

Bacteria Associated with Healthy Sudanese Camel Urine and Susceptibility of Some Bacteria of Human Origin to Camel Urine

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ملخص البحث

جمعت عينة من أبوال الأبل من القصارف، الأبيض، وتمبول بغرض للفحص البكتيري. عزلت أنواع مختلفة من البكتيريا هي العنقودية الخنزيرية (*Staphylococcus hyicus*)، عنقودية الرأس (*S. capitis*)، العنقودية البشرية (*S. hominis*)، العنقودية الحالة للدم (*S. haemolyticus*)، معزولتين للمكورة الدقيقة (*Micrococcus spp.*)، وندية ذات الأخاديد (*Corynebacterium striatum*)، وندية الجلد الجاف (*C. xerosis*)، وندية الدفتريا الكاذبة (*C. pseudodiphtheriticum*)، العصوية الشمعية (*Bacillus ceceus*)، والمانهمية الحالة للدم (*Manhemia haemolytica*).

أجرى اختبار حساسية بعض من أنواع البكتيريا المعزولة من الإنسان، لأبوال الإبل كمضاد للميكروبات. وجد أن أبوال الإبل تثبط نمو العنقودية الذهبية، والاشريكية القولونية، والزائعة الزنجارية ونوع من السالمونية، أما النيسرية المخاطية (*Neisseria mucosa*)، والمنقلبية الرائعة (*Proteus mirabilis*)، والكلبسية الرئوية (*Klebsiella pneumoniae*)، والبروسية المجيضة (*Brucella abortus*) فلم يتأثر نمو أي منهن بأبوال الإبل. عندما أعيدت التجربة بعد معادلة درجة الحموضة والقلوية (pH 7,1) لبعض أبوال الإبل زادت حساسية نفس البكتيريا التي كان لأبوال الإبل أثر علي نموها.

Summary

Two hundred and fifty samples of camel urine were collected from El-Gadaref, El Obeid and Tambool areas of the Sudan. They were subjected to bacteriological examinations. Different species of bacteria were isolated. *Staphylococcus hyicus*, *S. hominis*, *S. capitis*, *S. haemolyticus*, *Micrococcus spp*, *Corynebacterium striatum*, *C. xerosis*, *C. pseudodiphtheriticum*, *Bacillus cereus* and *Manhemia haemolytica*, which was the only Gram-negative isolate.

Sensitivity test of some bacteria of human origin to camel urine as an anti-microbial agent was evaluated. It showed an inhibitory effect on the growth of *S. aureus*, *E. coli*, *Salmonella spp.* and *Pseudomonas aeruginosa*, but had no effect on *Neisseria mucosa*, *Proteus mirabilis*, *Klebsella pneumoniae* and *Brucella abortus*. Camel urine sensitive bacteria after its neutralization to pH 7.1, was expressed by wider zones of inhibition.

Introduction

Sudan has the second largest camel population in the world which is estimated at approximately four millions head (Anon, 2006). The country is the home of the most well known camel eco-types, such as the Arabi, Anafi, kabashi, shukri, hadandawi and others (Medani, 1996).

Camel owners used its urine for treatment of various diseases, such as fasciolosis (Khogali *et al*, 2006) and for correcting disorders in general, particularly hepatitis (Ibn Al-Azrag, 1606; Natali, 2002), liver swelling, abscesses, Arabs used to drink boiled urine to cure some internal problems. On the other hand, they let out their camels on certain grasses and use their dried urine topically to treat burns and soft bleeding injuries. Camel urine is efficacious in treatment of skin diseases such as ringworm, tinea and abscesses, sores that may appear on the body and ulcers (Alawadi, 2004).

Experiments have proven that camel's urine has a lethal effect on germs that cause many diseases; many women wash their hair with camel urine to make it longer and lighter.

The objective of this study was to isolate bacteria present in camel urine and to study the effect of camel urine on some selected bacteria of human origin before and after neutralization of the urine.

Materials and Methods

Collection of samples:

Two hundred and fifty samples of camel urine were aseptically collected from Gadaref, El Obeid and Tamboul areas of the Sudan during August 2000 to August 2002. The whole urinary bladder was taken from slaughtered healthy camel and transported at 4°C to the laboratory. The surface of the bladder was swabbed with 70% alcohol before five ml amounts of urine were transferred aseptically into sterile bijoux bottles using sterile syringes and centrifuged immediately at 6000 rpm for 5 min.

Isolation techniques:

Each sample was streaked onto Blood Agar (Oxoid) and incubated aerobically at 37°C for 24 hr. Plates were incubated for a week before considered negative. Isolates were identified at the generic and species levels according to Barrow and Feltham (1993).

Sensitivity test:

Six samples of camel urine (pH 8.5-10) were tested for their antimicrobial activity using Mueller-Hinton Agar (Oxoid). As camel urine is used for treatment in humans; all isolates tested were of human origin; *S. aureus*, *E. coli*; *Proteus mirabilis*, *Klebsiella pneumoniae*, *Neisseria mucosa* and *Brucella abortus*. Sterile discs 6 mm in diameter from filter paper (Whatman No.2) were used. The discs were impregnated with the test urine and dried at 37°C for 30 min. An overnight broth culture of each of the different organisms was used. Cultures were diluted with Nutrient Broth (Oxoid) to a density equivalent to that of the standard prepared by adding 0.5 ml of 1% BaCl₂ to 99.5 of 1% H₂SO₄. (Kirby *et al*, 1966). The standard diffusion method was used (Kirby *et al*, 1966). The test was repeated using neutral urine (pH 7.1).

