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Bacterial Community Comparison between Regular Slaughter Houses and Street Slaughtered Meat Samples

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Abstract

Forty meat samples were collected from different places in Diyala province (20 samples for each of the regular slaughter and meat slaughtered in the streets). Bacterial community detection were done via using suitable media. The results indicated *Staphylococcus aureus* isolates were 30% and 90% that isolated from meat samples that were taken from slaughter houses and street slaughtered respectively. Isolation percentage of *E.coli* were 20% and 30% that isolated from slaughter houses and street slaughtered respectively. Isolation percentage of *Klebsiella* spp were 10% and 70% of meat samples that isolated from slaughter houses and street slaughtered respectively. *Pseudomonus* spp isolation percentage was 10% from street slaughtering meat samples. The Street slaughtered meat was highly contaminated as a comparative with that meat came from slaughter houses. This study proved that the Erythromycin was highly effective against *Staphylococcus aureus*, Ampicloxacilline was highly effective against *Escherichia coli* and *Klebsiella* was highly affected by Tetracycline.

Keywords: Slaughterhouses, microbes, meat samples, sensitivity test.

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مقارنة المحتوى البكتيري بين اللحوم من المسالخ العادية واللحوم المذبوحة في الشوارع

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الخلاصة

جمعت 40 عينة لحوم من اماكن مختلفة في محافظة ديالى (20 عينة لكل من المجازر النظامية واللحوم المذبوحة في الشوارع). حضرت العينات للتحليل البكتيري باستعمال اطباق زرع ملائمة. اشارت الدراسة الى ان النسبة المئوية للعزل ببكتريا المكورات العنقودية كانت 30% و 90% من عينات اللحوم المأخوذة من المسالخ ومن عينات اللحوم المذبوحة في الشوارع على التوالي. كما وجدنا ان النسبة المئوية لعزل الاشركيا القولونية كانت 20% و 30 % من عينات اللحوم المأخوذة من المسالخ ومن عينات اللحوم المذبوحة في الشوارع على التوالي. ان النسبة المئوية للعزل ببكتريا الكليبسيلا كانت 10 % و 70 % من عينات اللحوم المأخوذة من المسالخ ومن عينات اللحوم المذبوحة في الشوارع على التوالي و كانت نسبة عزل بكتريا الزائفة الزنجارية 10% من عينات اللحوم المذبوحة في الشوارع. ان اللحوم المذبوحة في الشوراع اكثر تلوثا من عينات اللحوم المأخوذة من المسالخ، والأمبيكلوكساسيللين فعال للغاية ضد الإشريكية القولونية. والكليبسلا شديدة التأثر بالتتراسيكلين.

الكلمات المفتاحية: المجازر، جراثيم، عينات اللحوم، اختبار الحساسية.

Introduction

Food microbial pathogens are considered as the main cause of disease in the Middle East countries (1). Meat has been today observed as one of the most essential and multipurpose food item, it has a high satiety value and consider as a source of protein, carbohydrates, vitamins, minerals and fat, Vitamin A and B12 in meat that is not available in plant sources (2). The presence of Salmonella species, *Escherichia* coli and Staphylococcus species organisms are of special concern because these could potentially cause food borne intoxication (3). *Salmonella*, *Escherichia coli*, *Clostridium Botulinum*, *Bacillus cereus*, *Clostridium perfringens*, and *Staphylococcus aureus* are the major pathogens in meat (4). Contamination could come from

unclean slaughtering, handling and treating conditions or from intrinsic micro flora in normal tissues of animals, air and environment (5). This study aimed to compare the microbial pollution of the meat between the meat was brought from slaughter and that which was taken from street slaughtering.

Materials and Methods

Ethical approval

In this study the Ethical approval for animal research was not required due to use of meat samples from animals after slaughtering.

Meat sample collection and preparation

In our study, the meat samples were collected from slaughter houses and street irregular slaughter positions in Diyala Province /Iraq. Forty samples (50gm) were collected (20 from slaughter house and 20 from street slaughtering). The samples were collected in early morning to minimize the external microbial contamination. 10 g of each sample was weighted and transferred to sterile flasks containing 90 ml of distilled water. Samples were homogenized using pestle and mortar under aseptic conditions.

