Contamination of markets meat with *E.coli* in Kut city

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تلوث لحوم الاسواق بجراثيم الاشريشيا القولونية في مدينة الكوت

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المستخلص

اجريت هذه الدراسة لتقيم مستوى تلوث لحوم الاسواق بجراثيم الاشريشيا القولونية ، 60 عينة (20 لحم بقر ، 20 بيفبركر ،20 لحم دجاج)جمعت من الاسواق المحلية في مدينة الكوت (العراق)للفترة من حزيران الى تشرين الاول 2013. معدل عزل جراثيم الاشريشيا القولونية في انواع اللحوم الثلاثة كان 27(45%) وبواقع : 13 (65%) في البيفبركر و 9 (45%) في اللحم البقري و 5 (25%) في لحم الدجاج .اظهرت نتائج الدراسة وجود فرق معنوي ($P<0.05$) في انتشار الاشريشيا القولونية في عينات اللحوم الثلاثة ، كان المعدل الحسابي لجراثيم الاشريشيا القولونية $1.6x10^6$ CFU/g ,$5.9x10^5$CFU/g

$2.4x10^3$CFU/g في البيفبركر واللحم البقري ولحم الدواجن على التوالي . وقد سجل فرق معنوي ($P<0.05$) في عدد مستعمرا ت جراثيم الاشريشيا القولونية بين انواع اللحوم الثلاثة .

كان العد الجرثومي للبكتريا الهوائية في البيفبركر واللحم البقري ولحم الواجن $3.4x10^6$ CFU/g, $3.1x10^6$ CFU/g,$2.1x10^6$ CFU/g على التوالي .لم تظهرت نتائج الدراسة وجود فرق معنوي ($P>0.05$) في العد الجرثومي للبكتريا الهوائية بين انواع اللحوم الثلاثة ، كما اثبت الدراسة أن اللحم مصدر هام للامراض المنقولة عن طريق الغذاء التي تهدد الصحة العامة في العراق.

Abstract

The study was done to assess the level of markets meat contamination with *E.coli*, 60 meat samples (20 beef, 20 beef burger and 20 chicken meat) were collected from local markets in Kut city (Iraq) during the period from June up to October 2013. The isolation rate of *E.coli* in the three types of meat samples were twenty –seven (45%) : thirteen (65%) beef burger , nine (45%)beef and five (25%)chicken meat, There was statistically significant difference (P< 0.0 5) in prevalence of *E.coli* between the three types of meat. The median counts of *E.coli* was $1.6x10^6$ CFU/g in beef,$5.9x10^5$CFU/g in beef burger and $2.4x10^3$CFU/g in chicken meat. There was statistically significant difference (P< 0.0 5) in *E.coli* counts between the three types of meat. The median counts of aerobic plate count (APC) in Beef burger, Beef and chicken meat are $3.4x10^6$ CFU/g, $3.1x10^6$ CFU/g$2.1x10^6$ CFU/g, respectively. The results of Statistical analysis showed no significant differences(P>0.05) in (APC)count between the three types of meat The results of this study showed that meat is a significant source for foodborn disease that concerns the public health in Kut city.

Introduction

Meat contaminated concern the public health in both developing and the advanced countries particularly under the present concept of one world one health. In recent years some outbreaks of foodborne diseases in the United States were caused by pathogenic bacteria such as *E. coli* O157:H7 and *Listeria monocytogenes*, have brought about meat safety issues to the forefront of societal concern(1). An estimated 10% of the population suffers from foodborne illnesses annually in Europe, in Iraq food borne illness in human beings due to bacterial, pathogenesis well reported through annually report of Iraqi Ministry of health, highlighted the fact that the production, handling, sales, and consumption of poor quality animal food products are serious public health problems in the country. The major meat consumed in Iraq is beef and chicken .Biological, chemical, and physical hazards are encountered in beef slaughtered and processed in the slaughterhouse. The biological hazards are mainly bacterial pathogens such as *E. coli* O157:H7, *Salmonella and Listeria spp.* (2). *E. coli* has been used as indicator of possible post-processing contamination and its presence as indicator of fecal contamination in foods. Infection with strains of Escherichia coli can result in asymptomatic infection or a number of ailments such as mild diarrhea and very severe diseases like haemorrhagic colitis (HC), haemolytic uremic syndrome (HUS) and thrombotic thrombocytopenic purpura(TTP) (3). This study was designed to assess the level of markets Meat contamination (beef, beef burger

and chicken meat), using *E. coli* as indicator organism and determine the prevalence of (APC) in all the 60 meat samples.

