

Studies on microbiological analysis of commercial fruit juices available in the Shahada Region

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Abstract

The present investigation was conducted to analyse the microbiological quality of various commercially available fruit juices in the Shahada market. 05 different street vendor and packed fruit juice sample collected in summer season were analysed microbiologically by the Standard Plate Count method for the detection of microorganisms in it. Results were expressed in terms of TVC/ml. Data obtained by Microscopic and Biochemical analysis revealed the presence of *Bacillus*, *Staphylococcus*, *Micrococcus* and *Streptococcus* species in different types of fruit juices. Results also revealed that mango-containing fruit juices have more bacterial count as compared to orange juice. Coliform types of organisms were detected in pineapple juice. The presence of different organisms in fruit juices indicated improper hygienic conditions during the preparation of juice. In order to prevent the risk of infections street vendors were suggested for maintaining cleanliness, proper hand washing, and use of filtered water for the preparation of juice.

Key words : Fruit juices, bacteriological analysis, TVC.

Fruit juice is the liquid extracted from the edible part of mature and fresh or preserved fruits or any concentrate of such liquid². Fruit juices are common beverages in many countries of the world. In hot climate areas, cafés, restaurants and road side stalls have local facilities to extract the juice from fresh fruits². Fruit juices are energy refreshing drinks. These are an essential requirement of the modern life in our societies. Being nutritious, as extracted from fruits their consumption increases energy level in the body. These are

rich in vitamins, high nutrients, and high mineral salts and help to maintain healthy blood pressure. As fruits are rich source of sugar and minerals, juice extracted from fruits are good source of nutrients for the growth of microbes. Presence of nutrients, sugar and vitamins support the growth of microorganisms due to which it easily undergoes spoilage. The existence of microorganisms including bacteria, yeasts and moulds in fruit juices are responsible for fermentation, food spoilage and food borne illness^{3,8}.

Fruit juices contain many microorganisms which is normally present on the surface of the fruits during harvest and post-harvest processing which include transport, storage and processing. The critical factors affecting the spoilage of juice include pH, oxidation reduction potential, water activity, availability of nutrients, presence of antimicrobial compounds and competing micro flora. Fruit juices have pH in acidic range (< 4.5) serving as important barrier for microbial growth. Fruit juices have pH in acidic range (< 4.5) serving as important barrier for microbial growth. Microbial contaminants may enter fruit juices from water source⁷. Different methods such as chemical preservatives, freezing, canning and pasteurization are used to process and preserve fruit juices⁴. The existence of microorganisms including bacteria, yeasts and moulds in fruit juices are responsible for fermentation, food spoilage and food borne illness^{5,6}.

Juice sample collection :

Pineapple, Mango and Orange fruit juice samples from street vendors and packed fruit juice Mazza and Mango Slice were procured from street vendors and juice centres and analysed microscopically in the Department of Microbiology of PSGVPMandal's ASC College, Shahada. Packaging date and expiry date were recorded present on the packed sample.

Microbiological analysis :

Microbiological analysis of the juice samples were carried out by serially diluting each fruit juice into 9 ml sterile distilled water up to 10^{-3} to 10^{-5} , and 0.1ml of sample was

spread inoculated into sterile Nutrient agar plate, sterile Potato Dextrose agar plate, sterile Mac-Conkeys agar plate and sterile Mannitol Salt agar plate for the determination of total viable count of bacteria, yeast and fungi in each fruit juice sample. All inoculated plates were incubated at 37°C for 48-72 hours. Number of colonies was expressed in terms of cfu/ml.

Identification of microbes :

After growth at 37°C up to 72 hours all plates were examined for microbial colonies grown from inoculated fruit juice samples on the plate. Colony characteristics were noted and Gram staining and biochemical characterization of each isolated colony was carried out.

Fruit juices are energy drinks very popular among the people of all ages. In summer season fruit juices are largely consumed by mostly youngsters, adults and children. Due to high heat mango, pineapple and orange fruit juices have very high demand particularly in summer. But quality of fruit juices sold by street vendors is not hygienic due to their preparation methods, washing of utensils and water used for its preparation. Microbiological analysis of fruit juices were carried out in order to determine the presence of microorganisms. 05 different street vendor and packed fruit juice sample collected in summer season were analysed for the presence of microorganisms in it. Samples were analysed by spread plate technique inoculating diluted 0.1 ml sample on sterile nutrient agar, Sterile potato dextrose agar, sterile Mac-Conkeys agar plate and sterile Mannitol Salt agar plate. Packed fruit juices were also analysed for the presence of microbes after long time storage.

Table-1. No of colonies TVC of diluted fruit juice sample

S.N.	Sample	Dilution	CFu/ml	Fungal Count
1	Pineapple	10 ⁻⁵	1.8 x10 ⁴	1.0 x 10 ⁻⁵
2	Mango	10 ⁻⁵	2.4 x10 ⁵	1.0 x 10 ⁻⁵
3	Orange	10 ⁻⁵	1.6 x10 ³	1.2 x 10 ⁻⁵
4	Maaza	10 ⁻³	1.2 x10 ³	1.3 x 10 ⁻⁵
5	Slice	10 ⁻⁴	1.0 x10 ³	1.4 x 10 ⁻⁵

Table-2. Colony characteristics of colonies present on the pates

S.N.	Sample	Size	Shape	Colour	Margin	Elevation	Gram staining
1	Pineapple	1mm	Circular	Off White	Even	Convex	Gram negative rods
2	Mango	Less than 1 mm	Circular	Yellow	Even	Convex	Gram positive cocci
3	Orange	1mm	Circular	Red	Even	Convex	Gram positive cocci
4	Maaza	Less than 1mm	Circular	White	Even	Convex	Gram positive rods
5	Slice	1mm	Circular	Off White	Even	Convex	Gram Negative rods

Table-3 Biochemical characterization of isolated microbes

S.N.	Sample	Catalase	Oxidase	Indole	MR Test	VP Test	Citrate Test
1	Pineapple	+	+	+	+	-	-
2	Mango	+	+	-	-	+	+
3	Orange	+	+	-	-	+	+
4	Maaza	+	+	+	+	-	-
5	Slice	+	+	+	+	-	-

+ Positive, - Negative

Microbiological analysis :

After incubation all plates were observed for the presence of colonies. Colony count was made and results of bacterial counts were expressed in terms of cfu/ml. Total number of fungal count was also determined. Colony characteristics of colonies were recorded and Gram staining and biochemical characteristics of well grown colonies were carried out.

Microbiological analysis revealed that all fruit juice sample contains microorganisms, but number is less in packed fruit juice sample as compared to street vendor's sample. From the Gram staining, colony characteristics and Biochemical characteristics isolated colonies may be presence of *Bacillus*, *Staphylococci*, *Streptococcus* and *Micrococcus* in pineapple, mango and orange juice samples. Pink colored colonies of *E. coli* were observed on Mac-Conkey's agar plate in slice juice sample as

well as in Pineapple juice. Fruit juices are rich in nutrients and support the growth of microorganisms but due to unhygienic method of preparation it gets easily contaminated. Consumption of such type of fruit juices are unsafe and responsible for infections specially children's are more sensitive to infections. Beside bacterial count presence of fungal spores and yeast cells in juices are responsible for skin infections. From this analysis street vendors were informed for maintaining cleanliness, proper washing of utensils and covering of juice and protection from dust, and use of filtered water for juice preparation.

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