Media and biochemical tests used in the study

In this study Mannitol Salt agar was for *staph aureus*, macConky and EMB agar for diagnosis of *Escherichia coli*, Simmon citrate test used for diagnosis of *Klebsiella* and Oxidase test used for pseudomonas spp.

Antibiotic sensitivity test

A disc diffusion process, known as Kirby- Bauer method (6) was used to determine the susceptibility of the bacterial isolates against selected antibiotic agents. For this purpose, seven

different antibiotic discs were obtained from commercial sources (Oxoid Ltd, Baring-stoke, Hampshire, England). The selected antibiotics used were Trimethiprim, Amikacine, AmpiCloxacilin, Gentamicine, Amoxicillin, Erythromycine, Tetracycline, the interpretation on susceptibility was done according to the guidelines of Clinical and Laboratory Standard Institute (7); formerly known as (NCCLS).

Results

Isolation and identification of bacteria

In this study (6 positive isolates from of 20 meat samples) with isolates percentage 30% of meat samples that were taken from slaughter houses showed yellow colonies on the mannitol salt agar as in figure1 that was initially identified as *S. aureus*, which was definite by Gram staining, biochemical tests and coagulase, catalase. It is purple like grape cluster under the microscope as in figure 2, table 1. On the other hand (4 positive isolates from 20 meat samples) with isolate percentage 20% of meat samples that were taken from slaughter houses were mucoid pink colonies on *macConcky* agar, figure 3 and green metallic sheen on EMB agar, figure 4 and this is the characteristic feature of *Escherichia* coli, table 1. *Klebsilella* appeared in (2 of 2o) or 10 % of meat samples that taken from slaughter houses mucoid on macConky agar figure 5 and blue in simmon citrate test figure 6, table 1.

While (18 positive isolates from 20 meat samples) with isolates percentage 90% of meat samples that were taken from street slaughtering showed yellow colonies on mannitol salt agar as *S. aureus*, table 2. On the other hand 6 positive isolates from 20 meat samples with isolates percentage 30% of meat samples that were taken from slaughter houses were green metallic sheen on EMB agar and mucoid pink colonies on *maconcky* agar and this is the characteristic feature of *Escherichia coli* (tab.2). *Klebsilella* is appeared in (14 positive isolates from 2o meat samples) with isolates percentage 70 % of meat samples that mucoid on macConky agar and

blue in simmon citrate test. 2 positive isolates from 20 meat samples with isolates percentage 10% of street slaughtering meat showed dark purple on oxidase test positive for pseudomonas spp figure 7. (2 positive isolates from 20 meat samples) with isolates percentage 10% of street slaughter meat samples were contaminated by psseudomonus spp table2 and figure 7.

The *Staphylococcus aureus* is highly sensitive to erythromycin than that of other antibiotics, table 1 *Klebsiella* is highly sensitive to Ampicloxacilline than that of other antibiotics, table 2 *Escherichia coli* is highly sensitive to Tetracycline than that other antibiotics, finaly, Pseudomonas spp were highly sensitive to Amikacine antibiotic, table 3.

Table 1: type of isolate, frequency and percentage of bacteria in meat from slaughter houses

Type of isolates	Number of positive isolates	Isolation percentage
Staphylococcus aureus	6 / 20	30%
Escherichia coli	4 / 20	20%
Klebsiella spp	2 / 20	10%

Table 2: type of isolate, frequency and percentage of bacteria in meat from street slaughtering

Type of isolates	Number of positive isolates	Isolation percentage
Staphylococcus aureus	18 / 20	90%
Escherichia coli	6 / 20	30%
Klebsiella spp	14 / 20	70%
Pseudomonus spp	2 /20	10%

Table 3: Antibacterial susceptibility test against S. aureus in this study

Antibacterial	Mean of inhibition zone diameter(mm)
Amikacine	30 mm
AmpiCloxacilin	32mm
Gentamicine	24mm
Erythromycine	34mm

Table 4: Antibacterial susceptibility test against *Klebsiella* in this study.

