

A review on importance of food safety knowledge for street food vendors

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Abstract

Food safety of street food has always been a controversial topic for discussion amongst Food Scientists and Technologists. Street foods form a consortium of ready to eat food articles and beverages which are commonly sold by local vendors and hawkers. They are gaining more popularity as it plays very important role in meeting foods and nutritional requirements of city consumers at affordable process from lower and middle-income group population in India. Apart from being affordable and available, people often prefer street foods because of the unique taste and their satiety value with

unique flavour. Despite of convenience, cheap price and the customer satisfaction they are also associated with some major health risks. The outbreaks of food borne illnesses due to the contamination by various food borne pathogens can be taken into consideration, where lack of education and awareness among street food vendors and improper hygiene and handling of food articles during processing has a vital role to play. The regulations and guidelines provided by FSSAI (Food Safety and Standards Authority of India) has already created a lot of awareness in the organised sector but still there is much work to be done in the case of unorganised sector

in the city. Therefore, regular monitoring, guidelines for safety procedures and awareness is the need of the hour for the informal sector of street foods so that consumers of street vended food items can get a product which is *Physically, Chemically and Biologically* safe thus ensuring food safety.

Key words: Food safety, FSSAI, hygiene, regulations, street food.

1. INTRODUCTION

Food Safety is a scientific term that emphasizes the need for safe and proper handling, preparation and storage of food articles in order to prevent them from being contaminated by various food safety hazards. A food safety hazard is a physical, chemical or a biological agent, direct consumption of which can pose a major threat to human health. These include harmful substances like pesticides, pieces of broken glass and presence of bacteria,

fungi and viruses that could contaminate food articles at any level of production, processing, distribution and preservation. Therefore, it is necessary to ensure food safety by incorporating certain quality control checks at every stage of food production i.e. from producer to consumer so that the food article fulfilling the requirements of customers would be *Physically, Chemically and Biologically* safe^[6].

In India, the guidelines and regulations to ensure food safety at various levels are provided by Food Safety and Standards Authority of India that has been established under the Food Safety and Standards act, 2006 and administered by Ministry of Health and Family Welfare, Government of India. The main objective behind the establishment of FSSAI is to lay down scientific standards for food articles along with the regulations for their manufacturing processes, storage, distribution, sales and import in order to provide safe and wholesome food

product to the consumers. Presence of multiple food laws governed by various ministers with different perspective and approach resulted in the overlapping of quality standards and labelling requirements during the pre FSSAI tenure. However, the advent of FSSAI as the principal governing body has successfully resolved these issues related to regulatory aspects of food industry with organised sector being the most benefitted part of the industry.

Due to the rapidly growing economy of India and the rural –urban migrations for the sake of better employment opportunities, eating habits of people are transitioning at a constant rate. Now a day's, street foods are gaining more and more popularity in the lives of consumers who are leading a hectic busy life schedule^[1]. Street food consists of broad range of ready to eat food articles and beverages sold by hawkers or vendors at a cheap price^[2]. People are getting inclined towards them because streets vended food articles provide a convenient,

affordable and often nutritious source of food. As a result of which they tend to rely more often on them to meet their satiety value and nutritional requirements. Apart from being readily available and affordable they are preferred for their unique taste and are appreciated by both rural and urban communities. In addition to this, street food market is also a major source of livelihood for most of the self employed lower income groups^{[8],[11]}.

Despite of the convenience, customer satisfaction and other economic benefits that they provide, they are associated with some major health risks^[7]. Microbiological assessment of street vended food articles by various researchers have shown that food Items offered by Hawkers do not comply with the defined safety standards and are responsible for the outbreaks of various pathogenic organisms. Therefore, Street Foods pose a poor quality in terms of microbiology which is a major concern worldwide, especially in

developing countries and is considered as a major challenge of this century^[4].

Food articles can get contaminated by pathogenic organisms such as *Escherichia coli*, *Staphylococcus aureus*, *Shigella spp*, *Campylobacter spp* and *Salmonella spp* etc, at any level of the food chain i.e. from production to storage^{[7],[6]}. According to WHO, Food handlers are the major contributors and are responsible for most of the contamination. The poor sanitary conditions, unhygienic practices, traditional processing techniques employed by them and lack of awareness amongst them are some of the significant causes of the contamination of street vended food articles^[1]. Various studies conducted to examine the microbiological quality of street foods have shown that these street food vendors are mostly poorly educated, unregistered and untrained due to which they are not familiar with safety standards and Good hygienic practices that should be followed while handling food articles^[11]. Apart from

this, raw materials used by them are also of inferior quality such as water, which is used for the cooking, cleaning and washing of utensils, is the major carrier of *Escherichia coli*^[3].

