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Original Research Article

Bacterial Quality of Meat Products From Various Basrah Restaurants

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Fifteen samples of meat product (before and after cooking) were collected from various Basrah restaurants to determine the bacterial quality. The present study was found of total aerobic was 2.3x109,4,5x108 from hamburger and 9.2x108,6.6x104 from kebab and 4.6x108,1.2x102 from kobba and 3.5x105,2,6x102 from beer shaearma and 4.3x104,1.9x102 from tekka. And the total coliform bacteria was 6.2x104 , 8.1x102 from hamburger and 7.4x104 , 3.5x102 from kebab and 1.2x102 , 0.8x102 from kobba and 4.5x102 , 3.3x 102 from beef shawarma and 0.6x102 from tekka. Total fecallo coliform bacteria was 3.8x103 , 0.9x102 from hamburger and 6.5x104 , 0.4x102 from kebab and 0.98x102 , 0.006x102 from kobba and 3.3x104 , 0.09x104 from beef shawarma and 0.04x102 from tekka. Total psychrophilic bacteria was 4.8x102 , 0.7x102 from hamburger and 1.6x102 , 0.06x102 from kebab and 0.6x102 , 0.08x102 from kobba and 00.9x102 from beef shawarma and 0.06x102 from tekka.

Key words: Basrah, Bacteria, Kebab, Hamburger.

INTRODUCTION

Meat refers to animal tissue used as food, mostly skeletal muscles and associated fat, but it may also refer to organs, including lungs, livers, skin, brains, and bone marrow[1]. Food-borne pathogens are the leading cause of illness and death in developing countries, costing billions of dollars in medical care and social costs [2]. Changes in eating habits, mass catering complex and lengthy food supply procedures with increased international movement and poor hygiene practices are major contributing factors[3]. Contaminated raw meat is one of the main sources of food-borne illness[5, 6]. Meat is the main edible part of domestic mammals; however, recent definition includes species, as well as fish, shellfish, poultry and exotic species such as frogs and allegation[7].The influence of environmental factors (product composition and storage conditions) on the selection, growth rate and metabolic activity of the bacterial flora is presented for meat (pork and beef) and cooked, cured meat products.

The predominant bacteria associated with spoilage of refrigerated beef and pork, are Brochothrix thermosphacta, Corynebacterium spp., Enterobacteriaceae, Lactobacillus spp ., Leuconostoc spp., Pseudomonas spp and Shewanella putrefaciens.8,9,10 The main defects in meat are off-odours and off-flavours, but discolouration and gas production also occur. Bacteria associated with the spoilage of refrigerated meat products; causing defects such as sour off-flavours, discolouration, gas production, slime production and decrease in pH, consist of B. thermosphacta, Carnobacterium spp.

Luctobacillus spp. Leuconostoc spp[10]. Bacterial contamination of meatproducts is unavoidable consequence of meat processing11. Hygienic and quality control methods of meat and meat products, especially in food catering have been recommended in many countries[12]. Without proper hygienic control, the environment in butcher"s area can act as important sources of bacterial contamination.[13,14] No comparable data were available regarding the assessment of food safety practice, food borne diseases and microbial load of meat cutter surfaces in butcher shops in Mekelle city. These factors could hinder government"s ability to accurately apply measures on the impact of food contamination problems in public health 15, 16. Various environmental effects are associated with meat production. Among these are greenhouse gas emissions, fossil energy use, water use, water quality changes, and effects on grazed ecosystems.[17, 18, 19]

The aims of study

The aims of the present study are to:

1. Identify of bacterial types from various source of meat products
2. Determine the bacterial numbers present in meat products
3. Identify the fecal contamination of meat products by isolate total aerobes, fecal aerobes , psychrophilic bacteria .

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4. The above mentioned steps were carried on hamburgers, kebab, kippa , ghas.

