Volume 2 Issue 1
www.escientificlibrary.com
ES Journal of Microbiology

Bacterial Aetiology of Pani Sold with Popular Street Food Chaat in Bengaluru

Research Article

Vikyath Satish[1]*, PM Giridhara Upadhyaya[2], and MS Kalpashree[3]

[1]*Department of Microbiology, Kempegowda Institute of Medical Sciences, India*
[2]*Department of Microbiology, Kempegowda Institute of Medical Sciences, India*
[3]*Department of Dermatology, Venerology and Leprosy, Kempegowda Institute of Medical Sciences, India*

Received: Feb 25, 2021; **Accepted:** Apr 30, 2021; **Published:** May 05, 2021

***Corresponding author:** Vikyath Sathish, Department of Microbiology, Kempegowda Institute of Medical Sciences, Bengaluru, India

Abstract

The primary focus of the study is to investigate the Aetiology of the bacteria to bridge the gap between inadequate knowledge of bacterial growth in the pani and its role in food poisoning.

Aims and objectives: Isolation of bacteria in "pani" sold with popular street food chaat in Bengaluru

Identification of bacteria in "pani" sold with popular street food chaat in Bengaluru

Procedure: 100 samples of pani purchased from the vendor in a parcel container was transferred to a sterile container of 30 mL capacity. The pani was streaked on MacConkey agar and Samonella Shigella agar and incubated at 37°C overnight. After overnight incubation, the plates of agar were observed for growth. If growth was observed, the isolated colonies were taken up for identification by performing the requisite biochemical reactions. If growth was not observed after overnight incubation, the plates were further incubated for 24 hours. If no growth was observed even on Selenite F broth sub cultured plates, the pani was considered sterile and free of aerobic bacteria.

Results: Of the 100 samples collected, growth of Non Lactose fermenters were reported in 12%; Lactose fermenters were 33% of which E.coli were 23% and Klebsiella were 14%; Enterococci were 16%; Suspected faecal contaminated samples were 51%; Candida were 39% and no growth was reported in 4% of samples. The above coliform bacteria indicate faecal contamination and pose a threat to human's health. Caution must be exercised to prevent the diseases caused by them. This health hazard was found in street stalls as well as in established restaurants which reflect the magnitude of disease risk in the community. Regularized food inspection should be conducted by Health Inspectors to determine and ensure compliance of food safety standards.

Keywords: Chaat; Diarrhea; E.coli; Food poisoning; Food safety; Hygiene; Pani puri; Street food

Introduction

Street foods is defined as "ready-to-eat foods and beverages prepared and/or sold by vendors and hawkers especially in street and other similar public places" [1].

Food poisoning refers to- Any disease of an infective or toxic nature caused by or thought to be caused by the consumption of food and water [2]. With millions of cases

of food borne illnesses annually, unsafe food is a threat to human health and economies, affecting vulnerable and marginalised people, especially women and children, populations affected by conflict and migrants [3], making travellers diarrhoea the most common travel related infectious illness [4].

An estimated 600 million – almost 1 in 10 people in the world – fall ill after eating contaminated food and 420 000 die every year, resulting in the loss of 33 million healthy life years (DALYs) [5].

The role of street food in the causation of Food Poisoning assumes a great deal of Public Health importance for the Country. The pani containing favourable ingredients for the growth of pathogenic bacteria including coliform organisms [6] serve as reservoirs in the spread of infection. The growth is augmented by the use of contaminated water from unsanitary sources and also by the dipping of the hand of the food handler [7] in the cauldron containing the Pani which could potentially spread the bacterial flora into it. Moreover, take away plastic covers filled with Pani also serve as a source of infection.

Aims and Objectives

Isolation of Bacteria in pani sold with popular street food chaat in Bengaluru

Identification of Bacteria in pani sold with popular street food chaat in Bengaluru

Methodology

The study was conducted in the Department of Microbiology in a tertiary healthcare hospital. Ethical clearance for the study was obtained from the Institutional Ethics Committee prior to the commencement of the study. This was a descriptive study with a sample size of 100 (purposive sampling) completed within a period of 2 Months. Pani collected from chaat vendors was included in the study and chaat food other than pani and vendors not having facility to parcel were excluded from the study.

Procedure of the study

Street vendors within a 10 kilometre radius around the institution were considered for the study. The confidentiality and anonymity of the vendor and sample collected was maintained by coding throughout the study. Pani was purchased in a parcel container and transferred to a sterile container of 30 mL capacity and stored in the refrigerator (2°-8°C) after inoculation. The pani was streaked on MacConkey agar and Samonella Shigella agar and incubated at 37°C overnight. 1 mL of pani was inoculated into 2.5 mL Selenite-F Broth (Enrichment media) and incubated at centigrade overnight. After overnight incubation, the plates of agar were observed for growth and isolated colonies were taken up for identification by performing the requisite biochemical reactions like Indole, Triple Sugar Iron, Urease, Citrate, Manifold motility, Oxidase, Sugar fermentation with Glucose, Maltose, Sucrose and Mannose. If growth was not observed after overnight incubation, the plates were further incubated for 24 hours. The Selenite F broth inoculated with the pani and incubated overnight was subcultured on MacConkey agar and Samonella Shigella agar and incubated at 37°C overnight. The subcultured plate was observed for growth the following day (24 hours). If growth was observed, the isolated colonies were taken up for identification. If no growth was observed on streaked plates, the pani was considered sterile and free of Aerobic bacteria (Figure 1).

