparation of sample (APHA, 2001):

Twenty-five grams of the examined meat products were transferred to a sterile blender jar and 225 ml of 0.1 % sterile buffered peptone water were aseptically added to the content of the jar. Each sample was then homogenized in the blender at 2000 r.p.m for 1-2 minutes to provide a homogenate, from which tenth - fold serial dilutions were prepared. The prepared samples were subjected to the following examination:

2.2.2 . Detection of APC:

It was carried out according to (ICMSF, 1996)

2.2.3 Detection of Enterobacteriaceae count:

It was carried out according to (ICMSF, 1996)

2.2.4Detection of staphylocooci count:

It was carried out according to (ICMSF, 1996)

2.2.5 Detection of mould and yeast Count:

It was carried out according to (APHA, 1966)

2.3. Statistical Analysis (Snedecor and Cochran, 1967).

2. RESULTS

It is evident from the results recorded in Table (1), that the mean values of APC (cfu/g) in the examined samples of meat products were $2.15\times 10^7 \pm 5.36\times 10^6$ in fresh meat, $2.89 \times 10^6 \pm 5.89 \times 10^5$ in minced meat , $1.23\times 10^5 \pm 5.88\times 10^4$ in sausage and $2.99 \times$

$10^5 \pm 6.52 \times 10^4$ in Burger. On the other hand, the mean values of the examined samples of fresh meat, minced meat, sausage and burger were $2.89 \times 10^4 \pm 6.99 \times 10^3$, $7.35 \times 10^4 \pm 3.75 \times 10^4$, $1.50 \times 10^3 \pm 4.88 \times 10^2$ and $1.60 \times 10^3 \pm 5.51 \times 10^2$(cfu/g), respectively for *Enterobacteriacae.* Also the mean values of *Staphylococci*(cfu/g) in fresh meat , minced meat , sausage and burger were $2.18 \times 10^4 \pm 5.86 \times 10^3$, $8.47 \times 10^3 \pm 3.40 \times 10^3$, $1.95 \times 10^3 \pm 5.14 \times 10^2$ and $1.36 \times 10^3 \pm 5.33 \times 10^2$, respectively. The mean values of mould and yeast counts(cfu/g) observed in fresh meat was $9.30 \times 10^4 \pm 3.94 \times 10^4$, followed by $1.88 \times 10^5 \pm 6.44 \times 10^4$ in minced meat, $1.25 \times 10^4 \pm 4.60 \times 10^3$ in sausage, and $1.63 \times 10^4 \pm 5.53 \times 10^3$ in burger.

Result in table (2) declared that , 32%, 48%, 40% and 56% were accepted according to the Egyptian standard (2005) for APC(10^6/g), while for *Enerobacteriace* were 16%, 24%, 20% and 8% were accepted according to EOS (2005),on the other hand, 16%, 8%, 20% and 20% accepted according to EOS (2005) for *Staphylococci*, and, 28%, 24% , 12% and 16% were accepted according to EOS (2005) for *mould and yeast* .

Table(1) Mean values (cfu/g)of microbial load in the examined meat products samples (n=25).
S.E : Standered error .

product	APC			Enterobacteriace			Staphylococci			Mould&yeast
	Mean ± S.E.	+VE SAMPLE		Mean ± S.E.	+VE SAMPLE		Mean ± S.E.	+VE SAMPLE		Mean ± S.E.
		NO	%		NO	%		NO	%	
Fresh meat	$2.15 \times 10^7 \pm 5.36 \times 10^6$	21	84	$2.89 \times 10^4 \pm 6.99 \times 10^3$	21	84	$2.18 \times 10^4 \pm 5.86 \times 10^3$	18	72	$9.30 \times 10^4 \pm 3.94 \times 10^4$
Minced meat	$2.89 \times 10^6 \pm 5.89 \times 10^5$	24	96	$7.35 \times 10^4 \pm 3.75 \times 10^4$	23	92	$8.47 \times 10^3 \pm 3.40 \times 10^3$	19	76	$1.88 \times 10^5 \pm 6.44 \times 10^4$
sausage	$1.23 \times 10^5 \pm 5.88 \times 10^4$	20	80	$1.50 \times 10^3 \pm 4.88 \times 10^2$	20	80	$1.95 \times 10^3 \pm 5.14 \times 10^2$	22	88	$1.25 \times 10^4 \pm 4.60 \times 10^3$
burger	$2.99 \times 10^5 \pm 6.52 \times 10^4$	23	92	$1.60 \times 10^3 \pm 5.51 \times 10^2$	20	80	$1.36 \times 10^3 \pm 5.33 \times 10^2$	21	84	$1.63 \times 10^4 \pm 5.53 \times 10^3$

** Significant at 1%

Table (2): Acceptability of bacterial load in the examined samples of meat products according to permissible limits of E.O.S (2005)

	APC	Enterobacteriace	Staphylococci	Mould&yeast

Product	Acceptable samples		Acceptable samples		Acceptable samples		Acceptable samples	
	No	%	No	%	No	%	No	%
Fresh meat	8	32%	4	16%	4	16%	7	28%
Minced meat	12	48%	6	24%	2	8%	6	24%
sausage	10	40%	5	20%	5	20%	3	12%
burger	14	56%	2	8%	5	20%	4	16%

*Permissible limits of Apc for fresh meat , minced meat and sausage(10^6)and burger(10^5)
*Permissible limits of enterobacteriace and staphylococci (10^2)

*Permissible limits of mould and yeast (free)

3. DISCUSSION

Meat products are perishable foods and unless stored under proper conditions spoil quickly. In addition, if pathogens are present, meat products become hazardous for consumers. Therefore, assurance of meat safety and quality is the most important (Shimoni and Iabuza, 2000).