Materials and Method

Fifteen samples were collected from meat of many shops and restaurants in Basra before and after cooking include hamburgers, kebab, kippa and ghas. One gram of sample pureed well and placed in sterilized test tube containing brain heart infusion broth (HiMedia) and incubated for 4-6 hours at 37 C in the incubator. Loop full of media was streaked on nutrient agar, blood agar, macConkey agar and incubated at 37 C for 18 – 24 hours.

The bacteria were diagnosed by supervisor according to routin laboratory technique (Forbes et al., 1998). Serial dilutions were used to calculate the number of various types of bacteria. All cultures media sterilized by using autoclave (15 pound /cm) 121 C for 15 minute. All glass and metal materials sterilized by using oven (180-200) C for 1-2 hours.

The following media were used to isolate the different bacteria from various meat products according to American Public follows: as (A.P.H.A., 1985) Health Association

1. MacConkeny Broth for total coliform (TC)
2. MFC Broth for fecal coliform (FC)
3. Asculin Azide Agar for fecal streptococci (FS)
4. Nutrient Agar for total aerobic bacteria (TB)

Discussion

Aerobic plate count (APC) is a measure of microbial quality of the meat. Presence of microbes in high numbers (APC >10CFU/cm62) fast tracks the spoilage of the meat. According to the Raw Meat Grading and Marketing Rules (1991, APC of 60% of analyzed samples must not exceed 10CFU/g or cm, whereas 40% of the samples may have counted up to 1072CFU/g or cm220.Significantly higher mean indicate the inferior quality of transportation and storage conditions, and supportive environment of retail outlets for the microbial growth.[21,22,23]

Higher level of aerobic plate count in this study is in accordance with previous studies [24, 25, 26,27,28,29]. Significantly higher level of contamination in the meat shops as compared to the abattoir have also been reported previously[30]. Although the microbial contamination of abattoirs was lower as compared to the retail outs, it was higher as compared to reports from developed countries and do not conform to EU specifications.[31, 32]

E.coli count in meat products indicates the hygienic qualities of meat. In this study, we only detected and enumerated the E. coli irrespective of pathogenic or nonpathogenic strain to estimate the level of hygiene. Out of 140 samples, E. coli were present in a total of 63 (45%) samples, including abattoirs[18,22] and retail outlets 30,33which were higher than established limits in guidelines [5,11,16,18,20]. Similar results have also been reported for retail chicken (>90% incidence of E. coli) in Australia.[12, 17, 25] Only when the bacteria are in the form of a vegetative cell are they able to grow in food. However, some types of bacteria are able to change into a different form, called a spore.[4] When bacteria are in the form of a spore, they cannot grow in food. One key concern with spores is that proper cooking does not destroy them. Cooking will heat shock the spore so that it can turn back into a vegetative cell. If potentially hazardous food is cooked and then allowed to sit at room temperature, the heat shocked spores become vegetative cells, the vegetative cells then grow, and if they grow in large enough numbers, they could cause foodborne illness.[34] Therefore, it is very important that potentially hazardous foods be maintained at proper temperatures after cooking. If they are not at proper temperatures, they must be thrown out after four hours. Some bacteria form toxins (or poisons).[35] Not all toxins are destroyed by proper cooking. Therefore, if potentially hazardous food is kept in the temperature danger zone for more than four hours, toxins might form.[7] Cooking or reheating potentially hazardous food that has been temperature abused will not always make it safe to eat.[11] All post-cook handling should be minimized and the utmost care given to everything that may come into contact with the cooked product.[12, 15] Prevent cross contamination from uncooked product. Sequester raw and cooked product areas and regulate the flow of personnel, carts, and equipment between those areas. Post- process sanitation is critically important.

