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Histopathological findings of lower urinary tract affections in buffaloes

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Abstract

In the current study, total 71 specimens of lower urinary tract, irrespective of age, sex and breed were collected. These tissue samples from lower urinary tract showing gross lesions were collected in 10% NBF and processed for histopathological evaluation. It was found that chronic cystitis (14.08%) was most frequent lesion found followed by acute cystitis (9.85%), haemorrhage (7.04%), urethritis (5.63%), ureteritis (4.22%) and urolithiasis (2.81%). The predominant pathological conditions in lower urinary tract were cystitis, haemorrhage and urethritis.

Keywords: Buffaloes, lower urinary tract, pathological conditions, histopathological examination

Introduction

Livestock is a vital component of the Indian economy. The livelihood of almost 20.5 million people is derived from cattle. Compared to the average of 14% for all rural families, livestock accounted for 16% of the revenue of small farm households. Two thirds of rural communities depend on livestock for their livelihood. Additionally, it employs around 8.8% of India's workforce. India has an abundance of cattle. The GDP of the livestock industry is 4.11% of the overall GDP and agriculture contributes, 25.6%.

Buffalo being a multipurpose animal is one of the key animals in the agricultural economy through their contribution to food, draught power, income and employment generation. The species is more productive due to higher production potential and higher percentage of fat in the milk. Buffaloes are well adapted to the hot and humid climatic conditions of India. The economy of farmers is primarily based on agricultural production systems and buffaloes play a distinctive role in it by providing high quality milk and meat and acting as a source of draught power for smallholders in India. In fact the risk of crop failure due to natural calamities is much more in country like India and these animals are considered a financial asset since they serve as an insurance against these adverse situations (Dhanda, 2004) ^[1].

Urinary problems are common illnesses affecting buffalo, and they have been identified as a significant contributing factor to the disease. Diagnosing urinary disorders in buffaloes is aided by pathological examination of the various urinary system organs. The focus of this study is on the numerous lower urinary tract-related pathological conditions. Some pathological disorders are prevalent in buffaloes' urinary systems, including urolithiasis (Kumper, 1994) ^[5], cystitis, ureteritis and urolithiasis (Herenda *et al.*, 1990; Sarfinaz *et al.*, 2013) ^[2, 8] etc.

Materials and Methods

Sampling

In the present investigation, total 71 specimens of lower urinary tract, irrespective of age, sex and breed were collected from slaughter houses of Bikaner, Jaipur, Sikar and adjoining areas of these districts of Rajasthan and tissue specimens were also collected from the carcasses of the buffalo submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Bikaner for post-mortem examination. Collected samples were examined and were further processed for histopathological examination.

Histopathological investigation

Using the acetone and benzene method, paraffin embedding was used to prepare representative tissue samples (0.5 cm in size) that were placed in 10% NBF (Lillie, 1965) [6]. Tissue sections with a thickness of 4-6 microns were cut, stained, and subjected to the haematoxylin and eosin staining procedure and examined under microscope.

Results

Gross and histopathological findings

71 lower urinary tract specimens with visible lesions were processed for histological analysis, which identified many pathological situations. On histopathological examination, it was found that chronic cystitis (14.08%) was most frequent lesion found followed by acute cystitis (9.85%), haemorrhage

(7.04%), urethritis (5.63%), ureteritis (4.22%) and urolithiasis (2.81%). The details of the classification of pathological lesions of the lower urinary tract are given in table 1.

Table 1: Pathological conditions involving lower urinary tract

S. No.	Name of Lesion	No. of Samples	Percentage
1.1	Ureter		
1.1(a)	(a) Ureteritis	3/71	4.22
1.2	Urinary bladder		
1.2(a)	Haemorrhage	5/71	7.04
1.2(b)	Acute cystitis	7/71	9.85
1.2(c)	Chronic cystitis	10/71	14.08
1.2(d)	Urolithiasis	2/71	2.81
1.3	Urethra		
1.3(a)	Urethritis	4/71	5.63

