HISTOPATHOLOGICAL STUDIES ON DROMEDARY CAMEL (*Camelus dromedarius*) MASTITIC MAMMARY GLAND

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ABSTRACT

The study aimed at investigating the effect of mastitis on dromedary camel **(*Camelus dromedarius*)** mammary tissue using histopathological examination. The study was carried out on seven (7) dromedary camel mammary gland; three (3) apparently healthy and four (4) mastitic mammary gland. The samples were collected from Maiduguri main abattoir, preserved and taken to histology laboratory, Faculty of Veterinary Medicine, University of Maiduguri. At slaughter, the udder was incised immediately, and mammary tissues were fixed in 10% formalin solution at room temperature. The tissue were subjected to routine histological staining using Haematoxylin and Eosin (HandE) staining method and safranin and fast green (SandFG) for examination under the light microscope. Histological studies indicated significant pathological changes in the tissue; dense interlobular connective tissue, atrophied gland, fibrous tissue proliferation, lower alveolar population and lower alveolar diameter.

Key words: Udder, Health, Disease

INTRODUCTION

Mastitis is a complex disease occurring worldwide among dairy animals, with heavy economic losses largely due to sub-clinical mastitis. Mastitis is an inflammation of the parenchyma of the mammary gland, which can result from cow exposure to a variety of infectious agents. It is characterized by an array of physical and chemical changes in milk (discolouration, presence of milk clots and presence of large number of leucocytes) (Al-Otaibi and El-Demerdesh, 2013), pathologic changes to the glandular mammary tissue, and at times systemic changes within the affected animal.

Mastitis may be due to pathogens, toxins or trauma (Schlafer and Miller, 2007). It is characterized by a decline in milk yield, physical and chemical changes in the milk and pathological changes of the udder. The pathogenesis of mastitis is well studied in cows and dependent on some factors including the species and virulence of the organism, ecology and host (Schlafer and Miller, 2007; Tibary and Anouassi, 2000). However, cases of mastitis in camel have been reported from different countries, particularly in pastoral production system of East Africa and Middle East (Abdelgadir, 2013).

Microorganisms that causes mastitis are generally classified as either contagious or environmental based upon their primary reservoir and mode of transmission. *Staphylococcus aureus* and *Streptococcus agalactiae* are contagious pathogens. Primary environmental pathogens include different types of bacteria: species of streptococci other than *Streptococcus agalactiae* (*Streptococcus* species), coliform species *(Escherichia coli, Klebsiella* species, *Enterobacter* species) and pseudomonas species. The study aimed at investigating the effect of mastitis on dromedary camel mammary tissue using histopathological examination.

MATERIALS AND METHOD

Experimental design

The study was carried out on seven (7) dromedary camel mammary gland; three (3) apparently healthy and four (4) mastitic mammary gland. The samples were collected from Maiduguri main abattoir, preserved and taken to histology laboratory, Faculty of Veterinary Medicine, University of Maiduguri for further processing.

Histopathological examination

At slaughter, the udder was incised immediately and the tissues fixed in 10% formalin solution at room temperature. The specimens were then removed from the buffered-formalin and dehydrated through a graded series of ethanol and xylene prior to paraffin embedment. After that, the specimens were embedded in paraffin, sectioned at the thickness of 5-6µ using rotary microtome, mounted on

slide, and stained with Haematoxylin and Eosin (H and E) Stain method and safranin and fast green (S and FG) for examination under the light microscope.

RESULTS

The udder section from apparently healthy dromedary camel showed no pathological lesions and the glands showed alveoli containing milk and thin interlobular connective tissue were observed (Plate IA and B). Milk was apparently observed in the lumen and it accumulated in the lactiferous duct of the mammary gland (Plate IIA and B). Protein cast were also observed in the convoluted duct system (Plate IIIA and B). However, the tissue section from mastitic udder revealed dense interlobular connective tissue and severe atrophied gland (Plate IVA and B). Infected mammary parenchyma tissue showed destruction of alveoli and fibrous tissue proliferation (Plate VA and B). Mastitic udder showed significantly lower alveolar epithelial cell population and alveolar luminal diameter. The lobular structure was completely replaced by scattered aggregates of granulation. The interlobular ducts were dilated and their lining epithelium was necrotic and disrupted (Plate VIA and B).

