



REVIEW ARTICLE

Indian Street Food Safety

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Abstract

India is famous for its street food and each city of India has its own unique street food and a massive percentage of the population relishes these delicacies. Food is only nutritive nutritious when is pure, fresh and free from hazardous matter such as pathogenic bacteria. Infected food or contaminated foods cause danger to health and impair quality of life. Food safety of street food has always been a matter of concern because consumption of these roadside foods has been suggested/reported to potentially increase the risk of foodborne diseases as street foods are readily contaminated from different sources like traditional processing methods that are used in the preparation, inappropriate holding and poor personal hygiene of food handlers are some of the main cause of contamination of street-vended foods. Thus there is emerging needs like provision of health education to the vendors and enforcing implementation of appropriate hygienic practice as control preventive measure to improve the microbial quality of street foods.

Introduction:

A major determinant of health is the consumption of wholesome food. Wholesome has two important dimensions firstly, the food should be of good nutritive value secondly and equally important is that the food should be free from contamination of toxic agents and noxious substances that would weaken the health and cause foodborne diseases. Ensuring food safety is, therefore, an important cornerstone in maintaining health (<https://www.nutritionfoundationofindia.res.in>).

Food is the most fundamental need of human beings. Zero hunger has been identified as one of the sustainable development goals to transform the world. The availability of food is not enough, but the available food must be safe and free from pathogens so that it can serve its purpose of growth and development. Food is the only nutritive when it is pure, fresh and free from hazardous matter such as pathogenic bacteria. Infected food or contaminated food cause danger to health and impair quality of life. Considering this crucial point, in 2015, World Health Organization has kept their theme on food safety i.e. from farm to plate-make food safe. World Health Organization has also given five keys for safer food viz. as keeping clean, separating raw and cooked food, cooking food thoroughly; keeping food at safe temperatures, use water and raw materials (WHO, 2015). It is a practical guide for all the food

handlers including vendors and consumers.

In India, tremendous economic growth is taking place. One outcome of this is that “eating out” has become an important part of daily life, especially in urban areas (Kashyap *et al.*, 2004). This is leading to the rapid growth of street foods. Street foods offer several varieties of foodstuffs that are fresh, tasty, quickly readily available at a reasonable price.

Streets foods have a wide range of “ready to eat” food and beverages prepared and sold by vendors and hawkers, especially in the street and other similar public places (FAO, 2011). Street foods play an important role in sustaining the 0culture, social heritage of societies and are an essential component for maintaining the nutritional status of the population (Rane, 2011). According to the national policy for urban street food vendors (<http://www.nasvinet.org>), in India total number of street vendors is estimated at around 10 million. Some studies also estimated that street vendors constitute approximately 2% of the population of a metropolis, this number is likely to increase further. India is a country where each city boasts its own unique street food and a large percentage of the population relishes these delicacies. The most popular street food in India is shown in Table-1.

Street foods are popular because of their unique flavour, variety, inexpensiveness, convenience and

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accessible means of obtaining a nutritionally balanced meal outside the home for many low-income people, prevailing socio-economic conditions and the influx of unorganized labour (Chauhan *et al.*, 2015). In contrast to these potential benefits, it is also recognized that street food vendors are often poor, uneducated and lack the knowledge for safe food handling. So, street food is perceived to be a major public health risk (https://www.who.int/topics/food_safety/). This study has highlighted the importance of street food safety.

A comprehensive literature search was conducted on street foods during the construction of this study. The studies about street foods are assessed and information is given here about the food safety aspect of street foods.

