

# PATHOLOGICAL DISORDERS OF THE OVARIES AND UTERINE TUBES IN CAMELS (*Camelus dromedarius*) SLAUGHTERED AT TAMBOUL ABATTOIR, SUDAN

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## ABSTRACT

This study was carried out to investigate the different pathological lesions, reproductive diseases and pathological conditions in the ovaries and uterine tubes of camels slaughtered at Tamboul abattoir, Sudan. Samples collected from genitalia of 2158 female camels at different ages of *Arabi* breed were examined. Gross lesions of affected organs 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. Tissue samples and swabs from affected organs (ovaries and uterine tubes) were taken for bacteriological examination. The results showed that 43 organs were affected representing 1.99% of the total she-camels investigated (2158). The various pathological lesions and conditions included; ovarian cysts (41.86%), ovarian hypoplasia (23.26%), ovarian oedema and enlargement (13.95%), ovarian fibrosis (9.30%), oophoritis (4.65%), hair in ovaries (dermoid cyst) (2.33%) and thickening and corrugation in uterine tubes containing pus (4.65%). It should be highlighted that fibrotic and oedematous ovaries were reported for the first time in dromedaries. Dermoid cyst (hair in ovaries) was reported for the first time in Sudanese dromedary camels. Various microorganisms were isolated from affected cases including; *Staphylococcus aureus*, *Streptococcus* spp. and *Corynebacterium* spp.

**Key words:** Camel, ovaries, pathological disorders, uterine tubes

Diseases and infections of the reproductive system of camels may cause complications resulting, infertility or poor reproductive performance and consequent loss of productivity (Yagoub, 2005; Tibary *et al* 2006; Al-Afaleq *et al*, 2012). These are usually associated with repeat breeding, early embryonic death, foetal loss and abortion. Repeat breeding is one of the major reproductive problems among she-camels which is mainly due to ovulation failure (Tibary and Anouassi, 1998).

The purpose of the present study was to investigate the different pathological changes, reproductive diseases, pathological conditions and their bacteriological causes in the ovaries and uterine tubes in camels (*Camelus dromedarius*) slaughtered at Tamboul abattoir, Sudan.

## Materials and Methods

This study was carried out to investigate the different pathological lesions and pathological conditions in the ovaries and uterine tubes of she-camels slaughtered at Tamboul slaughterhouse.

Samples collected from 2158 female camels at different ages of *Arabi* breed were examined and those from affected female genitalia were collected. Gross examinations of affected ovaries and uterine tubes 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 examination according to Bancroft *et al* (1996). Tissue samples and swabs from ovaries and uterine tubes were taken for microbiological examination according to the method of Barrow and Feltham (1993).

## Results

### Gross and histopathological examination

The parts of 2158 female reproductive systems were examined carefully during the post-mortem inspection at Tamboul slaughterhouse and different pathological changes were observed and described. The results showed that 43 organs were affected representing 1.99% of the total camels investigated.

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Table 1 shows the prevalence % of the encountered lesions as calculated from the affected organs. These were ovarian cysts (41.86%), ovarian hypoplasia (23.26%), ovarian oedema and enlargement (13.95%), ovarian fibrosis (9.30%), oophoritis (4.65%), hair in ovaries (teratoma) (2.33%) and thickening and corrugation in uterine tubes containing pus (4.65%).

## Ovaries

Types and distribution of pathological changes encountered in the ovaries and uterine tubes are summarised in Table (1). These included.

### 1. Ovarian cysts

Cysts were found to be the most prevalent pathological disturbances in ovaries. They represented (41.86%) of the pathological lesions of affected ovaries and uterine tubes. Four different types of ovarian cysts were described (Table 1).

**Table 1.** Types and distribution of pathological lesions encountered in the ovaries and uterine tubes in slaughtered females.

