

# A Comparative Investigation on the Assessment of Microbial Count Present in Commercially Packed Fruit Juices and Fresh Street Fruit Juices Available in Bilaspur City

## Research Article

Pandey AR\* and Ankita B

*Department of Microbiology, D.L.S.P.G College, Bilaspur, Chhattisgarh, India*

\*Corresponding author: Archana R. Pandey, Department of Microbiology, D.L.S.P.G College, Bilaspur, Chhattisgarh, India.  
E-mail Id: archupandey02@gmail.com

**Article Information:** Submission: 19/10/2024; Accepted: 15/11/2024; Published: 19/11/2024

**Copyright:** © 2024 Pandey AR, et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### Abstract

Different types of fruit juices are predominantly being sold by a squad of street vendors in Bilaspur city which are widely consumed all over the city. Fruit juice is a drink made from the extraction or pressing of the natural liquid contained in fruits and vegetables. Though they are the source of free sugars, it also contains micronutrients and plant bio actives. But one cannot deny the fact that these street fruit juices are principally very rich in microbial loads as well. So, the present analysis was under taken with the objective to assess the microbiological load and possible risk factors associated with these street drinks. The study was undertaken with three types of fruit juices such as orange pomegranate and pineapple. The percentage of microbes was also assessed in commercially packed fruit juice in all the three types of fruit juices as mentioned above. From all the assessment it was determined that the microbial quality of commercially packed fruits juice was far better than the street fruit juices.

**Keywords:** Bilaspur City; Fruit Juice; Pathogen; Bacteria; Food Borne Illness

### Introduction

In modern times, the escalating consumer awareness has stressed on the necessity for microbiologically safe food enhancements comprising plants and animals or products derived from them, it is quite obvious that our food supplements have a robust connection with a lot of microorganisms. If hygienic conditions are lacerated. When the microorganisms get involved which are pathogenic in nature, their association with our food becomes so very critical from a public health point of view as a consequence lethal health hazard can occur which can lead to food poisoning outbreaks. Fruit juices are nutrient-dense beverages that taste sweet and have several health advantages [1]. In order to maintain the color, flavor, and aroma of

fresh fruit juice, many times their quality is being sacrificed, which then becomes the cause of food poisoning and related health issues [2]. As per The Victorian Government, The Department of Human Services, 427 confirmed instances of salmonellosis were stated in Australia in 1999 as a consequence of consuming unpasteurized orange juice. Similar incidence was also reported in Florida [3]. In order to archive a prescribed microbiological stability and a healthy consumption rate, one has to follow the following parameters such as elimination of pathogenic microorganisms, pasteurization, chilling, and sterilization techniques for preservation of fruit juice. [3]. A variety of fruit juices are sold in the market, such as orange, pomegranate, pineapple, mango, sweet lime etc. The vendors often only look into the lucrative aspect of it and do not even care about

the harmful impact that these juices have on human population. But we cannot deny the beneficial aspect of these juices, as they are high in potassium, folic acid, and vitamin C, and they're a great source of bioavailable antioxidant phytochemicals [4]. They also significantly recover blood lipid profiles in those who suffer with hypercholesterolemia [5].

Fruit juices are a great way to get nutrients and they also have a lot of medicinal qualities that can boost one's immunity. They have a good flavor and aroma. Though fruit juices are thought to be a healthy beverage, freshly squeezed fruit juices are a far better option due to their low levels of contamination. The purpose of this present study was to determine the microbiological load and assess the bacterial contamination present in fresh street juices and commercially packed fruit juices so as to determine their consumption efficacy and quality.

### Materials and Methods

#### Collection of samples

Fruit Juice samples were collected from different locations of Bilaspur city (Chhattisgarh). Total 6 samples of fruit juices were collected three samples of street fruit juices were collected from local street area and three samples of commercially packed fruits juices were collected from different retail shops in Bilaspur city. Packed fruit juices were collected on the footing of their receiving status by the population in general and only samples which had the expiry date clearly mentioned on their pack were selected for further studies. There are many different packed popular fruit juices which are sold in retail shops of Bilaspur city. One of the most popular commercial brand of fruit juices (orange, pomegranate, pineapple) was taken for the comparative study.

