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Investigations on *Escherichia coli* serotypes isolated in buffalo species suspected with gastrointestinal tract disorders

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Abstract

The objective of the study was to investigate the serotypes of *Escherichia coli* isolated from the heart blood and the visceral organs of buffaloes. A total of 10 different serotypes were isolated, and most of them are responsible for diarrhoea in animals. The serotyping results revealed O98 as the most prominent serotype, followed by O135, O9, O8, O11, O7, O26, O18, and O126.

Keywords: Buffalo, gastrointestinal, serotype, *Escherichia coli* and diarrheagenic

Introduction

Ruminants represent a major reservoir for pathogenic *Escherichia coli* that can access human communities through the food chain (Pradel *et al.*, 2001) [1]. Serotyping of the pathogenic *Escherichia coli* is done on the basis of their O (somatic), H (flagellar), and K (capsular) surface antigens (Nataro and Kaper, 1998) [2]. Certain strains of *E. coli* cause a variety of infections in animals, including humans, and the strains of *E. coli* that cause enteric disease are called enterovirulent or diarrheagenic *E. coli* (Stenutz *et al.*, 2006) [3]. *Escherichia coli* that causes diarrhoea can be categorized on the basis of pathogenicity, clinical symptoms, and serology into different pathogenicity groups like enterotoxinogenic *E. coli* (ETEC), enteropathogenic *E. coli* (EPEC), enteroaggregative *E. coli* (EAEC), enteroinvasive *E. coli* (EIEC), haemorrhage or shiga (vero) toxin-producing *E. coli* (STEC/VTEC/EHEC), necrotoxicogenic *E. coli* (NTEC), and diffusely adherent *E. coli* (DAEC) (Nataro and Kaper, 1998) [2].

Materials and Methods

A total of 114 samples from the heart blood and different visceral organs (mesenteric lymph nodes and liver) in 38 buffalo species were collected aseptically and bacteriologically investigated for the presence of *E. coli*. After identification of *Escherichia coli* through the Vitek-2 compact system, the positive samples were sent to the National Salmonella and Escherichia Centre (NSEC), Central Research Institute, Kasauli (Himachal Pradesh), for serotyping.

Results and Discussion

The serotyping results of *Escherichia coli* are shown in Tables 1 and 2, which revealed mesenteric lymph node maximum isolations followed by liver and heart blood. Out of 15 isolated serotypes, O98 (26.67%) was found predominantly followed by O135 (13.33%), O9 (13.33%), O157 (6.67%), O8 (6.67%), O18 (6.67%), O11 (6.67%), O7 (6.67%), O26 (6.67%), and O126 (6.67%). In the present study, four categories of *E. coli* serotypes were isolated, i.e., EPEC (O26, O18, and O126), ETEC (O8 and O11), EHEC (O26, O98, O126, and O157), and EAEC (O7 and O126). The serotyping results are also in accordance with Sharma *et al.* (2006) [4]. EAEC is associated with persistent diarrhoea, which is usually watery and secretory without fever or vomiting (Nataro and Kaper, 1998) [2]. Benenson (1995) [5] reported diarrhoea caused by EHEC, EIEC, and DAEC. EHEC excretes potent toxins called Vero toxins or Shiga toxins, which are associated with non-bloody to bloody

stools. The strains can cause haemolytic-uremic syndrome (HUS). Benenson (1995) [5] also explained that EIEC strains invade the epithelial cells of the intestine and cause watery diarrhoea. EPEC involved in infant diarrhoea and breast feeding may protect against disease (Nataro and Kaper,

1998) [2]. ETEC is associated with traveller's diarrhoea and weaning diarrhoea in children (Nataro and Kaper, 1998) [2]. DAEC appears to be more pathogenic in preschool-aged children than in infants (Benenson, 1995) [5].

Table 1: Organ-wise isolation of different *Escherichia coli* serotypes from buffalo species suspected of gastrointestinal tract disorders (n=15)

S. No.	Animal species	<i>Escherichia coli</i> serotypes		
		Heart blood	Liver	Mesenteric lymph nodes
1	Buffalo	O135(1), O9(1), O98(1)	O8(1), O98(2), O9(1), O18(1)	O11(1), O7(1), O135(1), O26(1), O157(1), O98(1), O126(1)

Table 2: *Escherichia coli* serotypes isolated from heart blood and visceral organs of the buffalo species suspected of gastrointestinal tract disorders (n=15)

Sr. No.	Serotype of <i>E. coli</i>	Number of isolations	Percentage (%)
1.	O98	4	26.67
2.	O135	2	13.33
3.	O9	2	13.33
4.	O7	1	6.67
5.	O157	1	6.67
6.	O11	1	6.67
7.	O8	1	6.67
8.	O26	1	6.67
9.	O18	1	6.67
10.	O126	1	6.67
Total		15	100

Conclusion

The results of the present study revealed that the majority of *Escherichia coli* serotypes belong to enterovirulent or diarrheagenic *E. coli* (DEC), and one serotype (O157) bears zoonotic potential. These strains may be accessible to humans through milk, meat, etc. To avoid such transmission, attention should be paid to the adoption of hygienic sanitary precautions.

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