DISCUSSION

The most common histopathological findings in this study were dense interlobular connective tissue, severe atrophied gland, broken alveoli, fibrous tissue proliferation, lower alveolar epithelial cells population and lower alveolar luminal diameter. This result indicated pathological changes occurring in udder tissue, and could be due to severe tissue damage due to different mastitis pathogens or the toxins secreted by various species of mastitis pathogens. Similar changes in udder tissue was reported by Abeer *et al*, (2016) which observed profuse proliferation of fibrous tissue, necrotic, fragmented and atrophic mammary gland secretary acini. He went further and stated that, in advanced changes, the lobular structure were completely replaced by scaring and scattered aggregate of mononuclear cells or granulation. The histopathological changes included the number of alveoli, alveoli diameter and secretary alveolar cell population significantly decreased in mastitic cattle (Hussain *et al.,* 2012). Also, Quinn *et al* (1994) mentioned that, the chronic mastitis changes induced intensive proliferation of fibrous tissue in the inter and intra-lobular forming areas of scarring, infiltration of mononuclear cells, histocytes or macrophages, plasma cells and lymphocytes.

CONCLUSION

Histological studies on udder indicated significant pathological changes in the tissue; dense interlobular connective tissue, atrophied gland, fibrous tissue proliferation, lower alveolar population and lower alveolar diameter.

REFERENCE

Abdelgadir, A. E. (2013) Mastitis in camels (*Camelus dromedarius*):Past and recent research in pastoral productionsystem of both East Africa and Middle East. 1st International Conference on Sustainability of camel Population and Production, College of Agriculture and Food Science, King Faisal University, Al-has, Saudi Arabia, 17th – 20th February, 2013.

Abeer, A. M., Zakia, A. M., Muna, E. A. and Sabiel, Y. A. (2016) Bacteriological and pathological studies of mammary glands affections in camels (camelus dromedarius) at Tumbool abbatoir, Sudan. *British Microbiology Research Journal*. **15**(5): 1-8

Al-Otaibi and El-Demerdesh (2013) Nutritive value and characterization properties of fermented camel milk fortified with some date palm products chemical, bacteriological and sensory properties. *Int. J. of Nutrand food Sci*. 2(4): 174-180

Hussain, R., Javed, M. T. Khan, A., Mahmood, F. and Kausar, R. (2012) Mastitis and associated histo-pathological consequences in the context of udder morphology. *Int. J. Agric. Boil.,* 14: 947-952

Quinn, P. J., Carter, M. E., Markey, B. and Carter, G. R. (1994) Clinical veterinary microbiology. London, England. WOLFE publishers

Schlafer D. H. and Miller, R. B. (2007) Pathology of mammary glands. In Jobb, Kennedy and Palmer's Pathology of Domestic Animals. 5th ed., by Maxie, M. G, Saunders, Elsever. Edimburgh, London U.K. **3**:550-564.

Tibary A. and Anouassi A. (2000). Lactation and udder diseases. International Veterinary Information services (www.ivis.org.). Recent advances in camelid reproduction.

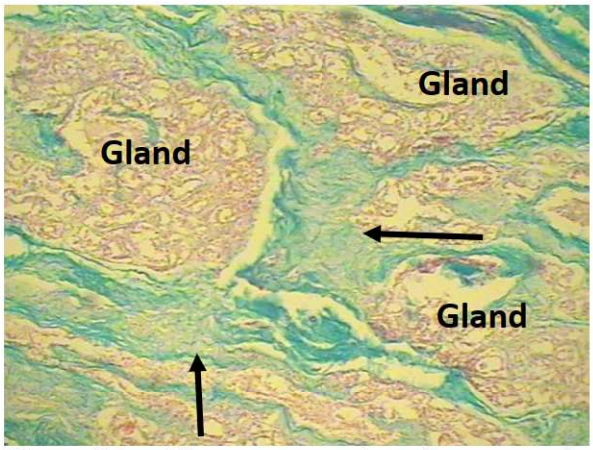


Plate IA: *Photomicrograph of apparently healthy mammary gland of an animal showing glands and thin interlobular connective tissues (arrows) S and FG x100H*

