HISTOPATHOLOGICAL STUDY OF MAMMARY GLAND INFECTION IN DAIRY BOVINE

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ABSTRACT

A total of nine mammary glands of bovine were collected from slaughter house in Basrah city and Surgical Department of Veterinary College for histopathological examination. Histopathological examination of mammary glands revealed that there was an acute, chronic, and necrotizing case in mammary gland tissue.

INTRODUCTION

Bovine mastitis is one of the most important diseases affecting the dairy industry. It is an economic burden on milk producers all over the world [1]. An inflammation of the mammary gland parenchyma is characterized by pathological changes in udder tissue [2]. The diagnosis of mastitis is based on clinical signs (swelling of the udder, tender to the touch, fever, and depression). For subclinical mastitis cases, the diagnosis depends on the leukocyte numbers in the milk [3]. Both clinical and subclinical mastitis can affect the milk composition and reduce milk production [4, 5]. During infection of the udder with mastitis there is lowering of lactose, casein, and reduction in natural
acidity. However, there is an increase in chloride content, soluble nitrogen, and ash content [4].

Etiology of mastitis can be bacterial and non-bacterial pathogens, such as mycoplasms, fungi, yeasts, and chlamydia [1]. These pathogens infect the udder via the teat canal and multiply in the milk of the teat and mammary cisterns [6]. The damage of tissue mammary gland can be caused by pathogens and their products. Toxins produce by certain type of pathogen can be destroyed cell membranes and damaged milk-producing tissue. While, other type of pathogen have the ability to invade and proliferate within the epithelial cells before causing cell death. In addition, mastitis is characterized by an increase of somatic cells, which in turn cause damage of the blood-milk barrier and mammary epithelium [7]. Taken to gather, this work aimed to study the histopathological changes in the mammary gland.

**MATERIAL AND METHODS**

**Experimental design:**

The study was carried out on nine mammary glands of bovine. They were collected from slaughter house in Basrah city and Surgical Department of Veterinary College for histopathological examination.

**Histopathological examination:**

At slaughter, the udder was incised quickly and mammary gland parenchyma was fixed in 10% formalin at room temperature for 24 h. The specimens were then removed from the buffered-formalin and dehydrated through a graded series of ethanol and xylene prior to paraffin embedding. After that, the specimens were embedded in paraffin, sectioned at the thickness of 5 microns using rotary microtome, mounted on slide, and stained with haematoxyline-eosin as described by [8]. The slides were then examined under light microscope (Olympus) to detect and describe any histopathological changes in mammary gland parenchyma induced by bacteria and non-bacterial pathogens.
The udder section from healthy bovine revealed no pathological lesions with normal alveoli and glandular structure (Figure1). However, the tissue sections of mastitic bovine revealed inflammatory changes. Microscopically, acute cases of mastitis showed hyper secretion in acini of duct which appeared as pink or orange color in the lumen of duct some of acini (Figure2). There was also hemorrhagic intralobular space with degeneration of epithelial lining cell, slightly inflammatory cells, and odematus fluid in many area of tissue (Figure3). Some of the duct is dilated and there were congested blood vessels (Figure 4).

Chronic cases of mastitis revealed that there was hyperplasia of duct with connective tissue proliferation (Figure 5, 6). There was infiltration of inflammatory cell associated with dilated some acini and hyperplastic (Figure 7). Excessive amount of fibrosis with dilated of acini was also seen (Figure 8). Adenocarcinoma and aplastic epithelium cell with swelling of hemorrhagic area was also seen (Figure 9, 10).

Necrotic cases of mastitis revealed that there was necrotic area which appeared as replaced by excessive amount of inflammatory cells, newly blood vessel, and loss of structure disorentation of mammary gland tissue. This necrotic area pressed caused pressure atrophy to the other tissue which closed to some acini and dilated other (Figure 11, 12).

Fig 1: No pathological lesions with normal alveoli and glandular structure [9].

Fig 2: Section of mammary gland of bovine showing hyper secretion of acinor duct(H) and intralobular odema(O). X10 H and E
Fig 3: Section of mammary gland of bovine showing closed some of duct (C), haemorrhage (H) with intralobular oedema (O) and degeneration of epithelial cells.

Fig 4: Section of mammary gland of bovine showing large glandular duct near by acini dilated the duct (++), congested blood vessels (C).

Fig 5: Section of mammary gland of bovine showing hyperplasia of mammary gland. x10

Fig 6: Section of mammary gland of bovine showing some of the mammary duct with papillary epithelium proliferation in some area (S).
Fig 7: Section of mammary gland of bovine showing presence of inflammatory cells (PMNs) in periductal region. Some areas prominent acini and hyperplastic (H). X40

Fig 8: Section of mammary gland of bovine showing excessive fibrosis (F) with atrophy some acini (A) and dilated the other (D).

Fig 9: Section of mammary gland of bovine showing adenocarcinoma. X10

Fig 10: Section of mammary gland of bovine showing aplastic epithelium cell with swelling of hemorrhagic area. X40

Fig 11: Section of mammary gland of bovine showing necrotic area (N) with closure of acini. X4

Fig 12: Section of mammary gland of bovine showing necrotic area of tissue (N) with accumulation pretentious materials (P) and the acini are different in size (S). X10
DISCUSSION

Histopathological examination of the acute, chronic, and necrotic mastitis cases is in agreement with previous studies [10, 11, 12]. During acute mastitis, it has been found that tissue changes might be due to endotoxic injury to the microvasculature of the alveolar walls and mammary interstitium, stimulating huge neutrophils emigration to clean the gland of organisms within few days [13]. The acute reaction develops as the initial inflammatory response to clear the tissue of mammary gland from all organisms. If the acute reaction fails to complete clear the tissue of mammary gland from all pathogens, chronic reaction will develop. The major chronic lesion found in the current study was the fibrosis.

In chronic mastitis, it has been found that fibrosis was due to the response to chemotactic factors released either from cells damaged by organism or from the organism itself [14]. A bovine mammary adenocarcinoma was due to inflammatory infiltrate composed of lymphocytes and plasma cells that has glandular characteristics [15]. The hyperplastic activity in chronic cases is formed by the tissue reaction. It has been found that the hyperplastic activity could be repair of the damaged epithelial lining [16].

In necrosis mastitis, generation of leukocidin or haemolysin from pathogens might be cytotoxic and promoting tissue necrosis [16, 17]. In conclusion, nine bovine udders were studied microscopically. The inflammation were classified into acute, chronic, and necrosis.

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