

Animal Health Research Institute  
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**BACTERIAL CAUSES OF LUNG AFFECTIONS  
IN SLAUGHTERED CAMELS  
IN ASSIUT GOVERNORATE**  
(With 4 Tables)

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الأسباب البكتيرية لإصابة الرئة في الجمال المذبوحة  
في محافظة أسيوط

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تمت هذه الدراسة على ٧٢ عينة من رئات الجمال المذبوحة والمصابة اكلينيكيًا وعند الفحص البكتريولوجي وجد أن ٦٩ من هذه العينات (٩٥.٨٣%) ايجابية للعزل البكتيري وأن ٥٦ (٨١.١٦%) من هذه العينات كانت ايجابية للعزل الفردي وأن ١٣ (١٨.٨٤%) من هذه العينات كانت ثنائية العزل أو ثلاثية العزل. ولقد وجد أن العزلات البكتيرية الأساسية هي الميكروب العنقودي الذهبي ١٦ (١٨.٨٠%) والاستريتوكوكس نيموني ١٤ (١٧%) وميكروب الكوريني باكتريم الصيدي ٨ (٩.٤٠%) والميكروكوكس ٦ (٧%) والاستريتوكوكس الصيدي ٢ (٢.٣٥%) والميكروب المتكور العنقودي الأبيض ٢ (٢.٣٥%) والكلبسيلا نيموني ١٣ (١٥.٢٦%) والميكروب المتكور السبحي ٩ (١٠.٥٨%) والسيدوموناس ابروجينوزا ٥ (٥.٨٨%) والباستيرلا ملتوسيدا ٤ (٤.٧٠%) والسستروباكتري ٢ (٢.٣٥%) والانتيروباكتري ٢ (٢.٣٥%) والباستيرلا هيموليتيكا ١ (٢.٣٥%) وتم اجراء اختبار الحساسية لكل من العترات البكتيرية المعزولة ولقد وجد أن معظم العترات البكتيرية المعزولة شديدة الحساسية لكل من الكلورامفينيكول والجنتاميسين والريمكتان ومقاومة لكل من التيراميسين والامبيسلين والكوليستين سلفات.

**SUMMARY**

Out of 72 clinically affected lungs of slaughtered camels, 69(95.83%) cases were culturally positive for bacterial infection. Bacteriological examination revealed that 56(81.16%) of the examined cases were culturally positive for a single bacterial isolate and 13(18.84%) yielded mixed bacterial isolates. The main bacterial isolates were *Staph.aureus* 16(18.80%), *Strept.pneumoniae* 14 (17.00%), *Coryne bacterium pyogens*

8(9.40%), *Micrococcus* 6(7.0%), *Strept. pyogenes* 2(2.35%), *Staph. albus* 2(2.35%), *Klebsiella pneumoniae* 13(15.26%), *E. coli* 9(10.58%), *Ps. aeruginosa* 5(5.88%), *Past. multocida* 4(4.70%), *Citrobacter sp.* 2(2.35%), *Enterobacter sp.* 2(2.35%) and *Past. haemolytica* 2(1.17%). The *in vitro* antibiotic sensitivity tests for each type of isolated bacteria were discussed. The results showed that most of the isolated strains were sensitive to gentamycin, chloramphenicol and rimactan while they were resistant to ampicillin, streptomycin and colistin sulphate.

**Key words:** Lung affection – camels – Assiut.

## INTRODUCTION

Camel is an animal of considerable importance in Egypt since it is one of the major sources of meat production where its meat represents 66.46% of the total meat obtained from the imported animals for slaughter purposes (Anon, 1986). Also it has a great value among our farm animals, working in agriculture fields or travelling between the village and carrying out the farmers' crops.

Lung affection in farm animals is a serious problem which hinders animal productivity and may result in great losses in animal husbandry. Several etiological factors contribute in the occurrence of pneumonia in farm animals which include viruses, bacteria, fungi and parasites.

Respiratory infection in camels varied from mild or symptomless form as snuffles to severe serious pneumonia (Ghawi, 1978). A list of microorganisms was mentioned as being isolated from cases of camel pneumonia (Mahmoud *et al.*, 1988).