#### Processing of sample

After collection of all the six samples, serial dilutions were performed and then spread plate technique was used to observe the microbial load.

#### Serial Dilution

Test tubes containing 9ml of peptone water were autoclave before use. Serial dilutions of the fruit juice samples were prepared in autoclaved peptone water. Initially 1ml of juice was mixed with 9ml of peptone water in a test tube in order to get 10<sup>-1</sup> dilution and similarly 10<sup>-2</sup>, 10<sup>-3</sup>, 10<sup>-4</sup> and 10<sup>-5</sup> dilution was prepared.

#### Media preparation

**Nutrient agar media:** 2.60 g of nutrient broth and 4g agar was weighed and dissolved in 200 ml of distilled water, then the mixture was autoclave for 15 mins at 15lbs pressure. After autoclaving Nutrient agar plates were prepared

#### Eosine methylene blue agar (EMB) media

7.5 gm of EMB and 3gm of agar was weighed and dissolved in 200ml of distilled water, then the mixture was autoclaved for 15mins at 15 lbs. pressure. After autoclaving EMB plates were prepared

#### MacConkey agar media

5.15 gm of MacConkey agar and 2.5 gm of agar was weighed and

**Table 1:** Showing total bacterial count in cfu/ml found in collected street fruit juices on Nutrient agar plates

Name of Samples and Media	No. of Colonies (cfu/ml)				
	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	10 <sup>-4</sup>	10 <sup>-5</sup>
Street fresh Orange Juice in NAM media	134	112	67	52	33
Street fresh Pomegranate Juice in NAM media	34	23	18	11	5
Street fresh Pineapple Juice in NAM media	17	12	9	7	4

**Table 2:** Showing total bacterial count in cfu/ml found in collected street fruit juices on EMB agar plates

Name of Samples and Media	No. of Colonies (cfu/ml)				
	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	10 <sup>-4</sup>	10 <sup>-5</sup>
Street fresh Orange Juice in EMB media	198	121	76	53	27
Street fresh Pomegranate Juice in EMB media	16	13	8	4	2
Street fresh Pineapple Juice in EMB media	28	19	9	7	5

**Table 3:** Showing total bacterial count in cfu/ml found in collected street fruit juices on MacConkey agar plates

Name of Samples and Media	No. of Colonies (cfu/ml)				
	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	10 <sup>-4</sup>	10 <sup>-5</sup>
Street fresh Orange Juice in MacC. media	234	116	54	14	6
Street fresh Pomegranate Juice in MacC. media	53	65	19	11	4
Street fresh Pineapple Juice in MacC. media	23	17	12	8	3

**Table 4:** Showing total bacterial count found in commercially packed fruit juices on Nutrient agar plates

Name of Samples and Media	No. of Colonies (cfu/ml)				
	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	10 <sup>-4</sup>	10 <sup>-5</sup>
Commercially pack Orange Juice in NAM media	97	76	59	36	12
Commercially pack pomegranate Juice in NAM media	23	14	27	5	9
Commercially pack pineapple Juice in NAM media	18	12	9	4	3

**Table 5:** Showing total bacterial count found in commercially packed fruit juices on EMB agar plates

Name of Samples and Media	No. of Colonies (cfu/ml)				
	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	10 <sup>-4</sup>	10 <sup>-5</sup>
Commercially pack Orange Juice in EMB media	152	93	14	5	3
Commercially pack pomegranate Juice in EMB media	5	2	7	4	1
Commercially pack pineapple juice in EMB media	77	16	3	8	12