So, the present review is developed with the aim of focussing towards the food safety concerns in the unorganised sector, more specifically the challenges faced by “The Factory of Junk Foods” or “The Street Food Market”.

2. REVIEW OF LITERATURE

In India, various studies revealed that street food items are mostly microbiologically unsafe for consumption. The review of previously presented studies is an important step in order to have a clear definition of street food vending and the challenges posed by them towards human health. Therefore, this review has localised its attention on the extensive work done by various researches in the given or related field. A brief review of the earlier studies is discussed below.

A study revealed that majority of the vendors (95%) in Noida, Uttar Pradesh, India were unregistered under Fssai. No preference was given to cover the food (61%). Tap water provided by Noida Industrial Development Authority was considered as major source for the water used for food preparation. 98% of them were serving food with bare hands. As far as personal hygiene is concerned, they were not wearing gloves (98%), head gears (79.6%) and apron while preparing and selling out food articles (76.8%). A few of them found to wash hands before getting to contact with food stuff and after using the toilets. They recommended that, immense training and education should be given to food vendors. All food stalls should be registered and their practices should be monitored. Periodic monitoring should be introduced to street food vending in Noida^[1]. Another study conducted in Delhi concluded that most of the samples were found unsafe for consumption. Samples were tested for

TPC, Coliform count, Yeast and mould count and staphylococcal count. Majority of the samples were contaminated with pathogens. Vendors were handling food articles with bare hands (80%). Same duster was used for wiping hands and utensils (95%). Food stuffs were left uncovered (31%). Necessary serving temperatures were not maintained. Most of them were wearing clean clothes but no one was wearing apron. Very few of them were maintaining GMP's. Study Suggested that there is a need to invest more in terms of cost and efforts. A clean, cleared and sanitized are should be selected for food stall. Use of separate dusters should be practiced. Temperature control should be maintained while serving food articles. Need for more HACCP studies was emphasised for different street foods to communicate the identified CCP's to vendors^[9]. A similar study conducted in Chennai stated that popular fast foods taken from different locations were contaminated by significant high

amount of pathogenic organisms including *Escherichia coli*, *Bacillus cereus*, *Salmonella* and *Staphylococcus aureus*. Lack of awareness, poor hygienic practices, inferior water quality and improper waste disposal were considered as the major reasons behind the presence of these pathogens. Mentioned the need for adequate facilities and provisions as well as training programs for food handlers, vendors and consumers^[11]. A group of researchers assessed the microbial quality of some of the popular ethnic street foods of Gangtok and Nainital. Their analysis revealed that the street foods were dominantly contaminated by *Enterobacteriaceae*, *Staphylococcus spp* and *Bacillus cereus*. A few of them showed positive results for the Enterotoxins. On the basis of their study they considered street foods as important ethnic foods and concluded that the risks associated with them can be controlled if more and more emphasis is given to consumer awareness, plus education and training

of vendors^[8]. A Cross-Sectional study conducted in Hyderabad, Telangana assessed the microbiological quality of street foods revealed that approximately 53.75% samples out of 80 samples of juices, panipuri and chutneys were contaminated with pathogens like *Escherichia coli*, *Salmonella spp*, *Klebsiella spp*, *Candida spp*, *Pseudomonas*, *Staphylococcus spp* and *Enterococci*. Dominant Pathogens were *E. coli* (40%) and *Salmonella* (17.5%). Most of the vendors were educated and were aware of importance of hygiene in the workplace but tended to not wear gloves. Strong associations amongst the presence of open drainages and lesser bin distance with the contamination of *E. coli* were found. However, contamination with *Candida spp* was associated with improper washing of utensils. Need for educating vendors about the importance of hygiene was mentioned^[4]. A similar study conducted on fruit juices available in Hyderabad city, showed that 96.6% of the juice

samples were found to be contaminated with Faecal *Colliforms* (77.3%), *Staphylococcus aureus* (73.3%), *Shigella spp* (48.6%) and *Escherichia coli* (42.6%). Among the juice samples, Sapota juice was highly contaminated followed by pineapple, sweet lime and grape juice. It was reported that a large number of respondents (around 90%) were having a good idea about the Food Safety aspects and around 50% of them translated their knowledge into practice. Close associations were found between the risky handling, poor hygienic practices and the contamination with pathogens. Need for trainings and education programmes was mentioned^[10]. Microbial analysis of salads (carrots and onions) served with street foods in the city of Hyderabad revealed that a majority of the samples were contaminated with *Staphylococcus aureus* (74% of carrot and 56% of onion samples), *Salmonella* (58% of carrot and 45% of onion samples) and *Yersinia* (68% of carrot and 24% of onion samples). Study