Results

Eleven bacterial isolates were obtained from different camel urine samples. One isolate of each of *Staphylococcus hyicus*, *S. haemolyticus*, *S. capitis* and *S. hominis*, *Corynebacterium xerosis*, *C. striatum*, *C. pseudodiphtheriticum*, *Bacillus cereus*, *Manheimia haemolyticum* and two isolates of *Micrococcus* spp.

Staphylococcus aureus, *E. coli*, *Salmonella* sp. and *P. aeruginosa* proved to be sensitive to camel urine (Fig 1; 2; 3). The other organisms tested were not affected. Urine has a bacteriostatic effect on *Salmonella* spp, *E. coli* and *P. aeruginosa* (reculturing from the zone of inhibition was positive) and a bactericidal effect on *S. aureus*. (reculturing from the zone of inhibition was negative). On repeat experiment using neutralized urine (pH 7.1), the zones of inhibition were wider Table 1.

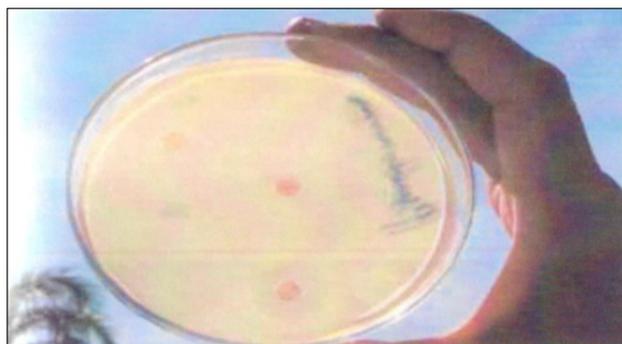


Fig. 1: Sensitivity of *Pseudomonas aeruginosa* to camel urine

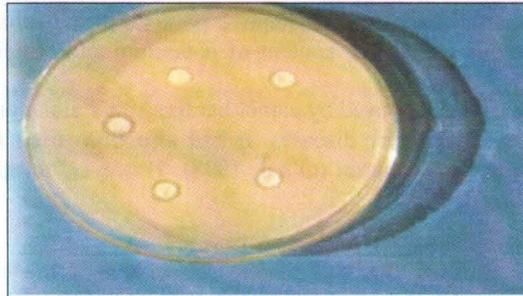


Fig. 2: Sensitivity of *Staphylococcus aureus* to camel urine



Fig. 3: Sensitivity of *Salmonella* spp. to camel urine.

Table 1: Difference between zones of inhibition in neutralized and normal urine.

Bacteria tested	Inhibition zone before neutrali-zation	Inhibition zone after neutrali-zation
<i>E. coli</i>	8 mm	9 mm
<i>S. aureus</i>	13 mm	14 mm
<i>Salmonella</i> spp.	9 mm	15 mm
<i>Pseudomonas aeruginosa</i>	7 mm	15 mm

Discussion

The present study was carried out to isolate bacteria from camel urine and to test the efficacy of camel urine as antimicrobial. Eleven aerobic bacterial isolates (4.4%) were recovered from 250 camel urine samples examined. Coagulase negative *S. hyicus* was isolated, and this is in agreement with Sompolinsky (1953) who reported that 24 to 26% of the *S. hyicus* subsp. *hyicus* are coagulase positive. *Manhemia haemolytica* was isolated from camel urine. This organism causes ovine pneumonia and gangrenous mastitis (Karim, 2002); its presence in camel urine may be attributed to the fact that camels and sheep co-exist in the same habitat in Kordofan State.

The results of this study clearly demonstrate that camel urine inhibits the growth of *S. aureus* and *E. coli* and this finding agrees with O' Haj (1998). Inhibition of *Salmonella* and *E. coli* growth by the urine explains its use in abdominal disorder.

Zones of inhibitions were wider when neutralized urine was used; this means that alkalinity of urine may have an undisclosed role. The sensitivity of *P. aeruginosa* to camel urine is important because this organism is resistant to many anti-microbial drugs.

Camel urine was found to contain antibodies that are so small in size and can penetrate deep into human tissues and cells (Deurasch, 2005). It is also used in the traditional medicine by the Arabs for the treatment of ascitis with successful results (O'haj, 1998). Camel urine plays an

important role as an antioxidant and protective agent against liver damage (Khogali *et al.*, 2002). It also acts as slow acting diuretic that does not deplete potassium and other salts as other diuretics do, and this could be due to its high content of potassium and protein (Muhammad, 1998).

In the Sudan, camel urine routinely used by camel herders either alone or in combination with camel milk for the treatment of many diseases. It had also been tried for treatment of leukemia, digestive system cancer and malaria (O'haj, 1998). However, further susceptibility tests on other bacteria are warranted.

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