Sampling and testing food contact surfaces and other environmental surfaces for Listeria spp. or Listeria-like organisms provide information on potential sources of Listeria monocytogenes contamination. On-site construction can free harbored L. monocytogenes within the plant environment, requiring extra diligence put toward testing and sanitation. See FSIS Listeria Rule, Directive and
Compliance Guidelines for additional information on L. monocytogenes control in RTE establishments. Pathogen contamination in meat is not destroyed by cold storage and must be prevented or eliminated.15, 18, 19, 20 Ensure the cleanliness and microbiological quality of spices added to cooked product as a surface rub.18 unless other methods such as pH or water activity level are used to prevent growth, proper temperature and time limits should be maintained. Water activity (a W) <0.85: Inhibits enterotoxigenic staphylococcal growth aerobically, but the manufacturer will have to take additional measure to prevent mold growth. PH <4.6: Inhibits Clostridium botulinum growth and toxigenisis under ordinary conditions. For retorted (canned foods) pH 4.6 is the border between “high acid” and “low acid” products. In non-retorted products, other pathogens can grow below pH 4.6, but additional factors such as nitrite, lack of moisture, or solutes such as salt are usually contributing inhibitory factors. If an establishment cites pH 4.6, its validation must include those other factors. 4, 7,9,12 Moisture Protein Ratio (MPR) of 3.1:1 or less and a pH of 5.0: This is a policy listed in the “Labeling Policy Book: <http://www.fsis.usda.gov/OPPDE/larc/policies/ PolicyBook.pdf>. Moisture Protein Ratio is a “product standard” not a critical limit for shelf stability unless the MPR is scientifically linked to formulation and other validated factors such as pH, brine, or a W.[21, 33, 35]

Results

Numbers of various bacterial types isolated from hamburger were illustrated in table 1 , Total aerobic bacteria recorded 2.3 x 109 and 4.5 x 108 before and after cooking while other bacteria recorded various numbers and percentages .

Table1: Illustrate the number of various bacterial types isolated from hamburger before and after cooking

Types of bacteria	hamburger		p
	Before cooking (cfu\ml)	After cooking (cfu\ml)	
Total aerobic bacteria	2.3×10^9	4.5×10^8	0.05
Total coliform bacteria	6.2×10^4	8.1×10^2	0.001
Fecal coliform bacteria	3.8×10^3	0.9×10^2	0.05
Psychrophilic bacteria	4.8×10^2	0.7×10^2	0.05

Numbers of various bacterial types isolated from kebab were illustrated in table 2, Total aerobic bacteria recorded 9.2 x 108 and 6.6 x 104 before and after cooking while other bacteria recorded various numbers and percentages

Table 2: Illustrate the number of various bacterial types isolated from kebab before and after cooking

Types of bacteria	kabab		p
	Before cocking	After cocking	
Total aerobic bacteria	9.2×10^8	6.6×10^4	o.oo1
Total coliform bacteria	7.4×10^4	3.5×10^2	0.001
Fecal coliform bacteria	6.5×10^4	0.4×10^2	0.001
Psychrophilic bacteria	1.6×10^2	0.06×10^2	0.05

Numbers of various bacterial types isolated from kobbar were illustrated in table 3, Total aerobic bacteria recorded 4.6 x 108 and 1.2 x 102 before and after cooking while other bacteria recorded various numbers and percentages .

Table 3: Illustrate the number of various bacterial types isolated from kobbar before and after cooking

Types of bacteria	kobba		p
	Before cocking	After cocking	
Total aerobic bacteria	4.6×10^8	1.2×10^2	0.001
Total coliform bacteria	1.2×10^2	0.8×10^2	p≥0.05
Fecal coliform bacteria	0.98×10^2	0.06×10^2	p≥0.05
Psychrophilic bacteria	0.6×10^2	0.08×10^2	p≥0.05

Numbers of various bacterial types isolated from beef shawarma were illustrated in table 4, Total aerobic bacteria recorded 3.5 x 105 and 2.6 x 102 before and after cooking while other bacteria recorded various numbers and percentages.

