

Bacteriological Analysis and Hygiene of Street Food Panipuri: A Case Study of Morbi City-Gujarat, India

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ABSTRACT

The present study was undertaken to investigate the microbiological quality of Panipuri sold in Morbi city - India. 40 water sample of Panipuri were aseptically collected from Different Areas selected of Morbi City. Analysis of the food samples revealed that 82% of Panipuri water samples had high loads of bacterial pathogens such as *Escherichia coli* (42%), *Staphylococcus aureus* (30%), *Klebsiella sp.* (20%), *Pseudomonas sp.* (6%) and yeast (2%). To ensure healthy life style of citizens, it is recommended to monitor quality and hygiene of the various street foods on regular intervals and such practices can be adhere in regulatory laws.

Keywords: Street food, Bacterial contamination, Food borne infections, Panipuri, Food hygiene

INTRODUCTION

There is something comfortingly familiar about eating a humble pani puri – a crispy hollow ball made of semolina or wheat, filled with spicy potatoes and topped with tangy, spicy tamarind water made fragrant by mint leaves and black salt. It may sound like culinary chaos, but that this spicy, crunchy wonder is absolutely delicious is something almost Indians will agree on.

Served by vendors from a setup that gives the word ‘utilitarian’ a run for its money, pani puri (also called golgappa, phuchka and a multitude of other monikers) is, in every sense, a material manifestation of the elusive emotion called “simple joy.” This innocuous street

snack is also a great leveler – at a pani puri stall, you will see be suited businessmen step out of sleek cars to join the queue alongside the city’s poorest residents .The street food is prepared on the streets and ready-to-eat, or prepared at home and consumed on the streets without further preparation. Street vended food not only appreciated for their unique flavors, convenience and the role which they play in the cultural and social heritage of societies, it also become important and essential for maintaining nutritional status of populations. The Street foods provide a source of affordable nutrients to the majority of the people especially the low-income group in the developing countries.

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However, street foods are frequently associated with diarrheal diseases due to their improper handling and serving practices (Barro et al., 2006). Microbial contamination of ready-to-eat foods sold by street vendors and hawkers has become a major health problem. Street food vendors are mostly uninformed of good hygiene practices (GHP) and causes of diarrhoeal diseases (Mensah et al., 2002), which can increase the risk of street food contamination. From the initial contamination of raw foods with pathogenic bacteria to subsequent contamination by vendors during preparation; there are many factors that should be considered for the analyzing the hazards due to street foods. The vendors can be carriers of pathogens like *E. coli*, *Salmonella spp.*, *Shigella spp.*, *Campylobacter spp.* and *S. aureus* who eventually transfer these food borne hazards to consumers. In most cases, running water is not available at vending sites; hands and utensils washing are usually done in one or more buckets, and sometimes without soap. Wastewaters and garbage's are discarded nearby, providing nutrients for insects and rodents, which may carry food borne pathogens. The serving utensils used at the vending site are often contaminated with *Staphylococcus sp.* which may have originated from the vendors hands when they touch the food preparation areas, dish cloths and the water during dish washing and hand washing which indicates cross contamination between dish water, food preparation surfaces, and the food itself; consequently, perceive a major public health risk (Mensah et al., 2002; Cardinale et al., 2005; Das et al. 2010). Street foods are posed major public health risk due to lack of basic infrastructure and services, difficulty in controlling the large numbers of street food vending because of their diversity, mobility and temporary nature (Desousa, 2008). A general lack of factual knowledge about the epidemiological significance of many street vended foods, poor knowledge of street vendors in basic food safety measures and inadequate public awareness of hazards posed by certain foods has severely hampered

the deployment of a precise scientific approach to this very serious problem (Rane, 2011). Therefore, the conditions of street food preparation and vending raise many concerns for consumer's health. Street vended chats like Panipuri and bhelpuri sold in almost all the cities throughout India and are consumed by huge population and frequently associated with diarrhoeal diseases due to their improper handling and serving practices. The present study aims to establish the hygienic status of street vended food Panipuri and their impact in street foods contamination at different parts of Morbicity, Gujarat, India. This study was undertaken to develop an understanding of the microbiological problems associated with street vended foods with particular reference to sources of risk and to identify the behavior and practices that may be hazardous.