**Table 6:** Showing total bacterial count found in commercially packed fruit juices on MacConkey agar plates

Name of Samples and Media	No. of Colonies (cfu/ml)				
	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	10 <sup>-4</sup>	10 <sup>-5</sup>
Commercially pack Orange Juice in MacC. media	262	194	86	23	11
Commercially pack pomegranate Juice in MacC. media	112	56	29	14	9
Commercially pack pineapple juice In MacC. media	149	127	83	72	38

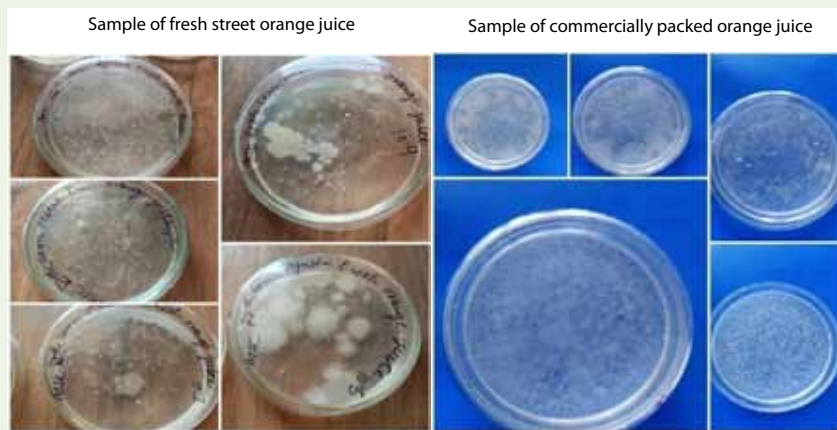


Figure 1: Showing colonies on nutrient agar plates



Figure 2: Showing colonies on nutrient agar plates



Figure 3: Showing colonies on nutrient agar plates



Figure 4: Showing colonies on EMB agar plates



Figure 5: Showing colonies on EMB agar plates

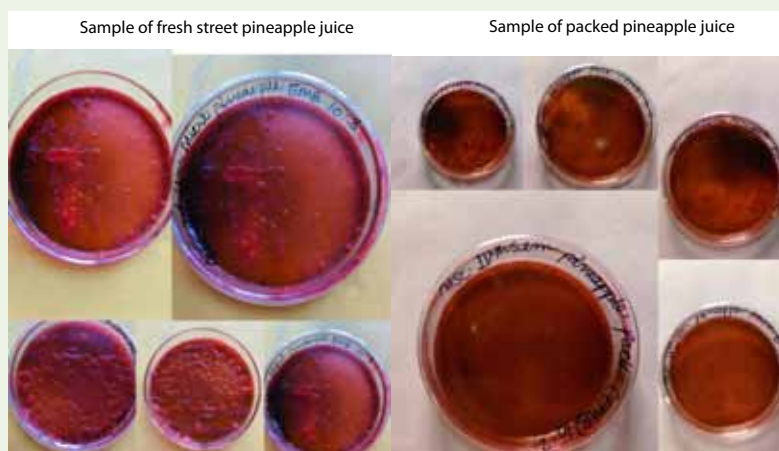


Figure 6: Showing colonies on EMB agar plates



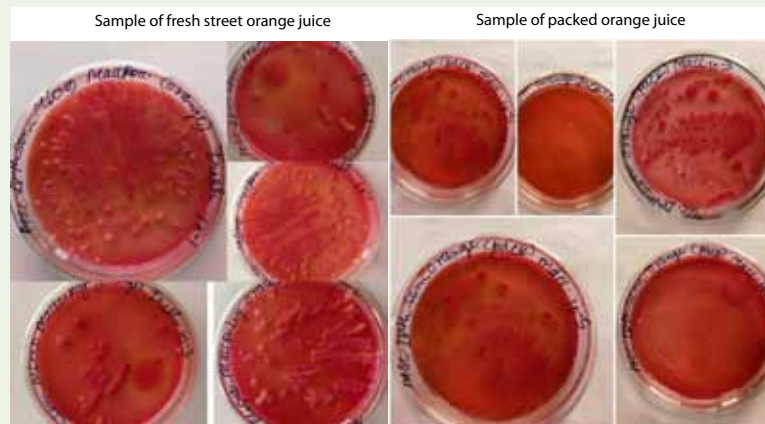


Figure 7: Showing colonies on MacConkey agar plates



