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A Pathological Abattoir Survey of the Reproductive Tracts of non Pregnant Camels (Camelus dromedaries) in Iraq

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Abstract: *An abattoir survey of the female reproductive tracts of 80 camels was conducted to evaluate the gross and microscopic abnormalities. An incidence of (32.5%) of disorders was recorded from 26 female. 16 camels (20%) had uterine lesions and 10 camels (12.5%) had ovarian lesions. Salpingitis occurred in three camels (3.75%) that also had uterine inflammations. Uterine inflammations were 12 cases (16.25%), and they were classified as subacute haemorrhagic endometritis (2.5%), chronic lymphocytic endometritis and metritis (12.5%). Other uterine lesions were 10 cases (12.5%), including adenomyosis (3.75%), uterine serosal inclusion cyst (1.25%), calcification of uterine blood vessels (BV) (5%) and obliterative endarteritis (2.5%). The 10th ovarian defects were ovarian inclusion cysts (2.5%), paraovarian cyst (1.25%), follicular cysts (2.5%), and finally, ovarian tumors, including hyperplasia of theca cells (1.25%), and (2.5%), of cystadenoma and a papilliferous cystadenoma. The study revealed that chronic meteritis and salpingitis were the important problems in female camel, and this change may cause infertility, so further studies is needed to determine the impact on camels' fertility and if treatments will prevent development of chronic types.*

Keywords *- camel; pathology; female genital tract; Iraq*

I. Introduction

Camels are well adapted to desert life, where camels can walk effectively in the sand as their hooves have broad pads. Camels are crucial for the life and food security in arid zones since they are good sources for wool, milk, and adult camel provides about 400-700kg meat. Thus, camels are of major significant animals that should be revised in the national programs. However, camels have various reproductive constraint such as lengthy sexual maturity (3-4) years, and pregnancy period extends about one year [1]. In addition camels are seasonally polyestrous and the ovulation occurs in induction [2].

Reproduction performances of camels depend on proper management, adequate nutrition [3;4] and more weight to the infertility of female camels has been attributed to pathological issues that some has been described by [5; 6;7; 8].

Healthy sex organs play important roles in successful reproductive functioning. Therefore, in order to offer data on the pathological status of female genital tracts of one humped camels, a gross and histological study was carried out at abattoir of AL-Samawa province, Iraq that is the main port to Iraqi's and Saudi Arabia's deserts.

Camels surveyed were slaughtered for human consumption at abattoir of Samawa, Iraq. The genitalia of 80 non-pregnant one-humped camels were examined. Ages of the animals were about (6-15) years old. The breeding history of the surveyed camels was unknown. The general health of the animals was detected with attention to the external genitalia, which were not included in the study.

II. Materials and Methods

Animals

Surveyed camels were slaughtered for human consumption at abattoir of Samawa, Iraq. The genitalia of 80 non-pregnant one-humped camels were examined. Ages of the animals were about (6-15) years old. The breeding history of the animals was unknown. The general health of the animals was detected with attention to the external genitalia, which were not included in the study.

Examination procedures and sampling

During the period of May 2007 to April 2008, the survey was conducted. Numbers of slaughtered animal ranged from 3-6 camels daily. After slaughter, uteruses, oviducts and ovaries were examined grossly and manually, they were incised along the dorsal aspect of the cervix and both uterine horns for gross lesions.

For histopathological assessments, tissue samples were collected on the basis of presence or absence of obvious defects. Tissue samples were gathered from the ovaries, diverse sections of uterine horns, body of the uterus and oviducts. For comparisons, tissue samples were collected from seemingly normal uterus from adult female camels as a control. Specimens were fixed in 10% neutral buffer formalin, paraffin embedded and then sections 4-6 microns thick were stained with haematoxylin and eosin (H&E). According to gross and

histopathological evaluation, reproductive tracts of the female camels were sorted into normal and abnormal, and the noticed lesions were arranged on the basis of gross and microscopic examination

III. Results

Of 80 genitalia from the abattoir, 16 camels had uterine abnormalities, 10 camels (12.5%) had ovarian abnormalities and three camels had oviduct lesions, which occurred with uterine lesions. The pathological lesions in the examined cases were presented in Table 1, and they were classified as follows;

Oviductal abnormalities

Bilateral salpingitis of three camels (3.75%) were found together with cases of chronic metritis. The inflammation was more severe in an infundibulum, consisting mainly of nodular collection of mononuclear cells (Fig. 1), which were lymphocytes and few plasma cells comparable to that detected in uterus inflammation.

