BACTERIOLOGICAL QUALITY OF SHAWARMA IN PORT-SAID

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SUMMARY

Fifty random samples of shawarma (cooked meat) were collected under hygienic circumstances from different fast-food restaurants in Port-said city. The samples were examined for aerobic plate counts, Enterobacteriaceae and S. aureus counts. The aerobic plate counts were ranged from 26 x 10^3 to 32 x 10^6/g. with a mean value of 33.8 x 10^5/g. The counts of Enterobacteriaceae and S. aureus were ranged from 3 x 10^2 to 3 x 10^4/g. and 5 x 10^2 to 7 x 10^4/g. with a mean values of 1.68 x 10^3 and 7.4 x 10^3/g. respectively., Citrobacter freundi , Hafnia alvei , Enterobacter spp. and Klebsiella spp. could be isolated from the examined shawarma samples. Salmonella ,Shigella and E. coli could not be detected. The present study indicated that food –borne pathogens present in examined shawarma samples constitute a potential public health hazard. The zoonotic importance of each isolates as well as the suggestive methods for minimizing and preventing bacterial contamination were discussed.

INTRODUCTION

Fast food on the streets are good vehicle to transmit gastrointestinal diseases to consumers because they are highly manipulated. The vegetables are a good media for pathogens growth, **(Acevedo, et al. 2001).**

Shawarma is a popular meat sandwich of either beef or lamb. It belongs to the category of ready to eat food products which usually does not undergo further preparation or cooking. Similar products of different name in different countries are also called: yeros, dona kebabs, donerkebobs,durnokebabs,donah, shawirma , gyros and souvlaki **(Bryan, et al. 1980** and **Ayaz, et al. 1985).**

Preparation of shawarma: Slices of beef or lamb are mounted on askewere about a meter long to form a frustum. larg parts of fat alternate with the meat. The weight of a shawarma skewer varies from 10 kg.to14 kg. The raw products is immersed for 8 to12 h. in a preparation of vinegar. Salt and spices for marination **(Bryan, et al. 1980** and **Ayaz, et al. 1985).** The frustum shape mass is held vertically in an open broiler for 4 to 6 h. with the source of heat from one direction. As the meat rotates on the skewer, it is broiled continuously and slowly. Thin slices of

cooked meat are carved from the outer surface of shawarma , and are served as a sandwich in arabic bread with onion, parsley, lettuce, tomato, and with a special dressing of tahena , (sesame seed paste), yogurt and / or sour cream **(Bryan, et al. 1980** and **Ayaz, et al. 1985)** .

Shawarma cooked on broilers attained temperature which were sufficient to kill vegetative bacteria on the surface of the meat and on the thin layer just below the surface but not in most internal regions **(Bryan, et al. 1980)**. The microbiological quality of the final product is influenced by microbial status of raw materials including the meat and additives specially spices as well as the sanitary conditions under which the product has been prepared and handled. **EL-Sherif., et al. (1991). Ayaz, et al. (1985)**. recorded food poisoning outbreaks from donakebab. They reported that under favorable conditions various pathogens may responsible for food poisoning and contamination of shawarma and donakebab is possible. On the other hand **(Eldaly , 1986)** reported that the existence of micro organisms in spices as a food contaminants affecting the actual microbial load. Therefore, the present work was planned to throw a light on sanitary condition of shawarma locally made in Port-said city.

MATERIALS AND METHODS

Collection of samples :

Fifty random samples of shawarma were collected from different fast - food restaurants at Port -said governorates . All samples were aseptically packaged and transferred to the laboratory with a minimum of delay where they were subjected immediately to bacterialogical examinations .

Preparation of samples :

25 grams of each sample were added to 225 ml of sterile 0.1% peptone water in a sterile blender. The samples was blended for 3 min. at hight speed. Serial dilutions from (10^{-1} to 10^{-7}) were made and then the bacteriological analysis were performed . **(Abou EL alla , et al. 1992)** .

Bacteriological analysis:

Aerobic plate count: Standard plate count agar was used for the aeroble plate count according to **A. P.H. A. (1972)**.

Enumeration of coagulase positive Staphylococci: By a surface plating technique , 0.1ml from each of the previously prepared dilution was transferred and evenly spread over a dry surface of Baird parker medium plates **(Thatcher and Clark, 1975)**. Inoculated plates were incubated at 37C^{0} for 48 honrs. Suspected colonies are counted and coagulase test was done by Latex Agglutination technique using Oxoid (Dry spot technology).

Enterobacteriaceae count: 0.1ml of each dilution was plated on violet red bile glucose agar (VRBG) according to **Mercuri and Cox (1979)**. The plates were incubated at 37C° for 18 -24 hr. All purplish -red colonies surrounded by a red zone of precipitated bile acids were counted. Representative colonies were identified biochemically according to **Vernam and Evans (1991)**.

Deteetion of Salmonella and Shigella organisms: 10 gm portion of each sample were inoculated into 200 ml Selenite cystine broth and incubated at 36 Cofor 18- 24 hr. A loop full from incubated broth was streaked on SS agar (Difco).Suspected Salmonella or Shigella colonies were further identified biochemically and serologically according to **(Cruickshank , et al. 1980)**.

