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HYGEINIC STATUS OF READY TO EAT FAST FOOD

Thesis Presented
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Abstract

The first part of this study included the examination of 300 random samples of the following types of RTE meat meals which are (fish fillet, grilled chicken, boiled chicken, chicken shawarma, shish tawook, fried chicken fillet, roast beef, boiled meat, beef piccata, escalope panee, kebab meat suit, beef kofta, beef fillet, local liver and Alexandrian liver).These samples were collected from different restaurantsof Egypt to examine the bacterial count of Aerobic plate count, Coliforms count, Enterobacteriaceae, and presumptive staphylococci plus the isolation of E. coli, Salmonella, and Staphylococcus aureus. The obtained results revealed that samples of boiled chicken, boiled meat and beef kofta suffer from high bacterial load in terms of Aerobic plate count, Enterobacteriaceae, Coliforms count and Presumptive staphylococci which clarify the bad hygienic practices and wrong cleaning procedures. *E.coli*, *Salmonella* and *S. aureus* failed to be isolated in all samples. The second part of the study was designed to show the effect of improving personal hygiene of the employee who work in kitchens and serving of RTE and cooked meals (in terms of cleaning, applying of the good manufacturing practices and methods of storing of cooked food in the period from preparing it till serving for the patient) on the quality traits of 60 samples of boiled chicken, boiled meat and beef kofta (20 samples each). The bacteriological quality of boiled chicken, boiled meat and beef kofta improved after training. It is recommended to keep caring about employee hygiene and their knowlegment about hygiene and personal hygiene and to take care about the quality of used ingredients and setting the hygienic measures that control production, storing and distribution of such meals.

Key words: Quality, ready to eat, meat meals, restaurants, bacteriological examination, ready to eat meat meals.

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INTRODUCTION

Meat is considered as an important source of protein, essential amino acids, B complex vitamins and minerals. Therefore, it offers a highly favorable environment for growth of pathogenic bacteria. Poultry meat is one of the most popular food products worldwide containing several nutritional factors such as high level of protein and low-fat content. On the other hand, poultry meat is an excellent substrate for the growth of a wide variety of microorganisms including pathogens and spoilage microorganisms.

Red meat provides animal protein of high biological value for consumers at all ages, where they contain all the essential amino acids required for human growth, higher proportion of unsaturated fatty acids and less in cholesterol value. Moreover, meat is good source of different types of vitamins and minerals. Meat meals can be exposed to several ways of contamination through improper preparation and handling of foods which constitute the most direct and harmful source of microbiological contamination. The risk of contamination is increased by storage of food at ambient temperature, by using insufficiently high temperature to reheating the food, and adding contaminated ingredients at stage which no further heat treatment was applied

Ready-to-eat foods (RTE) food can be described as the status of food being ready for immediate consumption at the point of sale, it could be raw or cooked and can be consumed without further treatment. They can be described as foods that can be bought directly from street vendors or hawkers and are consumed at the point of sale or at later

time without further processing. It could be raw or cooked, hot or chilled and can be consumed without further treatment (**Tsang, 2002**).

There is an increase in the consumption of ready-to-eat fast food because of a change in social patterns, which characterized by increased mobility, large numbers of itinerary workers and less family centered activities. Thus, good manufacturing practices of foods taken outside the home such as good sanitation or sanitary measure and proper food handling have been transferred from individuals/families to the food vendor who rarely enforces such practice.

Ready to eat meat or poultry products may be contaminated with high levels of some pathogens that could reach 10^6 CFU/gm.

Microbiological quality of food indicates the microbial contaminants it has, a high level of contamination indicates low quality of food storage and its handling more likely to transmit diseases (**Oranusi et *al*., 2013**). Bacterial count in prepared food and water is a key factor in assessing the quality and safety of food. It also reveals the level of hygiene adopted by food handlers in the course of preparation of such foods. Food and water in particular have been described as vehicle for the transmission of microbial disease among which are those caused by coliforms (**Nkere et *al*., 2011**).