Organ	Pathological lesion	Number of lesions	% to number of organs affected
Ovary	Ovarian cysts	18	41.86
	Hypoplasia	6	13.95
	Atrophy	4	9.30
	Oedema	6	13.95
	Fibrosis	4	9.30
	Oophoritis	2	4.65
	Teratoma (hair in ovary) and caseous necrosis	1	2.33
Uterine tube	Thickening, corrugation and pus accumulation	2	4.65
<b>Total affected organs</b>		<b>43</b>	<b>100%</b>
<b>Total examined animals</b>		<b>2158</b>	
<b>Per cent of affected organs to total examined animals</b>		<b>1.99</b>	

#### 1.1. Follicular cysts

Follicular cysts were either solitary (Fig 1) or multiple; with average diameter 3-5 cm, larger cysts exceeding 5 cm in diameter were also seen. The cysts were thin-walled and the wall was either semitransparent and well vascularised or slightly opaque with little vascularisation. The thin-walled cysts were filled with a straw coloured serous fluid, When multiple cysts were seen, they took a grape punch like appearance (Fig 2). Histopathologically, the ovum and the surrounding cells were completely degenerated or absent. The basement membrane was

not found in most of the cases and it was difficult to differentiate the theca interna from the theca externa.

#### 1.2. Luteal cysts

Luteal cysts appeared as dark red masses protruding from the ovarian surface and filled with a colourless, semi-coagulated fluid (Fig 3). The cysts were surrounded by a thick opaque and tense fibrous connective tissue capsule containing greyish yellow colour semi coagulated fluid. Histopathologically, the granulosa cells were changed into granulosa leutein cells due to leutilisation that appeared polyhedral with large vacuolated cytoplasm. No para-ovarian cysts were found.

#### 1.3. Haemorrhagic cysts

The cysts had a thick and highly vascular wall (Fig 4). In cut section, the internal cavity was filled by brownish fluid. Histopathologically, this fluid was mixed with a large amount of R.B.C. giving it a brownish colouration. The cyst wall was vascularised and covered by a thick connective tissue capsule (Fig 5).

#### 1.4. Infundibular cysts

These were lined by stratified squamous epithelium and are distinguished from cystic teratomas of the ovary by the absence of skin adnexae. It was filled with thin slightly yellowish serous fluid (Fig 6).

### 2. Teratoma (Dermoid cyst)

It is a bizarre tumor, usually benign, in the ovary. Usually it contains a diversity of tissues including hair, teeth, bone etc. In this study it contained hair and caseous material and surrounded by a fibrous wall (Fig 7).

### 3. Oophoritis

Two cases of Oophoritis were recorded. The ovary was enlarged congested and haemorrhagic. It was distended with thick, caseous pus surrounded by a thick fibrous capsule (Figs 8 and 9). Histopathological examination revealed haemorrhage, oedema, caseous necrosis and infiltration of inflammatory cells predominantly neutrophils.

### 4. Ovarian Atrophy

This condition was found in 4 cases, the affected ovaries were much smaller than normal (Fig 10) and showed no evidence of ovulation. Histopathological examination revealed atrophy of the ovarian cortex, which consisted almost exclusively of fibrovascular tissue, with no evidence of follicular activity.



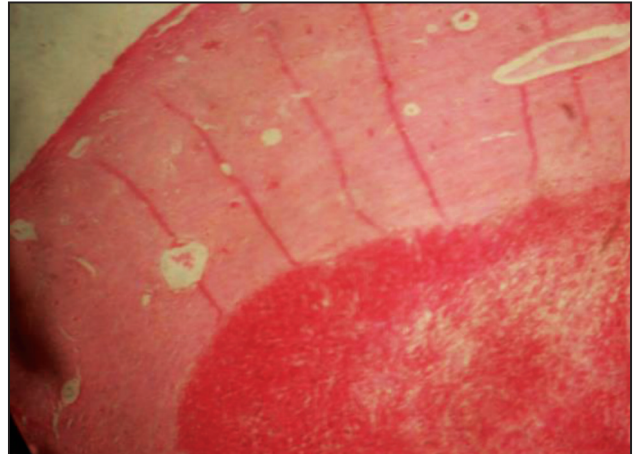
**Fig 1.** Solitary follicular ovarian cyst filled with straw coloured fluid.



**Fig 4.** Haemorrhagic ovarian cyst showing a thick and highly vascular wall.



**Fig 2.** Grape punch appearance of multiple ovarian cysts.



**Fig 5.** Haemorrhagic ovarian cyst with vascularised haemorrhagic wall.



**Fig 3.** Luteal ovarian cyst containing semi coagulated fluid.



**Fig 6.** Infundibular ovarian cyst containing yellowish fluid.

### **5. Ovarian hypoplasia**

This congenital condition was found in 6 cases where the affected ovary showed complete lack of follicles. In this study uni or bilateral hypoplasia (Fig

11) were encountered, characterised by small firm smooth ovaries, complete absence of follicular or luteal development and fibrous connective tissues proliferation.



