

Bacterial Diseases of the Reproductive System of Camels (*Camelus dromedarius*) in Eastern Sudan

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Abstract: A field survey for the study of bacterial diseases of the reproductive system of camels in Eastern Sudan was conducted. The important diseases of she-camels were acute catarrhal endometritis, pyometra, chronic endometritis and acute or chronic mastitis. The incidence of these diseases increased with age and reached its peak in autumn. Isolated bacteria included *Staphylococcus aureus*, *E. coli*, *Klebsiella* spp., *Corynebacterium* spp., *Proteus* spp., *Salmonella* spp. and *Streptococcus* spp. Although trials to isolate *Brucella* spp., were negative, high agglutinating titres were detected. Male camels had orchitis which was due to *Staphylococcus aureus*, *E. coli* and *Proteus* spp. These organisms in addition to *Corynebacterium* spp. and *Clostridium* spp., were isolated from wounds of the external genitalia. Incidence of orchitis and wounds of external genitalia was also increased with age in autumn.

Key words: Camel, bacterial diseases, reproductive system

INTRODUCTION

Various bacterial diseases of camel's reproductive system have been reported by many workers. Fayed^[1] and Refai^[2] tabulated the main genital tract infections in Egyptian camels as acute catarrhal or suppurative endometritis, chronic endometritis, pyometra and abscesses of the uterine wall. Tayeb^[3] reported orchitis and wounds of the scrotum as the main reproductive diseases of male camels. Arthur *et al.*^[4] found that the main reproductive diseases and abortion in Saudi camels were due to *Salmonella* spp., *Proteus* spp., *Escherichia* spp., *Serratia* spp., *Klebsiella* spp., *Pseudomonas* spp., *Streptococcus* spp., *Staphylococcus* spp. and *Corynebacterium* spp. Ali *et al.*^[5] isolated *Escherichia coli*, *Corynebacterium pyogenes*, *Staphylococcus aureus*, *Streptococcus pyogenes*, *Proteus* spp. and *Pasteurella multocida* from cases of endometritis associated with pyometra in Egyptian she-camels. Hassan^[6] examined the genital organs of 127 she-camels slaughtered at Cairo abattoir and isolated *Streptococcus pyogenes* and *Corynebacterium pyogenes* from cases with early embryonic death. Brucellosis in camels was reported by Abu-Damir *et al.*^[7] and Abbas *et al.*^[8] in Sudan and Andreani *et al.*^[9] in Somali Democratic Republic, Barbour *et al.*^[10] in Saudi Arabia and Fayed *et al.*^[11], Zagloul and Kamel^[12] and Karmy^[13] in Upper Egypt.

The present investigation was carried out to study the different bacteria associated with some reproductive diseases of camels in the Eastern State of Sudan.

MATERIALS AND METHODS

A field survey for the investigation of bacterial diseases of the reproductive system of Sudanese camels in Eastern State was carried out. Samples for bacteriological examination were collected during a period of one year to determine the incidence of these diseases. Bacteriological examination

Swabs from each case were collected under aseptic conditions, labelled and transported to the regional laboratory at El Showak area, Eastern State, for examination. These were inoculated into tubes of nutrient broth after streaking of blood agar (Oxoid), nutrient agar (Oxoid), MacConkey's agar (Oxoid), EMB agar, serum dextrose agar, albinin Brucella agar, liver infusion agar cooked meat medium (Difco) and selenite F broth or tetrathionate broth, deoxy-cholate citrate agar (DCA) and were then incubated aerobically at 37°C for 24 h and anaerobically at 37°C for 72 h. Milk and pus were separately collected in sterile bottles. Selective media for the isolation of *Brucella* spp., were incubated at 10% CO₂ tension and positive samples of *Salmonella* spp., were subcultured onto plates of S.S agar.

All isolates were identified further according to Cowan's tests^[14]. All serum samples were examined by agglutination test using standard antigen.

RESULTS

Table 1 shows that the most commonly encountered diseases of the reproductive system of she-camels were

Table 1: Incidence of bacterial diseases of the reproductive system of she-camels at different seasons

Seasons	No. of diseased she-camels				
	No. of she-camels examined	Acute endometritis (%)	Chronic endometritis	Pyometra	Mastitis
Winter	250	5 (2%)	6 (2.4%)	6 (2.4%)	15 (6%)
Summer	206	8 (3.9%)	6 (2.9%)	4 (1.9%)	15 (7.3%)
Autumn	300	10 (3.3%)	8 (2.2%)	10 (3.3%)	40 (13.4%)

Table 2: Incidence of bacterial diseases of the reproductive system of male camels at different seasons

Seasons	No. of male camels examined	No. of diseased male camels	
		Orchitis	wounds of external genitalia
Winter	117	7 (6%)	6 (5.1%)
Summer	130	7 (5.4%)	11 (8.5%)
Autumn	190	13 (6.8%)	23 (12.1%)