Unfortunately, such products offer ideal medium for microbial growth for they are highly nutritious, have a favorable pH, and are normally lightly salted or not salted at all (**Johnston and Tompkin, 1992**).

The aerobic plate count indicates the level of microorganisms in a product and provides general estimate of live aerobic bacteria.It can be considered as an indicator of quality, not safety, and cannot directly

contribute towards a safety assessment of ready-to-eat food(**Health Protection Agency, 2009)**. Processed meat meals are subjectedto be contaminated with several types of microorganisms from different sources during the period elapsed from the time ofslaughtering, preparation, processing and cooking to consumption. These microorganisms varied according to the method of manufacture, quality of used non-meat ingredients, and contamination level during the processing chain, packaging and storage (**Narasimha and Ramesh, 1988**).The total coliforms count may be used as a board base indicating fecal contamination of meat products due to inadequate processing and/or post processing recontamination of meat (**ICMSF, 1998).**E. coli is an important organism involved in food borne disease, it is considered as a good indicator of possible fecal contamination. Their presence in poultry cuts and its products indicates lack of proper sanitation. Moreover, direct and indirect fecal contamination **(Clarence et *al*., 2009).**

Staphylococcus aureus plays a great role in bacterial contamination of fast foods, because food handlers during preparation and processing may touch fast foods which are usually eaten without sufficient cooking or heating (**Davies and Board, 1998**). Food-borne infections caused by members of the genus Salmonella continue to be a problem for public health all over the world. These infections cause considerable morbidity, mortality and economic burden and are especially severe in the very young, the elderly and the immune-compromised people.

According to **WHO (1989),** food handling personnel play a very important role in ensuring food safety through-out the chain of food processing, storage and preparation. Street vended food is controlled by relevant authorities via physical and medical screening of potential food vendors before being issued with certificates and are allowed to play their trade. Food vendors are screened for communicable diseases and declared medically fit by medical authorities but this is not so with so many food vendors around the world.

The cross-contamination of such foods with pathogenic microorganisms could occur during the processing of ready fillings as well as during the preparation of fillings and sandwiches. Although the microbial quality of many RTE foods has been the subject of numerous investigations in more developed countries, in Egypt there is a paucity of information on the microbial quality and safety of this type of food products. In developing countries like Egypt, where effective food safety controls by concerned regulatory agencies are yet to be realized, evaluation of food microbial hazards and their indicators would help provide criteria for setting functional microbial guideline values.

Steps to improve local surveillance of quality and safety of RTE foods are needed to help ensure public health. The benefits in cost and convenience derived from RTE foods should always be coupled with safety assurance. Street vended and restaurant food can contribute to food security of those involved in its production, particularly, suppliers of raw produce, food processors, and consumers

Safe food is a basic human right despite the fact that many foods are frequently contaminated with naturally occurring pathogenic microorganisms which cannot be detected organoleptically (seen,

smelled or tasted) but can cause diseases including death especially if the way they are conserved during exposition for sale provides condition for those microorganisms to grow and reach considerable levels of contamination (**WHO, 2000**).

Outbreaks of foodborne infections are preventable but are facilitated by several factors; these include staff carriers, poor hygiene conditions in the kitchens, carelessness, and lack of training of food handlers. The particular danger of contaminated food in restaurants is that such food is sometimes given to stressed consumers.

Therefore, the approach of the present study was planned out to secure the following topics:

A- Investigation of the bacterial quality attributes of some ready to eat meat meals in Cairo governorate.

B- Improving the bacterial quality of some ready to eat meat meals through application of good manufacturing practices (GMPs).

Review of literature

I. Sources of contamination and the incidence in ready to eat meals

Bryan and lyon (1984) stated that microorganism could be transferred from the raw product to worker's hands, equipment surface or cleaning cloths or sponges which ought to be considered as the main sources of cooked food contamination.

