BACTERIAL CONTAMINATION OF FROZEN IMPORTED MEAT AND SAUSAGE IN BASRAH CITY

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ABSTRACT

The study was conducted for the purpose of investigating the intestinal bacterial contamination in imported red meat and imported sausage. The study was carried out on 40 samples of imported meat and 30 samples of sausage. The samples were collected from different areas in Basrah city (Al-Khaleej district, Al-Hayania, Al-Geneina, Five miles, Al-Ashar and Basra Market). Bacterial contamination in imported products (red meat and sausage)was investigated. In addition, total bacterial count for samples was done and compared with specific control rates. Meat samples extracts were cultivated in different developmental and diagnostic media for the purpose of screening for bacterial contamination mainly represented by coliform bacteria, *Klebsiella pnumonia* and Proteus spp. The results of the current study showed a high level of bacterial content in imported red meat and imported sausage, where the numbers of *coliform bacteria, Klebsiella pneumonia* and *proteus spp* above the permitted limit set by the Iraqi central standardization and quality.

INTRODUCTION

Red meat is an essential food for humans in all countries of the world. It is considered one of the main sources of protein, vitamins, minerals, and fat for human beings (1). The meat is a source of contamination from slaughtering until the end of selling, since the contamination of the carcasses occurs during the bleeding and carcass processing (washing, cutting, packaging and shipping) (2).

Meat is an excellent vehicle by which many pathogens (bacteria, viruses/prions and parasites) can reach an appropriate colonization site in a new host. Although food

production practices change, the well-recognized food-borne pathogens, such as *Salmonella spp.* and *Escherichia coli*, seem able to evolve to exploit novel opportunities, for example fresh produce and even generate new public health challenges (3). The colloidal or viscous substance on meat and meat products especially those meat long-overdue market exposure can result from excess growth Enter toxigenic *Escherichia coli*(4). Workers and equipment are also among the most likely sources of contamination during packaging and slicing (5). Food- borne organisms challenge safety of public health each year, from this point, this work aimed to diagnosis some types of bacterial contamination imported meat and sausage count total bacterial for samples and compare them with specific control rates.

MATERIAL AND METHODS

Samples collection: A total of seventy sample of imported red meat(40) and sausage(30) were collected. The samples were collected from 6 various areas in Basrah city namely (Hay Al-Khaleej Al-hayania,Al-Geneina, five-mile area, Al-Ashar, and Basra Market).

Bacteriological examination : Preparation of samples was done according to the method (6).Briefly, meat samples (25gm) were added to physiological salt solution (225 ml) and mixed with a blender for 3 min. Sample (1 ml) was transferred to tube containing 9 ml of normal saline to make serial dilution. Then, 1 ml for each dilution dish in duplicates to obtain the desired mitigation. Under sterile conditions, 10 ml of culture medium was added to each petri dish and mixed. The petri dishes were then incubated at 37°C for 24 h. After that, the counting of colonies was calculated according to colony forming units (CFU).

The number of colonies ranging from_30 to300 colonies were counting and the rate was extracted by calculate the number of colonies in the two dishes and multiply the inverse dilution coefficient. Bacterial isolates were diagnosed by using biochemical diagnostic tests (Enterosystem 18R)(7). One gram of each sausage sample was ground with a sterile pestle until it became smooth.

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The sterile distilled (9 ml) was then poured into the mortar. After that, the sample was transferred to a test-tube to make serial dilution up to 10^{-7} dilution. To determine total viable counts, 1 ml of each dilution (10^{-5} and 10^{-7}) spread on nutrient agar plates in triplicates. The plates were then incubated at 37° C for 24h.

RESULT

Total bacterial count in one gram of imported red meat in different areas ($\log_{10}$ CFU/gm) Where *E. coli* recorded the highest rate in Al-Ashar and lower rate in Basra market, while the highest rate of *Klebsiella pnumonia* was in Basra market and the lower rate in Hay Al-Khaleej, and finally for *Proteus spp.*was the highest contamination rate for samples in area Al-Asha and the lowest in Hay Al-Khaleej ,all these data was represented in table (1).