**Fig 7.** Camel's ovary showing teratoma (hair in ovary) and caseous necrosis.



**Fig 10.** Atrophied left ovary.



**Fig 8.** Oophoritis showing enlarged ovary with pinkish material.



**Fig 11.** Bilateral hypoplasia.



**Fig 9.** Oophoritis showing enlarged, congested and haemorrhagic ovary.



**Fig 12.** Fibrotic, shrunken ovary with whitish grey fibrous tissue.

### **6. Ovarian fibrosis**

This lesion was found in 6 cases. It was characterised by excessive proliferation of fibroblasts.

The primary pathological features of ovarian fibrosis are a thick capsule (Fig 12) increased mesenchymal connective tissue and decreased or absent follicles

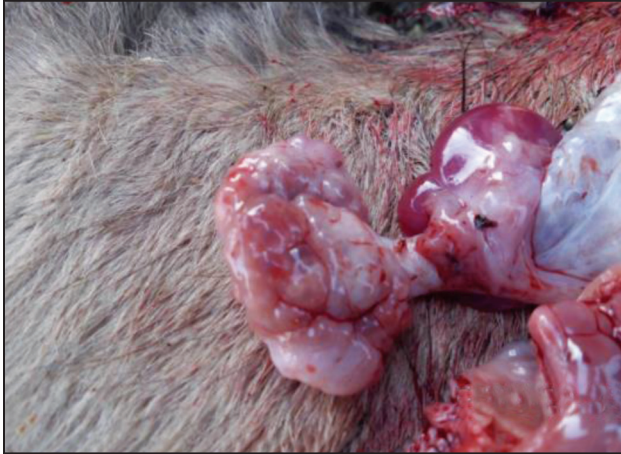


Fig 13. Oedematous ovary and oviduct.



Fig 15. Pyosalpinx, with tortuosity and thickening of the oviduct.



Fig 14. Large oedematous ovary (right) normal one (left).

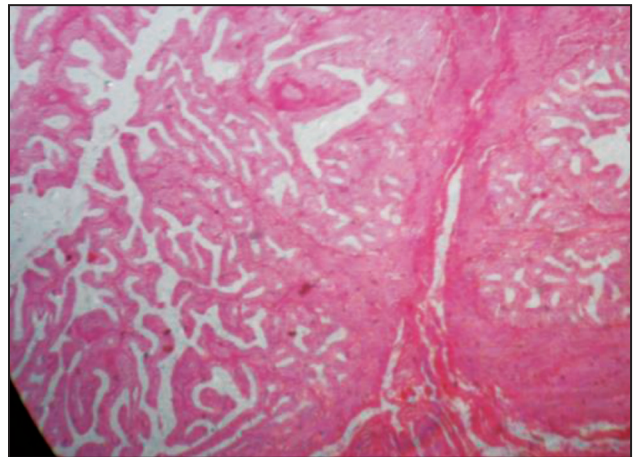


Fig 16. Accumulation of pus and congestion in the oviduct.

## 7. Ovarian oedema

This was found in 6 cases representing 13.95% of total affected cases. The ovary was enlarged. Clear serous fluid oozed out when the ovary was cut (Figs 13 and 14).

### Uterine tube

#### 1. Pyosalpinx

Pyosalpinx was observed in two cases representing 4.65% of the total affected cases. The lesion was characterised by bilateral salpingeal distension due to accumulation of pus. The uterine tubes wall was irregularly thickened and tortuous (Fig 15 and 16).

#### Organisms isolated from affected cases

The organisms that were isolated from affected cases included; *Staphylococcus aureus*, *Streptococcus* spp. and *Corynebacterium* spp.

## Discussion

The results showed a prevalence that 43 ovaries and uterine tubes were affected representing 1.99% of all examined she-camels. These included ovarian cysts (18), ovarian hypoplasia (6), ovarian atrophy (4), ovarian oedema (6), ovarian fibrosis (4), oophoritis (2), teratoma with caseous necrosis (1) and thickening and corrugation in uterine tubes containing pus (2).