revealed that food handlers were the major contributors for *Salmonella* contamination. Risky factors such as improper handling and processing, use of contaminated water for washing and preparation, cross contamination and the use of dirty utensils were linked with the pathogenic contamination and were considered as potential hazards. It was observed that higher loads of *Salmonella spp* were detected in wet, dirty chopping board. Similarly, dirty clothes used by vendors during preparation were more prone to the contamination of *Staphylococcus spp* and resulted in higher loads of the pathogen. A provision of basic training program for the street food vendors was considered as the need of the hour^[2]. Various street foods (Aloo tikki, Momo, Chowmein and Chutney) found in the streets of Dehradun city, India showed positive test results for the presence of different bacterial pathogens like *Escherichia coli*, *Staphylococcus aureus*, *Bacillus cereus*, *Salmonella* and *Shigella*. Study

revealed that most the food vendors were not aware about the Food Regulations and were untrained. Therefore, need for improvement of GHP's, provision for adequate facilities and training programmes was mentioned^[7]. Results of the microbial quality evaluation of ice-creams marketed in Kohlapur city revealed that different samples of ice-creams collected from different vendors showed positive growth of *Escherichia coli*, *Salmonella*, *Staphylococcus aureus* and *Shigella species* (ranging 1.2×10^3 to 8×10^7 cfu/g). Water, lack of hygiene and utensils used while preparation were considered as the major sources of Coliform organisms. Skin and clothing of food handlers served as the significant sources of *Staphylococcus* Species. Emphasis was given to the need for sanitary education for vendors with help of training and workshop was considered as a remedy to avoid potential hazards^[3]. According to a study conducted on the fruit juices sold in the markets of Kashmir Valley

showed that 25% of juice samples, especially orange juice, were not complying with the standards set for Microbial quality of Ready to eat foods. Lack of awareness and poor hygienic conditions amongst street food vendors could be the reason for the poor microbial quality of orange juice. In addition to this, safe storage temperatures were not maintained by the vendors which resulted in the increased chances of contamination. It mentioned the high need for intense sanitary inspection and regular monitoring of street vending establishments^[5].

3. PATHOGENIC MICROBES INVOLVED IN STREET FOODS


Food prepared by street vendors can get contaminated at various levels as hygiene and sanitation practices are not followed while handling food articles. The reason could be the unawareness and lack of knowledge of food handlers regarding safety aspects of food.

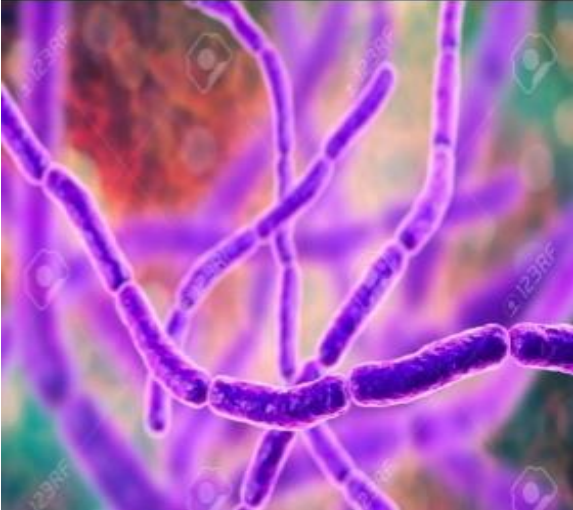
Consumption of contaminated food can result in food borne diseases which includes a broad array of illnesses caused by bacterial, viral, parasitic or chemical contamination of food. Food borne diseases can be classified into Food Borne Intoxication, Food Borne

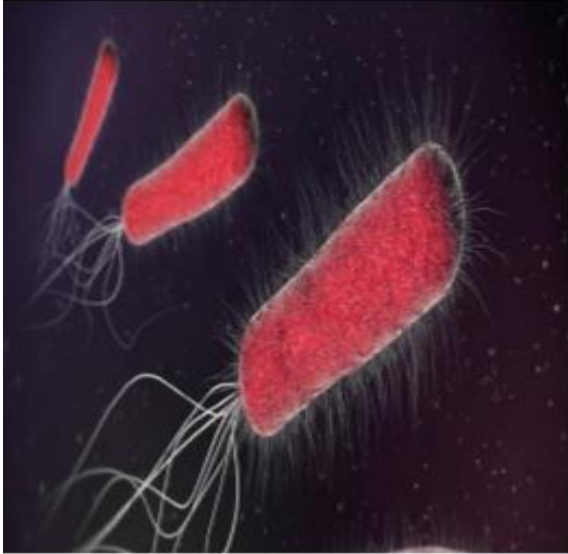
Illnesses and Food poisoning which are recognized as major problem worldwide^[7]. Therefore, contamination of street foods by pathogenic disease causing microorganisms is the major challenge against safety of street vended food articles^[4].