MATERIALS AND METHODS

Study site and samples collection:

Bacteriological investigations of Panipuri in Morbi city were performed during Feb-April 2019. The study was conducted in the major streets and markets of Morbi. There was approximately forty vending sites. Samples were collected during visits to the sites. Vending sites hygiene and salubrious status were determined by use of structured interview and through observations. A total of 40 Panipuri water samples were collected from selected vending sites in sterile containers and analyzed after procurement.

Sample analysis: For analysis 1 ml Panipuri water sample was inoculated in to Mac-Conkey broth and incubated for 12-16 h at 37°C. The microbial growth was observed as turbidity in broth, and then sub cultured on the Cysteine Lactose Electrolyte Deficient agar (CLED) and incubated at 37 °C for 24 hrs. After incubations, suspected colonies were identified based on their morphological, physiological and biochemical features using microscopic observation, standard biochemical methods and cultural characteristics on CLED such as yellow colored colonies of lactose fermenting *E.coli*, greenish blue or blue colonies of *Ps. aeruginosa*, mucoidal yellow to

whitish blue colonies of *Klebsiella spp.* and deep opaque colonies of *S. aureus* (Hi-Media manual, 2003).

Data handling and analysis: Along with collection and bacteriological analysis of Panipuri water, through field notes, personally administered interviews and a semi-structured questionnaire of randomly selected street food vendors were surveyed. Data on vital statistics was collected using interview schedules and observation, 40 randomly selected street food vendors in Morbi city were recruited into the study which had given their approval and the vendors were assured total confidentiality. Data extracted included season of sampling, site of shop, hygienic status of vendor, hygienic condition of vending site, place of food preparation etc were recorded and analyzed by SPSS statistical package.

RESULTS AND DISCUSSION

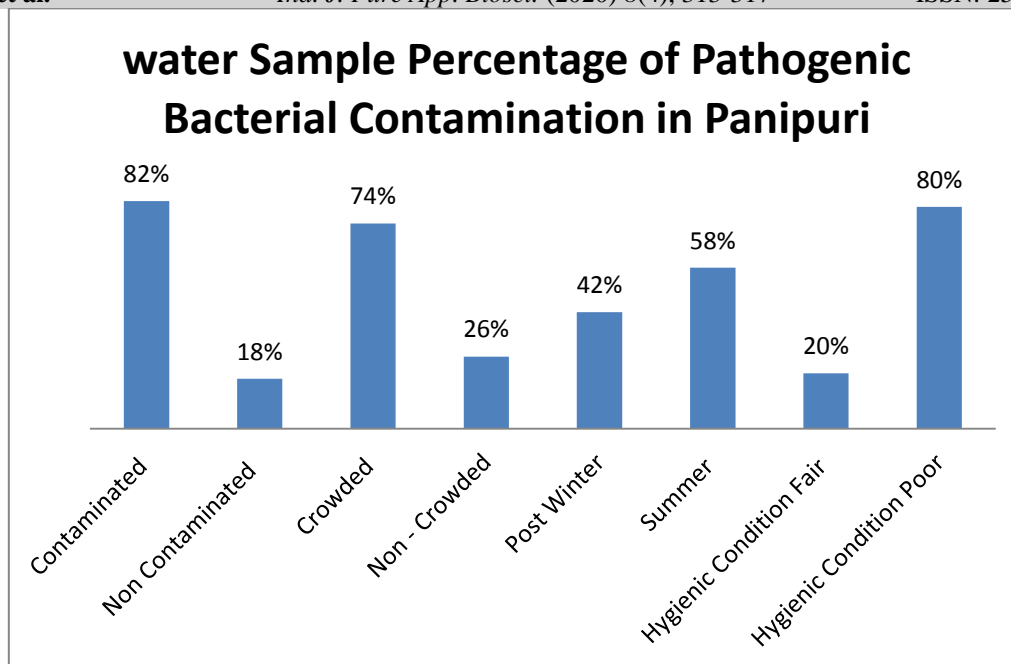
Hygienic quality of street food vending has become an important public health issue and a great concern to everybody. Microbial contamination of ready-to-eat foods and beverages sold by street vendors and hawkers has become a global health problem. In developing countries, fruit juices, drinks, meals and snacks sold by street-food vendors are widely consumed by millions of people. There are some reports of food borne illness associated with the consumption of contaminated street vended food like Panipuri. Street vended food like Panipuri sold in almost all cities throughout India consumed by huge population. The present study was undertaken to investigate the microbiological quality of Panipuri sold in Morbi, India. Food hawkers in India are generally unaware of food

regulations and have no training in food-related matters. They also lack supportive services such as water supply of adequate quality and rubbish disposal systems, which hamper their ability to provide safe food.

