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Microbiological Quality Analysis of Street Vended Fruit Juices in Hyderabad City, India

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ABSTRACT

Microbial contamination of fruit juices sold by street vendors has become a global health problem. Street vended fruit juices sold in almost all the cities throughout India are consumed by huge population. The present study was undertaken to investigate the microbiological quality of street vended fruit juices sold in the selected areas of Hyderabad. One ice sample and three fruit juices like apple juice, sapota juice and grape juice samples were aseptically collected from three different areas. The samples were analyzed by standard procedures within an hour of procurement. Water and ice used by street fruit juice vendors was microbiologically unsafe. Shop located alongside roads with heavy vehicular traffic or waste disposal systems and overcrowding further increases the degree of contamination. Analysis of the fruit juice samples revealed high loads of Total bacterial count in all the samples varied $3x10^{-7}$ cfu/ ml in sapota, $17x10^{-4}$ cfu/ml in apple, grape juice and water contained bacterial count below detectable level. Yeast/Moulds are $22x10^{-4}$ cfu/ml in sapota, $26x10^{-4}$ cfu/ml in apple, grape juice and water contained Yeast/Moulds count below detectable level.

Key words: *Street vended fruit juice, microbial contamination, hygiene.*

INTRODUCTION

Due to reports of food borne illness associated with the consumption of fruit juices at several places in India and elsewhere, a study was undertaken to assess the quality of street vended fruit juices.In developing countries, fruit and vegetable juices sold by street vendors are widely consumed by millions of people. All age group peoples are consumed fruit juices because of the health and nutritional benefits. The street foods are being served quickly, also tasty and it is available at reasonable rates. It attracts all the age groups, especially the younger generations[1]. Most of the fruit juices like grape, sapota, apple etc are sold by the street vendors. Since the popularity of street vended fruit juices is increasing there is a need to assess the quality. In view of the high demand for fresh fruit juices during summer in Hyderabad City, a study of the street vended fruit juices was undertaken with a view to assess safety for human consumption and as possible sources of bacterial pathogens.In India during recent years there is an increasing trend in the sale and consumption of foods on the road side.

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In many developing countries, such as India, street-food vending is a common part of urban lifestyle due to high unemployment and limited work opportunities. Vendors usually congregate in overcrowded areas where there are high numbers of potential customers. Such areas usually provide limited access to basic sanitary facilities[2]. There are different sources of microbial invasion of street vended fruit juices. Pathogens may invade the interior surfaces of the fruit during peeling, slicing, handling, trimming and other processes like packaging, storing and marketing. These juices provide a source of readily available and affordable source of nutrients to many sectors of the population, including the urban poor. Unpasteurized juices are preferred by the consumers because of the "fresh flavor" attributes and hence, in recent times, their demand has increased. They are simply prepared by extracting, usually by mechanical means, the liquid and pulp of mature fruit and vegetables. The final product is an unfermented, clouded, untreated juice, ready for consumption[3]. The spoilage of food is most after due to contamination with aerobic acid-tolerant bacteria as well as yeasts and molds. Thus, enumeration of these microorganisms is an important aspect of evaluating the microbiology quality of acidic foods[4]. In most cases they are prepared under unsanitary conditions by the vendors who are illiterate and have poor personal hygiene. The chances of contamination of these foods increase greatly due to extremely poor environmental condition in which they are prepared and served. The utensils were washed using water in buckets, were rinsed only once and the water was used repeatedly before it was replaced. The water for washing and rinsing the utensils was observed to be dirty[5]. Water and ice used by street food vendors was microbiologically unsafe[6].Water is a critical raw material in many street food vending operations. It may also be contaminated with biological, chemical or physical hazards. As such contaminated water will create a public health risk if it is: used for drinking purposes; used for washing of food, incorporated into food as an ingredient and used in the processing of food; or used in the washing of equipment, utensils and containers. Freezing does not remove chemical hazards and should not be considered a safe process for the removal of biological hazards. Consequently contaminated ice may introduce hazards to food and beverages with which it is in contact. Street foods are frequently associated with diarrheal diseases due to their improper handling and serving practices. The vendors can be carriers of pathogens like *E. coli*, *Salmonella*, *Shigella*, *Campylobacter* and *S.aureus* who eventually transfer these food borne hazards to consumers. In most cases, running water is not available at vending sites; hands and utensils washing are usually done in one or more buckets, and sometimes without soap. Wastewaters and garbage's are discarded nearby, providing nutrients for insects and rodents, which may carry food borne pathogens[7&8]. While the practice of consumption of juice cannot be stopped on nutritional grounds nor the street venders be stopped from selling such items since it is there only source of livelihood, measures should be taken to spread awareness amongst the vendors about the safe and hygienic practices and Government agencies and NGOs can take initiatives in this direction to lay out guidelines for selling of fresh and unpasteurized juices[9].

