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OCCURRENCE OF ENTEROTOXIGENIC STAPHYLOCOCCUS AUREUS IN SOME CAMEL`S MEAT PRODUCTS

AMAL ALI SHEHATA

Bacterial Toxin Unit, Animal Health Research Institute, Dokki, Egypt.

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SUMMARY

Fifty samples of camel's meat products were collected from Cairo and Giza supermarkets which were represented as burger, frankfurter, luncheon, minced meat and rice kofta. The mean values of *S. aureus* count were detected and were 12.3 x 10^2/g, 7.7 x 10^2/g, 10.6 x 10^3/g, 1.1 x 10^3/g and 7.01 x 10^3/g, respectively. The incidence of S. aureus were 40% in burger, luncheon and minced meat while 30% and 60% in frankfurter and rice kofta, respectively.

The two enterotoxigenic strains were isolated from minced meat and rice kofta with C and D type, respectively. The public health aspects as well as the hygienic measures were discussed.

INTRODUCTION

Camel is an unique animal as it can live where few other animal can live Camel is a good source of meat in areas where the climate adversely affected other animals and at regions where alternative forms of protein may be limited so camel meat is not universally eaten. Camel`s meat is described as tasting similar to beef but lower cholesterol and high protein contents so has health advantages over beef (Hussien, 2006).

Owing to the excessive continuous consumers demand for meat products expansion of the processed meat industries and appearance of several camel's meat products in Egyptian supermarkets become extremely necessary. Processing and packaging of meat and meat products at ambient temperature may lead to microbial growth and freezing will act as preserving agent which keep certain pathogenic organisms in a dormant state but when the condition become favorable for their growth they will create a hazardous problem (Mohamed et al., 2006).

Some of microorganisms such as S. aureus may contaminate the camel's meat during processing and handling. The risk to public health arises if toxigenic strains of S. aureus multiply to great numbers during improper handling and storage as a result extracellular compounds are produced from which enterotoxins (are exotoxigens) responsible for the symptoms of staphylococcal food poisoning which are mostly common as nusea, vomiting and diarrhea. However, in severe cases may be accompanied by acute prostration and abdominal cramps and it caused by ingestion of food contaminated with preformed toxins secreated by the S. aureus after 2-4 hrs (Lancett and Tatini, 1992). So, the present work was conducted to investigate the incidence of enterotoxigenic S. aureus in some camel's meat products and its public health importance.

MATERIAL AND METHODS

1- Collection of samples:

A total of (50) samples (10) each of burger, frankfurter, luncheon, minced meat and rice kofta were collected from different supermarkets in Cairo and Giza and transferred separately in plastic bags to the laboratory in an ice bag to be investigated.

2- Staphylococcus aureus count and isolation:

The count and isolation was carried out according to the technique recommended by FAO (1992) using Baird Parker medium incubated at 37°C for 48 hrs.

3- Identification of Staphylococcus aureus: according to Kreig and Holt (1984).

4- Detection of enterotoxins produced by isolated strains: using sac cultural method described by Donnelly et al. (1967).

5- Detection and typing of enterotoxins: (Oda et al., 1979 and Shingaki et al., 1981) by reversed passive latex agglutination technique using Oxoid SET. RPLA. (kits used for the detection of staphylococcal enterotoxins A, B. C and D).

* Microbiological investigations of camel's meat products are rare therefore we have to compare the other results of other meat types.

RESULTS AND DISCUSSION

Results represented in table (1) revealed the mean count of S. aureus of camels burger were 12.3 x 10^2. This results was lower than that of Hussien (2006), Eleiwa (2003) and Mohamed (2008) 5.2 (10^4/g, 2 x 10^3/g and 8.95 (10^3/g respectively and higher than that of Ouf (2004) 6.3 x 10^2 while the incidence in table (2) were agree with that of Ouf (2004) 40% and lower than that of Hussien (2006), 100% and Mohamed (2008) 45%.

Results of camel's frankfurter in table (1) give mean value of *S. aureus* count 7.7 x 10^2 and incidence of table (2) were 30%. These results were lower than that of Hussien (2006) 1.2 x 10^3 and 100%, respectively, but higher than Mohamed

(2008) 3 x 10^2/g and 30%, respectively.

Smoking used in frankfurter production cause reduction of microorganisms. The higher the temperature of smoking, the lower counts during storage (Heizler et al., 1972).

Results of camel`s luncheon in table (1) give an indication of mean count values of *S. aureus* were 10.6 x 10^3/g. This results are higher than that recorded by Shaltout and Ibrahim (1997) and Mohamed (2008) were 7.9 x 10^3/g and 3 x 10^2/g, respectively, while lower than that of Eleiwa (2003) 16.69 x 10^3/g. While table (2), revealed higher incidence than that of Ouf (2001), Eleiwa (2003) and Mohamed (2008) 15%, 24% and 20%, respectively.

Results of camel`s minced meat obtained in table (1) indicate that the mean count of *S. aureus* were 1.1 x 10^3/g. This results higher than those recorded by both of Ouf (2004), Mohamed et al. (2006) 1.7 x 10^2/g and 1 x 10^3/g, respectively but lower than Mohamed (2008) who recorded in 2 x 10^3/g, while the incidence table (2) were lower than that of Mahmoud and Ali (2004) 100% the results were higher than that of Eleiwa (2003), Ouf (2004) and both Mohamed et al (2006) and Mohamed (2008) 12%, 20% and 10%, respectively.

Concerning to Table (1) it was noticed that the mean count of *S. aureus* in camel`s rice kofta were 7.01 x 10^3/g. This results were lower than that of Mohamed et al. (2006), 7.2 x 10^3/g but higher than Hussien (2006) 5.9 x 10^2 and Mohamed (2008) 2 x 10^3/g, while incidence in table (2) were lower than Hussien (2006) 100% and higher than Mohamed et al. (2006) 20% as well as Mohamed (2008) 45%.

