# INCIDENCE AND PATHOLOGICAL FINDINGS OF COLIBACILLOSIS IN KIDNEY OF BUFFALO CALVES#

**Shesh Asopa[1], S. Rani, H. Dadhich, I. Vyas, M. Mathur and A. Joshi[2]**
Department of Veterinary Pathology, College of Veterinary and Animal Science
Rajasthan University of Veterinary and Animal Sciences, Bikaner-334 001, Rajasthan, India.

Received on: 12.05.2018
Accepted on: 19.08.2018

**ABSTRACT**

The present paper highlighted the incidence and pathology of *E. coli* infection in kidney of buffalo calves. The incidence of colibacillosis affecting kidney was recorded as 11.52 per cent. Grossly, the affected kidneys were congested and white spotted. Kidney showed marked areas of congestion on cortico-medullary junction. Microscopically, kidney sections revealed congestion, degeneration and necrosis of the kidney tubules, coagulative necrosis of the tubular epithelium and various lesions of glomeruli *viz*. congested glomerular blood vessels, degenerated, fragmented and atrophied glomerular tuft with increase periglomerular space. The vascular alterations in kidney might be the reflection of endotoxin mediated damage caused by *E. coli*.

***Key words:*** Colibacillosis, buffalo calves, kidney, histopathology

## Introduction

Buffalo forms an integral part of the typical Indian farming system due to its ability to sustain under harsh climatic conditions, scarce feeds and fodder. Of all the livestock species, buffalo holds the greatest promise for food security and sustainable development in the various farming systems. Though total buffalo population is less than half of the cattle, yet they contribute 55 per cent of the total milk produced in the country (Kundu *et al.*, 2004). The rearing of buffalo calves is extremely delicate and so requires a lot of care, particularly for the prevention of diseases.

Calf diarrhoeic diseases results from complex interactions of the environment, infectious agents and the calf itself. Among the bacterial causes, *E. coli* is the most common and economically important one (Muktar *et al.,* 2015). Buffalo calf scours, continued to pose a major health and threat for the buffalo-breeding (Nizza *et al.*, 2010). Diarrhoea due to *Escherichia coli* (also known as scours) is one of the most common diseases of young buffalo calves, despite vaccination programmes, management measures and treatment with antibiotics and fluid therapy. Identification of infectious agents that causes scours is essential for implementation of effective prevention and treatment (Radostits *et al.,* 2007).

A number of disease conditions are infectious that contribute towards mortality in buffaloes. Mortality due to *E. coli* infection in buffalo calves is reported to be 25.49 per cent (Abd-Elrahman, 2011). By invading the wall of small intestine, *E. coli* destroys the epithelium and causes bacteraemia and localizes in other organs including kidney. The present paper deals with the incidence and histopathological manifestations of colibacillosis in kidney of buffalo calves.

## Materials and Methods

For present study, a total of 610 buffalo calves, irrespective of sex and breeds were examined from various slaughter houses of Rajasthan. Out of these, 68 buffalo calves showing frank macroscopic lesions were further processed for bacteriological and histopathological examinations. Samples were collected in duplicate, one for bacteriological and another for histopathological examination.

### Isolation and identification of *E. coli* organism from kidneys of buffalo calves

For bacteriological examination, sterile cotton swabs were used for aseptic collection of the samples from the sites showing visible abnormality at necropsy for the bacterial isolation and streaked on Mac-Conkey agar petriplates within two hours of sampling. The inoculated plates were incubated at $37^0$C for 24 hours. After this, single pink colony from the Mac-Conkey lactose agar showing lactose fermentation was fished out and streaked on eosine methylene blue (EMB) agar petriplates. The inoculated plates were then incubated at $37^0$C for 24 hours. From EMB agar the colonies showing metallic luster, were further subjected to primary and secondary identification tests as per the method described by Cowan and Steel (1965) and Carter (1975).