Table 4: Illustrate the number of various bacterial types isolated from beef shawarma before and after cooking

Types of bacteria	Beef shawarma		p
	Before cocking	After cocking	
Total aerobic bacteria	3.5×10^5	2.6×10^2	0.001
Total coliform bacteria	4.5×10^2	3.3×10^2	p≥0.05
Fecal coliform bacteria	3.3×10^4	0.09×10^4	p≥0.05
Psychrophilic bacteria	0.09×10^2	——	

Numbers of various bacterial types isolated from tekka were illustrated in table 5, Total aerobic bacteria recorded 4.3 x 104 and 1.9 x 102 before and after cooking while other bacteria recorded various numbers and percentages

Table 5: Illustrate the number of various bacterial types isolated from tekka before and after cooking

Types of bacteria	Tekka		p
	Before cocking	After cocking	
Total aerobic bacteria	4.3×10^4	1.9×10^2	0.001
Total coliform bacteria	0.6×10^2	____	
Fecallocoliform bacteria	0.04×10^2	____	
Psychrophilic bacteria	0.06×10^2	____	

According to statistical analysis, there are highly significant differences between the numbers of various isolated bacteria $p \leq 0.01$ .table.6,7,8,9and 19 , and fig.1,2,3,4and 5

Table 6: illustrate the various bacterial type isolated from humburger

Type of bacteria	hamburger
Escherichia coli.	11.3
Enterobacter	___
Klebsiella	6.5
proteus	3.2
pseudomonas	12.8
Bacillus subtalis	16.6
Staphylococcus aureus	16.5
Streptococcus fecalis	22.3
Non. Bacterial agent	10.9

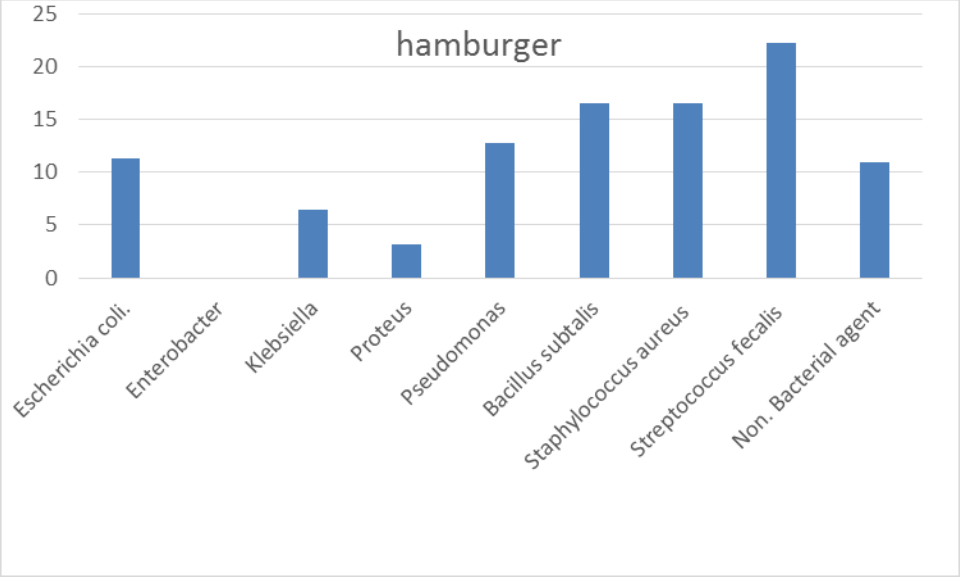

Fig 1: illustrate the various bacterial types isolated from huaburger

Table 7: illustrate the various bacterial types isolated from kebab

Type of bacteria	Kabab % of bacteria
Escherichia coli.	8.4
Enterobacter	2.8
Klebsiella	9.2
proteus	7.3
pseudomonas	19.2
Bacillus subtalis	15.4
Staphylococcus aureus	9.6
Streptococcus fecalis	17.8
Non. Bacterial agent	18.3