Table 3: Types and percentage of bacteria isolated from affected she-camels

Diseases	No. of isolates	(%)
Acute catarrhal endometritis	<i>Staphylococcus aureus</i>	(16) 45.7
	<i>E. coli</i>	(6) 17.2
	<i>Corynebacterium</i> sp.	(8) 22.8
	<i>Salmonella</i> sp.	(5) 14.3
	Chronic endometritis	
Pyometra	<i>Corynebacterium</i> sp.	(12) 28.6
	<i>Klebsiella</i> sp.	(10) 23.8
	<i>Proteus</i> sp.	(12) 28.6
	<i>Salmonella</i> sp.	(8) 19.0
Mastitis	<i>Staphylococcus aureus</i>	(15) 60.0
	<i>Proteus</i> sp.	(10) 40.0
	<i>Staphylococcus aureus</i>	(53) 38.7
	<i>E. coli</i>	(36) 36.3
	<i>Streptococcus</i> sp.	(6) 4.3
	<i>Corynebacterium</i> sp.	(42) 30.7

Table 4: Type and percentage of bacteria isolated from male camels

Disease	Bacteria isolated	Percentage %
Orchitis	<i>Staphylococcus aureus</i>	(27) 61.4
	<i>E. coli</i>	(10) 22.7
	<i>Proteus</i> spp.	(7) 15.9
Wounds of external genitalia	<i>Staphylococcus aureus</i>	(22) 34.4
	<i>Corynebacterium</i> spp.	(13) 20.3
	<i>E. coli</i>	(19) 29.7
	<i>Clostridium</i> spp.	(3) 4.7
	<i>Proteus</i> spp.	(7) 10.9

acute catarrhal and chronic endometritis, pyometra and mastitis. Orchitis and injuries of the external genitalia were the common problems in adult male camels (Table 2). The high incidence of the diseases in both female and male camels occurred mainly during the rainy season (June-September). All cases of chronic endometritis were

observed in she-camels of more than 12 years old and cases of mastitis were noticed in she-camels less than 10 years of age. There was no history or evidence of abortion in the herds.

The wounds of external genitalia were mainly superficial and sometimes contaminated with soil. Necrotic tissues were also observed.

Bacteriological findings

Several microorganisms were isolated from infected she-camels (Table 3). The microorganisms associated with acute endometritis were identified as *Staphylococcus aureus*, 16 isolates (45.7%), *E. coli*, 6 isolates (17.2%), *Corynebacterium* spp., 8 isolates (22.8%) and *Salmonella* spp., 5 isolates (14.3%). In chronic endometritis, bacteria were identified as *Corynebacterium* spp., 12 isolates (28.6%), *Klebsiella* spp., 10 isolates (23.8%), *Proteus* spp., 12 isolates (28.6%) and *Salmonella* spp., 8 isolates (19%). In pyometra, only *Staphylococcus aureus*, 15 isolates (60%) and *Proteus* spp., 10 isolates (40%) were identified. On the other hand, mastitic she-camels revealed *Staphylococcus aureus*, 53 isolates (38.7%), *E. coli*, 36 isolates (36.3%), *Streptococcus* spp., 6 isolates (4.3%) and *Corynebacterium* spp., 42 isolates (30.7%).

The microorganisms which were isolated from infected male camels are presented in Table 4. The microorganisms associated with orchitis were identified as *Staphylococcus aureus*, 27 isolates (61.4%), *E. coli*, 10 isolates (22.7%) and *Proteus* spp., 7 isolates (15.9%) and those associated with injuries of the external genitalia were identified as *Staphylococcus aureus*, 22 isolates (34.4%), *Corynebacterium* spp., 13 isolates (20.3%), *E. coli*, 19 isolates (29.7%), *Clostridium* spp., 3 isolates (4.7%) and *Proteus* spp., 7 isolates (10.9%).

Trials to isolate *Brucella* spp. from all the she-camels in the herds revealed negative results. Out of 756 serum samples, 12 samples showed high agglutination titres (1.6%). On the other hand, 12 samples from 437 male camels' sera showed positive agglutination titres (2.7%).

DISCUSSION

The results of the present study have shown that the incidence of reproductive diseases of both male and female camels is relatively low compared with other diseases. The high incidence of mastitis and pyometra may be due to some physiological reasons. Indeed, the occurrence of bacterial diseases of the reproductive system particularly during the rainy season might be attributed to ecological factors which forced the nomads to gather with their herds at a limited area and consequently facilitated transmission of diseases by direct contact. Several types of both Gram - positive and

Gram-negative bacteria were isolated from diseased animals^[5,6].

The results of this investigation indicated that *Staphylococcus aureus* was the main isolated bacterium from cases of acute catarrhal endometritis (45.7%), pyometra (60%) and mastitis (38.7%). On the other hand, this organism was not isolated from any case of chronic endometritis. The highest rate of isolation of *Staphylococcus aureus* from cases of orchitis (61.4%) and wounds of the external genitalia (34.4%) of male camels might indicate the wide distribution of this organism in nature and consequently cause many diseases.

The relatively high incidence of recovery of *E.coli* (22.7%) in orchitis and (29.7%) in wounds of external genitalia and in reproductive diseases of she-camels may reflect the importance of this organism in inducing genital tract infections in camels.

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