INTERNATIONAL JOURNAL FOR INNOVATIVE RESEARCH IN MULTIDISCIPLINARY FIELD
ISSN(O): 2455-0620 [Impact Factor: 9.47]
Monthly, Peer-Reviewed, Refereed, Indexed Journal with IC Value : 86.87
Volume - 11, Issue - 04, April - 2025

DOIs:10.2015/IJIRMF/202504042 --:-- Research Paper / Article / Review

Bacteriological Quality of a Most Popular Street Food (Panipuri) in Raipur City, Chhattisgarh

[1] Devika Thakur, [2]Shobhana Ramteke [3]Bharat Lal Sahu
[1]School of Studies in Environmental Science, Pt. Ravishankar Shukla University, Raipur-492010, CG, India
[2]Assistant Professor, Department of Chemistry, Guru Ghasidas Central University, Bilaspur, CG 495009, India.
Email – [1]shubrmtk21@gmail.com; bharatred007@gmail.com

Abstract: *The present study was undertaken to investigate the microbiological quality of panipuri sold in Raipur Chhattisgarh, India. Twenty water sample of panipuri were aseptically collected from eleven locations of Raipur City. Analysis of the food samples revealed that 93% of panipuri water samples had high loads of bacterial pathogens such as Salmonella, Staphylococcus, Iron bacteria and Vibrio species. It is suggested that regular monitoring of the quality of street foods must be practiced to avoid any food-borne infection in future. Although it was a preliminary endeavor, the present study is a prerequisite in understanding the significance of pathogenic microorganisms in street foods and use of EOs as both antibacterial agents and food preservatives.*

Key Words: *Panipuri , Identification, Qualitative analysis, Bacteriological analysis.*

1. INTRODUCTION:

Street foods are "ready-to-eat foods and beverages made and/or sold by vendors and hawkers, primarily in street and other comparable public spaces," according to the Food and Agriculture Organization. Due to time and financial constraints, urban dwellers today are reliant on ready-to-eat meals or street food. As a result, street food is currently the most popular [1–10]. Millions of people in developing nations frequently eat, drink, and snack from street food vendors. Among other street snacks, Panipuri or Gol gappas and Papdi chaat are the most well-liked in India. Despite its widespread use, accessibility, and affordability, it is commonly linked to a number of food-borne illnesses [11–15]. A list of 20,000 plants used for phytotherapy in herbal medical systems worldwide was recently compiled by the World Health Organization (WHO). In this sense, the food industry's first choice is medicinal and aromatic herbs and their essences. The most important of these are the essential oils and volatile chemicals. Essential oils are secondary metabolites of plants that are secreted. There have been reports of many essential oils having antioxidant and antimicrobial qualities. The literature is also discussing the use of essential oils as natural food preservatives [16]. Insects and rodents, which may transport food-borne diseases, benefit from the adjacent disposal of wastewater and trash [17–20].

There is a significant risk to public health because the serving utensils used at the vending site are frequently contaminated with Staphylococcus sp., which may have started on the vendors' hands when they touched the food preparation areas, dishcloths, and water during dishwashing and hand washing. This suggests cross-contamination between the food, food preparation surfaces, and dish water. Due to the absence of essential infrastructure and services, as well as the difficulties in managing the high volume of street food vendors due to their variety, mobility, and transient nature, street foods constitute a serious risk to public health [21–30]. The conditions under which street food is prepared and sold generate numerous health problems for patrons. Due to poor handling and serving procedures, street-vendered chats like panipuri and bhelpuri, which are consumed by a large populace in practically every Indian city, are commonly linked to diarrheal illnesses. Establishing the hygienic quality of Panipuri, a street food vendor, and their influence on street food contamination in various locations throughout Raipur city, Chhattisgarh, India, is the goal of the current study [31]. The purpose of this study was to identify potentially dangerous behaviors and practices and to gain a better understanding of the microbiological issues related to meals sold on the street, specifically with regard to risk factors [32–37].

2. MATERIALS AND METHOD

Study site and Sample collection

A total of 20 panipuri samples were collected during the month of March 2024 (temperature 30–35°C) from the best possible places in the Raipur region. These samples were collected separately, kept in sterile tubes, and placed in a cool box with ice packs until it gets to the laboratory. Within 2–3 h, the samples were transported from the field to the laboratory of School of Studies in Environmental Science, Pt RSU department where the samples were stored at 2–4°C temperature till the sample processing started at the laboratory. The types of panipuri samples collected are summarized in **Figure 1**, **Table 1**. Vending sites hygiene and salubrious status were determined by use of structured interview and through observations. The panipuri water collected separately in different presterilized vials and were maintained in chilled state using coolants (ice pack) and analyzed after procurement.

Figure 1: Representation of the panipuri samples from different locations of Raipur city.