Antibacterial	Mean of inhibition zone diameter(mm)
Amikacine	12 mm
AmpiCloxacilin	35mm
Gentamicine	18 mm
Erythromycine	No inhibition

Table 5: Antibacterial susceptibility test against Escherichia coli isolated in this study**.**

Antibacterial	Mean of inhibition zone diameter(mm)
Trimethiprim (TMP)	24.3 mm
Amoxicillin(AX)	No inhibition
Tetracyclin(TE)	30.3 mm

Table 6: Antibacterial susceptibility test against *Pseudomonus spp* in this study

Antibacterial	Mean of inhibition zone diameter (mm)
Amikacine	35 mm
AmpiCloxacilin	No inhibition
Gentamicine	30 mm
Erythromycine	No inhibition

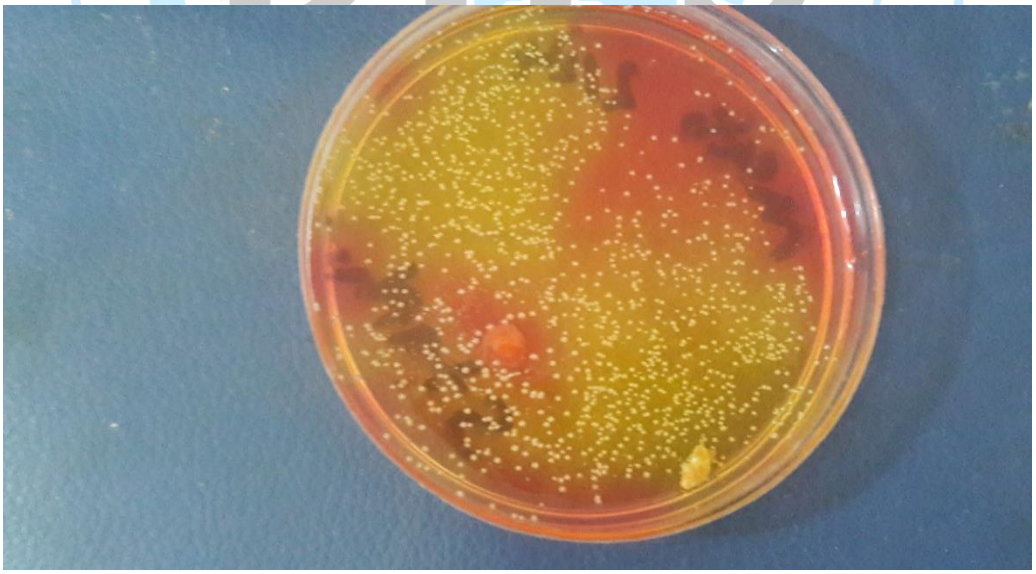

Figure 1: *Staph aureus on* mannitol salt agar

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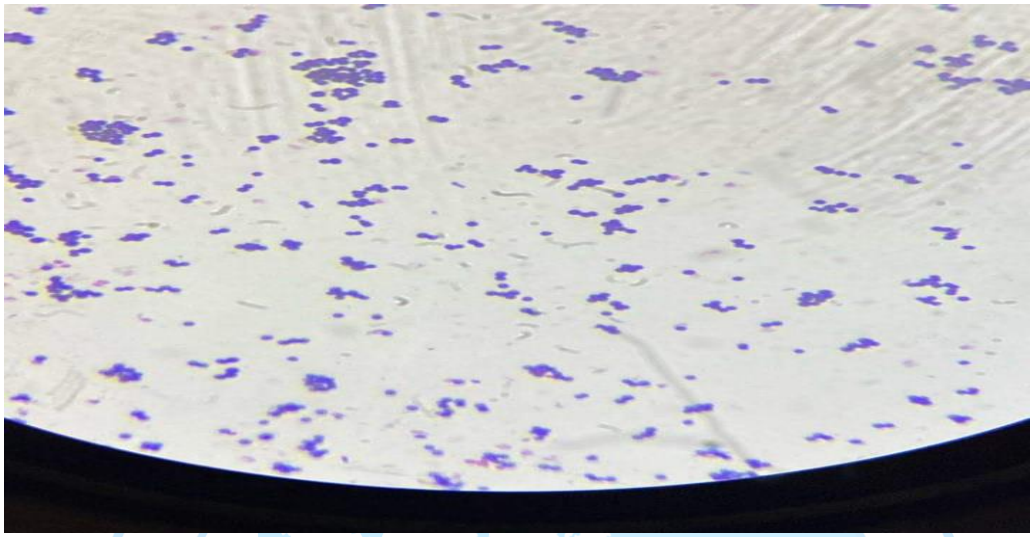