Observation and results

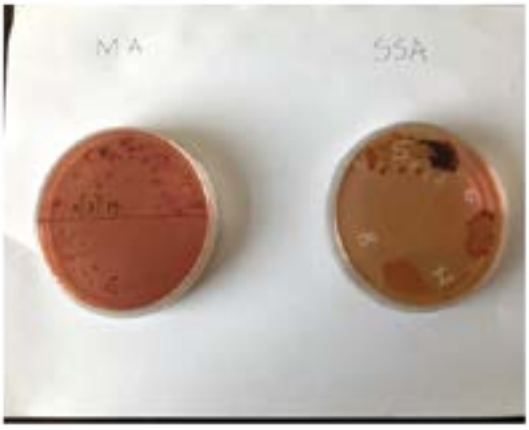

Figure 1: Growth observed in MacConkey agar and Samonella Shigella agar

A total of 100 samples were utilized in this Study. The samples were inoculated into MacConkey agar and Salmonella Shigella agar (Figure 2). Biochemical reactions were performed to identify the bacteria and the results were analyzed (Figure 3).

Statistics of Growth of Organisms

Non Lactose fermenters- 12% of total samples collected

Citrobacter- 8% of total samples collected

Proteus- 2% of total samples collected

Non fermentative gram negative bacilli other than Pseudomonas- 2% of total samples collected

Lactose fermenters- 33% of total samples collected

E.coli- 23% of total samples collected

Klebsiella- 14% of total samples collected

Both E.coli and Klebsiella in same sample-4% of total samples collected

Coliforms- 40% of total samples collected

Both Lactose fermenters and Non Lactose fermenters in same sample-5% of total samples collected

Enterococci-16% of total samples collected

Candida-39% of total samples collected

No Growth- 4% of total samples collected

Suspected Faecal contaminated samples-51% of total samples collected (Table 1).

Figure 2: Biochemical reactions performed on the isolated organism

Figure 3: Batch of samples observed after overnight incubation in MacConkey agar and Samonella Shigella agar

Table 1: Statistics of Growth of Organisms

Table 1	
Growth of Organism	**Number of Samples which showed growth (In 100 Samples)**
Non Lactose fermenters	12
Lactose fermenters	33
E.coli	23
Klebsiella	14
Both E.coli and Klebsiella	4
Coliforms (LF+NLF)	40
Both LF and NLF	5
Enterococci	16
Candida	39
Suspected faecal contaminated samples (LF+NLF+Enterococci)	51
No Growth	4

Discussion

Pani puri is a famous street vended food in India. Pani is the flavoured water containing spices and salt used abundantly with popular Indian street food 'Chaat'. In this study, we aim to identify the contaminating bacteria present in the pani. As the spices and salt are a rather rare source of harbouring coliform bacteria, growth on culture media can be incriminated directly to the water source.

By definition, safe and wholesome water must be free from pathogenic organisms; but the samples of pani collected harboured several disease causing organisms.

The isolation of the above mentioned organisms is unacceptable by the minimum standards of safe and wholesome drinking water and food safety standards and thus serve as a nidus for infection to the population at risk.

Coliforms bacteria isolated such as Lactose fermenting bacteria Escherichia coli (diarrhoea in infants, children and travellers) and Klebsiella [8] (diarrhoea in Immunocompromised individuals) and Non Lactose fermenting bacteria Citrobacter, Proteus and Non fermentative gram negative bacilli other than Pseudomonas present in a water sample provide a direct evidence of faecal contamination of the pani sample.

As observed in this study, pani laden with pathogenic organisms is not just limited to the street stalls. Established shops and restaurants serving pani claimed to be made from bottled mineral water also contained the same pathogens revealed on culture. This highlights the probability of carrier status in the food handler or the unhygienic preparation methods such as hand dipping into the pani cauldron.

The widespread contamination poses a disease threat to all sections of society irrespective of the socio economic status [10]. However, incomplete access to medical care and lack of essential medicines and oral rehydration solutions predispose the lower strata of society to increased morbidity and mortality. The prevalence of infection and related mortality [11] is also higher in children owing to their low resistance against infections.

The probable cause of contamination of pani could be implicated to poor personal hygiene of food handlers, polluted drinking water, improper preparation techniques and food hygiene, long holding time, serving food in polluted environment, unclean cutlery, unclean parcel containers, transmissible Illness in vendor, lack of food safety awareness in vendor, improper sanitation and waste disposal, uncooked/improperly cooked vegetables, unlicensed food stalls/vendors, lack of regular health inspection and lack of legislature regarding street vended food.

Avoidance of high risk food such as street vended food and improperly cooked food and regularising eating pattern [12] play a significant role in preventing oneself from food borne infections. Research and development of an effective vaccine against E.coli [13] and other food borne pathogens assumes high priority particularly in developing nations.

