International Food Research Journal 20(2): 1007-1009 (2013)
Journal homepage: *http://www.ifrj.upm.edu.my*

# Incidences of multi-drug resistance *Escherichia coli* isolates in Panipuri sold in Bangalore

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**Article history**

*Received: 6 August 2012*
*Received in revised form: 17 September 2012*
*Accepted: 19 September 2012*

**Keywords**

Panipuri
Bangalore
*E. coli*
multi-drug resistance

**Abstract**

Out of 100 samples of Panipuri collected, 74 showed the presence of *E. coli*. The *E. coli* isolates were subjected to antibiotic susceptibility using 19 antibiotics. Most of them were found to be multi-drug resistant, showing resistance against 5-13 antibiotics. Also, two isolates (pe16 and pe74) were found to be more resistant, where pe16 and pe74 were resistant against 13 and 12 antibiotics, respectively. Streptomycin was found to be the most effective antibiotic, against which 58 isolates showed sensitivity. On the other hand, Ofloxacin was found to be the least effective antibiotic, against which 68 isolates showed resistance.



## Introduction

In India, chaats chats like Bhelpuri, Panipuri etc. are sold at public places and roadside shops. In most cases, running water is not available at vending sites; hands and utensils are washed in one or more buckets and sometimes without soap (Mensah *et al*., 2002). Vendors can be the carriers of pathogens like *E. coli*, *Salmonella*, *Shigella*, *Campylobacter* and *S. aureus* (Tambekar *et al*., 2011).

*E. coli* is a consistent inhabitant of the human intestinal tract and it is the predominant facultative organism in the human gastrointestinal tract. *E. coli* is considered as a reliable indicator organism of fecal pollution, generally in insanitary conditions of water, food, milk and other dairy products (Soomro *et al*., 2002). But some strains, when they enter fecal-oral route may cause illness due to toxins they secrete. Due to the complex biochemical composition and water activity, street-vended-foods like Panipuri acts as an excellent culture medium for the growth and multiplication of *E. coli*. Contamination of Panipuri from clinical isolates of *E. coli* can be life threatening due to their resistance to antibiotics (Farzana *et al*., 2011).

Prevalence of *E. coli* in street-vended-chats including Panipuri has been studied by Das *et al*. (2010) and Tambekar *et al*. (2011). Antibiogram profile of *E. coli* from clinical samples has been studied by few investigators (Nazir, 2007, Paul *et al*., 2010, Momoh *et al*., 2011), and *E. coli* from these clinical samples has been found to be multi-drug resistant. The present study aims at isolation of *E. coli* from panipuri sold at Bangalore city in India, and antibiotic resistance patterns shown by the isolates.

## Materials and Methods

### *Media and antibiotics*

Dehydrated media, antibiotics and other chemicals used in the present study were procured from Hi-media Pvt. Ltd., Bombay.

### *Isolation of E. coli*

A total of 100 samples were collected from street vendors in and around Bangalore under aseptic condition. Isolation of *E. coli* was carried out using Eosin Methylene Blue (EMB) agar media. One ml of each sample was used for the isolation purpose. Nucleated colonies with or without metallic sheen on EMB were selected for further studies.

### *Antibiotic susceptibility test*

The *E. coli* isolates were subjected to antibiotic susceptibility test following the Kirby-bauer disc diffusion method (Bauer *et al*., 1966). Susceptibility or resistance patterns of the isolates were studied by measuring zone of inhibition and referring to standard chart for each antibiotic.

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## Results and Discussion

Out of 100 samples collected, 74 samples showed the presence of *E. coli*. All the 74 isolates showed nucleated colonies with or without metallic sheen on EMB agar medium. Analysis of the street-vended-chaats by Das *et al*. (2010) revealed a high prevalence of bacterial pathogens including *E. coli*. Total viable counts of faecal coliforms varied between 0.03-0.14×$10^4$ cfu $g^{-1}$. A prevalence of 41% *E. coli* was found in panipuri water (Tambekar *et al*., 2011).

In antibiotic susceptibility test, the 74 isolates showed varied results against each antibiotic. The number of antibiotics against which each isolate showed resistance ranged between 3 and 13. Among the isolates, three were found to be resistant to less than 5 antibiotics, 46 isolates showed resistance to 5-9 antibiotics and 25 isolates showed resistance to more than 10 antibiotics. The isolate pe16 was found to be resistant to 13 antibiotics, and the isolate pe74 was resistance to 12 antibiotics (Table 1).

Streptomycin was found to be the most effective antibiotic against which 78% isolates were found to be sensitive. In contrast, Ciprofloxacin and Ceftazidime were observed to be least effective antibiotics against which 74 (100%) isolates were resistance (Table 2).