Uterine abnormalities

Uterine abnormalities consisted of uterine inflammations 12 cases (16.25%) and non inflammatory lesions 10 cases (12.5%).

Uterine inflammations

There were two camels (2.5%) with subacute hemorrhagic endometritis, and 10 camels (12.5%) with chronic lymphocytic endometritis and chronic lymphocytic metritis

Subacute haemorrhagic endometritis

These inflammation types were found in two camels (2.5%). Grossly, the uterine lumens showed little serous exudates tinged with blood. The uterine walls were edematous and hyperemic. Microscopically, there was severe oedema, dilated blood vessels and hemorrhages. Many neutrophils infiltrated the stroma of the endometrium (Fig. 2). In one case, the hemorrhages involved the serosa, which was highly thickened and had serosal inclusion cysts as a microscopic infolding of the serosal covering cells, forming microscopic pockets or inclusion cysts. The serosal mesothelial cells of the uterus were cuboidal in some parts.

Chronic lymphocytic endometritis and chronic lymphocytic metritis

These inflammation types were found in 6 uteri (7.5%), and 4 camels (5%) respectively. Macroscopic changes were more distinct in cases of chronic metritis, where uteruses were thick, doughy and rigid. Catarrhal exudates were seen in the lumens of four uteri (5%). Irregular brown discoloration of the endometrium was seen infrequently. Microscopically, endometritis the inflammation involved only the endometrium and glandular tissues (Fig. 3) while in metritis the inflammation involved the other layers endometrium and the muscular layers (Fig. 4). The epithelium of the endometrium was exfoliated occasionally. Lamina propria showed presence of hemosiderin pigments, which were either free or within macrophages. The inflammatory cells were diffuse or multifocal nodular. Some cases shows oedema in the periglandular regions (Fig. 5). Cases of granulomatous infiltration in periglandular and perivascular regions were found. The reactions consisted of necrotic foci of endometrial glands, surrounded by zones of mononuclear cells and fibrous connective tissues in the periphery without giant cells. Lymphocytes were the predominant cells. Some endometrial glands were distended with homogenous eosinophilic materials. Calcification of necrotic foci was detected infrequently. Endometrial fibrosis was obvious in three cases (3.75%) especially around the uterine glands (Fig. 6). Obliterative endarteritis was seen in some cases of metritis**.**

Non inflammatory uterine abnormalities

They included adenomyosis (3.75%), uterine serosal inclusion cyst (1.25%), calcification of uterine BV (5%) and obliterative endarteritis (2.5%).

Adenomyosis

Microscopically, foci of endometrial glands were seen into different depth of uterine stratum vascular (Fig. 7) and the glands were seen within the uterine muscle.

Uterine serosal inclusion cyst

It was associated with subacute hemorrhagic endometritis (see above).

Calcification of uterine blood vessels (BV)

The lesions were seen in four camels (5%). Grossly, the uterine body of affected camel was thickend and the cut section showed small cystic structures in the myometrium and revealed gritty sound.

Microscopically, the calcification involved the walls of blood vessels of the myometrium as incomplete or complete rings of deep blue purple aggregates in some large BV of myometrium (Fig. 8).

Obliterative endarteritis

Small B.V in stratum vasculare of myometrium showed increase in tortuousity and, their lumens closed with fibrous connective tissue (obliterative endarteritis). Some of the obliterated B.V showed canalization. The lesions were coupled with chronic metritis (Fig. 9).

Ovarian abnormalities

The overall incidence of pathological conditions observed in camel ovaries (Table 2) were 10 (12.5%). They were sorted into chronic Oophoritis and miscellaneous ovarian abnormalities,

Chronic oophoritis

Chronic unilateral oophoritis was diagnosed in two camels (2.5%). Extensive focal area of inflammation infiltrated with mononuclear cells, consisting of lymphocytes, plasma cells and macrophages. The ovarian follicles showed cystic degeneration. In one case, yellowish pigments comparable with lipochrome pigments (Fig. 10) were present in the inflamed region and in the cytoplasm of macrophages.

Miscellaneous ovarian abnormalities

The abnormalities included cystic ovaries and ovarian inclusion cysts. Each type was seen in two cases (2.5%). The remaining four camel ovaries (5%) had cystadenoma, papilliferous cystadenoma, paraovarian cysts and gonadal stromal cells hyperplasia with calcification with equal incidence.