Table 1: **Details of the bacterial isolates obtained from different places in Raipur region.**

S.No.	Locations	Date	Code	Number of samples	Number of contaminated Samples
1	Amanaka Police Chowk	04/03/2024	PP-1	01	45%
2	Mahoba Bajar	04/03/2024	PP-2	01	35%
3	Tatibandh Chowk	04/03/2024	PP-3	01	20%
4	Gurudwara Chowk	04/03/2024	PP-4	01	10%
5	Tatibandh Near AIIMS	04/03/2024	PP-5	01	15%
6	Raipur Bus Station	04/03/2024	PP-6	01	30%
7	MG Road Fafadeeh	04/03/2024	PP-7	01	45%
8	Rathor Chowk	04/03/2024	PP-8	01	35%
9	Kabir Nagar	04/03/2024	PP-9	01	10%
10	Santoshi Nagar	04/03/2024	PP-10	01	15%
11	Motibagh	04/03/2024	PP-11	01	30%
12	Pachpedi Naka	04/03/2024	PP-12	01	45%
13	Pachpedi Kapda Market	04/03/2024	PP-13	01	35%
14	Gudhyari Pahari Chowk	04/03/2024	PP-14	01	20%
15	Bharat Mata Chowk	04/03/2024	PP-15	01	65%
16	Gudhyari Police Station	04/03/2024	PP-16	01	68%
17	Gol Chowk	04/03/2024	PP-17	01	48%
18	Jel Road	04/03/2024	PP-18	01	25%
19	Amanaka	04/03/2024	PP-19	01	20%
20	NIT Chowpati	04/03/2024	PP-20	01	68%

3. METHODOLOGY

The panipuri sample was collected in the cleaned narrow polyethylene 250-mL bottle in duplicate during March 2024. The physical and chemical parameters i.e. temperature (T), pH, reduction potential (RP) electrical conductivity (EC), Sodium (Na) and Potassium (K) were measured respectively. The samples were dispatched to the laboratory for the analysis by subsequent refrigerating at −4˚C.

4.ANALYSIS

The physical parameters such as temperature, pH, EC, TDS and Salinity were examined in the laboratory at department by using the HANNNA made sensors (model no. pH7200). Various other chemical parameters such as Na^+, K^+, etc. were also analyzed in the panipuri water samples.

5. ISOLATION

The serial dilution approach was the favoured method for isolating bacteria from panipuri samples, and it was used on all 20 samples that were gathered from different parts of the Raipur region. It was selected to isolate bacteria from Panipuri samples for bacterial culture isolation, and this method was used for all 20 samples that were gathered from different parts of the Raipur region. Using this approach, 100 milliliters of sterilized distilled water were poured into 20 sterilized bottles. Next, 100 milliliters of sterilized distilled water were combined with 10 milliliters of the panipuri sample, and well mixed. This procedure involved dispensing 100 ml of sterilized distilled water into 20 sterilized bottles, one for each of the following bacteria: Vibrio, Staphylococcus, Salmonella, and Iron Bacteria. The contents of the media pouches were then poured into the bottles, and 10 grams of the panipuri sample was added to 100 milliliters of sterilized distilled water. The mixture was thoroughly mixed. All bottles were incubated at 37°C for the entire night in order to identify the bacteria. For Salmonella, Staphylococcus, and Vibrio species, they were kept in a warm environment for 18 to 24 hours, and for Iron bacteria, they were kept in a warm environment for 24 to 72 hours (see **Table 2**, **Figure 2**).