Incidence of ovarian cysts in she-camels in this study was 41.86% of the lesions in the ovary. This finding was higher than that reported by Hamouda *et al* (2011) and Al-Afaleq *et al* (2012) in Saudi Arabia who reported 7.3% and 6.9%, respectively. Shawky *et al* (2004) in Egypt (7.6%) and Nourani and Khodakaram (2004) in Iran (18.75%). This high incidence could be attributed to heat stress in Butana region and hence increased activity of the pituitary and thyroid gland. It should be stressed that many non-bred female dromedaries normally tend to

develop follicular ovarian cysts since ovulation in these animals is induced during coitus (mating). Haemorrhagic cysts may be due to some pathological changes during growth of follicular cyst resulting in quick bleeding with accumulation of the blood within the cyst.

Ovarian hypoplasia is a congenital condition which is defined as incomplete ovarian development due to germ cell deficiency, where the affected ovary or part of the ovary shows complete lack of follicles. In this study 6 cases (13.95%) of both unilateral and bilateral ovarian hypoplasia were seen. The occurrence was higher than that reported by Shawky *et al* (2004) in camels in Egypt (0.4%) and Al-Afaleq *et al* (2012) in Saudi Arabia (3.19.%).

Dermoid cyst (hair in ovary) was found in one ovary (2.33%). Several authors reported dermoid cysts in the camel's ovary, i.e. Al-Afaleq *et al*, 2012; (1.06%); Shawky *et al*, 2004 (0.4%); Hamouda *et al*, 2011 (0.17%) and Nourani and Khodakaram, 2004 (1.04%). These lesions are sometimes classified as benign cystic teratomas and are believed to originate as congenital developmental anomalies.

Fibrosis of the ovary was found in 4 cases (9.34%). This finding appears to be the first report for ovary fibrosis in dromedaries.

The pathological conditions of uterine tubes was seen in 2 cases (4.65%). The lesion was characterised by tortuous and thickened tubes contain pus. Pathological lesions in the uterine tube have rarely been reported in female dromedaries. The present results revealed that pyosalpinx, corrugation, thickening and cystic changes could occur in dromedaries and could be one of the causes of infertility in this species.

Different species of microorganisms isolated from the affected cases of the camels indicated that camel environment is contaminated with the isolated organisms or that such organisms flourish under stressful conditions.

In conclusions, this study indicated that the pathology and infections are more common in the ovaries of dromedary camels. Reproductive tract pathology and infections in Sudanese female dromedary camels are more common than originally thought. Fibrotic and oedematous ovaries and dermoid cyst (hair in ovary) are reported for the first time in Sudanese camels.

## References

- Al-Afaleq A, Hegazy A, Hussein MF and Al-Dughaym AM (2012). Pathological disorders of the female reproductive system in slaughtered camels (*Camelus dromedarius*) in Saudi Arabia. *Comparative Clinical Pathology* 21:245-251.
- Bancroft JD, Alan S and Daived RT (1996). *Theory and Practice of Histopathological Techniques* 4<sup>th</sup> Edition.
- Barrow GC and Feltham RKA (1993). *Manual for the Identification of Medical Bacteria*. 3<sup>rd</sup> Edition, Cambridge.
- Hamouda MM, Fahad AA and Haseeb MM (2011). Pathologic studies on ovarian abnormalities in nagas (*Camelus dromedarius*) in Al-Ahsa, Sudai Arabia. *Scientific Journal of King Faisal University (Basic and Applied Science)* 12(1):1432:265-276.
- Nourani H and Khodakaram A (2004). Pathological study of ovaries of non-pregnant camels (*Camelus dromedarius*) slaughtered in Iran. *Journal of Camel Practice and Research* 11(2):109-113.
- Shawky A, Moustafa I, Ahmed A, Tantawy A and Mona F (2004). An abattoir survey of female genital disorders of camels (*Camelus dromedarius*) in Kalyobia, Egypt. 1<sup>st</sup> Annual Conference Faculty of Veterinary Medicine. Moushtohor. pp 137-160.
- Tibary A and Anoussi A (1998). Reproductive study of 113 cases of ovario-bursal adhesion in the female dromedary (*Camelus dromedarius*). In: *Proceeding of the Annual Meeting Society Theriogenology*, Nashville. pp 136.
- Tibary A, Fite E, Anoussi A and Sghiri A (2006). Infectious causes of reproductive loss in camelids. *Theriogenology* 66:633-647.
- Yagoub SO (2005). Bacterial diseases of the reproductive system of camels (*Camelus dromedarius*) in Eastern Sudan. *Journal of Animal and Veterinary Advance* 4(7):642-644.