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Occurrence of *Escherichia coli* harbouring *stx* genes in popiah, a Malaysian street food

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Abstract

Irrespective of its health effects, street foods are very popular with the consumers. The main purpose of this research was to study the biosafety of *Escherichia coli* in popiah, a Malaysian street food sold at a roadside food stall and a restaurant in Sri Serdang, Selangor, Malaysia, using the combination of the most probable number (MPN)-Polymerase Chain Reaction (PCR) assay-plating on Eosin Methylene Blue (EMB) agar methods. Using these biomolecular methods, *E. coli* was detected in 12/15 (80%) and 11/15 (73%) of the collected samples from the roadside food stall and the restaurant respectively. The incidence of *stx* virulence-associated genes was detected in 1/15 (7%) among the *E. coli* isolated from samples taken from the roadside food stall while the *E. coli* isolated from the restaurant was 3/15 (20%). The density of *E. coli* ranged from <3 to >1100 MPN/g and the density of *E. coli* positive with *stx* genes was <3 to 53 MPN /g in samples from both the roadside food stall and the restaurant. The presence of the *stx*-positive *E. coli* in popiah are significant to risk assessments of food and epidemiological studies. Therefore, from the information obtained in this study, it is obvious that the screening for STEC markers in food samples would be useful for food safety survey.

1. Introduction

It is now a well-accepted fact that street food vending represents an important food security strategy for low-income communities worldwide. However, more stringent measures must be promoted in street food vending to integrate the prevention of biological risk factors in order to promote comprehensive and up-to-date consumer safety as these foods are most commonly sold in the streets, public places, busy market places, school areas, near college campuses, and taxi stands, etc. Thus, the safety of street foods has been a source of concern to consumers due to its popularity, particularly in relation to their microbiological contamination.

Popiah, is a Malaysian street food favoured by many. It is mostly made with a filling of shredded raw vegetables, and various studies has shown that raw vegetables represent an important source of risk for human health because they are carriers of pathogenic micro-organisms (Harris *et al.*, 2003; Park *et al.*, 2012). The Enteroaggregative *E. coli* (EAEC), Enteropathogenic *E. coli* (EPEC), Enterotoxigenic *E. coli* (ETEC), Enteroinvasive *E. coli* (EIEC) and non-O157 Shiga toxin-producing *E. coli* are the important causative agents of diarrhea in developed countries (Nataro and Kaper, 1998; Nataro, 2004; Estrada-Garcia *et al.*, 2005, 2009). However, STEC strains, harbouring the *stx* genes is one of the most important recently emerged groups of food borne pathogens, and can contaminate fresh vegetables via primary contamination (while growing and during harvest) or secondary contamination (during washing, slicing, soaking, packaging and preparation) (Harris *et al.*, 2003).

To reduce the exposure of humans to this agent, the detection of *E. coli* based on its recovery from food samples and confirming the presence of its virulence associated factors (shiga-toxins) (Vernozy-Rozand, 1999) is a central goal. Conventional methods are still regarded as the basic tools for isolation, detection, and identification of foodborne pathogens since not all laboratories in developing countries have sufficient resources to incorporate PCR methods in their analytical procedure. The objective of this study was to determine the incidence and density of *E. coli*

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