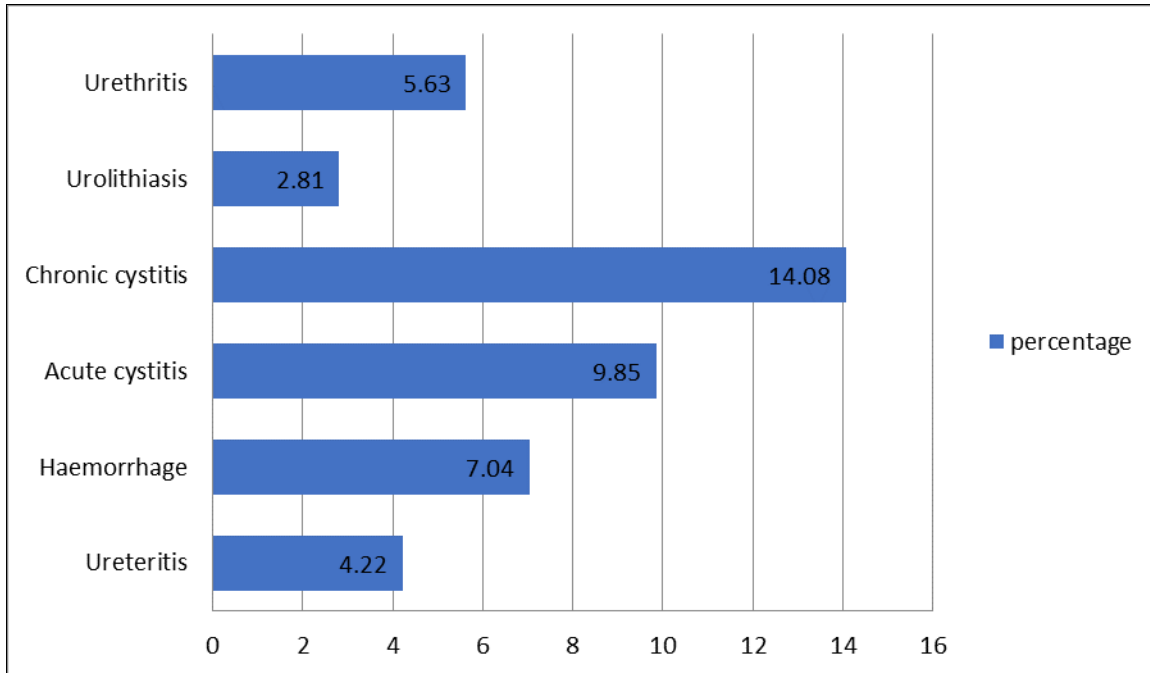


Fig 1: Pie diagram showing percent abnormalities with respect of specific conditions in lower urinary tract

Ureter

Ureteritis

Ureteritis was noticed in 3 (4.22 percent) cases. Grossly, congested and swollen ureters were found. Microscopically, congested mucosa and submucosa along with infiltration of monocytes and lymphocytes was seen. In submucosa, transitional epithelium was desquamated and degenerated with infiltration of polymorphonuclear cells (fig.2).

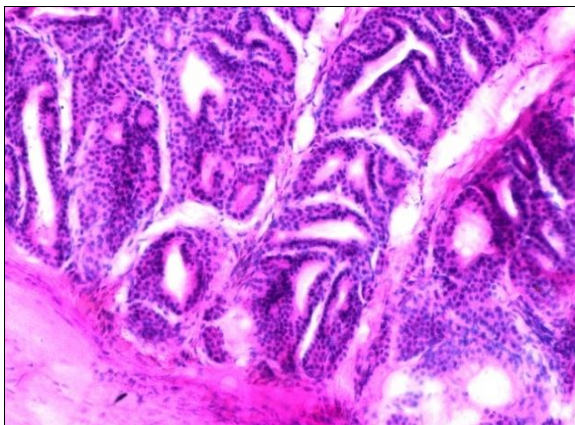


Fig 2: Microphotograph of ureteritis showing infiltration of mononuclear and polymorphonuclear cells. H & E 10X.

