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Quality Evaluation of Different Brands of Grapes Juice Available in Local Markets of Peshawar City, Khyber Pakhtunkhwa, Pakistan

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Abstract – The present study was conducted to investigate the comparative physiochemical analysis and quality assessment of different commercial brands of grape juices available in the local market of Peshawar. Five samples were analyzed for physiochemical characteristics like total soluble solids, moisture, ash, pH, acidity, total sugars, reducing sugars and non-reducing sugars. Different commercial brands of grape juices were collected from the local market of Peshawar. It was observed that TSS of sample II was higher i.e. (16.3° brix) and sample III was found to have lower TSS i.e. (12.1 ° brix). Maximum moisture contents were observed in sample III i.e. (88.326%) and minimum moisture was observed in sample II i.e. (84.012%). Ash contents were observed higher in sample V (0.244%) and were lower in sample IV (9.6 x 10'6 %). pH was in the range of (2.51 to 3.01). Maximum pH was in sample V and minimum was in sample IV. Acidity of the samples was found higher in sample IV i.e. (0.6%) and lower in sample III i.e. (0.33%). Total sugars of these samples were found maximum in sample IV (18.69%) and were minimum in sample III (13, 74%), Reducing sugars was high in sample IV (18.48%) and lower in sample III (11.03%). Non reducing sugars were maximum in sample III (2.71 %) and minimum in sample I (0.16%). Highest TPC were found in sample I (25 cfu/ml). TCB and FCB were found in normal range in all samples. *E.Coli* were absent in all samples. .

Keywords – Physiochemical Analysis, Bacteriological Analysis, Consumer Health.

1. Introduction

A grape is a fruiting berry of the deciduous woody vines of the botanicalgenus described as *Vilis.* Grapes can be eaten raw or they canb eused for making jam, juice, jelly, wine, grape seed extract, raisins, vinegar, and grape seed oil. Grapes are a non-climacteric type of fruit, generally occurring in clusters. Grapes are also used in some kind of confectionary. Grapes are a type of fruit that grow in clusters of15 to 300, and can be crimson, black, dark blue, yellow, green, orange, andpink.White grapes are actually green in color, and are evolutionarily derived from the purple grape [1, 2]. Grape juice consists largely of water (81-86%), with a high concentrationbof the sugars glucose and fructose. It presents a high acidity due to the presence of tartaric, malic and citric acids. These acids cause a low pH value, guaranteeing balance between acidic and sweet tastes. About its mineral elements, a high potassium value and low sodium value are established [3, 4]. Among the bioactive, compounds present in grape juice phenolic components are of great importance because their characteristic are directly or indirectly related to the quality of the juice and enhance its color and astringency [5, 6]. Grapes are also rich in antioxidants such as anthocyanins, flavones, geranial, linalool, nerol and tannins. It is these antioxidants that scientists believe are responsible for protecting the body against many forms of cancer. Red grapes in particular. contain a compound called resveratol. Which has been demonstrated to reduce cholesterol and protect the heart. Fresh grape skin contains between 50 to 100 micrograms of resveratol per gram, depending on the variety of grape [7, 8]. Chemical preservatives are added to the food products to increase their shelf life. These preservatives are always food graded and these are used in the amount which is not harmful health. There are a number of chemical preservatives used in the food for the extension of their shelf life [9]. Grape fruit is one of the most important tree fruit. The storage life of grape fruit is limited. It is mostly consumed as fresh, but due to its perishable nature it is also processed to make juices [10]. This study was aimed to calculate different physico-chemical parameters in different brands of grape juice available in the local market of Peshawar. This study was initiated to analyze different commercial brands of grape juices available in the local market of Peshawar. These samples were investigated for physiochemical properties. The study was aimed to check the best suitable grape juice.

2. Materials and Methods

2.1. Physiochemical Analysis

Different commercial brands of grape juices were collected from the localmarketof Peshawar. These were labeled with laboratory code Nos. i.e. I, II, III, IV, V respectively. Moisture and Ash were determined by direct heating methods as reported in AACC (2000) [11]. Acidity was estimated by titrating diluted samples against 0.1 % NaOH according to the method as described in AOAC (2000) [12]. The pH was recorded on pH meter (Delta 320). The total soluble solids were directly recorded by digital Refractometer (Atago Rx-1000) and results expressed as soluble solids (°Brix) as described in AOAC (2000) [12]. Total and reducing sugar were investigated by Lane Eynon method as reported in AOAC (2000) [12]. Vitarnin-C (ascorbic acid) content of the samples was estimated by indophenols titrimetric method as described in AOAC (2000).

2.2. Total Viable Count

Total Viable Count was determined by pour plate method as described. Take 1 ml of the sample from the three dilutions (10-1, 10-2 and 10-3) and added to each duplicate Petri dish. Plate Count Agar ((PCA) was added to each Petri dish and incubated at 35 °C for 48 hours ±2, after incubation colonies were counted by Colony Counter and result was expressed as CFU/ml.