Table 1. Antibiotic resistance of the isolates

| Sl. No. | Isolate | R | S | Sl. No. | Isolate | R | S |
|---|---|---|---|---|---|---|---|
| 1 | pe1 | 12 | 07 | 38 | pe55 | 17 | 02 |
| 2 | pe4 | 09 | 10 | 39 | pe56 | 15 | 04 |
| 3 | pe14 | 15 | 04 | 40 | pe57 | 16 | 03 |
| 4 | pe15 | 18 | 01 | 41 | pe58 | 15 | 04 |
| 5 | pe16 | 17 | 02 | 42 | pe59 | 17 | 02 |
| 6 | pe17 | 12 | 07 | 43 | pe60 | 15 | 04 |
| 7 | pe18 | 16 | 03 | 44 | pe61 | 17 | 02 |
| 8 | pe19 | 14 | 05 | 45 | pe62 | 17 | 02 |
| 9 | pe20 | 18 | 01 | 46 | pe63 | 16 | 03 |
| 10 | pe21 | 16 | 03 | 47 | pe64 | 17 | 02 |
| 11 | pe22 | 17 | 02 | 48 | pe65 | 17 | 02 |
| 12 | pe23 | 15 | 04 | 49 | pe66 | 17 | 02 |
| 13 | pe24 | 11 | 08 | 50 | pe67 | 16 | 03 |
| 14 | pe25 | 16 | 03 | 51 | pe68 | 18 | 01 |
| 15 | pe26 | 17 | 02 | 52 | pe72 | 17 | 02 |
| 16 | pe27 | 15 | 04 | 53 | pe73 | 17 | 02 |
| 17 | pe28 | 18 | 01 | 54 | pe74 | 17 | 02 |
| 18 | pe29 | 17 | 02 | 55 | pe75 | 18 | 01 |
| 19 | pe30 | 17 | 02 | 56 | pe76 | 16 | 03 |
| 20 | pe31 | 18 | 01 | 57 | pe77 | 17 | 02 |
| 21 | pe32 | 16 | 03 | 58 | pe79 | 16 | 03 |
| 22 | pe33 | 15 | 04 | 59 | pe80 | 17 | 02 |
| 23 | pe39 | 16 | 03 | 60 | pe81 | 15 | 04 |
| 24 | pe40 | 15 | 04 | 61 | pe84 | 17 | 02 |
| 25 | pe41 | 17 | 02 | 62 | pe85 | 15 | 04 |
| 26 | pe42 | 18 | 01 | 63 | pe86 | 18 | 01 |
| 27 | pe43 | 17 | 02 | 64 | pe87 | 16 | 03 |
| 28 | pe44 | 15 | 04 | 65 | pe88 | 18 | 01 |
| 29 | pe45 | 15 | 04 | 66 | pe89 | 17 | 02 |
| 30 | pe46 | 17 | 02 | 67 | pe92 | 17 | 02 |
| 31 | pe47 | 15 | 04 | 68 | pe93 | 18 | 01 |
| 32 | pe48 | 16 | 03 | 69 | pe94 | 14 | 05 |
| 33 | pe50 | 15 | 04 | 70 | pe95 | 13 | 06 |
| 34 | pe51 | 14 | 05 | 71 | pe96 | 13 | 06 |
| 35 | pe52 | 15 | 04 | 72 | pe98 | 12 | 07 |
| 36 | pe53 | 16 | 03 | 73 | pe99 | 14 | 05 |
| 37 | pe54 | 13 | 06 | 74 | pe100 | 16 | 03 |

R=resistance, S=susceptible

Table 2. Effect of each antibiotic against isolates

| Sl. No. | Antibiotic | Resistance | Sensitive |
|---|---|---|---|
| 1 | Amikacin | 63 (85%) | 11 (15%) |
| 2 | Ampicillin | 72 (97%) | 2 (3%) |
| 3 | Ceftazidime | 74 (100%) | 0 (0%) |
| 4 | Cefuroxime | 63 (85%) | 11 (15%) |
| 5 | Chloramphenicol | 62 (84%) | 12 (16%) |
| 6 | Ciprofloxacin | 74 (100%) | 0 (0%) |
| 7 | Doxycycline Hydrochloride | 64 (86%) | 10 (14%) |
| 8 | Gentamicin | 63 (85%) | 11 (15%) |
| 9 | Imipenem | 72 (97%) | 2 (3%) |
| 10 | Nalidixic Acid | 72 (97%) | 2 (3%) |
| 11 | Neomycin | 39 (53%) | 35 (47%) |
| 12 | Nitrofurantoin | 64 (86%) | 10 (14%) |
| 13 | Norfloxacin | 73 (99%) | 1 (1%) |
| 14 | Ofloxacin | 72 (97%) | 2 (3%) |
| 15 | Polmyxin-B | 62 (84%) | 12 (16%) |
| 16 | Rifampicin | 24 (32%) | 50 (68%) |
| 17 | Streptomycin | 16 (22%) | 58 (78%) |
| 18 | Tetracycline | 71 (96%) | 3 (4%) |
| 19 | Trimethoprim | 71 (96%) | 3 (4%) |

Antibiogram patterns of *E. coli* isolates of calves feces and diarrhegenic stool of infants were studied by Nazir (2007) who found that all the isolates were 100% resistant to Cloxacillin and Erythromycin. On the other hand, the calf isolates showed 100% sensitivity to both Ciprofloxacin and Chloramphenicol. However, children isolates were found to be completely resistant to Ampicillin and Erythromycin. The only highly sensitive antibiotic to children isolate was Chloramphenicol (Nazir, 2007). In another study, nearly all isolates were found to be susceptible to Norfloxacin, enrofloxacin and Ofloxacin (Paul *et al*., 2010).

## Conclusion

E. coli is prevalent in panipuri sold at Bangalore city in India. Contamination of Panipuri samples could be due to vendors who are the carriers and/or infected persons. A few of the isolated E. coli were multi-drug resistant. Care should be taken during preparation, handling and serving of chats by roadside vendors to avoid contamination of E. coli.

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