Materials and Methods

Sampling procedure and preparation

60 meat samples (20 beef, 20 beef burger and 20 chicken meat) were collected from local markets in Kut city (Iraq) during the period from June up to October 2013. 25g beef and beef burger and chicken meat transported in a cooler box at 4 °C. All samples were analysed immediately upon arrival at the laboratory. The samples were weighed into sterile stomacher bags Nasco Whirl-Pak™) and homogenised for 2 min in 225 mL of Mac-Conkey broth (Difco 0020-01) (4). ,

Isolation of *E.coli.*

Each 1 ml suspension of the swabbed samples was appropriately diluted using 10-fold serial dilution; 0.1 ml of the suspension at 10^6dilution factor was inoculated by spreading on EMB agar for enumeration of total *E. coli* count (5). Colonies with green metallic sheen were counted after incubation at 37 °C for 24 h. All isolates that showed green metallic sheen from swabs and water samples on EMB were characterized biochemically by API 20 E Kits(BioMerieux)(6).

Aerobic plate count (APC)

The aerobic plate count (APC) was evaluated from several naturally contaminated meat samples that were held at 4 °C for 24 hours from time the collection. The dilutions were made from each sample (10^1 ,10^2 , 10^3 , $10^{4,}$ 10^5 ,$10^{6)}$ · APC of the samples was measured by plating a 1-ml aliquot of each dilution onto Nutrient agar (3M TM Healthcare, St Paul, MN, USA). The agar was incubated at 37°C for 18-20 h, APC count evaluated using colony counter (7).

Results and Discussion

Prevalence of *E.coli* in meat samples

The *E. coli* is important pathogen and is now recognized as a foodborne bacterium of concern in many countries (8). This pathogen is especially associated with comminuted beef products such as burgers in the USA and other foods as diverse as beef jerky beansprouts, unpasteurised milk, apple ciders and salad vegetables such as lettuces. Prevalence in cattle and in sheep is generally higher than in other animals (9). 60 meat samples were screened for isolation of *E.coli* on EMB agar , the prevalence of *E.coli i*solation were twenty-seven (45%) : thirteen (65%) beef burger , nine (45%)beef and five (25%)chicken meat(Table.1).The results of Statistical analysis showed significant differences($P<0.05$) between the three types of meat. The findings of present study are agreed with (10) in Iraq that reported the prevalence of *E.coli* in local minced meat and imported minced meat and chicken meat were(80%,65%,56%) respectively , and with (11) who reported the prevalence *of E.coli* in Buffalo meat was 22%. In beef carcass processing, *E. coli* associated with cattle carcasses can increase or decrease during processing depending on factors such as the levels of contamination of live cattle, efficiency of evisceration and hygienic practice in the Slaughter house , Slaughter plants have also been required to test carcasses for generic *E. coli* as an indicator of the adequacy of the plant's ability to control fecal contamination (12).

Table (1): Prevalence of *E.coli* in meat samples

Type of Meat	Number of Samples	Positive	Negative	Parentage of prevalence %
Beef burger	20	7	13	65%
Beef	20	11	9	45%
Chicken	20	15	5	25%
Total	60	33	27	45%