Table (1): Bacterial count in one gram of imported red meat

Area	*E.coli*	*Klebsiella pnumonia*	*Proteus spp*
Hay Al-Khaleej	$35*10^5$	$40*10^5$	$20*10^6$
Al-hayania	$40*10^4$	$55*10^4$	$25*10^5$
Al-Geneina	$30*10^5$	$50*10^5$	$30*10^4$
5-mile area	$25*10^6$	$45*10^6$	$35*10^5$
Al-Ashar	$50*10^4$	$43*10^6$	$45*10^4$
Basra market	$22*10^6$	$62*10^4$	$40*10^6$

Total bacterial count in one gram of imported sausage in different areas ($\log_{10}$ CFU/gm).As the previous table, *E. coli* count was high in Al-hayania and low count in Al-Ashar, but the count of *Klebsiella pneumonia* was high in Hay Al-Khaleej and low count in Al-Hayania and 5-mile area, whlie in Basra market for *Proteus spp*. and low in Al-Geneina, all these data was shown in table (2). Analytical analysis for distribution of importedred meat according to collection areas are shown in figure 1.

Table 2: Bacterial count in one gram of imported sausage

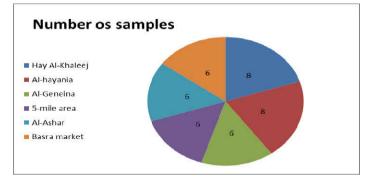| Area	E.coli	Klebsiella pnumonia	Proteus spp
Hay Al-Khaleej	$40*10^8$	$49*10^7$	$35*10$
Al-hayania	$60*10^7$	$23*10^5$	$25*10^6$
Al-Geneina	$32*10^5$	$45*10^7$	$23*10^8$
5-mile area	$33*10^5$	$23*10^8$	$32*10^5$
Al-Ashar	$25*10^6$	$39*10^5$	$33*10^5$
Basra market	$45*10^8$	$41*10^8$	$40*10^8$

Figure 1:Distribution of samples(importedred meat) according to collection areas.

The percentages   of bacteria that detected in one gram of imported red meat, the percentage of *E.coli* was high and low for *Proteus spp.* as shown in table(3).

Table 3: Diagnosis some types of bacteria in imported red meat

Type of bacteria	Isolation	
	No. of positive	Percentage
Klebsiella pneumonia	13	**5.2**
Proteus spp.	10	4
E.coli	17	**6.8**

The percentage of bacteria that detected in one gram of imported red meat are represented in figure2.
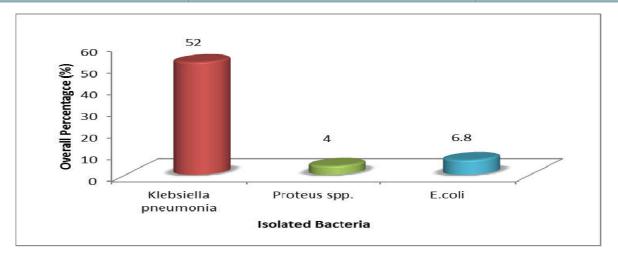
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Figure 2 : Percentage of bacteria that detected in imported red meat.

The Enterosystem 18R used for diagnosis some types of bacteria. This kit was used to diagnose some types of bacteria, as it depends on the color change for biochemical test and the result appeared as the following colors in figure 3.

Figure 3: The result of Enterosystem 18R kit which used for diagnosis some types of bacteria.

The percentage of *Klebsiella pneumonia* was high and the low percentage for *proteus spp.* that diagnosed in imported sausage as shown in table 4.