Results demonstrated that fresh meat highly contaminated these results agreed with those of (Biswas et al., 2008), where they reported that, the fresh meat of a high incidences to bacterial contamination followed by minced meat , burger and sausage. The clothes of workers, processing equipment and water used to wash carcass, hands and equipment were source of meat contamination during slaughter process. (Upmann *et al.,* 2000). The sources could be the animal, the environment or contamination during meat processing (McNamara 1998). The main source of meat contamination is animal feces especially during processing at the slaughterhouse (Kudva et al., 1998).

According to results achieved in table (1) Comparing the obtained values from the examined samples, higher result for APC, Staphylococci and Enterobacteriace count were reported by Tekinşen et al. (1980)($8.4x10^7$ cfu/g.),Gönülalan and Köse (2003)($5.3x10^9$cfu/g.) and Başkaya et al. (2004)($6.3x10^7$cfu/g.) in minced meat in APC. While, Ibrahim (2016) who found that Staphylococci counts (cfu/g) of examined sausage, beef burger and minced meat samples were $1.97\ x10^5 \pm 6.49\ x10^4$, $2.08\ x10^5 \pm 5.56\ x10^4$ and $5.83\ x10^5 \pm 1.06\ x10^5$, respectively. Also, higher ones for Staphylococci showed by Abou- Hussien-(2004)($5.38\ x10^5 \pm 9.7x10^4$cfu/g) in frozen sausage and Talaat (2009) ($6.92x10^6 \pm 4.54x\ 10^6$cfu/g) in frozen minced meat. AI-Mutairi (2011) ($37.8x10^4$ CFU/g in sausage for Enterobacteriace).

On other hand, lower results were recorded by Hasanein et al.(2015) found that The mean values of APC, and staphylococcus counts (cfu /g) were $7.34x10^4 \pm 1.22x10^4$ and $1.57\ x\ 10^3 \pm 0.36x\ 10^3$ in beef burger. Also, lower results for APC were reported by Salem et al. (2010) ($5.61\ x10^5$ cfu/g.), Melngaile et al., (2014) (5.08 log cfu/g.) & Elabbasy et al. (2014) (5.82 log cfu/g.) in minced meat, EL-Mossalami (2009) ($3.2\pm1.6x10^4$cfu/g.) in

sausage. And alco, El-Dosoky et al. (2013)(3.6±2 log cfu/g.) in sausage . Ahmed (2018) reveled that Enterobacteriaceae counts varied from $4.0\times10^2$to $6.4\times10^4$with mean value of $5.82\times10^3 \pm 1.02\times10^3$ in minced meat. Hegazi et al. (1992) found that The mean values of fungal count (cfu/g) were $1.0x10^2$ in fresh meat , $9.50\ x10^2$ in sausage , $1.75\ x10^2$ in minced meat and $4.15\ x10^2$ in burger .Moreover, Sayed (2006) found that the mean values of fungal count raw and meat minced meat were $5.96\ x10^3$±5.17x10 , $6.78\ x10^3$±6.14x10 , respectively.

while it is evident from the results recorded in Table (1) that there is nearly similar results obtained by Abd El-Hamid (2010) revealed that the mean values of Staphylococcal count were $2.17\times10^3 \pm 4.31\times10^2$ and $2.2\times10^3 \pm 4.54\times10^2$(cfu/g) in burger and sausage. Also , Ahmed (2018) reveled that *Enterobacteriaceae* counts(cfu/g)were $4.15\times10^3 \pm 1.36\times10^3$in beef burger and $3.91\times10^3 \pm 3.15\times10^3$ in sausage . Also , these results nearly agreed with Ayten K. et al. (2014) they recorded that the molds and yeasts count ranged from $7x10^3$ to $4\ x10^8$ cfu/g in fresh meat and El-Tawab (2014) ($7.63\ x10^4 \pm 1.79\times10^4$ in sausage and $3.06\ x10^4 \pm 0.92\times10^4$ cfu/g in burger).

As shown in table (2) results indicated that the presence of APC , *Enterobacteriace* , *Staphylococci* and mould & yeast in examined samples more than permissible limits of EOS (2005) in such meat products represent a high risk to consumer , cause health hazard and indicates inadequate sanitary conditions during stages of manufacturing, dirty equipment and improper handling.

4. CONCLUSION

Achieved results in the present study proved that fresh meat was the highly contaminated product that may considered a reliable index of fecal contamination and improper handling during processing. While, sausage was the lowest contaminated due to heat treatment and adding of spicy .

Consequently, strict maintenance of good practices during processing, strengthened by maintaining the cold chain during transport, distribution and carcass commercialization is of central importance to ensure both public health and food quality .

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