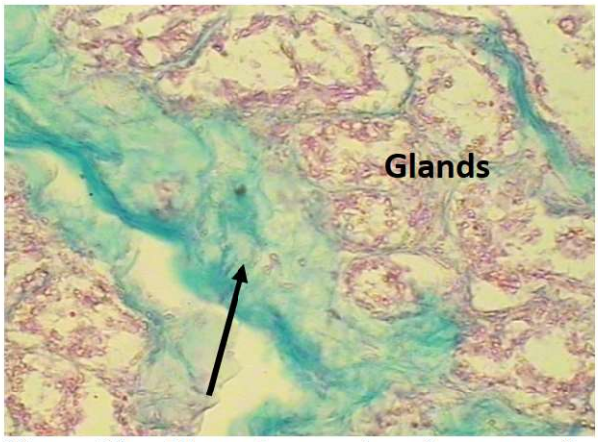


Plate IB: *Photomicrograph of apparently healthy mammary gland of an animal showing glands and thin interlobular connective tissues (arrow) S and FG x400* ***H***

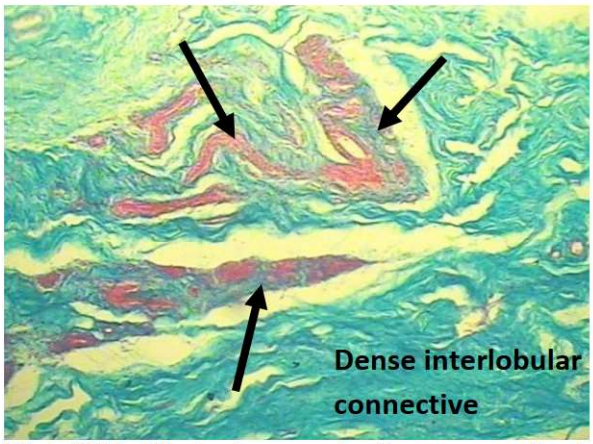


Plate IVA: *Photomicrograph of mammary gland of an animal showing dense interlobular connective tissues and atrophied glands (arrows) S and FG x100* ***M***

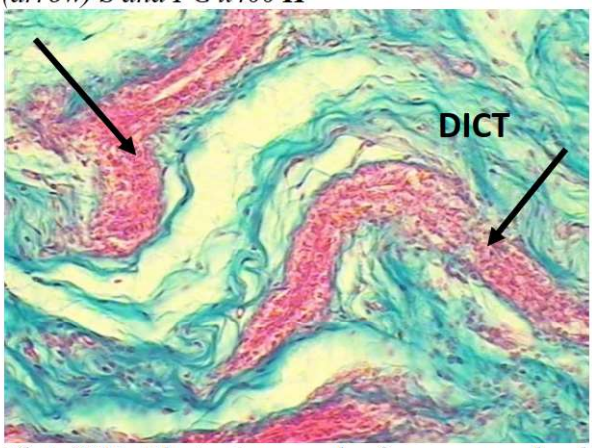


Plate IVB: *Photomicrograph of mammary gland of an animal showing dense interlobular connective tissues (DICT) and atrophied glands (arrows) S and FG x400* ***M***