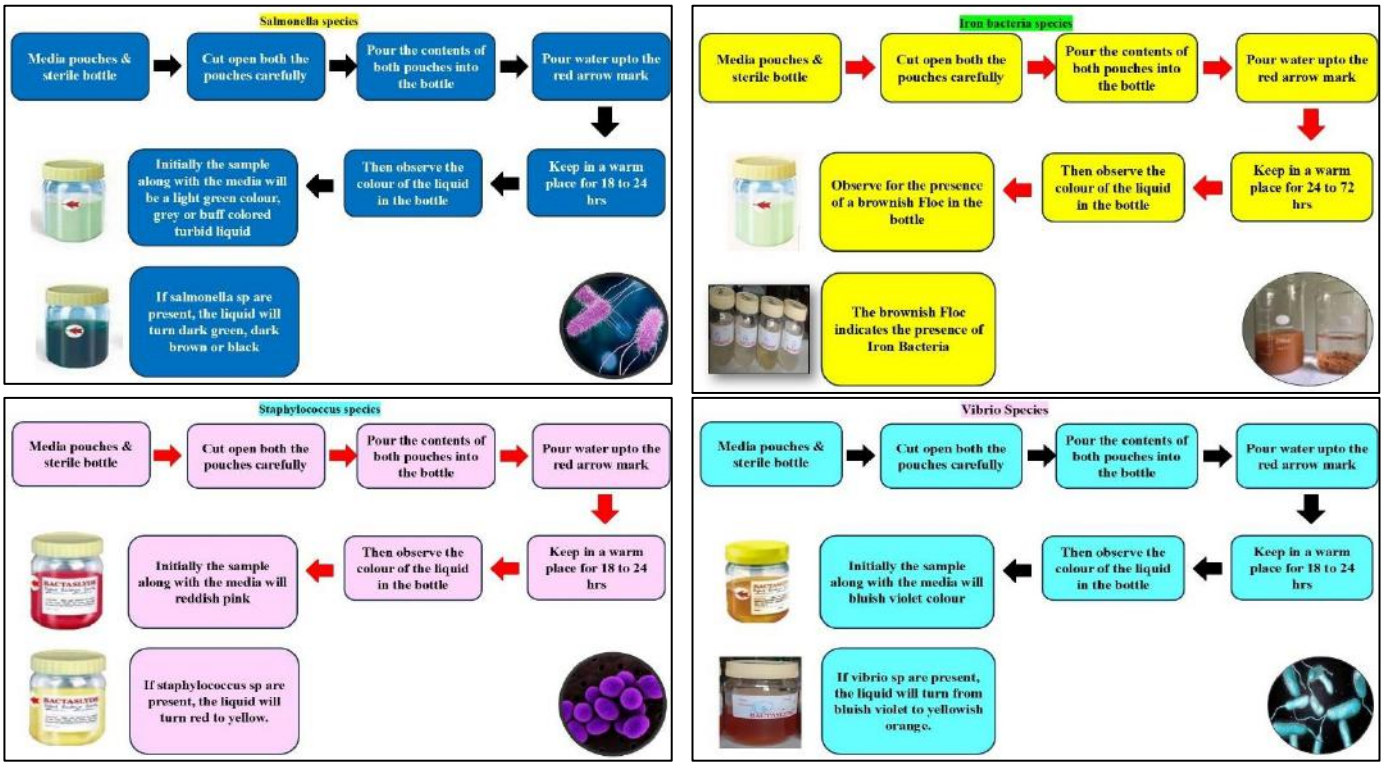

Figure 2: Flowchart represents the methodology of the salmonella species, Iron bacteria species, Vibrio Species and Staphylococcus species in panipuri samples.

Table 2:The isolated liquid sample observed the colour of the liquid in the bottle.

S.No.	Bacteria	Initial observation	Final observation	Observation

1.	Salmonella	Light green, grey or buff colour turbid liquid.	Dark green, dark brown or black colour.	
2.	Staphylococcus	Reddish pink colour .	Red to yellow colour.	
3.	Iron Bacteria	Milky white or light yellowish colour .	Brownish floc indicates the presence of iron Bacteria.	
4.	Vibrio Species	Bluish violet colour.	Bluish violet to yellowish orange.	

6. RESULT AND DISCUSSION:

Determination of bacteriological analysis

Salmonella species are intestinal pathogens that can cause a variety of illnesses, including food poisoning, typhoid, and paratyphoid. Generally speaking, this organism must be tested in foods, spices, and seafood, particularly when the material is intended for export (**Table 3, Figure 3**). It was discovered that the salmonella species is present in samples PP-10, PP-11, and PP-12 of the panipuri samples from PP-1 to PP-20.

Figure 3: Representation of the Final observation of Salmonella Sp in panipuri samples.

Iron Bacteria: Fresh, salty, and brackish water are all home to iron bacteria. Instead of oxidizing ferrous or manganese oxides inside their own cells, most species do so in their extracellular structures, such as sheaths or stalks. This is typically ferric hydroxide, which sticks to rocks, water plants, or even soil and looks as a yellow, brown slime, especially in waters that contain iron. The different species known as "iron bacteria" include Sphaerotillus, Leptothrix, Crenothrix, Galanellella, and Siderocapsa. The latter two are the appendaged bacteria, and the first three are the sheathed bacteria. The iron bacterium species was discovered in samples no. PP-5, PP-6, PP-8, and PP-10 during the last phase of the observation in Panipuri samples from PP-1 to PP-20 (see **Table 3, Figure 4**).

Figure 4: Representation of the final observation of Iron Bacteria in different panipuri samples.

Staphylococcus: Because these organisms are present on the skin and hairs of a significant section of the population, Staphylococcus species are the frequent source of pyogenic illnesses and food poisoning. They are typically disseminated in hospitals and home settings through various housekeeping tasks. Workers with infected cuts, abrasions, boils, or nasal infections may contaminate food. Meat, ham, synthetic cream, sauces (not over 400°C), canned vegetables, fresh seafood, and cheeses, particularly cheddar, are among the foods that are contaminated with staphylococcus species, especially those with high salt content. A number of enterotoxins produced by Staphylococci may survive 30 minutes of heating to 1000°C. Food poisoning can cause nausea, vomiting, diarrhea, and prostration, although it is rarely fatal because not all staphylococcus species are harmful. While the innocuous ones serve as helpful markers of sewage contamination, some are opportunistic (**Figure 5**). In the final stage of the observation in panipuri samples from PP-1 to PP-20 it was observed that the staphyloccus species is found in sample no PP-7, PP-9, PP-11, PP-14 and PP-18 respectively (**Table 3**).

Figure 5: Representation of the Initial observations for Staphylococcus sp in panipuri samples.

Vibrio Species: Both fresh and salt water naturally contain the comma-shaped bacterium that causes cholera. It can survive for a long time in lakes and rivers that are contaminated, and it is found all over the world. Food and drinking water contaminated by sewage and excrement are the main ways that vibrio is spread. Sea food from warm coastal waters has been shown to contain this bacterium. In addition to diarrhea, cholera is characterized by thin, watery, mucoid stools, rice water, severe vomiting, and prostration from severe dehydration in the rectum. Vibrio was discovered in almost all of the world's major cities, particularly in areas with poor sanitation and little effort to protect food and water. The vibrio species was discovered in samples no. PP-3, PP-7, and PP-11, respectively, during the last phase of the observation in Panipuri samples from PP-1 to PP-20 (**Table 3, Figure 6**).

Figure 6: Representation of the Final observations for Vibrio Species in panipuri samples.