Enumeration of *E.coli* in meat samples

The median counts for the pathogen load estimates of *E. coli* from Beef burger, Beef and chicken meat are $1.6x10^6$ CFU/g, $5.9x10^5$ CFU/g$2.4x10^3$ CFU/g, respectively. The results of Statistical analysis showed significant differences ($P<0.05$) in *E.coli* count between the three types of meat. Total of 27 isolations *E. coli* counts in 10 Meat samples(7 Beef burger, 3beef) were $<10^5$CFU/g. And count on 7 meat samples (3 Beef burger, 2 beef,2chiken meat) were $<10^4$CFU/g (Fig.1). Only 6 samples (2 Beef burger, 2beef,2chiken meat) had *E. coli* counts of $<10^2$CFU/g and four sample(1 Beef burger, 2beef,1 chicken meat) had >10CFU/g. These results agree with (13) who showed the counts of *E.coli* in minced meat were $3.3x10^2$ reported the counts of *E.coli* in beef were $3x10^2$ CFU/g.in England. The Elmali and Yaman (14) CFU/g. The poor hygienic culture of labor in supermarket of meat effect on the level of meat contamination and Cattle's faeces and hides are considered to be sources of *E.coli* contamination of carcasses during slaughter and it can occur during removal of the hide or the gastrointestinal tract(15). The variability in contamination and cross-contamination may be originated in factors such as plant size design, age, equipment, automation, speed of slaughter, and animal holding facilities; geographic location; season of the year; type, lot and origin of animals; labor shift ; and personnel training and turnover. As the hide is separated for removal, contamination may be introduced onto the carcass surface. A single source (one animal or the plant environment and equipment) may contaminate carcasses not only during dehiding but also during later steps, Some operations such as skinning and evisceration are more likely than others to result in carcass contamination, and some carcass areas are more prone than to exposure to potential contamination or cross-contamination. Contamination of meat others with *E.coli* during slaughter is the principal route by which these pathogens enter at the meat supply chain (16). The counts of *E.coli* in Chicken meat which found in this work is quite different from previous studies reporting mainly *E . coli* counts in chicken meat in the United Kingdom were 10 CFU/g (17) . In Turkey Fatma and Murat(18) reported an occurrence of 10 CFU/g of *E .coli* on chicken meat contamination of chicken occur during removal the digestive system because the *E.coli* present in intestine of Chicken.