Table-I: Popular street foods of India

Street food	Description
Chaat	It is a tangy spicy mix of potato, crispy fried Indian bread, curd, chickpeas, onion with varied ingredients like lemon, pomegranate seeds, chaat masala, salt, chilli, tamarind and different chutneys.
Panipuri/Puchka/gol-gappay/ gup-chup	Unleavened Indian bread fried crisp and filled with potato, onion and chickpeas served with sweet and tangy masala pain (Spicy water).
Dahi Bhalla/ dahibarey/ thayirvada/ dahi bara	Fermented urad dal fluffy bhalles drizzled with sweetened curd, tangy chutneys and chaat masala.
Chole bhature	It's a combination of chana masala (spicy white chickpeas) and fried bread made from soft wheat (maida). It is accompanied by onion, pickle and green chutney.
Pohajalebi	It is lightly fried flattened rice is cooked with onion, potato, peas, curry leaves, mustard seeds, cumin seeds and topped with sev, onion, tomato. It is served with a unique combination of hot piping jalebies (asweet type).
Kachori	Kachori is round balls made from maida flour and dough filled with onion/potato/ yellow moong dal /peas and served with chutney made from tamarind, mint or coriander.
Samosa	Samosa is a triangle-shaped fried or baked dish with a savoury filling such as spiced potato, onion, peas etc. and accompanied by mint coriander chutney.
Bhelpuri	Puffed rice and sav tossed with potato, onion, masala and tangy coriander and sweet dates chutneys.
Pav bhaji	Pav bhaji is a spiced mixture of mashed vegetables in a thick gravy served hot with a soft white bread roll usually cooked on a flat griddle.

Assessment of street food safety

The safety of street food is always a matter of concern in most of cases as it is prepared under unsanitary conditions by the vendors. The increased chance of contamination of these foods is due to the poor environmental conditions in

which they are prepared and sold. Food contamination can be caused by improper handling, preparing and storing of food; inadequate washing of hands; poor personal hygiene habits of food employees; people who may seem well but who carry pathogens that can make other people sick; improperly cleaned and sanitized eating and cooking utensils and equipment; contamination of food, utensils, and equipment from flies, roaches, and other insects and pests; use of foods from unapproved sources.

Due to unhygienic storage and handling, the water used for drinking and cleaning purposes is often contaminated. Moreover, the use of artificial colours like metanil yellow leads to serious health hazards. Proper garbage removal facilities are also not available, aggravating poor environmental conditions (Solanki, 2011; Tambekar *et al.*, 2008).

Street foods are the cause of several types of food borne disease. World Health Organization year 2015 estimated the global burden of foodborne diseases and revealed that 1 in 10 people falls ill every year from eating contaminated food and 4,20,000 dies as a result. Children under 5 years of age are at high risk, with some 125000 young children dying from food borne diseases every year. Diseases that people get from eating contaminated food are significant cause of illness, disability and deaths around the world. Food borne illness associated with the consumption of street foods has been reported in several places in India and elsewhere (FAO, 2011; Gadi *et al.*, 2013; Garode & Waghode, 2012; Das *et al.*, 2010; Kumar *et al.*, 2014; Marwaha *et al.*, 2018). The number of cases of foodborne bacterial infection and intoxication have been traced to street foods. Cholera, hepatitis A, typhoid and other diseases can be transmitted through such foods or the ready to eat items consumed in food establishments or in people's homes. Street foods are often associated with diarrhoea diseases that occur due to the offensive use of additives, the presence of pathogenic bacteria, environmental contaminants and disregard of good manufacturing practices (GMPs) and good hygiene practices (GHPs) (Barro *et al.*, 2006).

Studies carried out in food safety in various parts of India focused on the various pathogenic organisms that were detected in a variety of foodstuff revealed the presence of *Escherichia coli*, *Enterobacter* spp., *Shigella* spp. in milk and milk products (Pal & Jadhav, 2013) *Staphylococcus aureus*, *Salmonella* spp. *Escherichia coli* and *Yersinia*, in the vegetable salad (Sabbithi *et al.*, 2014; Kumar *et al.*, 2017). In street foods of India, the highest frequency of the occurrence of bacterial pathogens, such as *Pseudomonas aeruginosa* in samosa (25%), *Escherichia coli* (32%) and *Staphylococcus aureus* in kachori (27%), *Salmonella* spp. in samosa (36%), batatawada (12%) and pakode (7%) has been recorded (Tambekar *et al.*, 2008). There was report of high incidence of *E. coli* in food items from the city of Amravati, which might be occurring through the use of contaminated