Human and animals are the primary reservoirs of *Staphylococcus aureus*. This organism can be found in the nose, throat and hair also survive on the skin so various skin eruption and wounds harbor large number of Staphylococci and can transform the organism to the sites of food through food handlers (Price and Tom, 1998). The presence of *S. aureus* in higher percentages may be attributed to excessive hand manipulation and poor personal hygiene.

Staphylococcal enterotoxins are single polypeptide chain resist many proteotytic enzymes and boiling for up to 30 minutes although the vegetative cells would not survive this conditions (Eley, 1992).

The incidence of enterotoxigenic strains of *S. aureus* and their enterotoxins in table (3) show in 25% and 16.6% respectively while enterotoxins were reported as C and D enterotoxins isolated from minced meat and rice kofta respectively. These results are nearly similar to those of Payne and Wood (1974), Niazi et al. (1986) and Aideia and Yanny (2005). Some investigators deter-

mined enterotoxigenic strains producing (D) enterotoxins more frequently in meat products (Payne and Wood, 1974).

From the previous results it is becoming clear that to produce a hygienic camel's meat product steps must be followed the 1st and the most important is to have good grade purity of raw materials which including meat, spices and every addition which must be free from food poisoning microorganisms. It is important to keep those ingredients in properly closed containers away from any dampness or dust and from workers hands. The sanitation and hygienic measures must be applied at every step of production and storage.

Table (1): Statistical analytical results of *S. aureus* in camel's meat products.

Examined samples	Min.	Max.	Mean	SE
Burger	3×10^2	2.3×10^3	12.3×10^2	0.55×10^2
Frankfurter	2×10^2	1.1×10^3	7.7×10^2	0.68×10^2
Luncheon1	1×10^2	2.4×10^4	10.6×10^3	6.8×10^2
Minced meat	3×10^2	2×10^3	1.1×10^3	1.8×10^2
Rice Kofta	1.2×10^3	2.9×10^4	7.01×10^3	2.54×10^3

SE = standard error

Table (2): Incidence of *S. aureus* in examined camel's meat products samples (n = 10).

Examined samples	Positive sample	
	No.	%
Burger	4	40
Frankfurter	3	30
Luncheon1	4	40
Minced meat	4	40
Rice Kofta	6	60

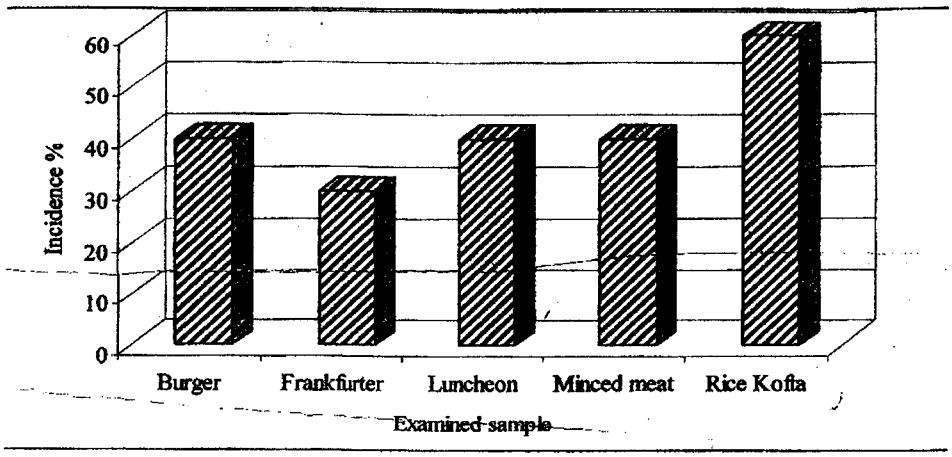

Fig. (1): Incidence of S. aureus in examined camel's meat products.

Table (3): Incidence of enterotoxigenic strains of *S. aureus* and its enterotoxins types.

Examined samples	No. of positive sample	Enterotoxigenic strains		Types of enterotoxins	
		No.	%	C	D
Minced meat	4	1	25	1	-
Rice kofta	6	1	16.6	-	1

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دراسة على مدى تواجد الميكروب المكور العنقودى الذهبى فى منتجات لحوم الجمال

د. أمل على شحاته

وحدة السموم البكتيرية - معهد بحوث صحة الحيوان

الـــدقى - مصـــر

أجريت هذه الدراسة على ٥٠ (خمسين) عينة عشوائية من منتجات لحوم الجمال (برجر، فرانكفورتر، لانشون، لحم مفروم وكفتة الأرز) ووجد أن متوسط العد البكتيرى للميكروب المكور العنقودى الذهبى/جرام كما يأتى: ١٢,٣ × ١٠^{٢}، ٧,٧ × ١٠^{٢}، ١٠,٦ × ١٠^{٣}، ١,١ × ١٠^{٣}، ٧,٠١ × ١٠^{٣} على التوالى.

وكانت نسبة تواجد ميكروب المكور العنقودى الذهبى فى منتجات لحوم الجمال كالتالى: ٤٠% فى كل من البرجر، اللانشون واللحم المفروم بينما كانت ٣٠% فى الفرانكفورتر ووصلت الى ٦٠% فى كفتة الأرز.

وقد تم عزل عترتين مفرزة للسموم المعوية للميكروب بنوع C من اللحم المفروم والنوع D من كفتة الأرز. وقد تم مناقشة الأهمية الصحية للميكروب وكذلك الشروط الصحية الواجب توافرها لحماية صحة المستهلك.