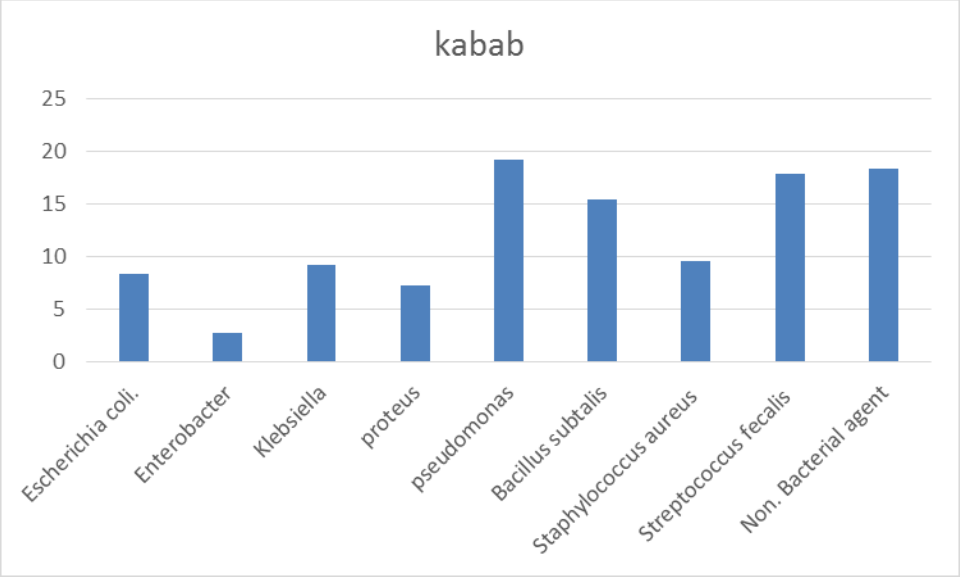

Fig 2: illustrate the various bacterial types isolated from kebab

Table 8: illustrate the various bacterial type isolated from Kobba

Type of bacteria	Kobba % of bacteria
Escherichia coli.	13.8
Enterobacter	—
Klebsiella	—
proteus	11.4
pseudomonas	17.4
Bacillus subtalis	26.6
Staphylococcus aureus	—
Streptococcus fecalis	13.6
Non. Bacterial agent	17.2

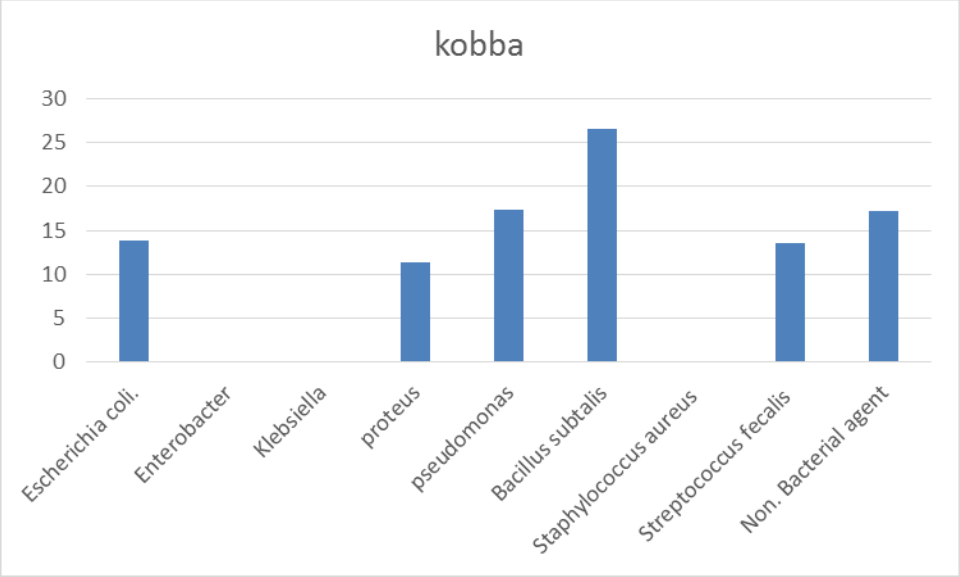

Fig 3: illustrate the various bacterial types isolated from kobba

Table 9: illustrate the various bacterial types isolated from beef shawarma

Type of bacteria	beef shawarma % of bacteria
Escherichia coli.	—
Enterobacter	16.4
Klebsiella	—
proteus	—
pseudomonas	25.8
Bacillus subtalis	—
Staphylococcus aureus	—
Streptococcus fecalis	28.3
Non. Bacterial agent	29.5