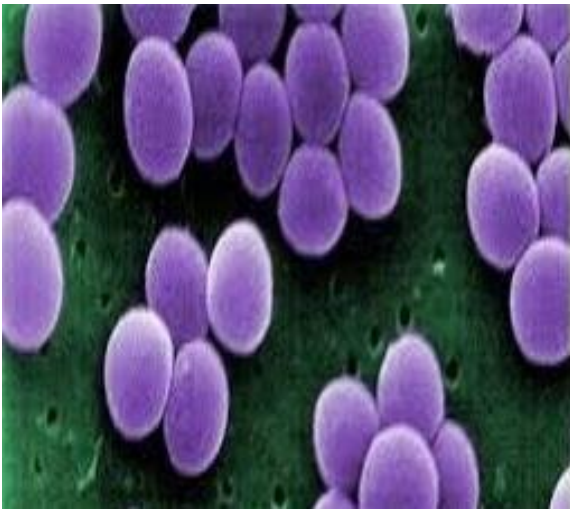
Table 1: Dominant species of Pathogenic microorganisms



Source: M.Thakur, 2018

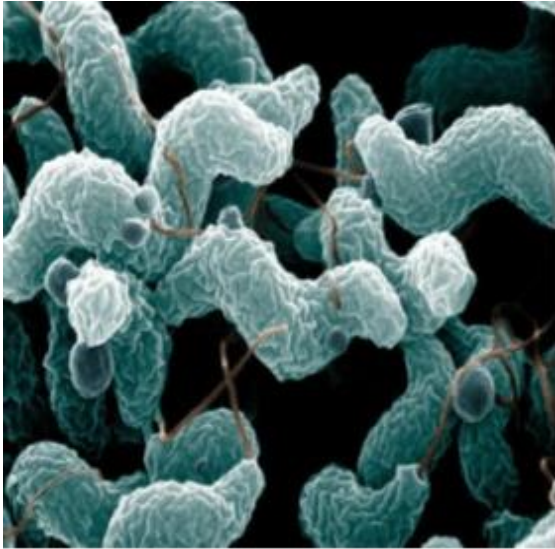
| S.No. | Pathogenic Microorganism | Image of the Microorganism |
|-------|---|--|
| 1. | <p><i>Salmonella typhi</i></p> <p>A gram negative rod shaped facultative anaerobe that is motile and non-spore forming.</p> <p>Incubation period: 6-72 hrs</p> <p>Sources: Under-cooked meat and meat products, undercooked poultry and poultry products.</p> <p>Symptoms: Headache, diarrhoea, abdominal pain and fever etc.</p> |  |

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| | <p>Prevention: Cook food properly (upto a safe internal temp.), Wash hands before handling, store food under refrigeration.</p> | |
| 2. | <p><i>Bacillus cereus</i></p> <p>A gram positive rod shaped facultative anaerobe that is motile and non-spore forming.</p> <p>Incubation period: 6-15 hrs</p> <p>Sources: Meat and meat products, soups, gravy, sauces, street fruit juices</p> <p>Symptoms: Diarrhoea, nausea.</p> <p>Prevention: Maintain appropriate storage temperatures. Keep hot foods hot (more than 60°C) and cold foods cold (less than 5°C).</p> |  |
| 3. | <p><i>Escherichia coli</i></p> <p>A gram negative, facultative anaerobe and rod shaped bacteria,</p> | |

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| | <p>that is usually found in the lower intestine of warm blooded organisms.</p> <p>Incubation period: 1-10 days</p> <p>Sources: Undercooked beef, contaminated water, contamination sewage.</p> <p>Symptoms: Diarrhoea, nausea, abdominal pain.</p> <p>Prevention: wash fruits and vegetables thoroughly.</p> |  |
| 4. | <p><i>Staphylococcus aureus</i></p> <p>Gram positive round shaped bacterium commonly present on the skin and hair as well as in the nose and throats of human beings and animals.</p> <p>Responsible for causing skin, eye, nose and throat infection.</p> <p>Majorly transmitted via food handler.</p> | |