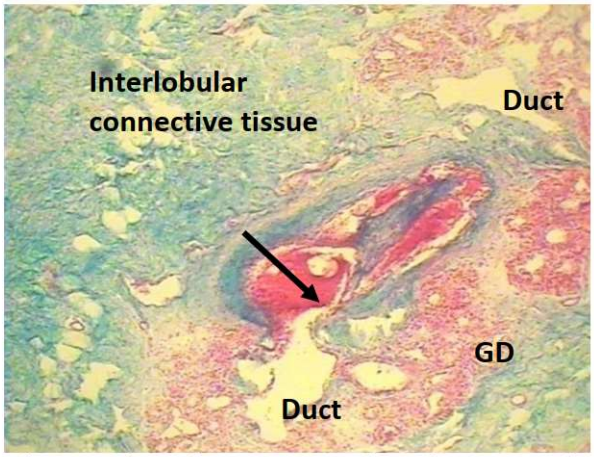


Plate IIA: *Photomicrograph of apparently healthy mammary gland of an animal showing glands (GD), protein cast (arrow) and thin interlobular connective tissues S and FG x100* ***H***

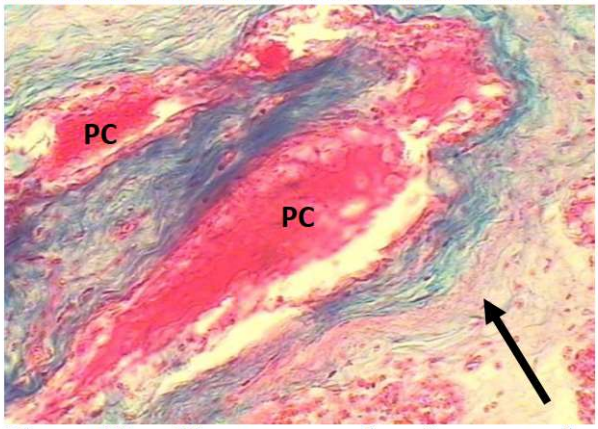


Plate IIB: *Photomicrograph of apparently healthy mammary gland of an animal showing*

interlobular connective tissues (arrows) and protein cast in the duct lumen (PC) S and FG x400 ***H***

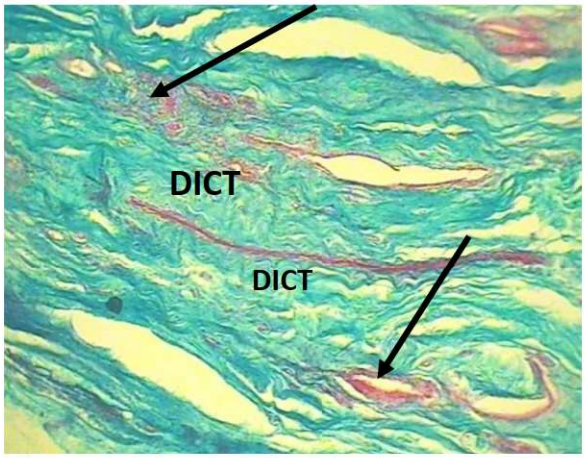


Plate VA: *Photomicrograph of mammary gland of an animal showing dense interlobular connective tissues (DICT) and atrophied glands (arrows) S and FG x100* ***M***

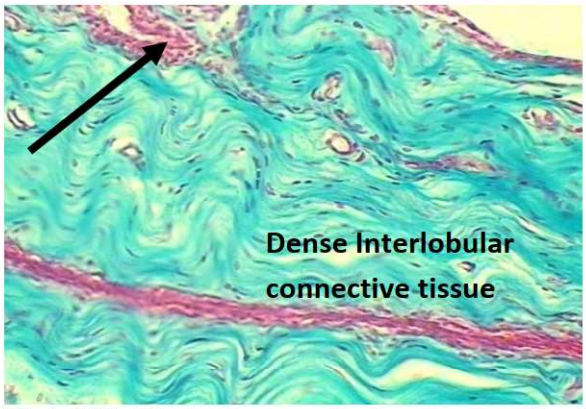


Plate VB: *Photomicrograph of mammary gland of an animal showing dense interlobular connective tissues and atrophied glands (arrows) S and FG x400* ***M***