Urinary Bladder

Haemorrhage

Haemorrhages were observed in 5 (7.04 percent) cases. Grossly, mucosal surface of affected urinary bladder was found to be haemorrhagic and lumen was filled with dark red clotted blood. Microscopically, mucosa was necrosed along with leucocytes infiltration and congested blood vessels. RBCs aggregations were seen inside lumen, submucosa and muscularis layer (fig. 3).

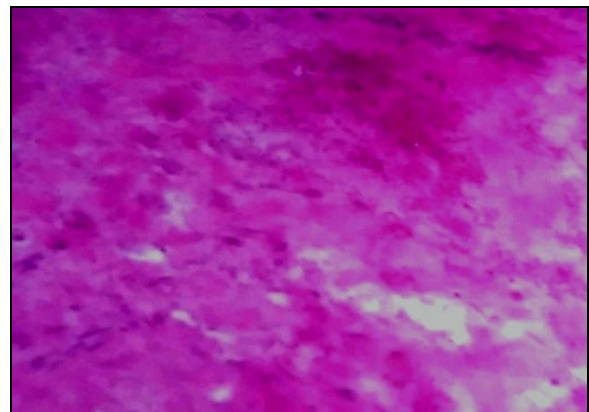


Fig 3: Microphotograph of urinary bladder showing haemorrhages in muscularis layer. H & E 40X.

Acute cystitis

Pathological lesions of this condition were seen in 7 (9.85 percent) cases. Grossly, Mucous membrane was oedematous and reddish brown in colour. Sub mucosal surface had slight hyperaemia, swelling and was covered with thick catarrhal exudates. Microscopically, this condition was characterized by leucocytes infiltration, dilation of vessels and desquamation of epithelial cells. Transitional epithelium revealed conspicuous desquamation and degeneration with infiltration of mononuclear cells in muscularis layers (fig. 4).

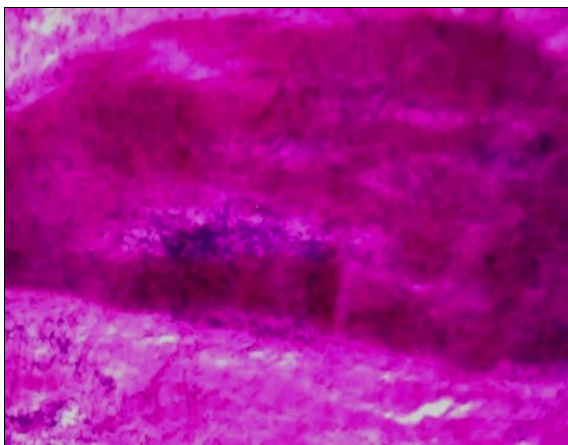


Fig 4: Microphotograph of cystitis showing infiltration of mononuclear cells in muscularis layer. H & E 20X.

Chronic cystitis

This condition was recorded in 10 (14.08 percent) cases. Grossly, thickened mucous membrane with hyperaemia was found in affected bladder. Microscopically, thickening of mucosa with muscle hypertrophy was evident. Mucosa revealed heavy epithelial desquamation along with infiltration of neutrophils, lymphocytes and other mononuclear inflammatory cells in submucosa (fig. 5).

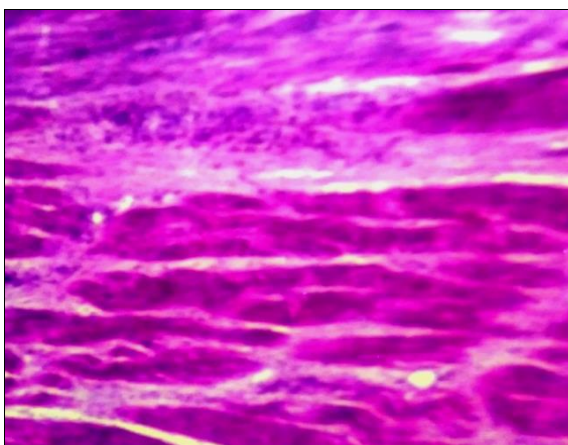


Fig 5: Microphotograph of cystitis showing mononuclear and polymorphonuclear infiltration in submucosal layer. H & E 100X.