### Histopathological study

After confirmation of bacteriological examination, kidney samples were processed for histopathological examination. As far as possible, the colour of kidney was noted immediately after collection and prior to fixation. The samples were promptly preserved in 10 per cent formal saline and processed mechanically for paraffin embedding by acetone and benzene technique (Lillie, 1965). The sections of 4-6 micron were cut and stained with haematoxylin and eosin.

## Results and Discussion

In the present study, total 217 *E. coli* isolates were obtained from different organs, out of which, 25 were isolated from kidney. Therefore, the incidence of colibacillosis affecting kidney was recorded as 11.52 per cent. A higher incidence was recorded by Verma and Kalra (1975) as 33.33 per cent and Seema (2007) as 19.11 per cent.

### Bacteriological study

The isolation and identification of bacteria (*Escherichia coli*) was carried out from 25 samples of kidney. The tissue samples inoculated on Mac-Conkey agar plates revealed the

[1]Assistant Professor; [2]Veterinary Officer, Badanu, Bikaner, Department of Animal Husbandry Government of Rajasthan

presence of lactose fermenting pink colonies. The bacteria subcultured on EMB agar plates resulted into colonies exhibiting metallic sheen, a characteristic feature of *Escherichia coli.* These organisms when subjected to primary identification tests revealed following properties:

Morphology and biochemical properties revealed when subjected to primary identification tests are presented in Table 1.

**Histopathological study**

Grossly, the affected kidneys were congested and white spotted. Kidney showed marked areas of congestion on cortico-medullary junction. Almost similar findings were observed by Yoon *et al.* (2005), Jubb *et al.* (2007), McDonald *et al.* (2007) and Seema (2007).

On microscopic investigations, kidney sections revealed congestion, degeneration and necrosis of the kidney tubules, coagulative necrosis of the tubular epithelium (Fig. 1) and various lesions of glomeruli *viz.* congested glomerular blood vessels, degenerated, fragmented and atrophied glomerular tuft with increase periglomerular space (Fig. 2). Mild interstitial nephritis with infiltration of neutrophils was also observed. Almost similar findings were described by Singh and Singh (1983), Singh *et al.* (1996), Sastry (2001), Yoon *et al.* (2005), Jubb *et al.* (2007), Londhe *et al.* (2013) and Singh *et al.* (2013) in *E. coli* infected calves. The vascular alterations in kidney might be the reflection of endotoxin mediated damage as reported by Smith (1986).

**Acknowledgments**

The author is thankful to the Dean, College of Veterinary and Animal Science, Bikaner for providing necessary facilities to conduct the research work.

**References**

Abd-Elrahman AH (2011) Colibacillosis in newly born buffalo calves and role of lacteol fort in preventing recurrence of calf diarrhoea. *Life Sci. J.* **8**: 497-502.

Carter GR (1975) Infections associated with ovine perinatal mortality in Victoria. *Aust. Vet. J*. **51**: 71-74.

Cowan ST and Steel KJ (1965) Manual for identification of medical bacterial, Cambridge University Press, pp. 1-217.

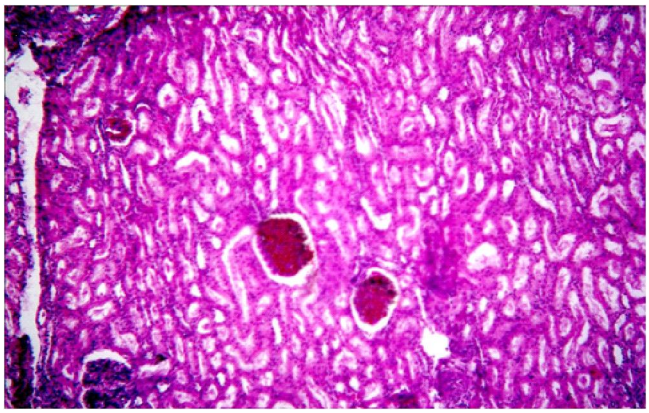

Fig.1: Microphotograph of kidney showing congested glomerular blood vessels along with coagulative necrosis in tubular epithelial cells (H&E, 100 X)