Follicular cysts

One camel exhibited follicle of about 5cm diameter on the right side. The other camel revealed two cystic follicles of about three and 4cm in diameter on both sides. These cystic follicles were filled with sticky transparent fluid, projecting outside the ovary. Microscopically, the follicular cells (granulosa cells) consisted of few degenerated cells layers in comparison with that of normal graafian follicles (Fig. 11).

Ovarian inclusion cyst

The cysts were detected microscopically as small spaces in the cortex of the ovary far away from the germinal cells of the ovary coat. The spaces were lined by a single layer of cuboidal cells rest on a thin basement membrane.

Cystadenoma and papilliferous cystadenoma

Unilateral ovarian tumors were encountered microscopically in two camels. One ovary expressed a papillary cyst adenoma. It was characterized by spaces lined up by simple cuboidal to columnar cells with many spots of stratification. Also many papillary protrusions were extended in the lumen (Fig. 12). Alveolar collections similar to the glandular alveoli, with wavy outline also occurred. Cytoplasm of many lining cells had vesicles similar to goblet cells. The cells rest on vascular fibrous stroma. Trace of pale eosinophilic mucin like substance was left in the spaces. The second case showed cyst adenoma, consisting of large focal area of glandular like tissues, forming simple alveolar arrangement with little wavy outlines and without papillary projections.

Paraovarian cysts

Three cysts were freely mobile, lying on both sides of the uterus' broad ligament, and were outside the ovary and fallopian tubes. The uterus and fallopian tubes were normal. The measuring of cysts was 4× 2 × 1.5, 1. 25 × 1.5× 0.5 and 3.5× 3 × 2 cm. The cysts were unilocular. The microscopic details of the cyst were not done.

Gonadal stromal cells hyperplasia

One camel's ovary showed wide focal abundance of the same cells and, the pattern of cells were diffuse. Cells' shapes were oval to spindle, but thicker and shorter than the fibroblast. They like theca cells. Calcification was prominent in different region of the ovary. Free erythrocytes and few polymorph nuclear cells were also detected in the medulla of the ovary. There was no clear enlargement in the ovary.

IV. Discussion

This survey presents basic information on gross and microscopic genital lesions from examination of 80 female reproductive tracts of non pregnant camel (Camelus dromedaries) at Samawa abattoir in Iraq. Out of 80 female reproductive tracts, 26 camels (32.5%) had pathological lesions in different parts of the genital tract. This result accord with earlier reports regarded camel fertility between 25% and 80% depending on veterinary care and the provided level of management [4; 6].

In this study, the uterine abnormalities were observed in 16 female camels (20%). The uterus of individual camel bear more than one lesion simultaneously but, the type of histopathology of these lesions were different. These uterine lesions were constituted 26 lesions (32.5%). Endometritis and metritis were the most common uterine disorder 12 cases (15%), which is low in observation of abattoir and clinical evaluation reports of the neighboring countries. In an abattoir survey of female camels in Iran, Nourani et al., [9] reported a higher incidence of uterine inflammation (34.37%). In camels at Saudi Arabia, metritis and endometritis were the predominant uterine disorders (57.1 %) and were considered as major causes of infertility [4], while in Nigeria, Mshelia et al., [10] found a lower incidence (17.4 %) of camel uterine lesion.

Uteri with lymphocytic infiltration and granulomatous inflammations obtained in this study were seen in six camels (7.5%). Similar histological finding were described previously [10; 11] , but they were higher than (3.12%) noted for camels in Iran [9]. Lymphoid granulomatous in the uterus of dromedary was considered as a response to campylobacter fetus and Trichomonus fetus [12].

The result of this study indicated that some chronic uterine inflammation response was with permanent fibrosis and calcification. This was in agreement with Fetaih [13], who considered uterine fibrosis of camels is outcome of metritis resolution.

Results of the current study also indicated that 3 camels had chronic salpingitis that were associate metritis. Abnormalities of the camels' oviduct were diagnosed in other studies with the use of rectal palpation [14] and microscope [15]. Tibary and Anoussi [14] considered that untreated uterine infections can lead to irreversible changes in oviducts and sterility.

In this survey, prevalence of adenomyosis was 3.75 %, which is slightly lower than that reported in Iran [9]. Adenomyosis is considered as a malformation or hyperplastic overgrowth of the endometrium, and it is common in all species [16].