Figure 2: *Staph aureus under microscope*

Figure 3: *Escherichia coli on macConky agar*

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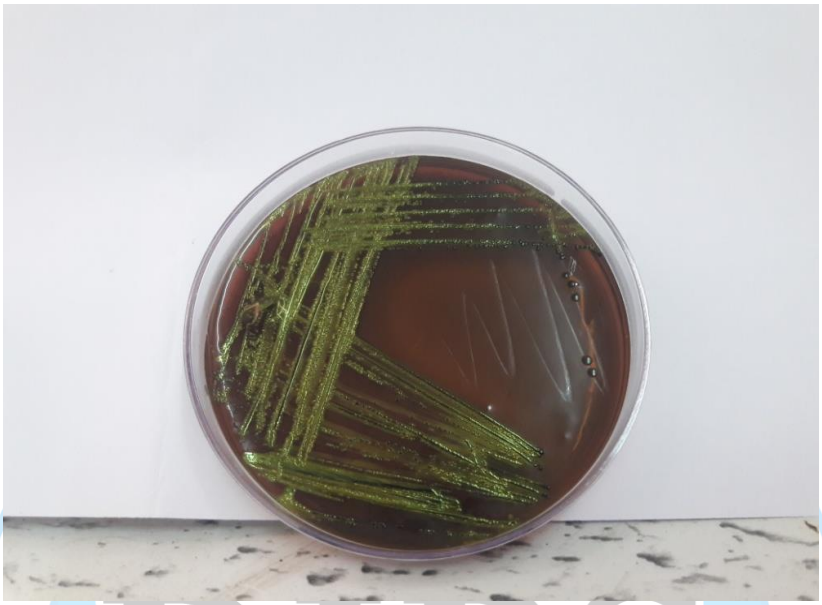

Figure 4: green metallic sheen of *Escherichia coli* on EMB agar

Figure *5:* Klebsiella on maconky agar (mucoid)

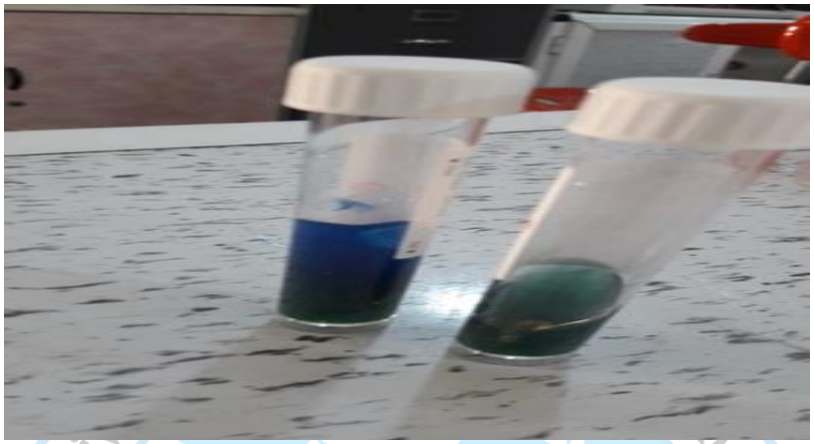

Figure 6: *Klebsiella on* citrate test (Blue color +)

Figure 7: Oxidase test (+) for pseudomonas (dark purple)

Discussion

In this study (6 positive isolates from 20 meat samples) or 30% of meat samples that were taken from slaughter houses showed yellow colonies on mannitol salt agar, it was identified as *S. aureus*, While (18 positive isolates from 20 samples) or 90% of meat samples that were taken from street slaughtering was the same microbe (8), (9), (10) and (11) referred to presence of 20% of samples positive with Staphylococcus aureus. On the other hand the presence (6 positive isolates from 20 or 30% of meat samples that taken from slaughter houses was

Escherichia coli, (8) referred to present 32% of samples were positive for *Escherichia coli*) and (12) referred to presence 40% of samples positive to *Escherichia coli.*

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