THE MICROBIOLOGICAL STATUS OF SOME EGYPTIAN MEAT PRODUCTS.

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INTRODUCTION

Kapab, Shawerma and Egyptian minced meat "Kofta" are popular meat products in Egypt. They are prepared of either beef or lamb, served in various restaurants. Kapab is prepared as slices of mutton or beef (rich in fat content), these slices are mixed with common salts and spices for at least six hours before grilling. The origin of Shawarma are unknown, it is prepared as slices of mutton or beef, the slices are mounted on skower about a meter long, to form a frustum. Large chunks of fat alternate with the meat. The moisture and fat content of mass cause the meat pieces to cohere especially during cooking, Bryan et. al., 1980. The weight of a Shawarma skewer varies from 5 to 40 Kg. The final diameter of each preparations varies from 30 to 50 cm. The row product is immersed for 8 to 12 h in a preparation of vinegar, salts and spices for marination. The shawarma mass is held vertically in an open gas broiler for 6 to 8 h with the source of heat from one direction. As the meat rotates on the skewer it is broiled continuously and slowly. The ready to eat shawarma are carved from the outer surface of frustum, Ayaz et. al. 1985. In general, Kofta is prepared from minced lean beef, mixed with fat "beef prenephric or "tail sheep fat", common salts, additives such as spices, vegetables. After thorough mixing being grilled in the form of fingers, El-Khateib et. al. 1985, 1986.

The microbiological quality of these products will depend upon the meat used, sanitary conditions during preparation, handling and temperature of cooking. Although much information is available on the number and types of microorganisms associated with raw Kofta, Roushdy 1971 and 1973, Abd El-Rahman and El-Khateib 1987, the publish data concern the microbial flora of raw and ready to eat kapab and Shawerma in Egypt are scarce and not infermative. Establishment of bacteriological critera of raw and cooked meat products should reflect both the benefit to the consumer and cost to the producer.

The objective of this research is to determine the microbiological status of three types of Egyptian meat products, Kapab, Shawarmw and Kofta and the possible puplic health hazards associated with the consumption of these products after cooking.

MATERIALS AND METHODS

SAMPLES

A total of 150 samples were collect from Assiut city, 75 raw meat products (Kapab, Shawerma and Kofta, 25 from each) and the similar numbers from the products after cooking (ready to eat). The samples were aseptically packaged in sterile Whirl-Pak bags and brought to the laboratory under ice conditions. The microbiological examination was begun in the laboratory immediatly. Twenty grams from each sample was placed in a Waring blender with 180 ml sterile 0.1 % peptone water and homogenized for 1 – 2 min. For

ther dilutions were made in 0.1% peptone water.

ANALYTICAL PROCEDURES

The following tests were conducted on the homogenate :

1. Total aerobic plate count (APC) and Pseudomonadaceae count were caried out according to Leistner et. al. 1981.
2. Enterobacteriaceae count was carried out on Deoxycholate Hydrogen Sulfide lactose Agar (DHL, Merck).
3. Mould and yeast counts were carried out by using acidified Malt extract agar according to A.P.H.A,1966.
4. Salmonella

Isolation and identification of Salmonella was carried out as described by Mates, 1983.

5. Staphylococcus aureus

Appropriate dilutions were steaked on Baird-Parker's Egg Yolk Tellurite agar plates which were incubated at 35 C for 48 h. Selected black colonies were tested for coagulase production by the tube methode.

6. E.Coli

Isolation and identification was carried out as described by EL-Khateib 1985.

7. Clostridium perfringens

As described by Beernes et. al. 1980.

RESULTS

The aerobic plate counts (APC) of raw (Kapab, Shawerma and Kofta) ranged from 10,000 to 10,00,0000, from 50,000 to 30,00,0000 and from 10,00,000 to 70,00,00000, and the average counts were 70,00,000, 60,00,000 and 10,00,0000,(CFU/g) respectively (Table 1). The Enterobacteriaceae count of row (Kapab, Shawerma and Kofta) ranged from 1000 to 100,000, from 1000 to 300,000 and from 4000 to 10,00,000 (CFU/g), the average counts were 10,000 for each. Pseudomonadaceae, mould and yeast counts of row (Kapab, Shawerma and Kofta) ranged from (1000 to 100,000, 10 to 3000 and 10 to 4000); (4000 to 100,000, 100 to 3000 and 10 to 3000) and (1000 to 400,0000, 100 to 40,000 and 10 to 10,000), CFU/g, respectively.