Novel techniques like MALDI-TOF MS [14], Biosensors [15], and Nucleic Acid-based Tests (NAT) [16] must be made available to rapidly detect food borne pathogens. Regularised food inspection should be conducted by Health Inspectors to determine compliance [17] with the law and gather evidence for enforcement in cases of noncompliance. Evidence states that the impact of health education intervention [18] on food safety and hygiene [19] and implementing a skill development program [20] in street vendors can prevent traveler's diarrhoea [21] and other food borne illnesses.

The transition from food toxins to food safety [22] is a gradual but yielding process for the safety and development of the nation and all necessary amends must be made to hasten the process.

Reference:

1. Street foods. International Rice Commission Newsletter. 2020; 48.
2. Kumar PJ, Clark ML. Kumar & Clarks clinical medicine. 9th ed. Edinburgh: Elsevier. 2017.
3. International Food Safety Conference. World Health Organization.
4. J. Larry Jameson, Anthony S. Fauci, Dennis L. Kasper, Stephen L. Hauser, Dan L. Longo, Joseph Loscalzo. Harrison's principles of internal medicine. 2015; 19: 855.
5. Food safety. World Health Organization.
6. Das M, Rath CC, Mohapatra UB. Bacteriology of a most popular street food (Panipuri) and inhibitory effect of essential oils on bacterial growth. J Food Sci Technol. 2012; 49: 564-571.
7. Mathur P. Hand hygiene: back to the basics of infection control. Indian J Med Res. 2011; 134: 611-620.
8. Lääveri T, Vilkman K, Pakkanen SH, Kirveskari J, Kantele A. A prospective study of travellers' diarrhoea: analysis of pathogen findings by destination in various (sub) tropical regions. Clin Microbiol Infect. 2018; 24: 908.
9. Steffen R, Hill DR, DuPont HL. Traveler's diarrhea: a clinical review. JAMA. 2015; 313: 71-80.
10. Smith SM, Montero L, Paez M, Ortega E, Hall E, Bohnert K, et al, Locals get travellers' diarrhoea too: risk factors for diarrhoeal illness and pathogenic Escherichia coli infection across an urban-rural gradient in Ecuador. Trop Med Int Health. 2019; 24: 205-219.
11. Wasihun AG, Dejene TA, Teferi M, Marugán J, Negash L, Yemane D, et al. Risk factors for diarrhoea and malnutrition among children under the age of 5 years in the Tigray Region of Northern Ethiopia. PLoS ONE. 2018; 13.
12. Gupta NJ, Kumar V, Panda S. A camera-phone based study reveals erratic eating pattern and disrupted daily eating-fasting cycle among adults in India. PLoS ONE. 2017; 12.
13. Chakraborty S, Randall A, Vickers TJ, Molina D, Harro CD, DeNearing B, et al. Interrogation of a live-attenuated enterotoxigenic. NPJ Vaccines. 2019; 4: 37.
14. Singhal N, Kumar M, Kanaujia PK, Virdi JS. MALDI-TOF mass spectrometry: an emerging technology for microbial identification and diagnosis. Front Microbiol. 2015; 6: 791.
15. Umesha S, Manukumar HM. Advanced molecular diagnostic techniques for detection of food-borne pathogens: Current applications and future challenges. Crit Rev Food Sci Nutr. 2018; 58: 84-104.
16. Mangal M, Bansal S, Sharma SK, Gupta RK. Molecular Detection of Foodborne Pathogens: A Rapid and Accurate Answer to Food Safety. Crit Rev Food Sci Nutr. 2016; 56: 1568-1584.
17. Manes MR, Kuganantham P, Jagadeesan M, Laxmidevi M, Dworkin MS. A Step towards Improving Food Safety in India: Determining Baseline Knowledge and Behaviors Among Restaurant Food Handlers in Chennai. J Environ Health. 2016; 78: 18-25.
18. Dudeja P, Singh A. A Longitudinal Study to Assess the Role of Sanitary Inspections in Improving the Hygiene and Food Safety of Eating Establishments in a Tertiary Care Hospital of North India. Indian J Community Med. 2017; 42: 230-233.
19. Singh AK, Dudeja P, Kaushal N, Mukherji S. Impact of health education intervention on food safety and hygiene of street vendors: A pilot study. Med J Armed Forces India. 2016; 72: 265-269.
20. Bhattacharya S, Talati S, Gupta AK, Malhotra S, Singh A. Implementing a skill development program among food handlers in tertiary care hospital to improve their personal hygiene: A pilot study. J Educ Health Promot. 2019; 8: 129.
21. Shlim DR. Looking for evidence that personal hygiene precautions prevent traveler's diarrhea. Clin Infect Dis. 2005; 41: 531-535.
22. Siruguri V. Journey from food toxins to food safety: Transition over a century in service of nation. Indian J Med Res. 2018; 148: 488-495.

Citation: Satish V, Upadhyaya PMG, Kalpashree MS. Bacterial Aetiology of Pani Sold with Popular Street Food Chaat in Bengaluru. ES J Microbiol. 2021; 2(1): 1013.