The material required for analysis

Petri dishes, conical flasks, test tubes, measuring cylinder, test tube stand, automatic pipette, pipette strips, autoclavable cups, weighing boards, spoons, glass rod, test tube stand, aluminum foil, autoclavable covers, rubber bands, tray, paraffin, marker, cotton.

Equipment required

Incubator, colony counter, mechanical agitator, laminar air flow chamber, autoclave, weighing balance, thermometer.

Chemicals required

PCA (Plate Count Agar), PDA (Potato Dextrose Agar), Nacl (Sodium chloride), 95% Ethanol, Distilled Water.

Sample collection

Samples were collected from street vendors in sterilized cups as different types of juices from different vendors in different weeks of intervals. Samples are analyzed within one hour after collected from street vendors.

Procedure

At first the petri dishes, conical flasks, test tubes, test tube stand, weighing boards, spoons are sterilized with 95% ethanol with the help of cotton. Chemicals Weighed as per calculated amounts i.e, PDA 39mg/1000ml, PCA 23.5mg/1000ml and Nacl 0.8 mg/1000ml accordingly in weighing boards with the help of a weighing balance. Diluted the weighed chemicals in weighed amount of water with the help of a glass rod in a conical flask. The mouth ends of the conical flasks were closed with aluminum foil, autoclavable covers with a rubber band. The petri dishes, conical flasks, test tubes, pipette strips are placed in autoclavable covers and sterilized in a autoclave at 121°C for 15 mins. Autoclaved conical flasks are allowed to cool 35-38°C. The temperature measured with the help of a thermometer. The pipetted 1 ml of fruit juice sample is transferred in to a test tube i.e, blank and blank was stirred with the help of a mechanical agitator then again 1ml is transferred from blank to another test tube this is called 10^{-1} likewise required dilutions are made for different samples as 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7}, 10^{-8}, 10^{-9}. The required dilutions are made for each individual fruit juice sample and same as for water sample. The petri dishes are labeled as required dilutions for both +Ve, -Ve, total bacterial count, total yeast and mold count. The 1 ml required dilutions are collected from test tubes and pour in to petri dishes and PCA, PDA media are poured in to the plates respectively.

The media was allowed to solidify for few minutes. The solidified petridishes covered air-tight around the edges of petri dishes. The petridishes which are labeled as total bacterial count, +Ve, -Ve are placed inside the incubator at 38°C for 24 hours and petridishes which are labeled as total yeast and mold count are placed in a tray and kept at normal atmospheric temperature for 72hours. Then the petri dishes are observed under colony counter and counted the number of microbial colonies.

RESULTS

Analysis of the fruit juice samples revealed high loads of Total bacterial count in all the samples varied $3x10^{-7}$ cfu/ ml in sapota, $17x10^{-4}$ cfu/ml in apple, grape juice and water contained bacterial count below detectable level. Yeast/Moulds are $22x10^{-4}$ cfu/ml in sapota, $26x10^{-4}$ cfu/ml in apple. Grape juice and water contained Yeast/Moulds count below detectable level. The results are showed that water and grape juice samples are contained microbial count (nil) below detectable level because these two types of samples may be prepared hygienically, juice containers covered with lids, less exposure to street environment etc.

Table: the results of the analysis is tabulated as follows

Sample	Total Bacterial Count dilutions						Total Yeast and Mould Count dilutions					Standard	
	10^{-4}	10^{-5}	10^{-6}	10^{-7}	10^{-8}	10^{-9}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	10^{-8}	+Ve	-Ve
Grape juice	-	Nil	Nil	Nil	Nil	-	-	Nil	Nil	Nil	Nil	Nil	Nil
Sapota juice	-	-	-	3	2	1	22	12	Nil	-	-	177	Nil
Apple juice	17	3	3	-	-	-	26	4	3	-	-	173	Nil
Water	-	Nil	Nil	Nil	Nil	-	-	Nil	Nil	Nil	Nil	Nil	Nil

CONCLUSION

The contamination occurs usually due to poor quality of water used for dilution as well as unhygienic conditions related to washing of utensils, contaminated water and ice, poor personal and domestic hygiene, peeling of fruits much earlier before processing, shops located in crowded places, increased dust particles in the evening and poor maintenance of premises. Health education of the fruit juice vendors and implementation of standard hygienic practices should be enhanced to reduce contamination of fruit juices. Regular monitoring of the quality of fruit juices should be introduced to avoid bacterial pathogen outbreaks in future.

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