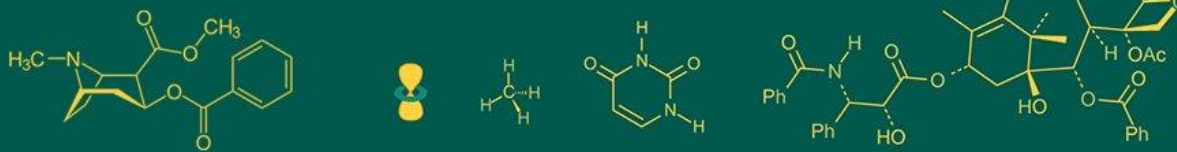


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## Pathological aspects of kidney in buffalo calf reference to diarrhoea

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### Abstract

The present investigation was carried out from September 2020 to August 2021. During this period a total number of 232 buffalo calves were collected irrespective of breed, sex and age examined for histopathology. The affected kidneys tissue samples were further processed for histopathological examination and revealed kidneys abnormalities in 82 samples. Kidney showed various histopathological changes viz. inflammatory conditions of glomeruli 9.48%, hemorrhages 16%, congestion 6.03%, and renal cortical necrosis 3.44%, inflammatory conditions of interstitial tissue (3.44%), fatty change 2.1%, cloudy swelling 2.1% and renal amyloidosis 1.72%.

**Keywords:** Necrosis, congestion. Inflammation, hemorrhage, cloudy swelling

### Introduction

India is the world's largest producer of buffalo milk, having over 20 different river buffalo varieties. Murrah and Jaffarabadi are very popular due to their great milk yields. India relies heavily on its dairy industry. The country is the world's largest milk producer, accounting for more than 13% of global milk production (2018). It is the world's greatest user of dairy products, consuming practically all of its own milk. Proper health management is critical to the successful development of cattle. Diseases are the leading source of economic losses due to mortality rates, treatment costs, and inefficient livestock output.

Neonatal calf diarrhoea (NCD) is a primary cause of neonatal death among calves. NCD can result from both infectious and non-infectious sources. The four most prominent infectious enteropathogens linked to NCD are enterotoxigenic *Escherichia coli* (ETEC) F5 (*E. coli*), rotavirus, coronavirus, and *Cryptosporidium parvum* (*C. parvum*). It should be noted that multiple agents can often coexist. These enteropathogens typically damage the intestinal lining, resulting in villous atrophy and a decrease in enterocyte mass. The clinical manifestations include dehydration, diarrhoea, malnutrition, and a possibility of systemic inflammatory response syndrome (SIRS) or sepsis, and in severe cases, even death.

### Materials and Methods

For the proposed investigation, samples of the organ of the liver of buffalo calves (*Bubalus bubalis*) irrespective of age, sex and breed were collected from carcasses that were died due to diarrhea irrespective of sex, age and breeds groups subjected to post-mortem examination in the various Veterinary hospitals, and rural areas in and around Bikaner district of Rajasthan. The tissue samples were also collected from the carcasses of calves submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Bikaner for routine post-mortem examination. Gross examinations of the specimens were done at the time of post-mortem examination. During post-mortem examination, the samples were thoroughly examined grossly for alterations in morphology in terms of shape, size, colour, consistency, location and presence of cysts, tumours and abscesses *etc.* lesions. A total number of 232 buffalo calves were collected irrespective of breed, sex and age examined for histopathology. Following collection, all the representative tissue samples were properly preserved in 10 per cent formalin. The tissue measured 2-5 mm thickness and presenting the lesions with normal tissue, were used for fixation and further histopathological examination. For histopathological examination, processing of tissues was done by paraffin embedding using acetone and benzene technique (Lillie, 1965) [1]. The sections of 4-6 micron thickness were cut and stained with routine staining method by hematoxylin and eosin.

The results were recorded by gross observations and microphotographs.