These raw foods which are received in the food processing unit in restaurants are contaminated with pathogenic microorganism such as *Staph. Aureus,* Salmonella, Coliforms, *E. coli,* etc … Salmonella are frequently isolated from raw chicken **(Morris and Wells, 1970).**

Lotfi et al. (1990) found that the mean values of the aerobic plate count (APC) of cooked meat collected from Assiut University Hospitals was $2.1x10^7$ CFU/g whereas that of coliforms and *Staph. Aureus* were $9.3x10^2$ and $2.5x10^2$ CFU/g, respectively. Coagulase positive *Staph. Aureus* constituted 6% of the isolated *Staph. Aureus* strains. They isolated *E. coli* from 17% of cooked meat sandwiches.

Ahmed (1991) reported that the bacteriological examination of 25 samples of cooked beef kabab showed that the mean values of APC, *Staph. Aureus* count and coliforms (MPN/g) were $5x10^5$, $7x10^2$ and $5x10^2$ CFU/g, respectively. He also found that the incidence of

E. coli was 12% while the incidence of *Staph. Aureus* was 12%.

EL-Sherif et al. (1991) reported that the average count of APC was 6 x 10^5 CFU/g in the examined samples of meat sandwiches.

Moussa et al. (1992) examined a total of 30 ready-to-eat meat samples collected from University restaurants. They found that the mean value of *Staph. Aureus* count was 5.8 x 10^4 CFU/g.

Arumugaswamy et al. (1995) examined a total of 331 food samples consisting of 219 raw and 112 ready to eat cooked foods in Malaysia for the presence of Salmonella. Accurately, Salmonella were isolated from 32% of the examined raw foods and 17% of the ready to eat cooked foods.

Sharma et al. (1995) investigated 290 samples of meat and meat products. They isolated 73 strains *E. coli* which were grouped into 20 biotypes from A to U, on the basis of 5 biochemical tests. The most abundant biotype was type A (15.38%).

Ekanem (1998) reported that APC and coliform counts of meat products sold on the streets were between 10^7-10^9 CFU/g and between 10^2-10^3 CFU/g.

Longree and Armbuster (1996) declared that the microbial risks associated with consumption of grilled chicken are quite high. Poultry and poultry products are extremely perishable and usually harbor pathogenic microorganisms. Chicken products have been reported as vector of food poisoning outbreaks especially due to Salmonella species.

Ekanem (1998) reported that APC and coliform counts of meat

products sold on the streets were between 10^7-10^9 CFU/g and between 10^2-10^3 CFU/g.

El-Sherif and El-Mossalami (1998) found that 3.3% of the examined ready to eat meat product samples were positive for Salmonella.

Mosupye and Holly (1999) examined 51 ready to eat street vended foods in Johannesburg, South Africa for their microbiological quality. Standard method was used to determine the mean values of aerobic plate counts which were 2.0±0.4 log10 CFU/g. The author isolated *Salmonella spp*. and *E. coli* from 2% of the examined ready to eat street vended food samples.

Abd-Allah and Hassan (2000) examined random samples of shawarma (raw and cooked) for APC and *Staph. Aureus* count and revealed that APC and *Staph. Aureus* count were $3.8x10^6$ and $2.5 x 10^3$ CFU/g in raw shawarma and $2.1x10^5$ and $1.2x10^2$ CFU/g in cooked one.

Aberle et al. (2001) pointed out that total viable bacterial count and coliforms counts are considered as indices of quality, which give an idea about the hygienic measures during further processing and help in assessing the keeping quality of further processed chicken meat products.

Ehirl et al. (2001) demonstrated that the preparation and handling of foods may constitute the most direct and harmful source of microbiological contamination. The risk of contamination is increased by storage of food at ambient temperature, by using insufficient high temperature to reheating the food, and adding