

# PATHOLOGICAL STUDY OF CAMEL MASTITIS IN TAMBOUL AREA, SUDAN

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## ABSTRACT

This study was carried out to determine different types of mastitis and their incidence in camels in Tamboul area. A questionnaire was designed to collect data on mastitis in 10 herds in 4 different localities with total population 1649 camels during 3 seasons (summer, winter and autumn) for 1 year. In addition a slaughter house study in which, udders of 2158 female camels at different ages of Arabi breed were examined. Gross lesions of affected udders were observed and recorded. Representative samples from the gross lesions were fixed in 10% neutral formal saline, processed, sectioned and stained with haematoxylin and eosin (H & E) for histopathological examinations. The prevalence of mastitis as calculated from the questionnaire results was 18.98%.

The results showed that prevalence of clinical mastitis was 18.98% (acute 6.9%, chronic 12% and gangrenous 0,061%). The results revealed that 47.92% of mastitis cases were found to use (surar), 19.17% were found to use gourab and 32.91% didn't use any device. Mastitis cases observed in the initial stage of lactation was 19%, middle stage of lactation 30.1% and the highest prevalence of mastitis was found in late stage of lactation (50.9%). Slaughter house results showed that 353 udders were affected representing 16.36% of the total she-camels investigated (2158). The various pathological lesions and conditions included chronic mastitis (66.29%), acute mastitis (31.73%), abscess (1.70%) and gangrenous mastitis (0.28%) of the total affected udders.

**Key words:** Camel, mastitis, pathological study, Sudan

Mastitis is a complex condition, which occurs worldwide among dairy animals, with heavy economic losses. Incidence of mastitis may increase in dairy camels due to hand milking and teat malformation (Almaw and Molla, 2000). Clinical mastitis (chronic, acute and gangrenous) causes abnormalities in udder and/or milk and these can be detected during physical examination and systemic signs. The clinical mastitis in camel is diagnosed by palpation and examination of udder or milk. Acute mastitis has been reported to occur during the first few days following parturition and with signs including anorexia, fever, general depression, swelling, severe inflammation and pain of the udder (Quandil and Oudar, 1984; Obeid and Bagadi, 1996; Tibary and Anouassi, 2000). Chronic mastitis can be observed by peresence of firm, swollen fibrous udder often with nodular indurations and abscess formation, atrophy of one or more quarters and presence of pustules on the surface (Barbour *et al*, 1984; Saad and Thabet, 1993). Gangerenous mastitis is characterised by bluish, oedematous and cold to the touch udder. The teat secretion is usually purplish violet in colour mixed with gas.

This study was carried out to determine the incidence of different types of mastitis in different

herds in Tamboul area (Butana) using a questionnaire coupled by gross and histopathological examination of the pathological lesions in udders in female camels slaughtered at Tamboul slaughterhouse.

## Materials and Methods

### *The Survey*

Ten camel herds comprising of 1649 females were surveyed for 1 year to determine the incidence and types of mastitis. A questionnaire was designed for data collection. Clinical examination was made to diagnose mastitis and identify the type.

### *Slaughterhouse study*

These studies were carried out to find out the pathological changes of udders of 2158 females (Arabi breed) slaughtered at Tamboul slaughterhouse. Gross examination of affected udders was made and the findings were recorded. Representative samples from the gross lesions were fixed in 10% neutral formal saline for histopathological examination. Sections were prepared and stained with haematoxylin and eosin (H & E) for histopathological examination according to the method of Bancroft *et al* (1996).

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## Results and Discussion

### Survey results

Ten camel herds (1649 females) were examined during summer, winter and autumn for 1 year to investigate prevalence of clinical mastitis and their types in Tamboul area, Sudan. The most important sign was enlarged, hard, hot and painful quarter which were apparent before changes appeared in the milk. In some cases, serous secretion was also seen. There was prominent subcutaneous oedema with teat congestion enlargement and severe inflammation of supra-mammary lymph nodes. Chronic mastitis was characterised by firm red, swollen and fibrosed udder often with nodular induration and abscess formation. Some cases showed hypertrophy of mammary gland tissue and watery secretion or pus. Other cases of chronic mastitis showed obstruction of the teat canal and enlargement of the teat due to the anti-suckling devices (surar or gourab). The gangrenous mastitis showed bluish discolouration of udder; this was found associated with injury by anti-suckling devices (surar).

### The effect of anti-suckling devices (surar and gourab)

The owners of the camels used 2 kinds of local anti-suckling devices (surar and gourab). Surar is a piece of wood and cloth which ties two pairs of teats together. It is injurious and traumatic to the udder and neck of the teat leading to its fibrosis.