Table 3: Identification of different bacteria in panipuri samples

S.No.	Sample	Date	Identification of bacteria in *panipuri* sample			
			Salmonella	Staphylococcus	Iron bacteria	Vibrio Species
1	PP-1	04/03/2024	+	−	−	+
2	PP-2	04/03/2024	+	−	−	+
3	PP-3	04/03/2024	+	−	−	+
4	PP-4	04/03/2024	+	−	−	+
5	PP-5	04/03/2024	+	−	+	+
6	PP-6	04/03/2024	+	−	+	−
7	PP-7	04/03/2024	+	+	−	+
8	PP-8	04/03/2024	+	−	+	−
9	PP-9	04/03/2024	+	+	−	+

10	PP-10	04/03/2024	+	−	+	−
11	PP-11	04/03/2024	+	+	−	+
12	PP-12	04/03/2024	+	−	−	+
13	PP-13	04/03/2024	−	−	−	−
14	PP-14	04/03/2024	−	+	−	−
15	PP-15	04/03/2024	−	−	−	−
16	PP-16	04/03/2024	−	−	−	−
17	PP-17	04/03/2024	−	−	−	−
18	PP-18	04/03/2024	−	−	−	−
19	PP-19	04/03/2024	−	+	−	−
20	PP-20	04/03/2024	−	+	−	+

DATA SURVEY

Twenty Panipuri water samples in all were examined for the presence of bacterial pathogens. The majority of the 92% harmful bacterial contamination found in the investigation was caused by Salmoella Sp, Staphylococcus aureus, Vibrio Sp, and iron bacteria, showing that the Panipuri had low bacteriological quality. Numerous writers have noted that germs from soiled dishwashing liquids and other sources can stick to utensil surfaces, increasing the possibility of contamination when food is being sold. Poor personal hygiene can make it easier for humans to contract these harmful germs from the environment and from people's hands through food. Ten panipuri samples were taken from an uncrowded location, and twenty were taken from packed sellers. Compared to noncrowded areas, the samples taken from populated areas were more polluted. In populated locations, the rate of contamination was 73%, whereas in non-packed places, it was 27%. Sixty percent of the summer-collected samples were contaminated. When it comes to the hygienic venting of panipuri, the personal hygiene of the seller or worker is crucial, and it has been discovered that inadequate personal hygiene contaminates the food item more. In addition, the degree of contamination is higher with filthy hands and clothing (65%) than with clean clothing (35%). The likelihood of handling utensils increases with the number of employees, potentially increasing the level of bacterial contamination. Street food contamination is also reflected in the vending site; the more unsanitary the neighborhood or the more bacterial contamination there is (Table 3, Figure 7).

