IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

MICROBIAL CONTENT OF STREET FOODS

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ABSTRACT

The foods that we eat carry microbial associations whose composition depends upon which organisms gain access and how they grow, survive and interact in the food over time. The microorganisms present will originate from the natural micro-flora of the raw material and those organisms introduced during harvesting, slaughter, processing, storage and distribution. The numerical balance between the various types of microorganisms will be determined by the properties of the food, its storage environment, properties of the organisms themselves and the effects of processing. The aim of the study is to check the microbiological quality of street foods. In present work samples constituting spicy salty water and sweet chutney used for preparation of chat dishes were collected from five different locations from street vendors in Nasik city of Maharashtra. These samples were tested for different parameters such as Total Bacterial Count, Total Coliform Count, Presence of Moulds, *Escherichia Coli*, *Salmonella*, *Staphylococcus* and *Pseudomonas*. Enumeration of bacteria from these samples showed the presence of mesophilic bacteria in each of the sample and there was a considerable variation in bacterial content and pathogens amongst the samples.

Keywords: Street food, Microbial count, Food borne disease, Pathogens, Hygiene

Introduction

Food analysis is a diverse and interdisciplinary field of research that has a significant health, societal and economic impact. It aims to characterize food products in terms of chemical composition, traceability, safety, quality, sensory perception and nutritional value. Microbial contamination of food and water is a major source of illness. Severe contamination is generally linked to contaminated water, but transmission could occur through contaminated foods served by the street vendors and restaurants (Vedesh and Neel, 2017). Food borne illness usually arises from improper handling, preparation or food storage. Good hygiene practices before, during and after food preparation can reduce the chances of contracting an illness. Regular hand washing is one of the most effective defences against the spread of food borne illness. The action of monitoring food to ensure that it will not cause food borne illness is known as food safety. Microorganisms get into food from both natural sources and from external sources to which a food comes into contact from the time of production until the time of consumption. Natural sources for foods of animal origin which includes skin, hairs, feathers, gastrointestinal tract, urogenital tract, respiratory tract, milk ducts (teat canal) in udders of milk animals. Most food pathogens are of soil or intestinal origin. The presence of microorganisms indicates unhygienic conditions related to the location of the food stalls, especially in dusty roadside locations (Suneetha et al., 2011). Most of the vendors lack the awareness on hygiene during preparing, processing or handling the foods. They lack services such as good quality water supply and proper waste disposal systems. They also lack their ability to provide safe food (Titarmare et al., 2009). Improper personal hygiene of the people preparing the foods can facilitate the transmission of pathogenic bacteria found in environment via food to humans (Tambekar et al., 2008). Improper method of display and selling in unhygienic environment also causes food safety problems. Water used for the preparation may also be contaminated and stored in unclean containers. The artificial food colours and enhancers added also cause health hazards (Teplitski et al., 2009).

Objectives of the study

1. To find out the microbial content of the samples collected from different locations of Nasik city.
2. Microbial analysis of samples for the presence of food borne pathogens.

Materials and Methods

Collection of Samples

In present work samples constituting spicy salty water and sweet chutney used for preparation of different chat dishes were collected from five different locations in Nasik city of Maharashtra and were appropriately coded which includes five samples of sweet chutney namely SC1, SC2, SC3, SC4 and SC5 and five samples of spicy salty water namely ST1, ST2, ST3, ST4 and ST5. Collected samples were transported to the laboratory and samples were refrigerated before tests.

Total Bacterial Count

Serial dilution technique was used for the enumeration of bacteria present in samples as described in Manual of methods of analysis of food (2012). Samples were diluted (10^{-1} to 10^{-8}) using normal saline as a diluent and 0.1 ml of each diluted sample was plated on sterile plates of Nutrient agar. Pour plate technique was used for plating and plates were incubated at 37ºC for 24-48 hours for growth of bacteria. After incubation appropriate plates were selected and results were expressed as cfu/ml.

Total Coliform Count

Serial dilution technique was used for the enumeration of coliform bacteria present in samples. Samples were diluted (10^{-1} to 10^{-8}) using normal saline as a diluent and 0.1 ml of each diluted sample was plated on sterile plates of MacConkey's agar.