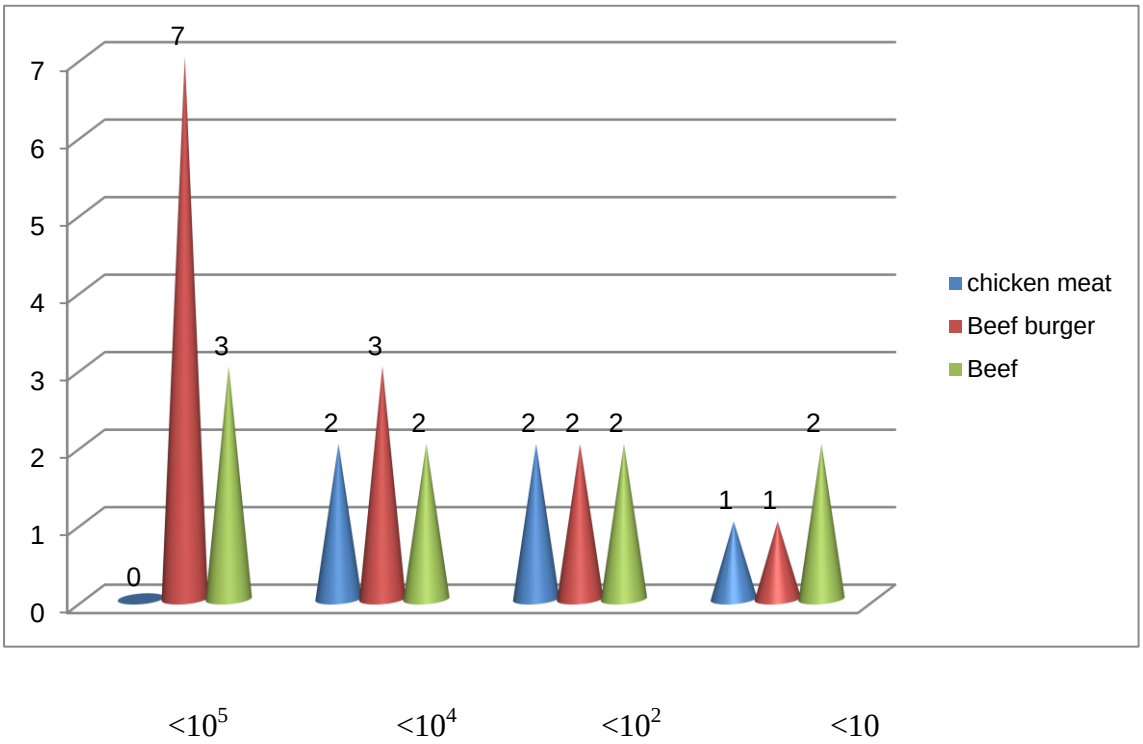

Figure (1): Enumeration of *E.coli* in Meat Samples

Evaluation of meat background flora grow

The evaluation of meat background flora growth was done through counting the aerobic plate count (APC) in meat samples that stored at 4 °C after 24 hours from collection. The median counts of APC in Beef burger, Beef and chicken meat are $3.4x10^6$ CFU/g, $3.1x10^6$ CFU/g$2.1x10^6$ CFU/g, respectively(Fig.2).The results of Statistical analysis showed no significant differences($P>0.05$) in *E.coli* count between the three types of meat. The growth natural flora occurred during marketing and the finding of Vernozy *et al*.,(19)were similar to those of the present study .the high number of bacteria may be transmitted from fleece of animals to the carcass surface during hide remove(20). .

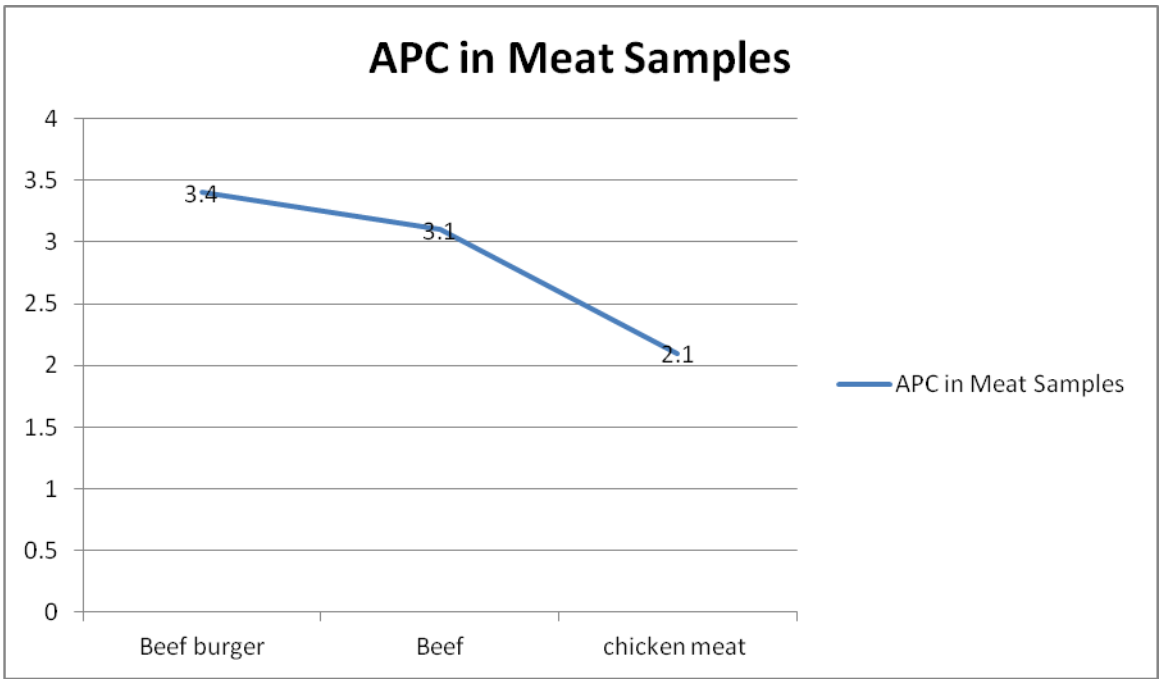

Figure (2): APC in meat samples in Log10[6]

Conclusions

1. These results show an increase in the counts of *E.coli* in the market meat, This situation represents an increased risk for the consumers and a challenge for those working in the beef sanitary control service.

2. The prevalence of *E.coli* in beef burgers was more than beef and chicken meat.

3. The level of (APC) was high in the three types of meat .

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