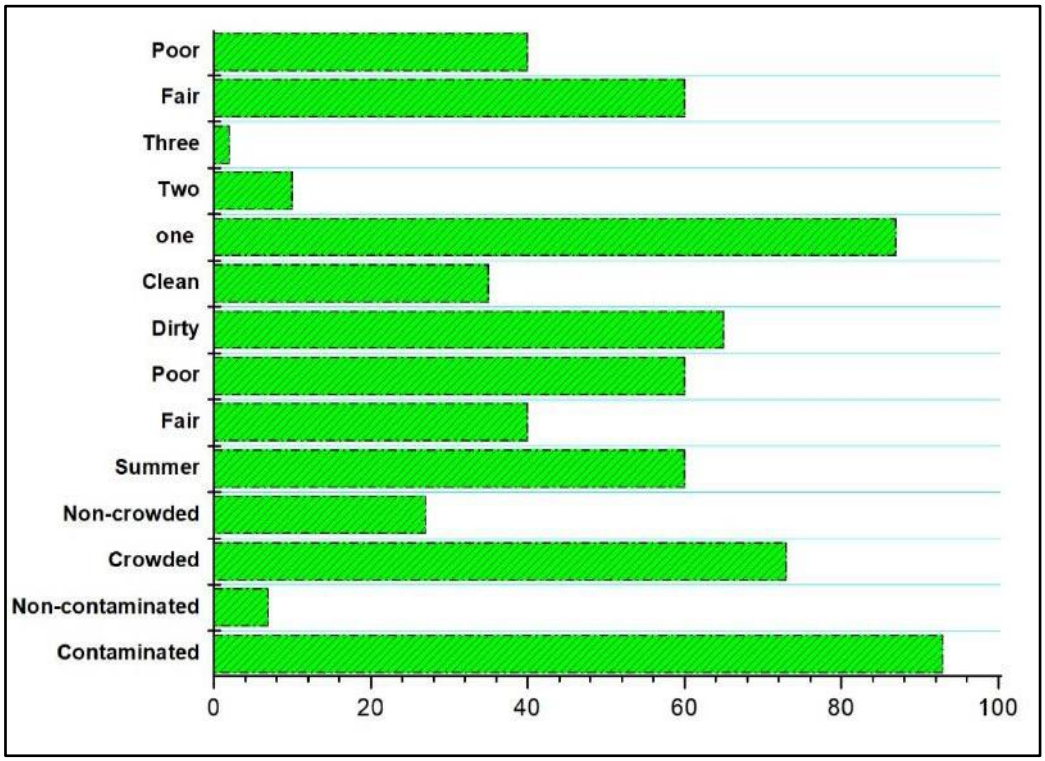

Figure 7: Percentage Pathogenic Bacterial Contamination in Panipuri samples

Table 3: Prominent Bacterial pathogen isolated from various panipuri samples									
		Salmonella		Staphylococcus		Vibrio sp		Iron Bacteria	
		No of isolates	%	No of isolates	%	No of isolates	%	No of isolates	%
Site of shop	Crowded	10	38%	19	29%	5	7%	2	2%
	Non-crowded	10	66%	1	17%	0	0	0	0
Season of collection	Summer	18	40%	14	31%	1	2%	2	3%
Personal hygiene of vendor	Clean	0	0	1	50%	1	3%	0	0
	Fair	13	34%	11	29%	2	5%	0	0
	Poor	10	40%	8	32%	8	6%	2	5%
Cloths of worker	Dirty	14	38%	12	32%	13	32%	0	0
	Clean	6	25%	10	31%	2	5%	0	0
Number of workers	One	20	38%	15	28%	2	3%	2	3%
	Two	4	31%	4	31%	1	7%	0	0
	Three	1	50%	1	50%	0	0	0	0
Hygenic conditions sampling site	Fair	12	31%	13	32%	2	5%	0	0
	Poor	10	33%	9	31%	1	3%	2	6%

Physico-Chemical Characteristics in Panipuri

The physcio-chemical characteristics of the panipuri samples are presented in **Table 4.** The value of physical parameters such as TºC, pH, EC, TDS, RP and Salinity was ranged from 24.6 ºC-24.9 ºC, 5.54-6.01, 0-19.99 µS/cm, 0-13.55 mg/L, 59.7-69.9 mV, 0-11.96 mg/L with value of 24.77 ºC±0.043ºC, 5.7245±0.0491, 16.634±2.203 µS/cm, 10.464±1.7568 mg/L, 65.775±1.2194 mV, 301.45±37.311 mg/L respectively (**Figure 8**). The chemical parameters concentration of Na^+ and K^+ was ranged from 200 – 450 and 200-496 mg/L with mean value of 301.45 ± 37.311 and 290.1 ± 44.181 mg/L respectively (**Figure 9**).

Table 4: Representation of the physcio chemical parameters of panipuri samples.									
S. No	**Sample**	**T**	**pH**	**EC**	**TDS**	**RP**	**Salinity**	**Na^+**	**K^+**
1	PP-1	24.6	5.65	7.1	4.43	59.7	4.21	200	250
2	PP-2	24.8	5.54	19.78	1.47	69.8	1.12	300	325
3	PP-3	24.9	5.6	18.66	13.26	66.4	11.91	250	450
4	PP-4	24.9	5.65	16.34	10.59	67	8.44	300	496
5	PP-5	24.8	5.69	19.9	12.55	65.4	6.7	400	368

6	PP-6	24.8	5.75	15.2	10.2	64.2	9.27	450	389
7	PP-7	24.9	5.66	18.64	11.78	68.5	10.72	230	200
8	PP-8	24.6	5.7	18.2	13.55	67.1	11.81	200	257
9	PP-9	24.8	5.74	19.55	12.66	66.2	11.96	321	298
10	PP-10	24.7	5.73	19.24	12.54	63.7	11.12	215	299
11	PP-11	24.8	5.71	19.66	13.44	68.1	10.72	210	358
12	PP-12	24.8	5.77	17.28	11.33	63.4	9.99	231	456
13	PP-13	24.8	6	19.41	12.75	69.5	10.9	450	238
14	PP-14	24.7	5.7	0	0	65	0	412	241
15	PP-15	24.6	5.69	19.79	13.25	65.7	11.44	431	200
16	PP-16	24.7	5.7	19.99	13.44	66	11.51	325	124
17	PP-17	24.8	5.69	18.6	12.83	69.9	10.27	300	231
18	PP-18	24.9	5.81	12.24	7.63	62.2	6.22	259	200
19	PP-19	24.7	5.7	15.5	10.25	61.3	9.92	247	212
20	PP-20	24.8	6.01	17.6	11.33	66.4	10.24	298	210