Table 4: Diagnosis some types of bacteria that isolated from imported sausage

Type of bacteria	Isolation	
	No. of positive	percentage
Klebsiella pneumonia	8	**4.2**
Proteus spp.	9	**1.2**
E.coli	12	**3.6**

The distribution of samples (imported sausage according to the collection areas are shown in figure 3.
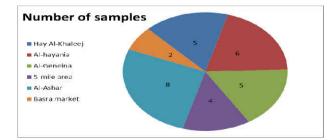

Figure4: Distribution of samples(sausage) according to collection areas

The percentage of bacteria that detected in one gram of imported sausage are represented in figure 5.
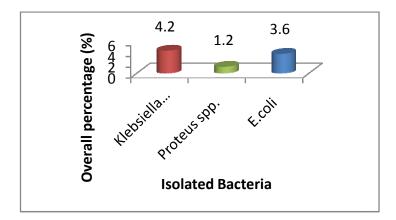

Figure5: Percentage of bacteria that detected in imported sausage

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DISCUSSION

The current study revealed that total bacterial count in red meat for *E.coli, Klebsiella pneumonia* and *Proteus spp.* according to the collection area was high than allowable limit . Many studies explained that the contamination of red meat especially with *E.coli* match the result in this research(8) .The species of *Citrobacter, Klebsiella* and *Enterobacter* are the most predominant species in samples collected from slaughter house (9).

Another study conducted on 120 samples of beef meat that collected from different areas for study. The superficial bacterial contamination was noticed that the contamination with *E.coli* was high reflects the lack of health conditions in slaughterhouse (10). The high total viable counts from collection areas might be attributed to improper cleaning and sanitizing of equipment and poor employee hygiene within the store and more importantly due to erratic power supply in these areas.

The *Enterobacteriaceae* counts for all samples obtained from Hay-Al Khaleej and Basra market were above the limit specified by the British Standard Institute (11).

The high enterobacteriaceae count is an indication of potential microbial contamination during processing, distribution and storage. Their presence in large numbers in food indicates inadequate processing/or recontamination due to cross contamination by raw materials, dirty equipment or poor hygienic handling (12).

Enterobacteriaceae can be found in intestinal tract as normal flora. They are widely distributed in nature. *E. coli* and *Enterobacter spp.* have the potential to cause diarrhea (13). *Proteus sp.* is associated with food deterioration and hence its presence cannot be directly related to infections, but as a contaminating agent (14).

Proteus sp. is involved in the decomposition of carcasses and can be found in faeces, putrefied meat, sewer water, suppurating wounds, and others (15). *Klebsiella* sp. is one of the bacteria that can be found in a lot of environments including the intestinal tract of humans and animals, plants, soil, and water. Several researchers have reported that the meat samples were contaminated with high level of *Klebsiella pneumonia*.(16)

التلوث البكتيري للحوم المستوردة المجمدة و للصوصج

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الخلاصة

اجريت الدراسة لغرض التحري عن الملوثات البكتيرية المعوية في اللحوم الحمراء المستوردة والصوصج المستورد، حيث تم شراء ٤٠ عينة من اللحم المستورد كل عينة بمقدار كيلو واحد اما الصوصج ٣٠ عينة كل عينة بمقدار٣٧٥ غم من مناطق مختلفة من محافظة البصرة(حي الخليج، الحيانبة ،الجنينة، خمسة ميل، العشار و سوق البصرة). زرعت مستخلصات عينات اللحوم على اوساط زرعية إنمائية وتشخيصية مختلفة لغرض التحري عن التلوث البكتيري المتمثل بشكل اساسي من انواع بكتريا القولون Coliform bacteria و Klebsiella pnumonia و Proteus spp. . أظهرت نتائج الدراسة ارتفاع مستوى المحتوى البكتيري في اللحوم الحمراء المستوردة و الصوصج المستورد حيث كانت معدلات اعداد بكتريا القولون و Klebsiella pneumonia و proteus spp. اعلى من الحد المسموح به والمحددة من قبل الجهاز المركزي للتقييس والسيطرة النوعية العر اقي وكذلك بالنسبة لعينات الصوصج.

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