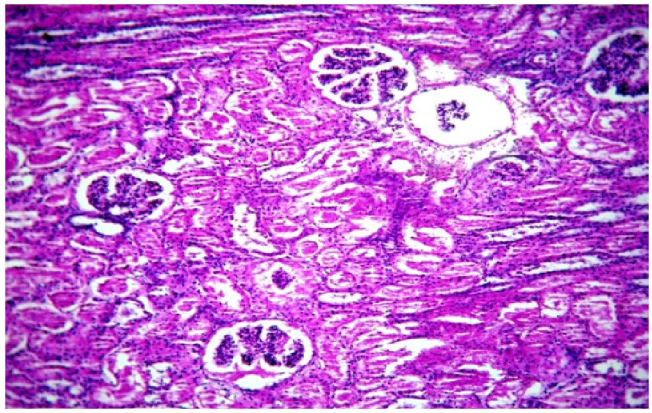

Fig.2: Microphotograph of kidney showing degenerated, fragmented and atrophied glomerular tuft with increased periglomerular space ( H&E, 100 X)

Jubb KV, Kennedy PC and Palmer N (2007) Pathology of Domestic Animals. Elsevier Saunders, 5th edn., Vol. **2**, pp. 183-193.

Kundu SS, Mishra, AK and Pathak PS (2004) Buffalo production under different climatic regions 1st ed. International book distributing company, Lucknow.

Lillie RD (1965) Histopathological technique and practical histochemistry, Mc Graw Hill Book co., New York and London.

Londhe MS, Pruthi AK, Gupta RP, Sharma A, Renu and Lather D (2013) Pathological investigation of gastrointestinal tract disorders of bovines. *Haryana Vet.* **52:** 33-37.

McDonald, McGavin and James FZ (2007) Pathologic basis of veterinary disease. 4th edn. Penny Rudolph Publisher, China.

Muktar Y, Mamo G, Tesfaye B and Belina D (2015) A review on major bacterial causes of calf diarrhea and its diagnostic method. *J. Vet. Med. Anim. Health* **7**:173-185

Nizza S, Mallardo K, Manco E, Marullo A, Pisanelli G, Demartino L, Lovane G and Pagnini U (2010) Lethal co-infection of rotavirus and *E. coli* 0157:H7 in Mediterranean buffalo calves of a closed community in Italy. In: Proceedings of Ninth World Buffalo Congress, Infectious Diseases, pp. 470-472.

Radostits OM, Gay CC, Hinchcliff KW and Constable PD (2007) Veterinary Medicine, 10th edn. pp. 847-888. Saunders, Philadelphia.

Sastry GA (2001) Veterinary Pathology. CBS Publishers and Distributers, New Delhi.

Seema (2007) Etiopathomorphological studies of buffaloes/buffalo calves mortality. *Indian J. Vet. Pathol.* **31**(1): 87.

Singh DV, Sodhi SPS, Brar APS and Grewal JS (1996) Certain pathological profiles of endotoxic shock in buffalo calves. *Buffalo J.* **12**: 283-288.

Singh GK and Singh NP (1983) Clinicopathological study of experimental calf scours induced by *E. coli* strain (0:129). *Indian J. Vet. Pathol.* **7:** 31-34.

Singh K, Mishra S K, Jakhar KK and Lather D (2013) Pathological investigation on buffalo calves suffering from gastrointestinal tract disorders. *Haryana Vet.* **52:** 38-42.

Smith BP (1986) Understanding the role of endotoxins in Gram negative septicaemia. *Vet. Med.* **81**: 1148-1161.

Verma PC and Kalra DS (1975) Studies on buffalo calf mortality, with special reference to its etiology. *Indian Vet. J.* **52**: 605-609.

Yoon SS, Han HR, Bae YC, Lee HS, Yang DK and Kwon YK (2005) Septicemic colibacillosis accompanied by white-spotted kidney in a calf. Korean *J. Vet. Res.* **45**: 99-103.