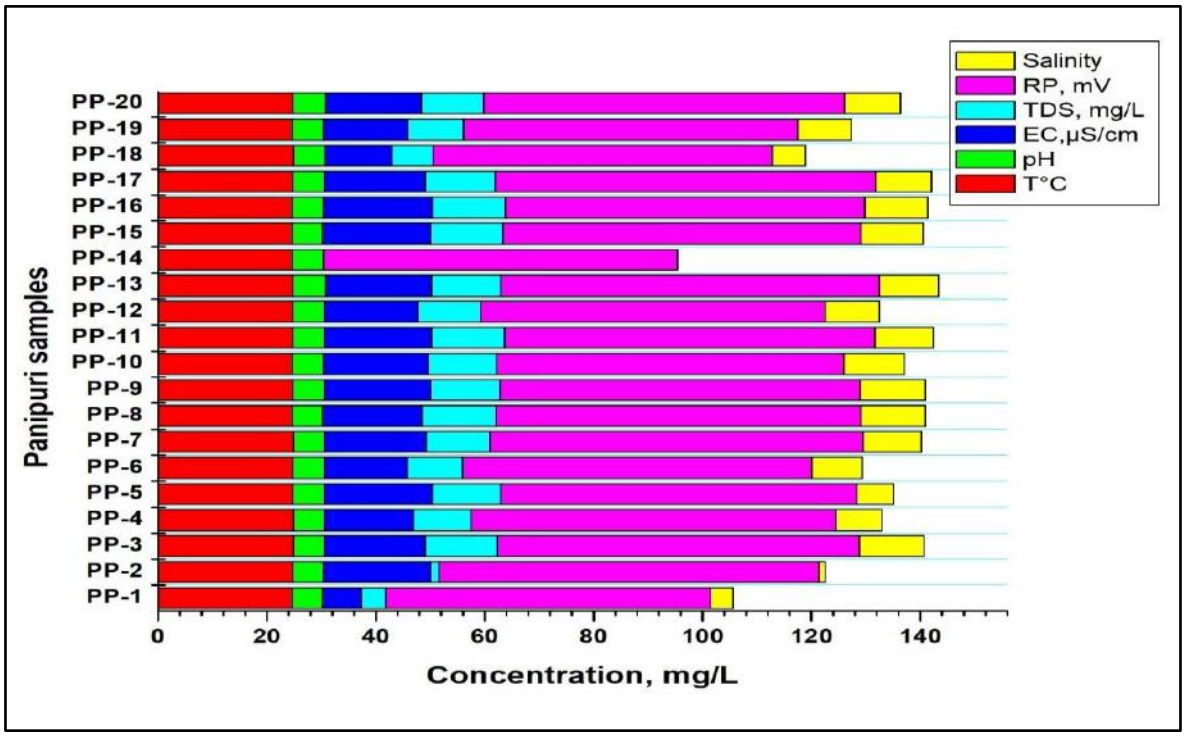

Figure 8: Representation of Total concentration of the various physical parameters in different panipuri samples.

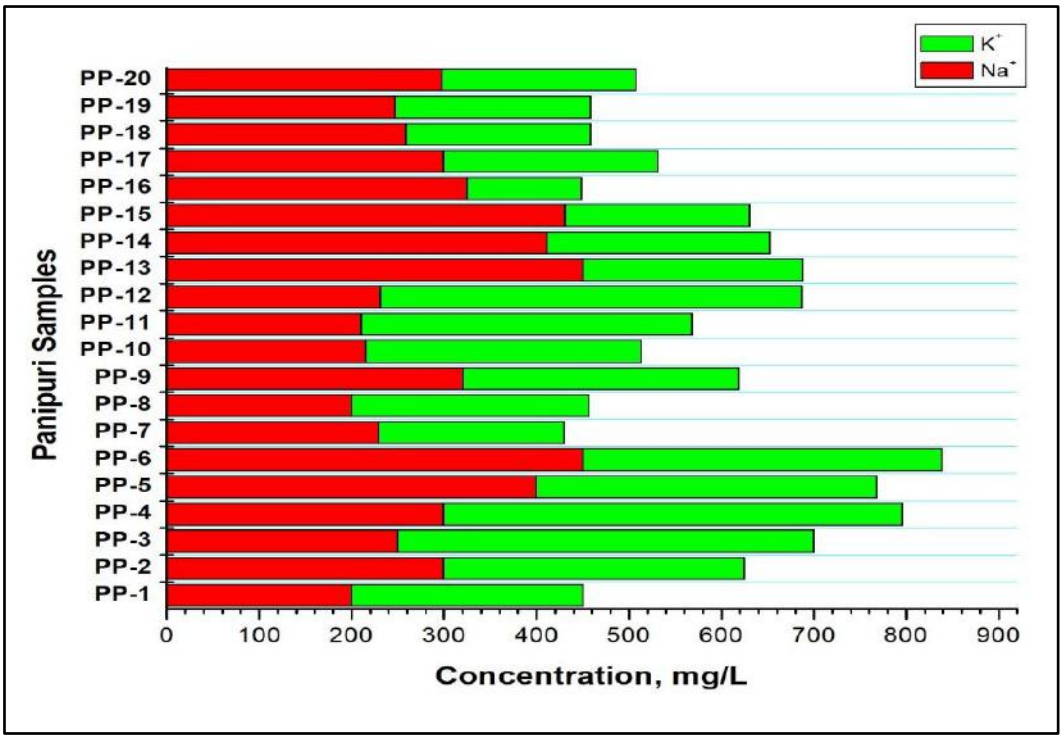

Figure 9: Representation of Total concentration of the various chemical parameters in different panipuri samples.

6. DISCUSSION:

In the Indian state of Chhattisgarh, Raipur is a well-known historical city and popular tourist destination. In practically every area of the city, there is a comparatively large consumption of street food. The contamination of food is caused by improper handling of food before, during, and after cooking. Street food sellers are frequently inexperienced, unlicensed, and ignorant of proper hygiene practices. They also operate in filthy, unsanitary surroundings. When it comes to cooking and handling street food, cleanliness is crucial. The FAO states that in order to clean food, a food handler needs to possess the requisite knowledge and abilities. Eighty percent of vendors prepared their food in unsanitary settings, according to one study. A set of researchers in Nairobi found that 85% of food vendors prepared their food in unhealthy conditions, yielding similar outcomes. Personal cleanliness also plays a major role in food security. Uncovered hands can cause cross-contamination when handling food, which can lead to the introduction of germs into the food. 95% of food vendors did not wear aprons, and 98% handled with their bare hands, according to one of our survey studies on the unsanitary conditions common among street food vendors and at their establishments. According to unpublished data, over 99 percent of the food vendors did not wear hair caps. Eighty percent of the food samples in this investigation had various microorganisms identified. The dealers' poor food handling practices are to blame for the elevated K. pneumoniae count. K. pneumoniae, which can thrive across a broad range of pH (4.5–6.5) and temperatures (7–43°C), was shown to be prevalent in the current study. Enterotoxins that cause foodborne illnesses can be produced when the quantity of K. pneumoniae is high.

