Assessment the Microbiological Safety of Ready-to-Eat Meat and Chicken Products prepared in National, Local Restaurants and street vendors in Assiut city-Egypt

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Abstract- **A total of 200 ready to eat (RTE) meat products (40 of each) beef burger, kofta, Shawerma, Hawawshy and Chicken were collected from fast food restaurants and street venders. Samples were examined to detect the prevalence of *Salmonellae, L. monocytogenes* and *E coli* O157:H7. *Salmonellae* were isolated from 8 RTE products. *Listeria* spp. was isolated from 2 RTE meat products. *E coli* O157:H7 was detected in only one sample of beef burger. Measuring the quality of RTE chicken and Hawawshy sandwiches referring to the maximum time should not elapsed between cooking and consumption was done. The results indicated that the maximum time to keep the ready to eat chicken and Hawawshy at room temperature and 65°C were 3 hours.**

Determining the best time elapsed between cooking and consumption were recommended.

Keywords—**Kofta, Shawerma, Hawawshy**

I. INTRODUCTION

Grilled chicken, Kofta, Hawawshy, beef burger and Shawerma are the most common RTE sandwiches in Egypt sold in fast food restaurant. Shawerma is a popular meat sandwich of both beef and chicken in Middle East. Kofta is a middle-eastern street food made of ground lamb or beef formed into sausage shape and then grilled. The ingredients of Hawawshy are Egyptian Breads (Taboon), 1/2 kg of minced lamb, 1 large onion chopped, 1 large capsicum chopped, and 1 small chili (optional)- salt and pepper to taste. All ingredients are mixed. The mixture is spread on half of each bread, the other half of the bread to cover the mix. The bread is brushed with butter, and then it is wrapped tight with the baking paper. The prepared bread is placed on a baking tray. They are baked in the oven 120^{o}C for about 40 minutes or until the meat is tender. Shawerma, is a Middle Eastern Arabic-style sandwich-like wrap usually composed of lamb, goat, chicken, turkey, beef, or a Halal mixture of meats. It is a popular dish and fast-food staple across the Middle East and North Africa; it has also become popular worldwide. The classic Shawerma combination is pita bread or Taboon bread, hummus, tomato and cucumber, and the shaved meat itself. Typical additional toppings include Tahini, pickled beets. In outward appearance, it vaguely resembles the gyros of Greece or the (Turkish kebab in the sense that all use pita-wrapped meat, but the sauces are distinctly different.

Microbiological hazards continue to be one of the biggest threats to food safety. RTE foods are valuable source of animal protein, vitamins and minerals that promote growth and multiplication various microorganisms including food borne pathogens. CDC (1996) reported that 80% of Food borne outbreaks occur outside home associated with RTE food in restaurant and street vendors.

Salmonellae, *L. monocytogenes* and *E. coli* O157H7 are three major pathogens emerged as being of significant importance in terms of human health and diseases. These pathogens have frequently been associated with RTE meat products.

The main objectives of this work are to: 1) assess the microbial hazards and threats to human health that are associated with consumption of these foods, 2) assess the safety of some popular RTE foods prepared in international and national, restaurants and street vendors to detect *Salmonellae*- *L. m* and *E. coli* O157H7 and measuring the quality of some RTE meat sandwiches and chicken referring to the maximum time should not elapsed between cooking and consumption.

III. MATERIALS AND METHODS

Part 1

Incidence of Salmonella, L.m and E. coli O157:H7 in RTE meat and chicken Products

A total of 200 RTE sandwiches of meat and chickens were collected from fast food restaurants with different sanitation levels in Assiut City. The collected sandwiches include beef burger, kofta, Shawerma, Hawawshy and chickens (40 of each). All collected samples were obtained aseptically in sterile polyethylene bags and examined directly after transporting to the laboratory. The contents of each sandwich were removed aseptically. Under complete sterile condition, Isolation and identification of Salmonella, (APHA, 1992) *L. Monocytogenes* (Hitchins 1990) and *E. coli* O157:H7 (Samad pour, et al., 1991) were detected.

Part 2

Measuring the Quality of Some RTE Meat and Chicken Sandwiches referring to the Maximum Time should not Elapsed between Cooking and Consumption

Ten RTE samples of chicken and Hawawshy (5 for each) were collected from fast food restaurants and transported directly to the laboratory for examination. Each sample was divided into three parts, the first part was kept at room temperature, the second was kept at 65^0C, and the last was kept in refrigerator. Each sample was reheated well before examination. Samples from each group were examined at 0, 3, 6, 12 and 24 hours for enumeration of the TBC, total coliform count and *staph aureus* count.