Table 2. revealed that out of 25 samples from each raw products (Kapab, Shawerma and Kofta) were found to be Salmonellae free. Staphylococcus aureus coagulase positive were detected in 10 samples (40 %) from raw Kapab, 9 samples (36 %) from raw Shawerma and 6 samples (24 %) raw Kofta. E.Coli was detected in 20 (80 %); 16 (64 %) and 23 (92 %) samples of raw (Kapab, Shawerma and Kofta), respectively. Clostridium perfringens was isolated from raw Kapab, raw Shawerma and raw Kofta, levels were reached 8 (32 %), 8 (32 %) and 10 (40 %), respectively.

The APC, Enterobacteriaceae Pseudomonadaceae, mould and yeast counts of ready to eat meat products (Kapab, Shawerma and Kofta) ranged from (1000 to 10,00,000, 100 to 1000, 100 to 2000, <10 to <10 and <10 to <10); (400 to 10,00,000, 100 to 2000, 100 to 1000, <10 to <10 and <10 to <10) and (10,000 to 50,00,000, 100 to 100,000, 300 to 400,000, 10 to 1000 and <10 to <10),CFU/g, respectively Table 3.

Table 4. shows that Salmonella failed to detect in all examined samples. Staphylococcus aureus coaguase positive was isolated from 8 % of all samples (25) of ready to eat Kapab, 12 % of all samples (25) of Shawerma and 16 % of all samples (25) of Kofta. On the other hand, E.Coli and Clostridium . perfringens were isolated from (4 % and 4 %) of

all samples of ready to eat Kapab, from (8 % and 4 %) of all samples of ready to eat Shawema and from (24 % and 12 %) of all samples of ready to eat Kofta.

DISCUSSION

Raw Kofta showed the highest (average) aerobic plate count (10,000,000), followed by Kapab (70,00,000) and raw Shawerma (60,00,000). The (average) count of entrobacteriaceae in the three raw meat products were similar. The highest (average) Pseudomonadceae count was in raw Kofta (100,000) followed by Shawerma and Kapab 10,000 (similar). Also the (average) counts of mould and yeast, were nearly highest in raw Kofta followed by Shawerma and Kapab. When the plate count exceeding 10,00,000 CFu/g is an indication of higher numbers of bacteria in foods, Ockerman and Stec, 1980; Pace, 1975. In general the obtained Microbial data can not be compared with those reported by other investigators as the procedure adopted differs from that applied by them, Roberts et. al., 1980.

Regarding the isolation and identification of bacteria of food infection and intoxication from raw meat products, it is clear that the analysis of samples in this study yielded no Salmonellae isolates. The fat that no Salmonellae were found to could be due to low number of samples examined from each products (25 samples). Ayaz et. al., 1985 reported that out of 108 Shawerma samples, tewelve percent of it was positive for salmonellae.

The incidence percentage of Staphylococcus aureus in raw products indicate that, very few samples of kofta were contaminated with staph. aureus coagulase positive (24 %), while a higher contamination level was observed in raw Kapab (40 %). Higher contamination of E.Coli and Clostridium perfringens were found in raw Kofta (92 %) and (40 %) respectively. Although the E. coli test has long been used as an indicator of fecal contamination, presence of E. coli does not mean that there are feces in the product. E.Coli is an organism which is normally found in the intestinal tract of man and other vertebrates; however, it is an organisms which is widely distributed in nature, Foster, 1977. Attempts to correlate presence of E. Coli to presence of pathogenic organisms in raw meat products have resulted in minimal success, Goepfert, 1976. Miskimin et. al., 1976, found that the E. Coli count was suitable as an indicator of the microbiological quality of foods, but to assure safty of a food product, specific pathogen testing is necessary. Clostridium perfringens organisms are abiquitous, hence it is difficult to avoid their contamination of meat at the source. Hobbs, 1974, described the means by which food products are contaminated with clostridium perfringens.