7. CONCLUSION:

The study's findings unequivocally demonstrate that the food sold on the street is tainted with various harmful microorganisms as a result of improper handling procedures for food ingredients or utensils used in meal preparation or serving. When these bacteria are present in food, customers may experience health issues. The main causes of foodborne illness contamination in Raipur are inadequate personal cleanliness, inappropriate food handling and storage procedures, and food vendors' ignorance of foodborne illnesses. Given that eating street food gives many people jobs and is a habit for many foodies, strategies for promoting sanitary and healthy habits or reducing the risk of microbial food contamination should be created. The current study's findings are encouraging in this regard since the produced nanoparticles offer a technique to counteract prevalent food pollutants and open the door to safer, more hygienic street food. Street food sellers may be made more aware of the value of hygiene, and the produced nanoparticles could be further processed and examined before being used in soaps, dishwashing solutions, or hand sanitizers, among other

everyday products. The bacteriology of Panipuri, a popular street snack, and the impact of essential oils on the isolated pathogens in both in vitro and model food systems were reported in this study.

REFERENCES:

1 WHO. (2002): Global Strategy for Food Safety: Safer Food for Better Health. Geneva, Switzerland: World Health Organization.
2 Maxwell DG, Levin CE, Klemesu MA, Ruel MT, Morris SS, Ahiadekeet C. (2000):Urban livelihood and food and nutrition security in greater Accra, Ghana. International Food Policy Research Institute, Research Report. p. 112.
3 Hanoshiro A, Morita M, Matte GR, Matte MH, Torres EA. (2004): Microbiological quality of selected foods from a restricted area of Sao Paulo city, Brazil. *Food Control*,16,439-44.
4 Bryan FL. (1998): Risks associated with practices, procedures, and processes that lead to outbreaks of food borne diseases. *Journal Food Protection*, 51, 663-73.
5 Mohammad AS, Asgari S. (2013): Effects of plants bioactive compounds on foods microbial spoilage and lipid oxidation. *Food Sci Technology*,1, 52-61.
6 Pradhan N, Singh S, Ojha N, Shrivastava A, Barla A, Rai V, (2015): Facets of nanotechnology as seen in food processing, packaging, and preservation industry. *Biomedical Research Int*, 2015, 365672.
7 Bauer AW, Kirby WM, Sherris JC, Turck M. (1996): Antibiotic susceptibility testing by a standardized single disc method. *Am J Clin Pathology*,45, 493-6.
8 Muinde AM, Kuria E. (2005): Hygienic and Sanitary Practices of Vendors of Street Foods in Nairobi. Kenya. Ajfand, 5, 1-13.
9 Martins JH. (2006): Socio-economic and hygiene features of street food vending in Gauteng. *South Africa Journal Clinical Nutrition*, 19,18-25.
10 Von HA, Makhoane FM. (2006): Improving street food vending in South Africa: Achievements and lessons learned. *International Journal Food Microbiology*, 111, 89-92.
11 Oranusi US, Braide WA. (2012): Study of microbial safety of ready-to-eat foods vended on highways. *International Research Journal Microbiology*, 3, 66-71.
12 Tambekar DH, Jaiswal VJ, Dhanorkar DV, Gulhane PB, Dudhane MN (2008): Identification of microbiological hazards and safety of ready-to-eat food vended in streets of Amravati city. *Indian Journal Applied Bioscience*, 7, 195–201.
13 Mensah P, Manu DY, Darko KO, and Ablordey A. (2002): Streets foods in Accra, Ghana: how safe are they? *Bulletin of World Health Organization*. 80(7): 546-554.
14 Mensah P., Owusu-Darko K., Yeboah-Manu D., Ablordey A., Nkrumah F.K., Kamiya H. (1999): The role of street food vendors in the transmission of enteric pathogens in Accra, *Ghana Medicinal Journal*, 33,19-29.
15 Rajesh Singh Tomar, Monika Gupta, Shuchi Kaushik, Raghvendra Kumar Mishra, (2018): Bacteriological Quality of Panipuri in Historical Gwalior City (MP), *India Asian Journal of Pharmaceutics* 12(1), S328.
16 Ray M.K and Mishra P.K., (2014): A Preliminary Study of Fungi on Panipuri Sold in Different Areas of Dhubri Town, Assam. *Trends in Biosciences*, 7(11), 991-993.
17 Sharma I, Mazumdar J A. (2014). Assessment of bacteriological quality of ready to eat food vended in streets of Silchar city, Assam, India. *Indian Journal Medicinal Microbiology*, 32,169-71
18 Barro N, Bello AR, Savadogo A, Ouattara CAT, IIboudo AJ, Traore AS. (2006): Hygienic status assessment of dish washing waters, utensils, hands and pieces of money from street food processing sites in Ouagadougou (Burkina Faso) *Am Journal Biotechnology*, 5(11),1107–1112.
19 Bauer AW, Kirby WMM, Sherris JC, Turck M. (1996):Antibiotic susceptibility testing by a standardized single disc method. *Am Journal Clinical Pathology*, 45, 493–496.
20 Bhaskar J, Usman M, Smitha S, Bhat GK. (2004): Bacteriological profile of street foods in Mangalore. *Indian Journal Medicinal Microbiology*, 22,197–197.
21 Bhat P, Myero RM. (1962): Standard methods and procedures used in the bacteriology laboratory of Vellore Christial Medical College Hospital for isolation and identification of organisms belonging to the family Enterobacteriaceae. *Indian Journal Medicinal Research*, 50(4),559–566.
22 Sahu B, Ramteke S, Sahu BL, (2024): Determination of Physico-chemical Analysis of Different Soft Drinks Brands in Raipur City. *International Journal for Innovative Research in Multidisciplinary Field*, 10, 161–169.