Arora and Kalara, (1973) mentioned that Streptococci, Staphylococci, *E. coli* and *Klebsiella pneumoniae* were the predominant isolates from respiratory tract infection in camels. However, respiratory infection caused by *Past. sp.* takes acute form and the organism had been isolated from cases of pneumonic camels.

Also bacterial affections of the lung were previously recorded in slaughtered camels by some authors, Thabet (1993) pointed out that the most predominant bacterial isolates from pneumonic camel lungs were *Klebsiella sp.*, *Streptococcus sp.*, *E. coli* and *Pseudomonas aeruginosa*. Amany (2000) revealed that *Staphylococcus aureus*, *Corynebacterium*

*spp.*, *Micrococcus spp.* and *Citrobacter* were the most prevalent isolates from pneumonic lung of slaughtered camels.

The aim of the present study was to detect the various bacterial microorganisms as the causative agents of affected lungs in slaughtered camels. The antibiograms of the bacterial isolates were also determined using 10 different agents.

## MATERIAL and METHODS

### • Materials:

Out of 72 pneumonic lungs (showing gross lesions of pneumonia as swelling, congestion and consolidation) of slaughtered camels were collected from Assiut Abattoir (Bani-Adi) during the period of a year time (2000-2001). The age of the animals ranged from 2 to 5 years. Representative portions from each infected lung were selected and were put in a sterile bage in an ice box for bacteriological examination.

### • Methods:

#### A- Bacteriological examination:

Each specimen was cultured into nutrient broth for 24h at 37°C and then a loopful was taken and subcultured onto each of the different following solid media, nutrient agar, 5% sheep blood agar and MacConkey's agar. The isolated strains were identified according to Baily and Scott (1974) Cruickshank *et al.* (1975) and Carter (1984).

#### B- Antibiotic sensitivity:

Antibiotic sensitivity tests were done for bacterial isolates using antibiotic sensitivity discs (Biomerieux) of Chloramphenicol (30 µg), Kanamycin (30 µg), Neomycin (30 µg), Streptomycin (10 µg), Gentamycin (10 µg), Erythromycin (10 µg), Ampicillin (10 µg), Rimactan (30 µg), Colistin sulphate (10 µg) and Nalidixic acid (30 µg).

## RESULTS

The results are shown in Tables 1,2,3 and 4.

## DISCUSSION

Bacterial infection of the lung is one of the main causes of pneumonia in camels and the present study deals with the pathogenic bacteria responsible for lung affection. It was found that out of 72 cases of lungs 69 (95.80%) revealed bacterial infection from which 56(81.16%) yielded a single pure isolate and 13(18.84%) yielded mixed bacterial isolates. The isolates included 48(56.5 %) Gram-positive bacteria and 37 (43.52%) revealed Gram-negative isolates Table (1). These results indicate a variety of Gram positive and Gram negative microorganisms had been isolated from infected lung of camels, whether as a single or multiple infection. These results agree with those of Fatma, *et al.* (2001) who isolated Gram positive and Gram negative bacteria with an incidence of 45 (56.96%) and 34 (43.04%) respectively. These organisms were as follows follows *Staph. aureus* 15 (18.99%), *Strept. pneumoniae* 14(17.72%), *C.pyogenes* 7(8.86%); *Micrococcus sp.* 6(7.60%), *Strept. pyogenes* 2(2.53%), *Kleb. pneumoniae* 12(15.19%), *E.coli* 8(10.13%), *Ps.aeruginosa* 4(5.10%), *Past.haemolytica* 2(2.53%), *Citrobacter* 2(2.53%) and *Yersinia enterocolitica* 1(1.26%).

Most of percentages of the different organisms mentioned coincide with those obtained in the present study as follows (Table 2), *Staph.aureus* 16(18.80), *Strept.pneumoniae* 14(17.00), *Corynebacterium.pyogenes* 8(9.40%), *Micrococcus sp.* 6(7.0%), *Strept. pyogenes* 2(2.35%), *Staph.albus* 2(2.35%), *K.pneumoniae* 13(15.26%), *E.coli* 9(10.58%), *Ps.aeruginosa* 5(5.88%), *Past.multocida* 4(4.70%), *Citrobacter sp.* 2(2.35%), *Enterobacter sp.* 2(2.35%) and *Past.haemolytica* 2(2.35 %). Both results in general agree to a large extent to those recorded by several workers (Ghawi 1978; Bendary 1986; Zaitoun 1986 Hafez *et al.*, 1991; Abd El-Kader, 1992; Thabet, 1993 and Amany, 2000).