Gourab is a plastic sac or cloth covering the udder and flank which are considered as source of contamination to the udder. Out of 313 cases of mastitis cases, 150 (about 48%) were found to be associated with the use of surar, while 60 cases (19.17%) were associated with the use of gourab. In remaining 103 cases (32.91%) of mastitis she-camels were free from these two devices.

### Seasonal effects on mastitis

The highest prevalence (23.16%) (107 cases from 462 cases) of clinical mastitis were reported in summer season, followed by winter season (19.54%)

(120 out of 614 cases) and the lowest prevalence was reported in autumn season (15.1%) (86 out of 373 cases) (Table 1). The survey revealed that the highest prevalence of acute mastitis was seen in summer (9.09%), followed by autumn (8.03%) and winter (4.23%) (Table 1).

The survey revealed that the highest occurrence of chronic mastitis was recorded in winter (15.31%), followed by summer (13.85%) and autumn season (6.98%) (Table 2). Only one case of gangrenous mastitis was seen in summer (0.22%) (Table 1).

### Prevalence of mastitis among age groups

The age of camels affected with clinical mastitis (acute, chronic or gangrenous) varied between 4 and 18 years.

Acute mastitis was highest (8.54%) in the age group of 4-8 years, followed by 9-13 years (7.06%) and 14-18 years (5.55%) (Table 2). The survey also revealed the highest prevalence of chronic mastitis in the age group 14-18 years (12.94%), followed by age groups of 9-13 years (11.66%) and 4-8 years (12.94%) (Table 2). Only one case of gangrenous mastitis was reported in she-camels age 9-13 years (prevalence 0.22%).

### Effect of stage of lactation on mastitis

Few mastitis cases were observed during the first stage of lactation (19%), the cases increased at the middle stage of lactation (30.1%) and the highest prevalence of mastitis was diagnosed in the late stage of lactation (50.9%) (Table 3).

### Slaughterhouse investigation

The organs of 2158 female udders were examined carefully during the post-mortem inspection at Tamboul slaughterhouse and different pathological changes were observed and described. The main pathological lesions diagnosed were 353, representing 16.36% of the total udders examined. According to the lesions chronic mastitis constituted (66.29%), acute (31.73%), suppurative (1.70%) and gangrenous (0.28%) Table (4).

**Table 1.** Prevalence of clinical mastitis among she-camels according to season in Tamboul area.

| Season  | Number tested | Acute mastitis |            | Chronic mastitis |            | Gangrenous mastitis |            | Overall |            |
|---------|---------------|----------------|------------|------------------|------------|---------------------|------------|---------|------------|
|         |               | +ve            | Prevalence | +ve              | Prevalence | +ve                 | Prevalence | +ve     | Prevalence |
| Summer  | 462           | 42             | 9.09%      | 64               | 13.85%     | 1                   | 0.22%      | 107     | 23.16%     |
| Winter  | 614           | 26             | 4.23%      | 94               | 15.31%     | -                   | -          | 120     | 19.54%     |
| Autumn  | 573           | 46             | 8.03%      | 40               | 6.98%      | -                   | -          | 86      | 15.1%      |
| Overall | 1649          | 114            | 6.91%      | 198              | 12%        | 1                   | 0.061%     | 313     | 18.98%     |

**Table 2.** Prevalence of clinical mastitis among she-camels according to the age group in Tamboul area.

| Age group   | Number tested | Acute mastitis |            | Chronic mastitis |            | Gangrenous mastitis |            | Overall |            |
|-------------|---------------|----------------|------------|------------------|------------|---------------------|------------|---------|------------|
|             |               | +ve            | Prevalence | +ve              | Prevalence | +ve                 | Prevalence | +ve     | Prevalence |
| 4-8 years   | 445           | 38             | 8.54%      | 50               | 11.23%     | 1                   | 0.22%      | 89      | 20%        |
| 9-13 years  | 609           | 43             | 7.06%      | 71               | 11.66%     | -                   | -          | 114     | 18.72%     |
| 14-18 years | 595           | 33             | 5.55%      | 77               | 12.94%     | -                   | -          | 110     | 18.49%     |
| Overall     | 1649          | 114            | 6.91%      | 198              | 12.00%     | 1                   | 0.06%      | 313     | 18.98%     |

**Table 3.** Effect of stage of lactation on clinical mastitis in Tamboul area.

| Stage of lactation | Number Tested | +ve | Prevalence |
|--------------------|---------------|-----|------------|
| First              | 200           | 38  | 19%        |
| Middle             | 295           | 89  | 30.1%      |
| Late               | 318           | 162 | 50.9%      |
| Overall            | 814           | 139 | 17.07%     |