Urolithiasis (*cystic calculi*)

This condition was recorded in 2 (2.81 percent) cases. Grossly, multiple cystic calculi with variable size were found. These calculi were composed of some sand like material. In chronic cases, urinary bladder was found distended and ruptured. Microscopically, urinary bladder was found to be inflamed and haemorrhagic. Smooth muscles were degenerated and necrosed. There was cellular inflammatory exudate infiltration in lamina propria along with fibrosis of blood vessels (fig. 6).

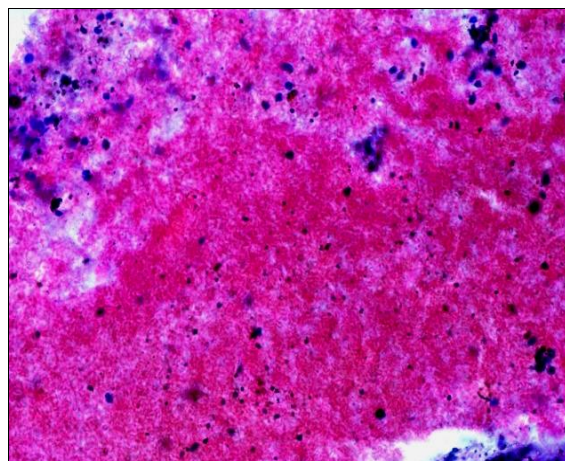


Fig 6: Microphotograph of urinary bladder having uroliths showing haemorrhage. H & E 10X.

Urethra

Urethritis

This condition was noticed in 4 (5.63 percent) cases. Grossly, swollen, pale, hyperaemic and congested urethra was found. Microscopically, congestion was evident in venous and submucosal spaces. There was epithelial desquamation and degeneration along with infiltration of polymorphonuclear cells in submucosa and serosa. Muscularis layer was congested with infiltration of mononuclear and polymorphonuclear cells (fig. 7).

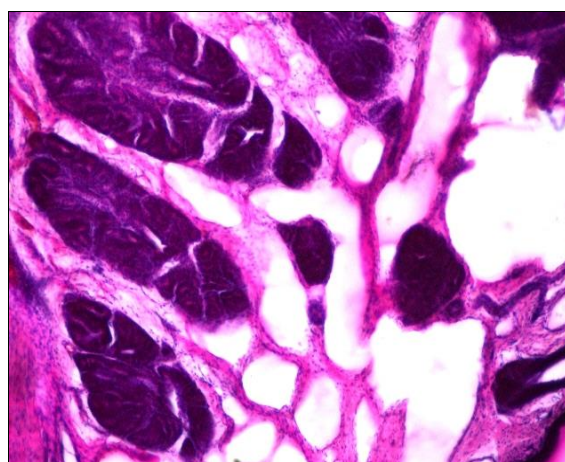


Fig 7: Microphotograph of urethritis showing infiltration of mononuclear and polymorphonuclear cells in muscularis layer. H & E 20X.

Discussion

Ureteritis was noticed in 3 (4.22 percent) cases which was lower than incidence rate recorded by Jat (2016) ^[3] as 5.26 percent in cattle. Grossly, congested and swollen ureters were found which was similar to findings of Jubb *et al.* (2007) ^[4]. Microscopically, congested mucosa and submucosa along with infiltration of monocytes and lymphocytes was seen. In submucosa, transitional epithelium was desquamated and degenerated with infiltration of polymorphonuclear cells. Similar findings were observed by Jubb *et al.* (2007) ^[4]. In urinary bladder, haemorrhage was observed in 5 (7.04 percent) cases which were lower as compared to Jat (2016) ^[3] as 9.21 percent in cattle and Mohammadian *et al.* (2016) ^[7] as 10.8 percent in buffaloes. Grossly, mucosal surface of affected urinary bladder was found to be haemorrhagic and lumen was filled with dark red clotted blood. These observations were found to be in close affinity with that of