23 Chumber SK, Kaushik K, Savy S. (2007): Bacteriological analysis of street foods in Pune. *Indian J Public Health,* 51(2),470–476.
24 Sahu B, Ramteke S, Sahu BL, (2024): Determination of Physico-chemical Analysis of Different Soft Drinks Brands in Raipur City, *International Journal for innovative Research in Multidisciplinary Field*, 10,161-169
25 Das A, Nagananda GS, Bhatacharya S, Bharadwaj S. (2010): Microbiological quality of street vended Indian Chaats sold in Bangalore. *Journal of Biological Science,* 10, 255–260. doi: 10.3923/jbs.2010.255.260.
26 Das-Mohapatra A, Rath CC, Dash SK, Mishra RK. (2002): Microbiological evaluation of street foods in Bhubaneswar. *Journal of Food Science & Technology,* 39(1), 59–61.
27 de-Barros JC, da-Conceição ML, Neto NJG, da-Costa ACV, Júnior JPS, Junior IDB, de-Souza EL. (2009): Interference of *Origanum vulgare* L. essential oil on the growth and some physiological characteristics of *Staphylococcus aureus* strains isolated from foods. *LWT Food Science & Technology,* 42(6),1139–1143. doi: 10.1016/j.lwt.2009.01.010.
28 Desai SV, Varadaraj MC. (2010): Behavioural pattern of vegetative cells and spores of *Bacillus cereus* as affected by time-temperature combinations used in processing of Indian traditional foods. *Journal of Food Science & Technology,* 47, 549–556. doi: 10.1007/s13197-010-0099-9.
29 Estrada-Garcia T, Lopez-Sancedo C, Zamarripa-Ayala B, Thompson MR, Gutierrez L. (2004): Prevalence of Escherichia coli and Salmonella sp. in street vended food of open markets (tianguis) and general hygienic and trading practices in Mexico City. *Epidemiology Infection,* 132, 1181–1184. doi: 10.1017/S0950268804003036.
30 Ghosh M, Wahi S, Ganguli KM. (2007): Prevalence of enterotoxigenic *Staphylococcus aureus* and *Shigella* sp. in some raw street vended Indian foods. *International Journal Environmental Health Research,* 17(2), 151–156. doi: 10.1080/09603120701219204.
31 Hanashiro A, Morita M, Matte GR, Matte MH, Torres EAFS. (2005): Microbiological quality of selected street foods from a restricted area of Sao Paulo city, Brazil. *Food Control*, 16, 439–444. doi: 10.1016/j.foodcont.2004.05.004.
32 Barro N, Bello AR, Savadogo A, Ouattara CAT, Ilboudo AJ, and Traore AS. 2006. Hygienic status assessment of dish washing waters, utensils, hands and pieces of money from street food processing sites in Ouagadougou (Burkina Faso). *African Journal of Biotechnology*, 5(11), 1107-1112.
33 Bhaskar J, Usman M, Smitha S, and Bhat GK. (2004): Bacteriological profile of street foods in Mangalore. Indian *Journal of Medical Microbiology*, 22, 97-197.
34 Cardinale E, Claude JD, Tall F, Gueye EF, and Salvat G. (2005): Risk factors of contamination of ready-to-eat street vended poultry dishes in Dakar, Senegal. *International Journal of Food Microbiology*. 103, 157-165.
35 Das A, Nagananda GS, Bhatacharya S, and Bharadwaj S. (2010): Microbiological quality of street vended Indian chaats sold in Bangalore. *Journal of Biological Sciences*, 10, 255-260.
36 Mankee A, Ali S, Chin A, Indalsingh R, Khan R, Mohammad F, Reheman R, Sooknanan S, Tota-Maharaj R, Simeon D, and Adesiyun AA. (2003): Bacteriological quality of doubles sold by street vendors in Trinidad and the attitudes, knowledge and perceptions of the public about its consumption and health risk. *Food Microbiology*. 20, 631-639.
37 Mosupye FM, and Van Holy A. (2000): Microbiological hazard identification and exposure assessment of street food vending in Johannesburg, South Africa. *International Journal of Food Microbiology*, *61,* 137-145.