Food borne Pathogens

Presence of pathogenic bacteria were checked by inoculating the samples on sterile plates of EMB (Eosin Methylene Blue) agar, Mannitol salt agar, Salmonella Shigella agar and Cetrimide agar for the growth of *E. coli*, *Staphylococcus*, *Salmonella* and *Pseudomonas* species respectively. All plates were incubated at 37ºC for 24 hours. For the growth of Moulds, Sabouraud's agar was used and plates were incubated at 25ºC for 5 days.

RESULTS AND DISCUSSION

Table 1 Microbial count in different samples

Sample	Total Bacterial Count (cfu/ml)	Total Coliform Count (cfu/ml)	*Salmonella*	*Pseudomonas*	*Staphylococcus*	*E. coli*	Mould
SC1	$9x10^6$	$3x10^5$	Present	Absent	Absent	Present	Absent
SC2	$9x10^7$	$2x10^5$	Present	Absent	Absent	Present	Absent
SC3	$7x10^6$	$3x10^2$	Absent	Absent	Absent	Absent	Absent
SC4	$8x10^6$	$3x10^4$	Absent	Absent	Absent	Present	Absent
SC5	$8x10^7$	$3x10^5$	Present	Absent	Present	Present	Absent
ST1	$4x10^6$	$3x10^3$	Absent	Present	Absent	Absent	Present
ST2	$5x10^6$	$4x10^4$	Absent	Absent	Absent	Present	Absent
ST3	$2x10^6$	$5x10^3$	Absent	Absent	Absent	Absent	Present
ST4	$2x10^6$	$3x10^4$	Absent	Present	Absent	Present	Absent
ST5	$3x10^6$	$7x10^4$	Absent	Absent	Present	Absent	Absent

It is evident that each sample contains a higher microbial load in terms of bacteria and coliforms. Enumeration of bacteria from these samples showed the presence of bacteria in each of the sample and there was a considerable variation in bacterial content amongst the samples. Qualitative microbial analysis shows that most of the samples contain pathogenic bacteria such as E. coli, Salmonella, Pseudomonas and Staphylococcus while two samples contains mould. Most of the street vended foods, especially in the densely populated poor countries have been reported to harbour a huge range of bacteria (Rajan and Neel, 2017). The presence of E coli in foods suggests lack of hygiene in handling and poor water quality for the preparation of foods. E coli is an indicator of faecal contamination (Rashmi & Krishna, 2012). People all over the world are gradually being habituated to consuming street-vended foods due to their ease of availability, relatively low pricing, ease of handling, etc. (Ahmed et al., 2009). Most of the street vended foods, especially in the densely populated poor countries, have been reported to harbor a huge range of bacteria (Sarker et al., 2013; Das et al., 2012). Major causes were lack of attention to hygiene, poor access to clean water and improper waste disposal which made street foods as a source of public health problems.

Photo 1 Growth on Nutrient agar

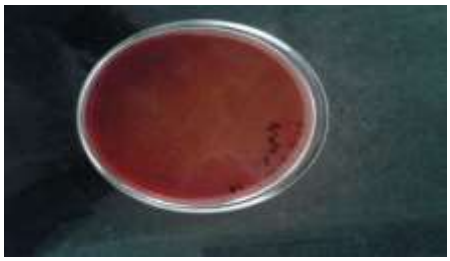

Photo 2 Growth on MacConkey's agar

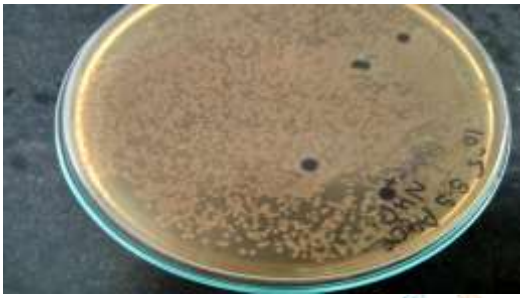

Photo 3 Growth on Salmonella Shigella agar

Photo 4 Growth on Sabouraud's agar

Photo 5 Growth of *Pseudomonas*

CONCLUSION

The microbial analysis revealed that the levels of contamination were high in all samples which indicates that there is an urgent need for creating awareness about good hygienic practices among vendors for a safer consumption of street foods. Proper hygiene and proper storage avoiding cross contamination are the major ways for preventing food borne diseases.

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