Sarfinaz *et al.* (2013) ^[8]. Microscopically, mucosa was necrosed along with leucocytes infiltration and congested blood vessels. RBCs aggregations were seen inside lumen, submucosa and muscularis layer. Similar findings were recorded by Sarfinaz *et al.* (2013) ^[8]. Acute cystitis was seen in 7 (9.85 percent) cases. A very high incidence rate was recorded by Somvanshi *et al.* (2012) ^[10] as 18.64 percent in buffaloes. Grossly, mucous membrane was oedematous and reddish brown in colour. Sub mucosal surface had slight hyperaemia, swelling and was covered with thick catarrhal exudates. These observations were also encountered by Jubb *et al.* (2007) ^[4]. Microscopically, this condition was characterized by leucocytes infiltration, dilation of vessels and desquamation of epithelial cells. Transitional epithelium revealed conspicuous desquamation and degeneration with infiltration of mononuclear cells in muscularis layers. These findings were in close resemblance with that of Jubb *et al.* (2007) ^[4]. Chronic cystitis was recorded in 10 (14.08 percent) cases. Similar incidence rate was observed by Mohammadian *et al.* (2016) ^[7] as 14.4 percent in buffaloes while Herenda *et al.* (1990) ^[2] recorded lower incidence rate of 4.7 percent in cattle. Grossly, thickened mucous membrane with hyperaemia was found in affected bladder. These findings were in close affinity with findings of Somvanshi *et al.* (2012) ^[10]. Microscopically, thickening of mucosa with muscle hypertrophy was evident. Mucosa revealed heavy epithelial desquamation along with infiltration of neutrophils, lymphocytes and other mononuclear inflammatory cells in submucosa. These findings were in close affinity with work of Jubb *et al.* (2007) ^[4]. Urolithiasis (cystic calculi) was recorded in 2 (2.81 percent) cases. A high incidence rate of 3.94 percent in cattle was observed by Jat (2016) ^[3]. Grossly, multiple cystic calculi with variable size were found. These calculi were composed of some sand like material. In chronic cases, urinary bladder was found distended and ruptured. Similar findings were observed by Sastry and Rao (2001) ^[9] and Vegad (2007) ^[11]. Microscopically, urinary bladder was found to be inflamed and haemorrhagic. Smooth muscles were degenerated and necrosed. There was cellular inflammatory exudate infiltration in lamina propria along with fibrosis of blood vessels. These findings are in close resemblance with Vegad (2007) ^[11]. Urethritis was noticed in 4 (5.63 percent) cases which was similar to the incidence rate observed by Jat (2016) ^[3] in cattle as 5.26 percent. Grossly, swollen, pale, hyperaemic and congested urethra was found. Similar findings were also observed by Jubb *et al.* (2007) ^[4]. Microscopically, congestion was evident in venous and submucosal spaces. There was epithelial desquamation and degeneration along with infiltration of polymorphonuclear cells in submucosa and serosa. Muscularis layer was congested with infiltration of mononuclear and polymorphonuclear cells. These observations are in close agreement with that of Jubb *et al.* (2007) ^[4].

Conclusion

The goal of the current study was to determine the frequency, etiology, microscopic, and histological changes in the afflicted buffalo ureters, urethras, and bladders in Rajasthan.

71 buffalo urine system specimens, irrespective of breed, age, or sex, were gathered from the districts of Sikar, Jaipur, and Bikaner in Rajasthan that were thought to have abnormalities. For a histological analysis, these specimens underwent further processing.

The various forms of lower urinary tract affections were classified as Ureteritis 4.22 percent, Haemorrhage in urinary

bladder 7.04 percent, Acute cystitis 9.85 percent, Chronic cystitis 14.08 percent, Urolithiasis (cystic calculi) 2.81 percent and Urethritis 5.63 percent.

Ultimately, based on the investigation's whole findings, it was possible to draw the conclusion that cystitis was the most common pathological ailment affecting the lower urinary tract in this study. Nearly all of the microscopic and macroscopic alterations on the various diseased states of the urinary system that were examined in this study were in close alignment with the findings of previous researchers that have been reported elsewhere.

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