After cooking the counts of the different microorganisms to some extent decreased, and the presence of some food poisoning bacteria such as Staph. aureus, E. Coli, Clostridium perfringing may be attributed to the insufficient cooking or post cooking contamination.

CONCLUSION

From all data given above, it can concluded that raw Egyptian meat products (Kapab, Shawerma

and Kofta) harbour large and variable microbial flora and in the same time include a number of potential pathogenic micro-organisms.

The microbiological parameters decrease to some extent whenever the products are subject to cooking. Present of some food poisining bacteria as Staphylococcus aureus, E. Coli and Clostridium perfringens after thermal treatment indicated that insufficient cooking, neglected the hygienic measures during handling. Therefore great care should be imposed to ensure that hygienic precautions are observed during the manufacture and handling after cooking.

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Table 1. The microbiological examination of raw Egyptian meat products (Kapab, Shawerma and Kofta).

Counts /g	Kapab			Shawerma			Kofta		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
Aerobic plate	$1x10^{4}$	$1x10^{7}$	$7x10^{6}$	$5x10^{4}$	$3x10^{7}$	$6x10^{6}$	$1x10^{6}$	$7x10^{8}$	$1x10^{7}$
Enterobacteriaceae	$1x10^{3}$	$1x10^{5}$	$1x10^{4}$	$1x10^{3}$	$3x10^{5}$	$1x10^{4}$	$4x10^{3}$	$1x10^{6}$	$1x10^{4}$
Pseudomonadaceae	$1x10^{3}$	$1x10^{5}$	$1x10^{4}$	$4x10^{3}$	$1x10^{5}$	$1x10^{4}$	$1x10^{3}$	$4x10^{6}$	$1x10^{5}$
Mould	$1x10^{2}$	$3x10^{3}$	$1x10^{2}$	$1x10^{2}$	$3x10^{3}$	$1x10^{3}$	$1x10^{2}$	$4x10^{4}$	$1x10^{3}$
Yeast	$1x10^{2}$	$4x10^{3}$	$1x10^{2}$	$1x10^{2}$	$3x10^{3}$	$1x10^{2}$	$1x10^{2}$	$1x10^{4}$	$1x10^{3}$

Table 2. The incidence percentages of some food infection and intoxication bacteria in raw Egyptian meat products (Kapab, shawerma and Kofta).

Microorganisms	No. of sample	Kapab		Shawerma		Kofta	
		Frequency	%	Frequency	%	Frequency	%
Salmonellae	25	---	--	---	--	---	--
Staph. aureus	25	10	40	9	36	6	24
E. Coli	25	20	80	16	64	23	92
Cl. perfringens	25	8	32	8	32	10	40

Table 3. The microbiological examination of ready to eat Egyptian meat products (Kapab, Shawerma and Kofta).

Counts /g	Kapab			Shawerma			Kofta		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
Aerobic plate	$1x10^{3}$	$1x10^{6}$	$5x10^{4}$	$4x10^{2}$	$1x10^{6}$	$3x10^{4}$	$1x10^{4}$	$5x10^{6}$	$1x10^{5}$
Enterobacteriaceae	$1x10^{2}$	$1x10^{3}$	$2x10^{2}$	$1x10^{2}$	$2x10^{3}$	$3x10^{2}$	$1x10^{2}$	$1x10^{5}$	$1x10^{3}$
Pseudomonadaceae	$1x10^{2}$	$2x10^{3}$	$4x10^{2}$	$1x10^{2}$	$1x10^{3}$	$3x10^{2}$	$3x10^{2}$	$4x10^{5}$	$1x10^{3}$
Mould	<10	<10	<10	<10	<10	<10	$1x10^{3}$	$1x10^{3}$	$1x10^{2}$
Yeast	<10	<10	<10	<10	<10	<10	<10	<10	<10

Table 4. The incidence percentages of some food infection and intoxication bacteria in ready to eat Egyptian meat products (Kapab, shawerma and Kofta).

Microorganisms	No. of sample	Kapab		Shawerma		Kofta	
		Frequency	%	Frequency	%	Frequency	%
Salmonellae	25	---	--	---	--	---	--
Staph. aureus	25	2	8	3	12	4	16
E. Coli	25	1	4	2	8	6	24
Cl. perfringens	25	1	4	1	4	3	12