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| <p>Incubation period: 0.5 to 8 hrs</p> <p>Sources: Anything that is in direct contact with the food handler such as pani puri, fruits salad, potato salad etc.</p> <p>Symptoms: Headache, diarrhoea, abdominal pain, fever and sudden onset of vomiting.</p> <p>Prevention: Avoid direct contact with food, wear head gear, apron and gloves while handling food, wash hand properly etc.</p> |  |
| <p>5. <i>Shigella species</i></p> <p>A gram negative, rod shaped, non-motile, non-spore forming and facultative anaerobic bacterium which is closely related to <i>E. coli</i>.</p> <p>Incubation period: 1-7 days</p> <p>Sources: All food articles that</p> | |

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| | <p>involve direct hand contact during their preparation are contaminated with this species.</p> <p>Symptoms: Sudden abdominal cramps, fever, diarrhoea and nausea.</p> <p>Prevention: wash hands properly, wash fruits and vegetables properly, avoid contact with infected person etc.</p> |  |
| 6. | <p><i>Clostridium botulinum</i></p> <p>A gram positive, rod shaped, spore forming anaerobic bacterium.</p> <p>Incubation period: 12-36 hrs</p> <p>Sources: Commercial and home canned foods.</p> <p>Symptoms: Abdominal pain, nausea,</p> <p>Prevention: Appropriate heat</p> |  |

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| | <p>processes should be used for canning, avoid cross contamination, prevent dents in the cans etc.</p> | |
| 7. | <p><i>Campylobacter spp</i> A gram negative, helical shaped, non-spore forming and non-fermenting bacterium that is commonly found in the intestinal tract of animals.</p> <p>Incubation period: 6-15 hrs</p> <p>Sources: Undercooked poultry and poultry products, unpasteurized milk etc.</p> <p>Symptoms: Diarrhoea, abdominal pain, fever etc.</p> <p>Prevention: Avoid cross contamination with raw poultry, use separate equipments for the raw poultry and other products and wash them thoroughly.</p> |  |

4. SUMMARY

To recapitulate, the trend for street food vending is mushrooming because of the rapid urbanization, technological advancements and hasty lifestyles. People are getting more inclined towards the easier ways of spending their lives. Instead of cooking at home most of them prefer to buy ready to eat foods from the local market without releasing about the safety concerns^[1]. Street foods are the kind of Ready to eat foods which are prepared and sold by vendors in the streets, public places, busy market places, and near schools and colleges. They are appreciated for their unique taste and the convenience they provide to the consumer. In addition to this they also provide Food Security to low-income groups of urban population^[8]. Microbial contamination of street vended foods makes them unsafe for the human consumption and has become a global health concern^[10]. Food borne illnesses caused by the consumption of contaminated food are the major health problems associated

with the street foods^[4]. Street foods can get contaminated with micro-organisms like *Escherichia coli*, *Salmonella spp*, *Staphylococcus aureus* and *Bacillus spp* etc^{[7],[11]}. If the microorganism involved is pathogenic in nature then it could pose serious health problem and may lead to Food poisoning outbreaks^[5]. Many studies conducted to assess the quality of street foods revealed that mostly these foods articles are do not comply with the safety standards and many of them are responsible for the various food borne diseases which are one of the major challenges of 21st century^[1].

Various studies conducted in different countries have revealed that there exist a huge gap between knowledge on food hygiene and handling practices^[10]. Any vendor's main objective is to sell out their product just for the sake of monetary gain without considering the health of community^[3]. It is observed that lack of hygiene, use of inferior quality water and improper waste disposal have been the major causes for

the high levels of contamination in street food articles^{[4]-[11]}. Open drainages near the vending site, lesser bin distance and personal hygiene of a street food handler are some other factors associated with the risk of contamination^{[7],[4]}.

5. FUTURE SCOPE

The sole objective of the present study was to highlight the need to provide safe and wholesome food to consumer of street foods. In order to ensure the safety of the street vended food articles and to reduce the risk of food borne illnesses the study ensures that the Government and Health ministry emphasis the need of :-

- Education to the vendors regarding safety aspects of food and the practices that should be followed while handling;
- Create awareness by conducting training programs;
- and regular monitoring for the street food vending systems.

Following are some suggestions made for the vendors of street food items which might need investment in terms of cost and effort as: vendors should designate a clean area for the preparation and storage of food articles; distinction in the dusters used for different purposes like hand wiping, equipment cleaning and cleaning of work surfaces; care should be given to the storage temperatures required to maintain the freshness of the food articles; water used by them should meet the requirements of potable water.

The street food vendors should also be trained on following six sections as - Food stall details, Environment around the stall, Personal hygiene, Food storage facilities at the stall, Utensil maintenance, and Licensing.

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