2.3. Total Coliform Bacteria/fecal Coliform Bacteria

The MPN of total coliforms bacteria were determined by multiple tube fermentation technique. Prepared separate sets of 10 tubes of Lauryl Tryptose Broth (LTB). Inoculate each set of 10 tubes of double strength LTB with 10 ml of the water sample. These LTB tubes along with inverted Durham tubes were incubated at 35 ± 0.5 °C for 24 and 48 ± 2 hrs after inoculation. Tubes were examined for gas production at the end of 24/48 hrs incubation. Gas production was measured by gas displacement in the inverted vial and also effervescence produced when the tube was gently shaken. Positive tubes with gas formation and turbidity were sub-cultured into BGB (Brilliant Green Lactose bile broth and E.C. Broth having 10ml broth with inverted Durham tubes by means of 3 mm loop. All BGB tubes were incubated at 35 ± 0.5 °C for 48±2 hrs and E.C. Broth tubes at 44.5±.01 °C for 24±6 hrs and examined for gas production. Total coliforms and fecal coliforms were calculated from MPN tables.

2.4. Escherichia coli O157:H7

EMB Agar was used for the enumeration of *E. coli*. All the tubes of E.C. broth showing gas were subcultured on EMB agar plates and incubated at 35 °C for 18-24 hrs. Positive plates contained typical colonies with green metallic sheen colour were inoculated on PCA slants (plate count agar) and incubated at 35 °C for 18-24 hrs and were identified biochemical and also by kits (*E.ColiO157:H7* latex test reagent kit Pro Lab. Canada).

3. Results and Discussion

3.1. Physiochemical Analysis

The results of the physicochemical analyses are given in Table. The results are also shown in graphs. It is evident that moisture content was found maximum in sample IIIi.e. (88.326%) and minimum in sample I and II i.e. (84.152% and 84.0 I 2%).Samples IV and V were found to have moisture contents with alittle difference i.e. (86.276% and85.634%). Higher moisture content is very important factor affecting the

Table 1. Physiochemical Analysis of Branded Grape Juices.

Parameters	Sample I	Sample II	Sample III	Sample IV	Sample V
TSS	15.5	16.3	12.1	14.0	14.1
Moisture %	84.15	84.01	88.32	86.27	85.63
Ash %	0.029	0.174	0.0396	9.8×10^{-6}	0.244
pH	2.66	2.78	2.83	2.51	3.01
Acidity %	0.56	0.42	0.33	0.6	0.47
Total Sugar %	15.50	17.25	13.74	18.69	13.06
Reducing Sugar %	15.34	17.05	11.03	18.48	13.06
Non Reducing Sugar %	0.16	0.2	2.71	0.21	1.71

Table. 2 Microbiological Analysis of Branded Grapes Juices

Parameters	Sample I	Sample II	Sample III	Sample IV	Sample V
Total Plate Count (cfu/ml)	25	7	6	2	4
Coliform Bacteria (MPN/100ml)	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1
Fecal Coliform Bacteria (MPN/100 ml)	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1
E. Coli	Nil	Nil	Nil	Nil	Nil

Table. 3 WHO Standards of Drinking Water

S#	Bacteriological parameters	WHO Standards
1	Total Plate Count (CFU/ml)	<100
2	Total Coliform Bacteria (MPN/100ml)	<1.1
3	1. Total Fecal Coliform Bacteria	<1.1
4	2. Escherichia Coli (O157: H7)	Nil

flavor of juices. The products having high moisture content have minimum shelf stability. Ash content shows different minerals present in the food products. The ash of given grape juice samples were ranged from (9.6 x 10-^{6}% to 0.244%). Maximum ash content was found in sample V (0.244%) and minimum was found in sample IV (9.6x 10-^{6}%). The variations in ash contents of these samples may be due to the different formulations of each manufacturer. pH was recorded in the range of (2.51 to 3.01). pH was higher in sample V (3.01) and lower in sample IV (2.51). The higher pH values may be due to the loss of acidity. Sample I, II and III have pH values (2.66, 2.78 and 2.83) respectively. TSS of sample II was higher (16.3 °brix) and sample III was lower (12.1 °brix). The TSS of sample I, IV and V were (15.5, 14.0 and 14.1 °brix) respectively. Acidity of grape juice was found higher in sample V (0.6%) and lower in sample III (0.33%). Acidity of sample I, II and V were (0.5625%,0.42%and0.4725%) respectively. Total sugars of these samples were in the range of (13.74% to 18.69%). Sample IV showed the highest sugar (18.69%) and sample III showed the lowest sugar (13.74%). Reducing sugar was higher in sample IV (18.48%) and lower in sample III (11.03%). Non reducing sugar was higher in sample III (2.71 %) and lower in sample J (0. 16 %).

3.2. Microbial Analysis

The bacteriological analysis of the grapes juice results are presented in Table 2. The highest TPC were found in sample I (25 cfu/ml), followed by 7 cfu/ml, 6 cfu/ml, 2 cfu/ml, 4 cfu/ml. These juices were fit for human consumption according to the WHO standards. TCB were found less than 1.1 MPN/100ml in all samples. The samples were fulfilling the WHO standards for TCB and also for TFCB <1.1MPN/100ml. *Escherichia coli O157:H7* were absent in all samples. According to microbial point of view all samples were fit for dinking purposes

4. Conclusion

From the study it is concluded that grape juice sample No I was found to be most acceptable on the basis of physiochemical investigation for daily usage. Sample No III was observed of low quality physiochemicaly. Microbial analysis falls in the range of WHO standards, and observed fit for human consumption.

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