**Results and Discussion**

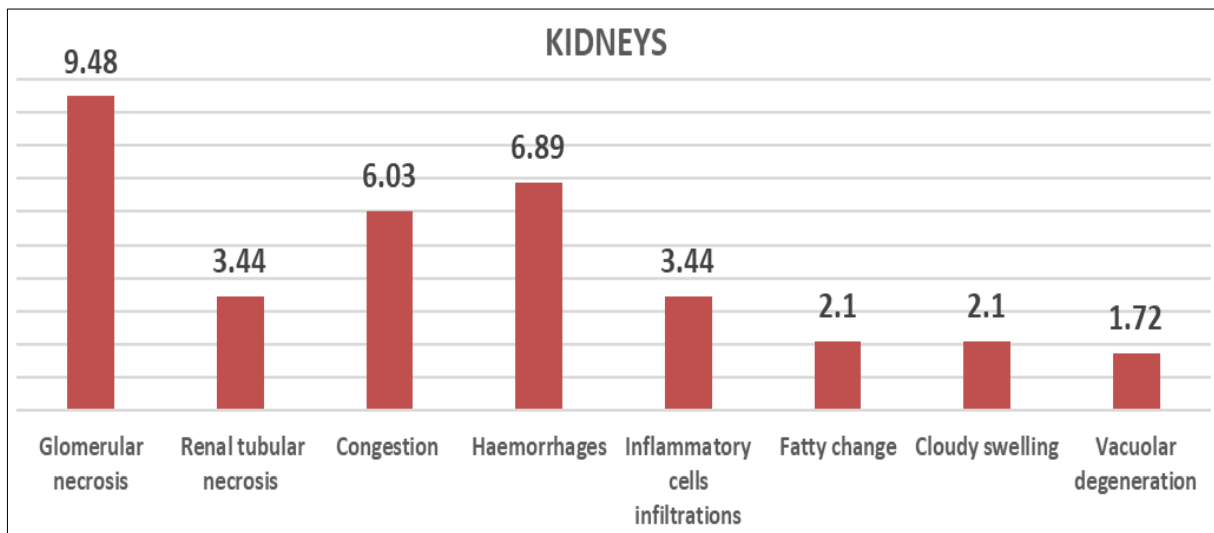
The present investigation was carried out from September 2020 to August 2021. During this period a total number of 82 representative samples of kidneys showing gross lesions were processed for subsequent histopathological examination.

**Kidneys**

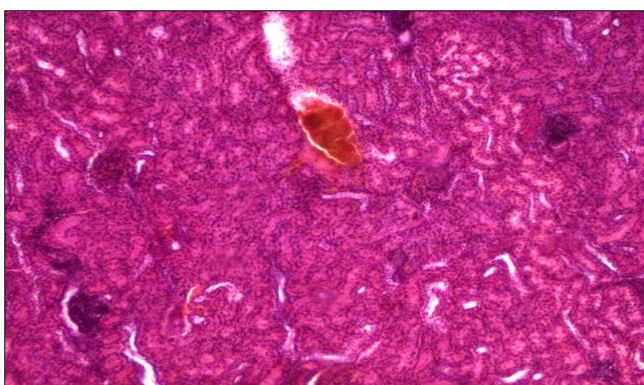
Grossly, congested or hyperemic kidneys were swollen, darker red than normal and ooze blood from cut surface. Spectacular changes were not found due to tough capsule. On a cut large amount of blood-tinged fluid oozed out. Kidneys with amyloid deposited were enlarged and spotty in appearance and bulging on the edges in cut section. The capsules were non-adherent and peeled off easily revealing cortex with yellow spots of glomeruli and translucent grey points of dilated tubules. The cortex was diffusely pale yellow with a zone of hyperaemia separating the necrosis cortex from the medulla. The cortex was reduced in thickness. Similar findings were reported by Nidhi (2012)<sup>[2]</sup>; Singh *et al.* (2013)<sup>[4]</sup>.

Microscopically, Inflammatory Conditions of Glomeruli characterised by glomerular tuft was increased in size with increased number of endothelial and mesangial cells. The glomeruli became ischemic and there was oedematous thickening of the capillary walls. The glomerular tuft showed swelling and proliferation of the native cells occupied most of the capsular space. Congestion characterized by, inter tubular vessels were filled with blood and glomeruli showed congested blood vessels and capillaries. Hemorrhages characterized by multifocal tubular and vascular necrosis were seen in ecchymotic hemorrhage, there were red blood cells foci within the tubules and between the intertubular capillaries at the cortico-medullary junction.