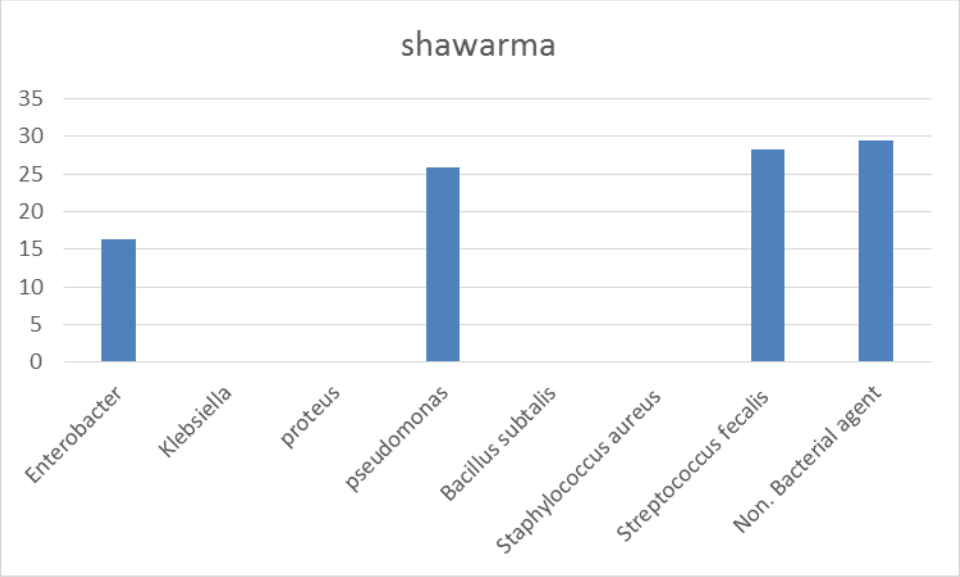

Fig 4: illustrate the various bacterial types isolated from shawarma

Table 10: illustrate the various bacterial type isolated from Tekka

Type of bacteria	Tekka % of bacteria
Escherichia coli.	11.6
Enterobacter	___
Klebsiella	___
proteus	10.5
pseudomonas	13.4
Bacillus subtalis	6.7
Staphylococcus aureus	17.8
Streptococcus fecalis	16.4
Non. Bacterial agent	23.6

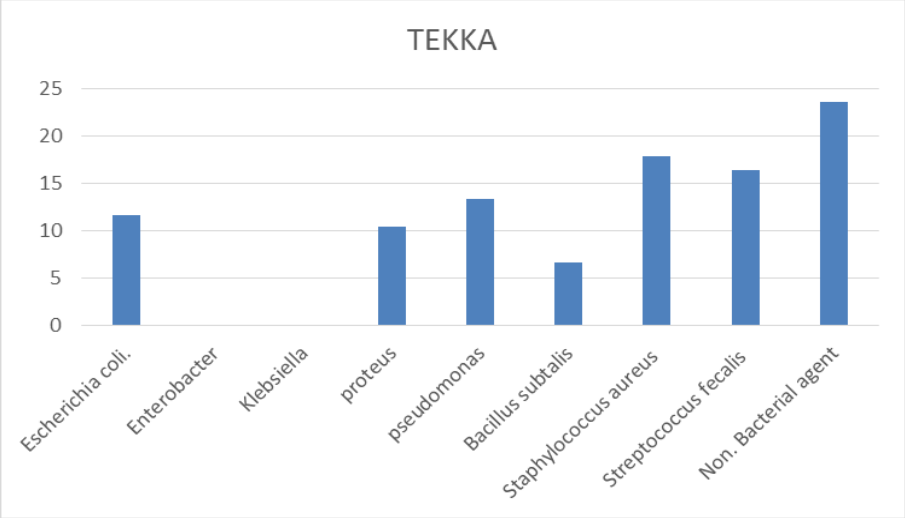

Fig 5: illustrate the various bacterial types isolated from tekka

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