Figure 8: Showing colonies on MacConkey agar plates

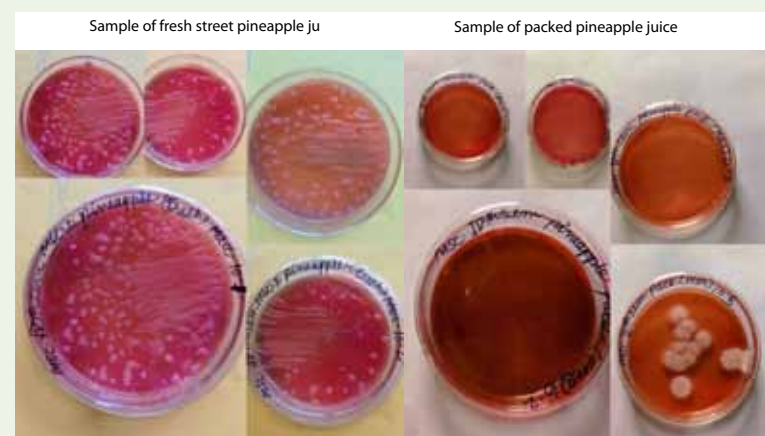
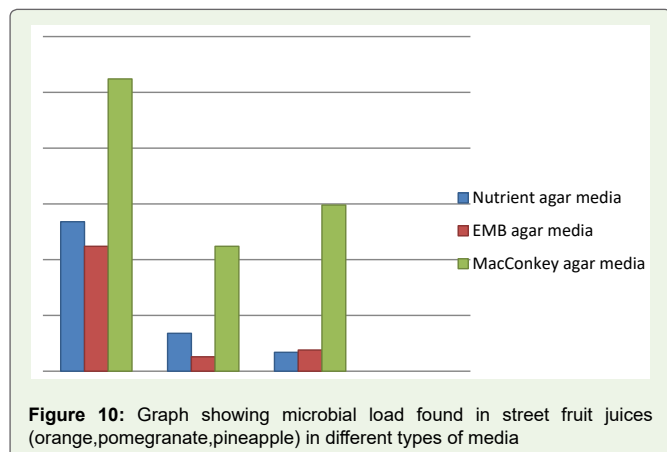
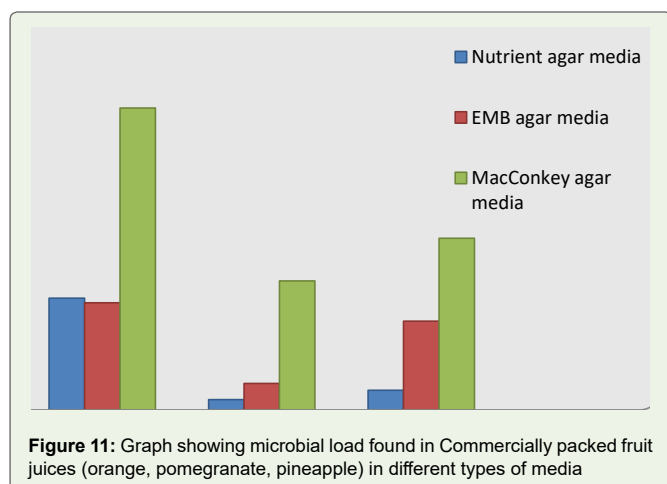


Figure 9: Showing colonies on MacConkey agar plates



**Figure 10:** Graph showing microbial load found in street fruit juices (orange, pomegranate, pineapple) in different types of media



**Figure 11:** Graph showing microbial load found in Commercially packed fruit juices (orange, pomegranate, pineapple) in different types of media

dissolve in 100 ml of distilled water, then the mixture was autoclaved for 15 mins at 15lbs pressure. After autoclaving MacConkey agar plates were prepared

### Spread Plate Technique

After serial dilution of all the samples, respective dilutions were plated onto respective agar media, (Nutrient agar plates, EMB agar plates, MacConkey agar plates). After inoculations all the plates were incubated at 37° c for 48 hours.