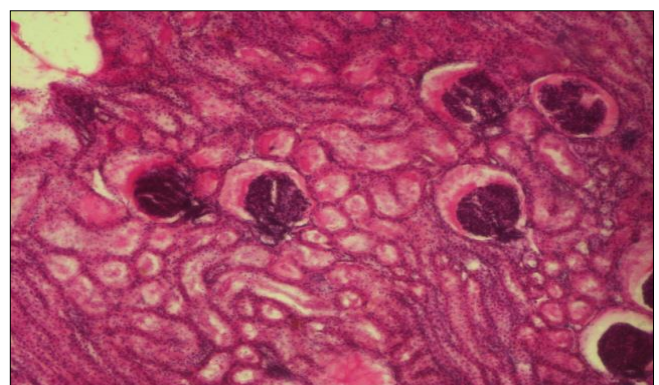
Inflammatory conditions of interstitial tissue characterized by, there were marked degenerative changes in the epithelium of the cortical renal tubules. The changes varied in severity from hydropic swelling to necrosis and desquamation. Cloudy swelling characterized by, the cells appear cloudy, their cytoplasm was granular and they stain more intensely with eosin. Cells were rounded and hypertonic. Similar findings were reported by Nidhi (2012)<sup>[2]</sup>, Singh *et al.* (2013)<sup>[4]</sup> and Sarvan (2017)<sup>[5]</sup>.



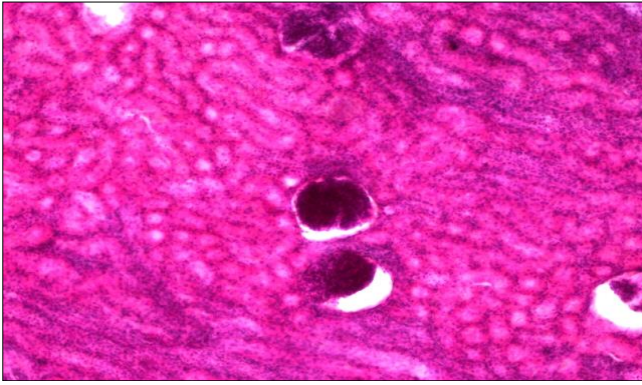
**Fig 1:** Bar diagram showing incidence of various conditions in kidneys.



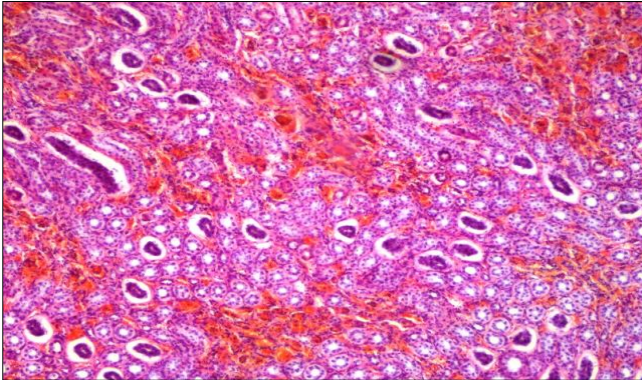
**Fig 2:** Photomicrograph of kidney showing severe congestion and coagulative necrosis in renal tubules along with diffuse interstitial nephritis. H&E 40X.



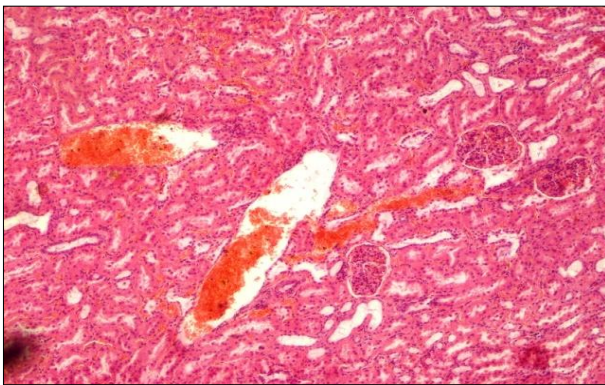
**Fig 3:** Photomicrograph of kidney showing dilated tubules filled with eosinophilic material. Atrophied, fragmented glomeruli, capsular space filled with eosinophilic material. H&E. 100X.



**Fig 4:** Photomicrograph of kidney showing severe infiltration in glomeruli and degenerative changes in tubules. H&E 100X.



**Fig 5:** Photomicrograph of kidney showing congestion of inter-tubular capillaries and hemorrhage in inter-tubular space along with atrophy in glomeruli with infiltration of lymphocytes. H&E 40X.



**Fig 6:** Photomicrograph of kidney showing severe congestion in tubules and infiltration of polymorphonuclear cells in glomeruli tuft, cloudy swelling in nearby area. H&E 40X.

### Conclusion

Kidneys showed various histopathological changes viz. inflammatory conditions, hemorrhage, congestion, renal cortical necrosis, fatty change, cloudy swelling and renal amyloidosis.

### Acknowledgement

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