Isolation of *Enterobacter sp.* in this work was also recorded by Mollin and Zessin (1990). Besides, the isolation of *C. pyogenes* from pneumonic lung of camels in the present study agrees to that recorded by Schauhan *et al.* (1987).

It was clear that the bacteria causing pneumonia in camels may occur in a mixed form mainly as a combination between *Staph.aureus* and each of the following species, *K.pneumoniae*, *Strept.pneumoniae*, *Micrococcus sp.*, *Enterobacter sp.*, *C.pyogenes* and *E.coli.* or another

combination between *Strept. pneumoniae* and *C.pyogenes*. Also there was combination between *E.coli* and each of *Micrococcus*, *C.pyogenes*, *Citrobacter sp.*, *K.pneumoniae* and *Pseudomonas aeruginosa* (Table 3). These mixed bacterial isolates in the present work are also in agreement with that obtained by Fatma *et al.* (2001) while in disagreement with those mentioned by Mahmoud *et al.* (1988) and Thabet (1993) who recorded other types of mixed isolates of *Staph. albus* and *Diplococcus pneumoniae*, or *S. albus* and *Kleb. sp.*

On the other hand, the present results partially agree with those of Amany (2000) who found that mixed bacterial isolates infection in pneumonic lungs of camels consisted of *Staph. aureus* with either *Strept.pneumoniae*, *Micrococcus*, *K.pneumoniae* while there is a disagreement in case the isolation of *Strept. pneumoniae* with *Pasteurella multocida*, *E. coli* with *Staph. saprophyticus*, *Strept. pneumoniae* with *Micrococcus* and *Staph.aureus* with *S.saprophyticus*.

Some of the mixed bacterial isolates reported in this work from pneumonic lung of camels were not previously recorded by other authors and this may be due to several factors as hygienic measures, environmental condition, nutritional deficiencies and immune status of the animal (Fatma *et al.*, 2001).

The sensitivity of the antibiotics on the 10 different bacterial isolates which represent the main causative agents of bacterial pneumonia in slaughtered camels is shown in table 4. The results reveal that the organisms were highly sensitive to gentamycin, chloramphenicol and rimactan, moderate sensitive to erythromycin and neomycin and resistant to ampicillin, colistin sulphate and streptomycin.

These findings are in agreement with those of Raid (1989); Abd El-Kader (1992) and Amany (2000) who found that *Staph.aureus*, *Strept. pneumoniae*, *C.pyogenes*, *Micrococcus*, *Klieb. pneumoniae* were sensitive to gentamycin and resistant to ampicillin, but in partial agreement with those of Ahmed (1994) who found that these organisms were sensitive to gentamycin and ampicillin. On the other hand the isolated strains of *E. coli*, *Ps.aeruginosa* and *Past. haemolytica* recovered were sensitive to chloramphenicol and gentamycin and less sensitive to erythromycin. Similar findings were obtained by Amany (2000) as regards the sensitivity to gentamycin, but in partial agreement with those mentioned by Thabet (1993) and Amany (2000) who recorded that *Ps. aeruginosa*, *K.pneumoniae* and *Past. haemolytica* were sensitive to gentamycin, chloramphenicol and ampicillin.

It had been suggested that resistance of bacterial isolates to some antibiotics may be attributed to wrong dosage, duration of treatment and route of administration (Amstutz *et al.*, 1982).