### Conclusion

Fruit juices have a high nutritional content and may be beneficial to human health, but in recent years, there have been many queries upstretched about their quality, safety, and hygiene. A large number of fruit juice firms have begun to introduce a wide range of different fruit juices with cheap price and easy availability criteria however; the majority of these companies do not seem to be concerned about the quality of their fruit juices. However, street fruit juices are also

highly popular among the young generation, who mostly avoid meals due to their so-called busy schedule. Tasmina et al. (2011) aimed at examining the quality and safety of freshly squeezed fruit juices. Al-Jedah (2002) [7] studied the microbiological safety of fruit juices. Md. Munjur et al. (2014) [8] investigated to resolve the microbiological attributes of the fruit juices collected from different areas around Jessore city. Tasmina et al. (2010) [9] conducted their study to assess the microbial quality of fresh and commercially packed available juices collected from different locations of Dhaka city. Durgesh et al. (2008) [10] investigated to resolve the microbiological attributes of the fruit juices collected from different areas around Mumbai city. People who enjoy drinking fruit juice solely consider the nutritional value of the drink, not its quality or hygiene. Six fruit juice samples (three of freshly squeezed juice and three of commercially packaged fruit juices, such as orange, pomegranate, and pineapple) were used in the current investigation and it was concluded that the street fruit juices that were available in different locations in Bilaspur city had the maximum microbial load when we compared them with commercially packed fruit juices. But these commercially packed fruit juices also showed reasonable number of microbes which clearly indicates the improper packaging (in terms of hygiene, contents, sterilization methods used etc.) of these fruit juices. Therefore, it is highly recommended to have direct fruits for consumptions rather than their juice.

### References

1. Suaads A, Hamed E (2008) Microbial growth and chemical analysis of Bottled fruit juices and drinks in Riyadh, Saudi Arabia 3: 315-325.
2. Lund B, Snowdon A (2000) The microbiological safety and quality of food. Fresh and processed food Pp: 738-758.
3. Tambekar DH (2009) Microbial Quality and safety of street vended fruit juices: A casestudy of Amravati city. Internet Journal of Food Safety 10: 72-76.
4. Franke AA, Cooney RV, Henning SM, Custer LJ (2005) "Bioavailability and an J Agric Food Chem. Franke, AA; Cooney, RV; Henning" Bioavailability and antioxidant effects of orange juice components in humans" 53: 5170-5178.
5. Kurowska EM, Spence JD, Jordan J, Wetmore S, Freeman DJ, et al. (2000) "HDL-cholesterol-raising effect of orange juice in subjects with hypercholesterolemia" Pp: 1095-1100.
6. Tasmina Rahman, Hasan S, Noor R (2011) An Assessment of Microbiological Quality of Some Commercially Packed and Fresh Fruit Juice Available in Dhaka city: a comparative study 1: 13-18.
7. Al-Jedah JH, Robinson RK (2002) Nutritional Value and Microbiological Safety of Fresh Fruit Juices sold through Retail Outlets in Qatar. Pakistan Journal of Nutrition 1: 79-81.
8. Munjur Kader, Mamun AA, Islam T, Sultan N (2014) Biosciences Bacteriological analysis of some commercially packed and fresh fruit juices available in Jessore city: a comparative look 5: 415-420.
9. Tasnim F, Hossain MA, Hossain MK, Lopa D, Haque KMF (2010) Malaysian Journal of Nutrition. Quality Assessment of Industrially Processed Fruit Juices Available in Dhaka City, Bangladesh 16: 431-438.
10. Mahale DP, Khade RG, Vaidya VK (2008) Microbiological analysis of street vended fruit juices from Mumbai, city. Journal of Food safety 10: 31-34.