A total of forty water samples of Panipuri were analyzed for presence of bacterial pathogens. The study revealed 82% pathogenic bacterial contamination, majority of them contamination with *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella sp.*, *Pseudomonas sp.* and *Yeast* indicating poor bacteriological quality of the Panipuri. Several authors have observed those bacteria from dirty dish washing waters and other sources can adhere to utensil surfaces and constitute a risk for contamination during food vending. Defective personal hygiene can facilitate the transmission of these pathogenic bacteria found in environment and on people's hands via food to humans. Thirty Panipuri samples were collected from crowded vendors and 10 from non-crowded area. The samples collected from crowded area were more contaminated than non-crowded area. The percentage of contamination was 74% in crowded areas and 26% in non-crowded area. The percentage of contamination of samples which were collected in summer was 58% and 42% in post winter (Fig 1). The personal hygiene of vendor or worker is important in hygienic vending of Panipuri and it was found that poor personal hygiene contaminate the food item more. At the same vending site also reflect the contamination in street food, more the unhygienic condition or surroundings of area more degree of bacterial contaminations (Table 1).

Table 1: Prominent Bacterial pathogen isolated from various sample of Panipuri in Morbi city Area

Morbi City Area	Area type	Sample size	<i>E. coli</i>	<i>S. aureus</i>	<i>Ps. aeruginosa</i>	<i>Klebsiella spp</i>	<i>Yeast</i>	Total %
Site of Shop	Crowded	30	39%	17%	07%	08%	3%	74
	Non-Crowded	10	09%	5%	05%	06%	1%	26
Season of collection	Post Winter	18	15%	11%	05%	08%	3%	42
	Summer	22	24%	13%	3%	17%	1%	58
Hygienic Condition Vending Site	Fair	25	10%	03%	3%	4%	0	20
	Poor	15	40%	14%	8%	13%	05%	80



Overall study indicated that 82% Panipuri sample were contaminated with variety of pathogenic bacterial contaminations. Many people have worked on the fact that Panipuri is contaminated with different bacterial pathogens because of various sources like improper handling of street foods, washing of utensils, dish cloths, stalls are at crowded place and movable stalls.

E. coli and other coliform bacteria could be due to inadequate hand washing by food workers and the absence of good manufacturing practices. The occurrence of *P.aeruginosa* might be due to improper personal hygiene, unhygienic surroundings, vehicular transmission, and sewage. The presence of *S.aureus* was severe contamination through handling. The water sample of Panipuri from different areas of Morbi has different percentage of pathogens. Crowded areas have more percentage of pathogens than non-crowded areas (Table 1). In addition, there is potential health risks associated with initial contamination of foods by pathogenic bacteria as well as subsequent contamination by vendors during preparation, handling, and cross contamination. From all above discussion it was concluded that chatpata water of Panipuri was contaminated with *E. coli*, *S. aureus*, *K. pneumoniae*, *P. aeruginosa*,

yeast which cause various food borne infections.

CONCLUSION

Panipuri is very popular street food which is consumed by large amount of population of different age groups. Panipuri is very tasty, cheap in cost and readily available and hence people like to eat Panipuri on large scale. For the contamination of street food, personal hygiene of vendor is also responsible. Vendors touch the floor, wash the utensils most of the time without using soap, handling of dish cloths and after all they touch food without gloves for preparing and serving water without washing the hands, this may lead to cross contamination of bacterial pathogens. All the steps involved from preparation to serving of foods and food ingredients to the consumer must be bacteriologically evaluated. In the present study, the bacteriological quality of water of Panipuri found to be contaminated with different bacterial pathogens like *E.coli*, *S.aureus*, *K. pneumoniae*, *P. aeruginosa*, *yeast*. All these bacterial pathogens are responsible for the food borne and diarrheal diseases. The Local Government and the ministry should consider establishment of adequate facilities and utility services as well as provision of necessary information, education and training programmes for

vendors and consumers. Our findings show the need for more respect of Good Manufacturing practices (GMP) and Good Hygiene Practices (GHP) to reduce street foods contamination.

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