In the present study, the incidence of ovarian affections came after uterine lesions, involving 10 cases (12.75%). A higher incidence of ovarian abnormalities (20%) was reported by Al-Afaleq et al. [15], and a lower incidence (9%) was encountered by Ali et al. [6]. Incidence of ovarian cysts in this report (2.5%) was higher than (0.9%) reported in Egypt [17] and lower than that observed in Saudi Arabia [15]. The diameter of normal follicle of camel is supposed to be 2.5 cm and larger follicles believed to be cystic[6]. However, dromedaries ordinarily be liable to develop follicular ovarian cysts in absence of coitus [18].

Also, in this survey, ovarian neoplasms were 3.75 %. They were classified as cyst-adenoma with or without papillary projection. This is the first time, when cyst-adenoma with or without papillary projection is reported in camels. The reported ovarian tumors in other studies were teratomas [17; 19; 20].

Changes in the uterine blood vessels included obliterative endarteritis and calcification of large uterine blood vessels observed in this survey may lead to ischemia and subsequently bad impact on the uterus functions. Calcification of uterine blood vessels could be a part of dystrophic calcification in dromedary; calcification of thyroid glands (personal observation), calcification of damaged myocardial cells [21], and calcification of pulmonary blood vessels were recorded with chronic interstitial pneumonia and lymphoid pneumonia (maedi like) in camels [22].

V. Figures and Tables

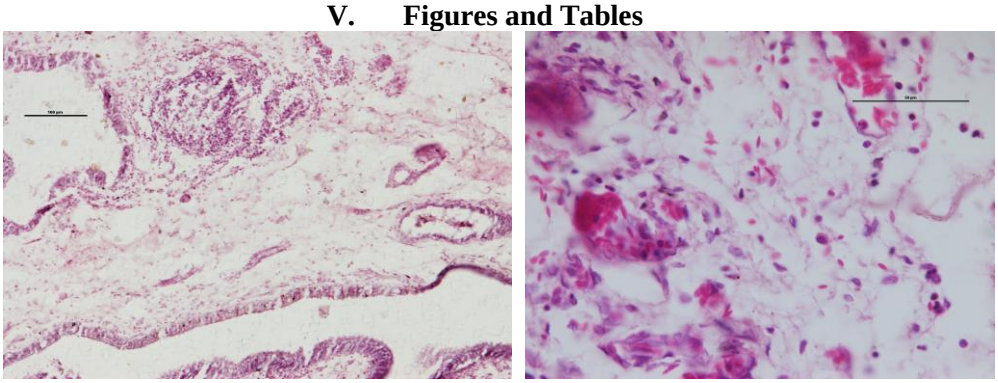

Fig. 1 Camel's oviduct shows chronic salpingitis. Note the nodular infiltration of lymphocytes in the tunica mucosa. Hematoxylin and eosin staining, ×100. Bar = 100 µm.

Fig. 2 Section of dromedary uterus shows subacute hemorrhagic endometritis. Note the free oval non nucleated erythrocytes, infiltration of mononuclear cells (triangles) and scanty neutrophils (arrow) in stroma and within the B.V. Hematoxylin and eosin staining, ×400. Bar = 50 µm.

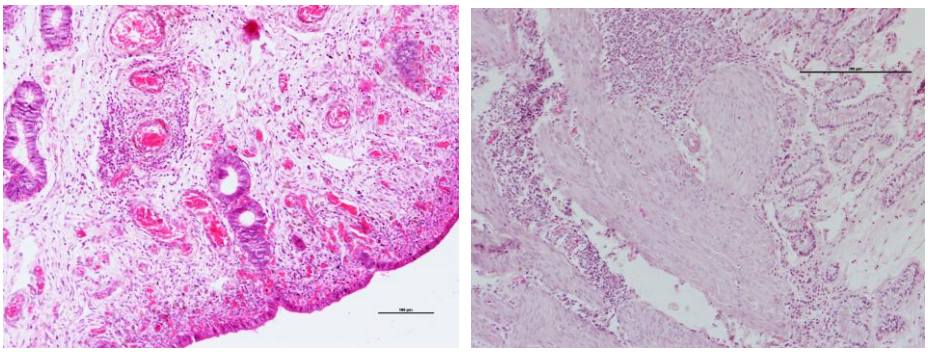

Fig. 3 A section of a camel's uterus shows chronic endometritis. The inflammation involves the endometrium and glandular tissues. Note the reticular connective tissue around B.V and glandular tissue (arrow) and the perivascular cuffing of mononuclear inflammatory cells (between the arrows). Hematoxylin and eosin staining, ×100. Bar = 100 µm.