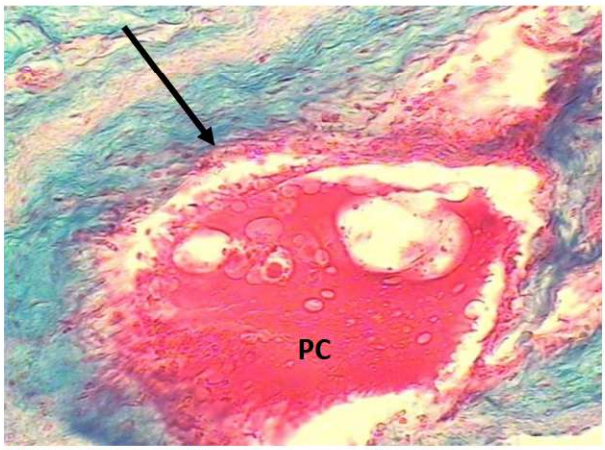


Plate IIIA: *Photomicrograph of apparently healthy mammary gland of an animal showing interlobular connective tissues (arrows) and protein cast in the duct lumen (PC) S and FG x400* ***H***

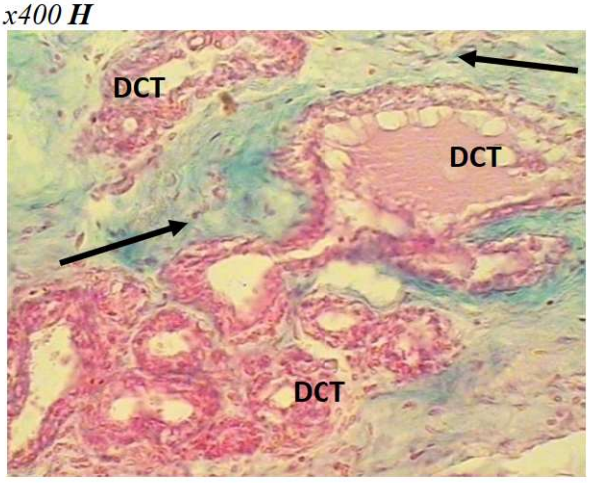


Plate IIIB: *Photomicrograph of apparently healthy mammary gland of an animal showing interlobular connective tissues (arrows) and protein cast in the convoluted duct system (DCT) S and FG x100* ***H***

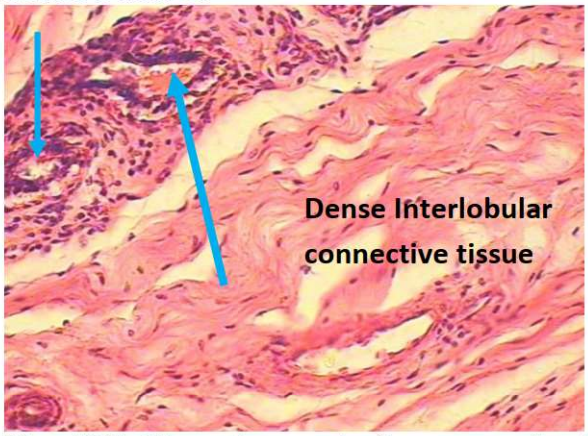


Plate VIB: *Photomicrograph of mammary gland of an animal showing dense interlobular connective tissues (arrows) and atrophied glands (arrows) H and E x400* ***M***

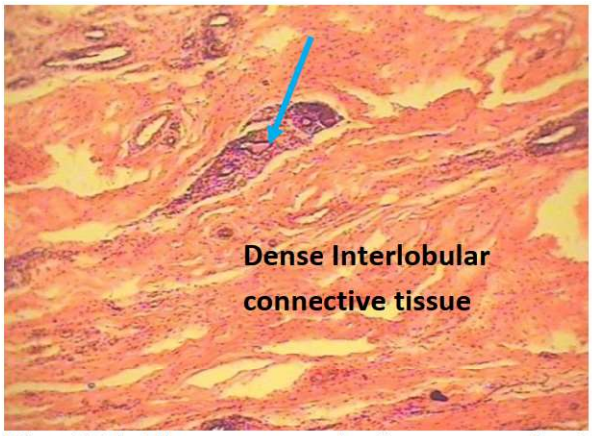


Plate VIA: *Photomicrograph of mammary gland of an animal showing dense interlobular connective tissues (arrows) and atrophied glands (arrows) H and E x100*