**Table 1:** Incidence of bacterial culture of lung affections of slaughtered camels.

Item	No.	%
Total samples	72	
Positive samples	69	95.83
Samples yielding single isolate	56	81.16*
Samples yielding mixed isolate	13	18.84*
Total isolates	85	
Gram positive isolates	48	56.5**
Gram negative isolates	37	43.5**

\* The percentage was calculated according to positive samples (69)

\*\* The percentage was calculated according to total isolates (85)

**Table 2:** The incidence of different bacterial isolates recovered from affected lungs of slaughtered camels.

Types of microorganisms	No.	%
<b>Gram positive:</b>		
<i>Staph. aureus</i>	16	18.80
<i>Staph. albus</i>	2	2.35
<i>Strep. Pneumoniae</i>	14	17.00
<i>Strept. Pyogenes</i>	2	2.35
<i>Micrococcus sp.</i>	6	7.00
<i>C. pyogenes</i>	8	9.40
<b>Gram negative:</b>		
<i>K. pneumoniae</i>	13	15.26
<i>E. coli</i>	9	10.58
<i>Ps. Aeruginosa</i>	5	5.88
<i>P. multocida</i>	4	4.70
<i>P. haemolytica</i>	2	2.35
<i>Citrobacter sp.</i>	2	2.35
<i>Enterobacter sp.</i>	2	2.35
<b>Total isolates</b>	<b>85</b>	<b>100</b>

The percentage was calculated according to the number of total isolates (85)

Table 3: The incidence of different mixed bacterial isolates recovered from affected lungs of slaughtered camels.

Types of microorganisms	No.	%
<i>Staph.aureus</i> + <i>K.pneumoniae</i>	2	2.89
<i>Staph.aureus</i> + <i>E. coli</i>	2	2.89
<i>Staph.aureus</i> + <i>Strept. Pneumoniae</i>	1	1.44
<i>Staph.aureus</i> + <i>Micrococcus</i>	1	1.44
<i>Staph.aureus</i> + <i>Enterobacter sp.</i>	1	1.44
<i>Staph. aureus</i> + <i>C.pyogenes</i>	1	1.44
<i>Strept. pneumoniae</i> + <i>C.pyogenes</i>	1	1.44
<i>Strept. pneumoniae</i> + <i>Ps.aeruginosa</i>	1	1.44
<i>E.coli</i> + <i>Micrococcus sp.</i> + <i>K. pneumoniae</i>	1	1.44
<i>E. coli</i> + <i>C. pyogenes</i> + <i>Citro bacter</i>	1	1.44
<i>E. coli</i> + <i>K. pneumoniae</i> + <i>Ps. Aeruginosa</i>	1	1.44
<b>Total mixed bacterial isolates</b>	<b>13</b>	<b>18.84</b>

The percentage was calculated according to the number of positive samples (69)

Table 4: The antibiogram of isolated bacteria recovered from affected lungs of slaughtered camels.

Tested isolate	Antibiotic (amount/disc)									
	GM (10 µg)	CL (10 µg)	E (10 µg)	C (30 µg)	NA (30 µg)	N (10 µg)	AM (10 µg)	RSA (30 µg)	S (10 µg)	K (30 µg)
<i>S. aureus</i>	+++	-	-	+++	++	+	-	-	-	++
<i>Strept. Pyogenes</i>	+++	-	+	+++	++	-	-	+++	-	++
<i>C.pyogenes</i>	+++	-	-	+++	++	-	-	+++	-	++
<i>Micrococcus sp.</i>	+++	-	+	+++	++	-	-	+++	-	++
<i>Strept. Pneumoniae</i>	+++	-	-	+++	++	+	-	+++	-	++
<i>Staph. albus</i>	+++	-	-	+++	++	+	-	+++	-	++
<i>K. pneumoniae</i>	+++	-	-	+++	++	+	-	+++	-	++
<i>E. coli</i>	+++	-	-	+++	++	+	-	+++	-	++
<i>Ps. Aeruginosa</i>	+++	-	-	+++	++	+	-	+++	-	++
<i>Past. Multocida</i>	+++	-	-	+++	++	+	-	+++	-	++
<i>Citrobacter sp.</i>	+++	-	-	+++	++	+	-	+++	-	++
<i>Enterobacter sp.</i>	+++	-	+	+++	++	+	-	+++	-	++
<i>Past. Haemolytica</i>	+++	-	+	+++	++	+	-	+++	-	++

Abbreviations:

GM: Gentamycin    CL: Colistin sulphate    E: Erythromycin    C: Chloramphenicol    NA: Nalidixic acid  
 N: Neomycin    AM: Ampicillin    RSA: Rimactan    S: Sterptomycin    K: Kanamycin

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