Fig. 4 Chronic inflammation of a camel uterus (metritis) shows inflammations of the glandular tissues (left) and the muscular layers (left). Hematoxylin and eosin staining, ×100. Bar = 200 µm.

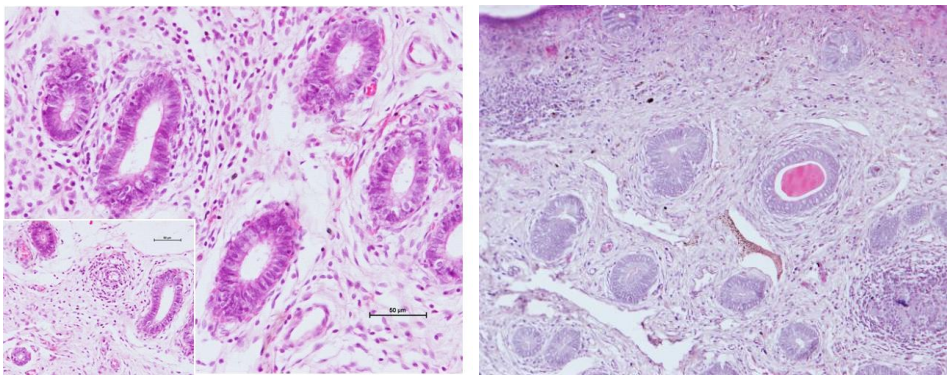

Fig. 5 Photomicrograph of a dromedary uterus shows periglandular oedema and diffuse and focal mononuclear cells infiltration around the glandular tissue (arrow) and B.V (insert). Hematoxylin and eosin staining, ×200. Bar = 50 µm.

Fig. 6 Camel uterus shows granulomatous reactions (left bottom) with calcification of necrotic foci. Note distended endometrial gland with homogenous eosinophilic materials and fibrosis around the glands (thick arrows), and haemosiderin pigments in lamina propria (thin arrows). Hematoxylin and eosin staining, ×100.

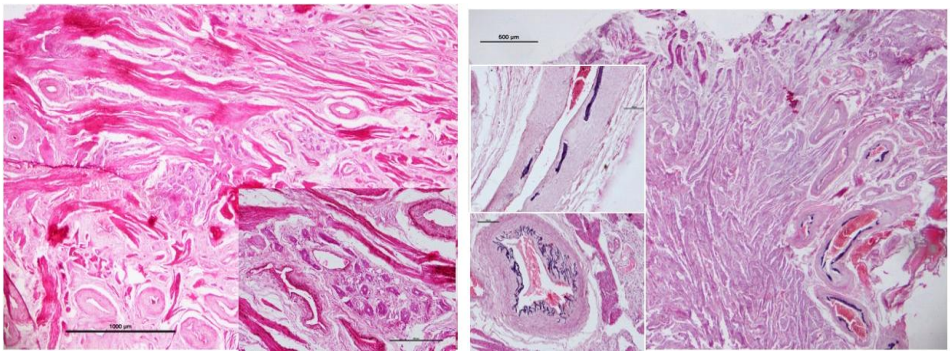

Fig. 7 Camel uterus shows adenomyosis, pockets of endometrial glands (arrows) in the myometrium (dark pink**)**. Hematoxylin and eosin staining, × 20. Bar = 1000**.** The insert (right bottom) shows higher details of the endometrial glands. Hematoxylin and eosin staining, × 200. Bar = 200 µm.

Fig. 8 Camel uterus shows calcification (deep blue-purple) of B.V of the myometrium. Hematoxylin and eosin staining, × 20. Bar = 500 µm. The inserts (left side) to show higher details × 100. Bar = 100 µm.

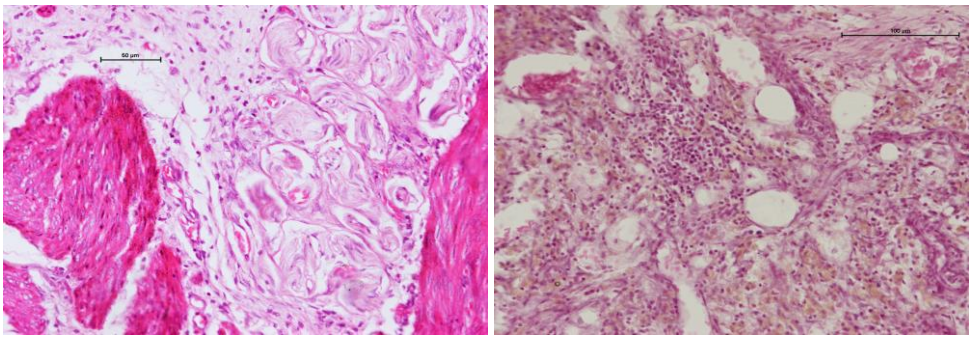

Fig. 9 Camel uterus shows lumens of small B.Vs of stratum vasculare of myometrium (dark pink Stain) were closed with fibrous connective tissue. Some of the obliterated blood vessels show canalization (arrow). Hematoxylin and eosin staining, × 400. Bar = 50 µm.