**Table 4.** Type of mastitis observed in the udders of camels slaughtered at Tamboul abattoir.

| Type of mastitis     | Number affected | % affected |
|----------------------|-----------------|------------|
| Acute mastitis       | 112             | 31.73      |
| Suppurative mastitis | 6               | 1.70       |
| Gangrenous mastitis  | 1               | 0.28       |
| Chronic mastitis     | 234             | 66.29      |
| Total                | 353             | 100%       |

### Acute mastitis

In this type of mastitis, the affected udders were often swollen, hard, reddened and hot to touch (Fig 1). Abscessation was observed with discharge of white, yellow or green pus according to the causative bacteria (Fig 2). Mammary secretions were watery, yellowish or bloody. Mammary lymph nodes were increased in size. Microscopic examination revealed congestion, haemorrhage and oedema. Mature and immature abscesses were also seen. The mature ones were surrounded by a thick fibrous capsule and infiltration of neutrophils and macrophages.

### Gangrenous mastitis

It was observed in one case representing 0.28%. The affected quarters were necrotic, oedematous bluish in colour (Fig 3), and sloughing was seen (Fig 4). Mammary lymph nodes were enlarged. Microscopic examination revealed necrotic area surrounded by inflammatory cells, mainly neutrophils and giant cells.

### Chronic mastitis

In chronic mastitis, the affected udders were often hard with fibrosis. Abscessation were observed with evidence of white, yellow or green pus (Fig 6). Lactiferous ducts were blocked by accumulations of keratin. Microscopic examination revealed necrosis

of alveolar epithelium, hyperplasia of epithelial lining, proliferation of fibrous tissue, and thickening of alveolar septa that led to shrunken udder. In some cases abscesses surrounded by a thick fibrous capsule and infiltration of neutrophils and lymphocytes.

The occurrence of clinical mastitis in the herds surveyed was 18.98%. This is in agreement with reports by Alamin *et al* (2013) in Kordofan state, Sudan and Al-Juboori *et al* (2013) in Abu Dhabi, United Arab Emirates. These authors found an incidence of 25% and 24.7%, respectively. Such incidence was higher than that reported by Abdella, (2015) in Butana area, Sudan (9.09%).

The local anti-suckling devices used for lactating females proved to be a risk factor for mastitis as 67.09% of animals used these showed mastitis. Tick infestation which causes teat lesions was also found to predispose to mastitis. These lesions or wounds together with poor udder hygiene facilitated bacterial entry and hence infection of the udder. In this connection Alamin *et al* (2013) in western Sudan and Abdella (2015) in Butana area, Sudan reported that mastitis spread between she-camels due to the bad milking practises and/or the use of local anti-suckling devices which caused wounds facilitating invasion by *Staphylococcus* spp. into mammary gland tissue. Hussein *et al* (2013) reported that tick infestation causes lesions and is one of the potential risk factor for occurrence of mastitis by creating a suitable condition for infection by the majority of mastitis causing microorganisms.

The highest prevalence of clinical mastitis in this study was that of chronic mastitis (12%) followed by acute (6.91%) and least by gangrenous mastitis (0.061%). These results were different from that reported by Abdella (2015) in Butana area, Sudan who reported acute, chronic and gangrenous mastitis and these constituted prevalence 24.14%, 72.41% and 3.45%, respectively. Al-Tofaily and Alrodhan (2011) in Iraq reported a very low mastitis prevalence. The results of the present survey were in agreement with the finding of Yagoub (2005) who reported that acute and chronic mastitis were among important





**Fig 1.** Acute mastitis showing swelling and redness of udder.



**Fig 4.** Sloughed quarter and black bluish skin in the teat in case of gangrenous mastitis.



**Fig 2.** Camel's udder showing abscess and escape of pus.



**Fig 5.** The shrunken quarters in a case of chronic mastitis.



**Fig 3.** Gangrenous mastitis with blue hind quarters.



**Fig 6.** Udder showing abscess and chronic mastitis in camel.

pathological conditions in she-camels in eastern Sudan.

The results indicated that the age of she-camels had no significant effect on the occurrence of clinical mastitis as 6.90% of mastitis cases were found at

the age between 9-13 years, 6.39% at the age 14-18 years and 6.07% for the age group 4-8 years. Abdella, (2015), on the other hand, demonstrated that she-camels above 9 years old were the most susceptible to clinical mastitis. Hussein *et al* (2013) reported

that the incidence of mastitis was influenced by age, where the lowest prevalence of mastitis in she-camels was between 5-7 years in Jijiga town, Ethiopia. The present findings indicated that there was a correlation between the stage of lactation and mastitis; this agrees with the studies of Abdella (2015) and Suheir (2004) who reported that the percentage of mastitis increased with the progress of lactation.

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