RESULTS AND DISCUSSION

The results in table (1) demonstrated that aerobic plate count detected in examined beef shawarma samples was ranged from 26 x 10^3 to 32 x 10^6 with a mean values of 33.8 x 10^5. These findings agree with **Pace (1975), Oblinger** and **Kennedy (1980)** and **Ockerman and Stec (1980)**. The presenee of microorganisms in cooked samples means that the duration and temperature of cooking is not yet enough or presence of resistant strains of micro organisms Tiwari and **Kadis (1981)**. Higher results of aerobic plate count (6 x 10^3 to 15 x 10^8 with a mean value 24.6 x 10^7) were recorded by **Ayaz, et al. (1985)**. In this respect **Bryan, et al. (1980)** and Refaie and **Sabah, (1990)** stated that temperature attained during cooking would be able to kill any vegetative pathogenic food borne bacteria, but bacterial spores that survived cooking , and any bacteria that contaminated the meat as a result of carving or subsequent handling could have multiplied after cooking . The count of Enterobacteriaceae in cooked shawarma samples ranged from 3 x 10^2 to 3 x 10^4/g. with a mean value of 1.68 x 10^3/g.These results are in accordance with the finding obtained by **Ayaz , et al. (1985)**. Higher findings were reported by Christiansen and **King (1971)** and Ockerman and **Stec (1980)**. In this respect **Pace (1975)** stated that Enterobacteriaceae count exceeding 10^2 cells /g. is an index of high numbers of bacteria in food and unsanitary practices during manufacture and handling of this product. Types of Enterobaeteriaceae could be isolated with different percentage from the examined cooked shawarma samples as shown in table (2) were Citrobacter freundi 41.23%, Hafnia alvei 24.56%, Enterobacter spp. 20.18% and Klebsiella spp. 14.04%. S..aureus constitute a public health hazards **(Bryan, 1980)**. As many food poisoning outbreaks have been attributed to such microorganisms. The present result revealed that coagulase positive S .aureus count were ranged from 5 x 10^2 to 7 x 10^4 /g with a mean value of 7.4 x 10^3 as shown in table (1). Nearly similar results were obtained by **Ayaz, et al. (1985)** and **Mates(1983)**. Meanwhile, higher results of S. aureus were recorded by Robbs and **Robbs (1979) , Tiwari and Kadis (1981)** and **Acevedo, et al (2001)**. Ef-

forts should be directed towards preventing the multiplication of Staphylococci contamination, workers with sinus infection and those with abscess on their hands should be prevented from sharing in processing, handling of meat products before and after cooking **Nikodemusz, et al. (1962)**. Salmonella, Shigella and E. coli could not be detected in the examined samples of cooked shawarma.Similar result could be recorded by **Acevedo, et al. (2001)**. The sanitary quality of grilled meat sandwiches should be improved to be safe for human consumption by using raw meat products of excellent and known sources, quite examination of raw materials used in preparing meat sandwiches, meat sandwiches additives should be of good hygienic quality to minimize the final bacterial load of the sandwiches, all the utensils, knifes and equipments which are used in manufacturing meat sandwiches should be of good hygienic quality, strict application of hygienic measures during preparation, handling and serving meat sandwiches ,periodic medical examination for all workers in touch with meat sandwiches and complete prevention of eating meat sandwiches after elapsing of half hour from preparing without reheating at 100C° for at least 15 minute.

Table (1): Aerobic plate count, Enterobacteriaceae and Staph . aureus counts in examined cooked shawarma samples .

Types of micro organisms	Minimum	Maximum	Mean
Aerobic plate count	$26x10^3$	$32x10^6$	$33.8x10^5$
Entero bacteriaceae count	$3x10^2$	$3x10^4$	$1.68x10^3$
Staph.aureus count	$5x10^2$	$7x10^4$	$7.4x10^3$

Table (2): frequency of Enterobacter organisms detected in 50 cooked shawarma samples .

Types of micro organisms	No. of isolates	Percentage
Citrobacter freundi	47	41.23
Hafnia alvei	28	24.56
Enterobacter spp.	23	20.18
Klebsiella spp.	16	14.04
Total	114	

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الملخص العربى

التقييم البكتريولوچى للشورمة فى بورسعيد

مارسيل فخرى جلاب

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تم فحص ٥٠ عينة عشوائية من الشاورمة والتي تم جمعها من مطاعم مختلفة في مدينة بورسعيد. ولقد تم تقدير العدد الكلى للميكروبات الهوائية والميكروبات المعوية والميكروب المكور العنقودى الذهبى والتى تراوحت ما بين ٢٦ × ١٠^{٣} إلى ٣٢ × ١٠^{٦} / جم، و ٣ × ١٠^{٢} إلى ٣ × ١٠^{٤} / جم ، و ٥ × ١٠^{٢} إلى ٧ × × ١٠^{٤} / جم على التوالى والمتوسط العددى لهم كان ٣٣٫٨ × ١٠^{٥} جم، و١٫٦٨ × ١٠^{٣} جم، و ٧٫٤ × ١٠^{٣} جم على التوالى، وقد أمكن عزل الميكروبات الآتية:

Citrobacter freundi , Hafnia alvei, Enterobacter spp.and Klebsiella spp.

وقد تم مناقشة الاهمية الصحية ومدى خطورة هذة الميكروبات على صحة المستهلك.