Fig. 10 Camel's ovary had chronic unilateral oophoritis. Notice the mononuclear inflammatory cells and yellowish pigments comparable with lipochrome pigments. Hematoxylin and eosin staining, × 200. Bar = 100 µm.

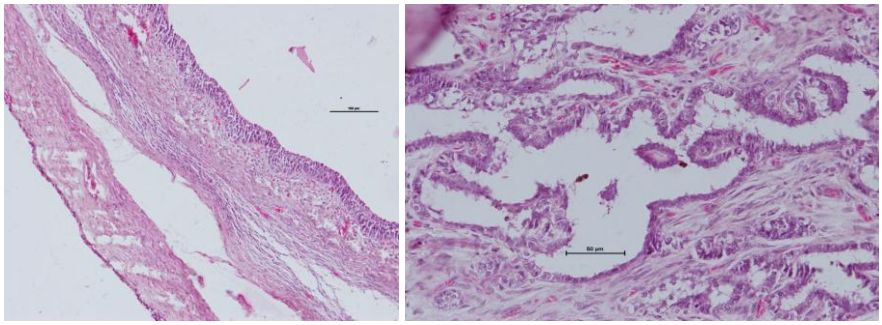

Fig.11. Follicular cysts from a camel's ovary (bottom left corner); the granulosa cells consisted of few degenerated cells layers (thin arrow) and the normal graafian follicles have > 9 layers (thick arrow). Hematoxylin and eosin staining, × 100. Bar = 100 µm.

Fig. 12 Camel's ovary shows papillary cyst adenoma. The spaces lined by simple cuboidal to columnar cells with stratification spots (arrow) and papillary projections toward the lumens. Many cells look like goblet cells. Note the alveolar arrangement similar to the glandular alveoli (right bottom). Hematoxylin and eosin staining, × 200. Bar = 50 µm.

Table 1: Pathological lesions observed in uterus and oviducts of 16 camels (with

Lesion (overlapping conditions)	Number of specimens	% of total with defect(n=80)
Salpingitis	3	3.75
Subacute hemorrhagic endometritis	2	2.5
Chronic non granulomatous endometritis	3	3.75
Chronic granulomatous endometritis	3	3.75
Chronic non granulomatous metritis	1	1.25
Chronic granulomatous metritis	3	3.75
Adenomyosis	3	3.75
Uterine serosal inclusion cyst	1	1.25
Calcification of uterine BV	4	5
Obliterative endarteritis	2	2.5
Total	25(31.25%)	31.25%

Table 2: Ovarian lesions detected among camels with gross genital defects

Lesion	Number of affected camels*	%
Oophoritis	2	2.5
Ovarin inclusion cyst	2	2.5
Paraovarian cyst	1	1.25
Cystic ovary	2	2.5
Ovarian cystadenoma	1	1.25
Ovarian Papilloferous cystadenoma	1	1.25
Hyperplasia of ovary stroma calcification	1	1.25
Total	10	12.5

Table3: Misellaneous uterine lesions (mixed lesions) among examined reproductive tracts of dromedary

Pathological lesions	Number of observed lesions	Percentage	Number of mixed lesions	Types of associated lesions
Salpingitis	3	3.75	3	Chronic metritis
Adenomyosis	3	3.75	2	Endometritis
Serosal inclusion cyst	1	1.25	1	Hemorrhagic endometritis
Calcification -uterine BV	5	6.25	2	Chronic metritis
Obliterative endarteritis	2	2.5	2	Chronic metritis
total	14	17.5	10	

VI. Conclusion

It can be concluded that pathological conditions of female camels in Iraq are similar to those reported in other countries but with lower incidences. The uterine inflammations were the main problem encountered among Iraqi camels. However, these pathological conditions need care particularly inflammation of uterus to prevent its progress to chronic with permanent changes.

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