water or through the ill practice of hand washing and on account of contaminated utensils (Tambekar *et al.*, 2011). This was followed by contamination with *Staphylococcus aureus*, which might be occurring through infected wounds, running hands through hair or scratching the scalp, cuts, burns and dirty clothing of the vendors (Muleta & Ashenafi, 2001; Ghosh *et al.*, 2007). *E. coli*, *S. aureus*, coliforms and Enterococci were isolated from street foods of Karnataka (Gautami *et al.*, 1995; Girish *et al.*, 2002). Sudershan *et al.* (2009) revealed that the critical control points of contamination of both street foods and water samples are poor during handling and prolonged storage conditions. In the different locations of Tumkur, 80% of street food samples were contaminated with pathogens. Salads were highly contaminated (19.79%) followed by cut fruits, panipuri, bhelpuri, noodles, fried rice, lemon rice with *S. aureus* (18.75%), *E. coli* (7.26%) and *Salmonella* spp. (5.20%) (Kumar *et al.*, 2017).

The reasons for high counts of pathogens could be due to poor personal hygiene of the food handlers, lack of heat processing steps during preparation, serving utensils used at vending sites that are often contaminated. Thus, not only from the food vendors' hands but also dish, clothes and water used during dishwashing and handwashing indicate cross-contamination between dishwater, food preparation surfaces and the food itself are major sources of contamination. Even though people are aware that foodborne diseases could occur due to the consumption of street food, the majority disregards these health hazards (Bryan, 1998). Most of the foods are not protected from flies, which may also carry foodborne pathogens. Safe food storage temperatures are rarely applied to street foods. Potential health risks are associated with contamination of food by *E. coli*, *Salmonella typhi*, *Pseudomonas* spp., *Staphylococcus aureus* or *Proteus* spp. during preparation, post-cooking and other handling stages (Hanoshiro, *et al.*, 2005; Ghosh, *et al.*, 2007).

Strategy for street food safety

The conditions under which street foods are prepared and vended raise many concerns related to consumers' health. The growing concern about food safety by public health authorities and consumers based on media reports of foodborne outbreaks (Boards & Tranter, 1986) has provided the impetus for the application of a system of hazard analysis and critical control points (HACCP). The HACCP system is defined by the Codex Alimentarius Commission (CAC) as a system that identifies, evaluates and controls hazards that are significant for food safety (Motterjemi, 2001). The HACCP system consists of the following seven principles: (i) conduct a hazard analysis; (ii) determine the critical control points (CCPs); (iii) establish critical limits; (iv) establish a system to monitor control of CCP; (v) establish the corrective action to be taken when monitoring

indicates that a particular CCP is not under control; (vi) establish a procedure for verification to confirm that the HACCP system is working effectively; and (vii) establish documentation concerning all procedures and records appropriate to these principles and their application (Gupta *et al.*, 2010). The HACCP approach would be a good tool to gain knowledge about the causes of high microbial counts. In India, quality control with regards to food products is being enforced through various regulatory mechanisms like the food safety and standard authority of India (FSSAI), Prevention of Food Adulteration Act (PFA), Agriculture Grading and Marketing (AGMARK), Fruit Product Order (FPO) etc. The bureau of standards (BIS) has launched a HACCP certification program for the food industry in the year 2000 but the adaption of regulations to local conditions is essential. Street foods have differing potentials for transmitting agents of diseases. Thus, dry bakery products, dried grains and sufficiently sugared and acidulated foods are less likely to transmit disease than gravies, cooked rice and low acid dairy, egg and meat products all of which support bacterial growth. Foods that are thoroughly cooked and consumed on the spot are safe whereas precooked foods stored at an ambient temperature of 15-40°C for more than about four hours present considerable risk. Highly coloured foods and beverages are more likely to have unauthorized additives than others.

Street vending should be officially recognized as part of the food supply system and where possible covered by urban development programs. Formal recognition may enable some vendors to obtain loans for improving their business and to secure other benefits.

Care should be taken not to stifle this important source of supplies by excessive regulation. Stress should be laid on education rather than the punishment of vendors. Street vendors should be categorized according to the type of food they sell and their mobility so that the appropriate requirement can be laid down for regulating their operations. Mobile units selling only bottled beverages or food items of low hazard require much less control than those selling full meals, snacks or beverages prepared by the vendors in bulk. Therefore, the need of generating government initiatives for the wider dissemination of information, education and communication to these street food vendors regarding food hygiene and safety is highly advocated.

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