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In Vivo Mouse Pathogenicity Study of *E.Coli* Isolated from Porcine Gastrointestinal Tract

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Abstract

The present study was carried out to assess the degree of pathogenicity of *E.coli*, isolated from the GI tract of piglets. All the mice inoculated with *E.coli* isolates died within 36 hours. Post-mortem examination of the mice revealed lesions similar to that observed in most of the natural infection cases in piglets. The *E.coli* were re-isolated from the dead mice by streaking on EMB agar. Thus in the present study *E.coli* isolated from the GI tract of piglets was found to be highly pathogenic to mice and was also re-isolated from the dead mice indicating that *E.coli* could be responsible for mortality in piglets.

Keywords: *E.coli*, Gastroenteritis, Piglets, *in vivo* Pathogenicity study, Mice.

Introduction

Escherichia coli (*E.coli*) is one of the important causative agent for gastroenteritis in piglets (Fairbrother *et al.*, 2005). Although several disorders affect piglets, gastrointestinal disorders are extremely important as they not only cause poor growth efficiency but also lead to mortality. There have been reports of high mortality of piglets in and around Thrissur district, which leads to heavy economic loss to the pig farmers.

Numerous *in vitro* and *in vivo* assays have been developed in an attempt to study various aspects of *E. coli* infection in humans and animals (Mohawk and O'Brien, 2011). Recent studies in various experimental animals revealed that *in vivo* mouse models could provide essential information regarding virulence, host immunity and pathology of disease associated with *E.coli* infection (Law *et al.*, 2013 and Blanco *et al.*, 1997).

The present study was carried out to assess the degree of pathogenicity of *E.coli*, isolated from the GI tract of piglets, using *in vivo* pathogenicity study in mice.

Materials and Methods

E.coli isolates were obtained from porcine gastrointestinal tracts of the Piglet carcasses came to the Pathology department for postmortem examination. Thirty mice (25 to 30 g each) procured from Small animal breeding station, Mannuthy, Kerala Veterinary and Animal Sciences University were used for conducting the *in vivo* pathogenicity of 5 *E.coli* isolates. All the animals were

maintained in well ventilated cages on standard maintenance ration. The study was conducted after approval of research and institutional ethical committee.

Each *E.coli* isolate was inoculated into six mice intraperitoneally with 0.2 ml of a 24hr Mueller Hinton broth culture containing 10^7 CFU of organisms. Mortality of mice over a period of one week was scored.

Results and Discussion

All the mice inoculated with *E.coli* isolates died within 36 hours. On post-mortem examination of the mice severe haemorrhagic enteritis was observed; which was similar to that observed in most of the natural infection cases in piglets (Fig. 1). Organisms were re-isolated from the dead mice by streaking on EMB agar. Greenish metallic sheen colonies were observed on EMB agar (Fig. 2).

Re-isolation of *E.coli* from the dead mice indicated subsequent mortality in piglets. Johnson *et al.* (2006) and Deshpande *et al.* (2010) also confirmed isolation of highly pathogenic *E.coli* from gastroenteritis cases by mouse pathogenicity studies. Thus the mice pathogenicity study of porcine *E.coli* isolate confirmed its ability to cause gastroenteritis and subsequent mortality in piglets.

In conclusion, the results of the present study revealed that highly pathogenic *E.coli* could be a major causative agent for gastroenteritis in piglets. This study also provides evidence that porcine *E.coli* could colonize mouse intestinal tract and induce changes in the GI tract which were comparable with that noted in gastroenteritis cases in piglets.



Fig. 1. *In vivo* mice pathogenicity test- Haemorrhagic enteritis



Fig.2. Colonies of *E.coli* with characteristic greenish metallic sheen on EMB agar

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Conflict of Interest: All authors declare no conflict of interest.

References:

- Blanco, J.E., Blanco, M., Mora, A. and Blanco, J. (1997). Production of toxins (Enterotoxins, Verotoxins, and Necrotoxins) and colicins by *Escherichia coli* strains isolated from septicemic and healthy chickens: relationship with *in vivo* pathogenicity. *J. Clin. Microbiol.* **35**: 2953-2957.
- Deshpande, A., Sharda, R., Chhabra, D., Gupta, N.K., Singh, C., Pardeshi, R. and Ludarkar, S. (2010). Pathogenicity and antibiogram of *Escherichia coli* isolates from diarrhoeic buffalo calves. *Indian J. Comp. Microbiol. Immunol. Infect. Dis.* **31**: 11-13.
- Fairbrother, J.M., Nadeau, E. and Gyles, C.L. (2005). *Escherichia coli* in post-weaning diarrhea in

pigs: an update on bacterial types, pathogenesis and prevention strategies. *Anim. Health Res. Rev.* **6**:17-39.

Johnson, J.R., Clermont, O., Menard, M., Kuskowski, M.A., Picard, B. and Denamur, E. (2006). Experimental mouse lethality of *Escherichia coli* isolates, in relation to accessory traits, phylogenetic group, and ecological source. *J. Infect. Dis.* **194**: 1141–1150.

Law, R.J., Gur-Arie, L., Rosenshine, I. and Finlay, B.B. (2013). *In vitro* and *in vivo* model systems for studying Enteropathogenic *Escherichia coli* infections. *Cold Spring Harb. Perspect Med.* **3** (3): 1-16.

Mohawk, K.L. and O'Brien, A.D. (2011). Mouse Models of *Escherichia coli* O157:H7 Infection and Shiga Toxin Injection. *J. Biomed. Biotechnol.* **11**: 1-17.

Sithara, M.S., George, A.J., Vijayan, N., Manomohan, C.B., Abraham, M.J. and Mani, B.K. (2015). Incidence of bacterial gastroenteritis in piglets. Accepted for publication in *J. Vet. Ani. Sci.*

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