Sample preparation

Collected samples were prepared according to technique recommended by ICMSF, 1978. Then the following tests: APC according to APHA, 1984, coliform count according to Patti Wilson 2001 and Staph. *aureus* count according to Barid-Parker, 1962 were done.

The obtained results were compared with the microbiological standards of RTE food in Australia, New Zealand (2001) and Hong Kong (2002)

III. RESULTS AND DISCUSSION

Part 1

Incidence of Salmonella , Lm and E. coli O157:H7 in RTE meat and chicken Products

Table 1. Incidence of food poisoning bacteria in Ready to Eat Meat Products in 40 samples of each

Products	S*al.*	*L.m*	*E. coli* 157:H7
Beef burger	1	-	1
Kofta	1	-	-
Shawerma	2	-	-
Hawawshy	1	1	-
Chicken	3	1	-

From the results obtained in Table (1) it was evident that 8 strains of *Salmonellae* spp. were isolated from 200 ready to eat meat products. This finding disagreed with Ebraheem, 2001, El-Mossalami, 2003, Ismail, 2006. They recorded negative results of Salmonella spp. in the examined Hawawshy Sandwiches. The incidence of salmonella spp. isolated from RTE chicken samples was 7.5%, Gardinale et al., (2005) recorded higher incidence (10%), while, Along and Dyekole (1982) isolated Salmonella spp. from 72% of the examined samples.

L.m was isolated from 2 samples of RTE meat products. Higher incidences were reported by Coillie et al. (2004), Angelidis and Koutsoumanis (2006), Heredia et al., (2007), Jalali and Abed (2007), Zhang et al., (2007). El-Gazzar and Sallam, 1999). Ljiljana et al., 2007 failed to isolate *L.m* from RTE meat products. All the examined samples of RTE Kofta, Shawerma and beef burger show negative results for *L.m.* This results in harmony with that recorded by Mohamed and Ali, 1999, El-Mossalami, 2003 Abd El-Aziz, 2004. On the other hand, El-Mossalami 2003 failed to detect *L.m* in

all of the examined RTE Hawawshy samples.

The chicken samples were contaminated with *L.m* in percentage of 2.5%, which disagree with the results obtained by Mohamed and Ali, 1999, in which they obtained higher incidence of *L.m* (10%). while, El-Mossalami, 2003 could not detected *L.m* from chicken samples.

E. coli O157:H7 were isolated from RTE meat products with an incidence 0.5%. This result agreed with that obtained by (Heurvelink et al., 1999). They isolate *E. coli* O157:H7 from 0.3% of the examined ready to eat meat products. Culukanli 2006 illustrated higher incidence of *E. coli* O157: H7. He recorded 11.25% of the RTE meat products had contaminated with E. coli O157:H7. Abo-zaid et al., 2001, Abd El-Aziz 2004, Bohaychuck et al., 2006 failed to isolate *E. coli* O157: H7 from RTE meat products.

Concerning beef burger, it was clear that only one strain of *E. coli* O157:H7 was isolated.. It was nearly similar to the results of (Kassem and Sabry 2003). They isolated *E. coli* O157:H7 from 3.3% of beef burger.

Presence of *E coli* O157:H7 in RTE meat products attributed mainly to post cooking contamination. Kalian and Hassan 2003 isolated *E. coli* O157:H7 from food handlers in restaurant in Khaliobia governorates.

Food borne illness associated with the consumption of RTE has been reported all over the world. Poor personal hygiene of food handlers are some of the main causes of contamination of street-vended food (Barro et al., 2006).

Part 2

Measuring the Quality of Some RTE meat and chicken Sandwiches (the Maximum Time Elapsed between Cooking and Consumption

The effect of the time elapsed after cooking and consumption of some traditional Egyptian meat products at (room temp., 65°C& chilling) on the APC, coliform and *Staph. aureus* was studied

RTE Chicken

The results showed that the APC at room, 65°C and chilling storage temperatures were equal 3.4 log10 CFU/g after cooking (time zero). According to the some international standards after 3hrs of storage, the product at room and 65°C temperatures the APC counts were acceptable but after 3 hours the products became unsatisfactory In case of chilling, the chicken product was satisfactory, and unsatisfactory after 3h, 6h and 12h respectively.

RTE Hawawshy

Regarding the RTE Hawawshy, the all examined samples stored at room and 65°C became unsatisfactory when examined at the end of 3 hours. The results declared that when Hawawshy stored either in room or 65°C it considered fit for consumption before 3hrs elapsed after cooking in which the results at zero time has acceptable count ($<10^2$) while after 3hrs it has unsatisfactory coliform count($\geq 10^2$)

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