

Comparison of different commercial fruit beverage characteristics in Iran

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Abstract

In this study, it was aimed to measure the physico-chemical characteristics of six kinds of Iranian commercial fruit beverage in cloudy cherry, apple, pineapple, mango, orange and grape that were obtained from local store. In this samples mean value for pH, total sugar, fat, calcium and phosphorus, total solid and total soluble solid content was 3.32, 8.26%, 0, 0.03%, 0.05%, 14.5 %, and 16.40 % respectively.

Key words: fruit beverage, chemical properties.

Introduction

Fruit juice is a popular beverage in the world. Generally in juice processing, initially fruits are milled which is subsequently extracted or pressed and a cloudy liquid obtained. This liquid is clarified, screened and then pasteurized. (Zarate-rodriguez and Ortega-Rivas, 1999). Historically, the consumption of fruit juices began with usage of orange juice, due to prevent scurvy, as a source of vitamin ascorbic acid. Today markets are flooded with different kinds of juices: apple, guava, mango, litchi, pineapple, grape, etc. The key reason for increased usage is raising level of health awareness and changing people lifestyles. They believe that these products provide valuable nutrition. Child preference, convenience, easy availability, and naturalness that have given fruit juice and drink industry a booming growth. (Gupta and Gupta, 2008). According to Codex Alimentations Commission, Fruit juice is the unfermented beverage but fermentable product that produced from the edible part of sound, fresh fruit and appropriately matures. Also some product may be processed with seeds, pips and peel, which is not generally incorporated in the product, but some parts of seeds, pips and peel, which cannot be omitted by Good Manufacturing Practices will be acceptable. The beverage is produced by suitable processes, which preserve the essential nutritional, chemical, physical and organoleptical characteristics of the

juices of the vegetable and fruit from which it comes. The juice may be clear or cloudy and may have restored volatile flavour and aromatic substances, all of them must be prepared from the same kind of fruit. Fruit juice is produced in two ways: the first directly expressed by mechanical extraction processes, and the second, Fruit juice from concentrate that made by mixing concentrated fruit juice with water, also Fruit purée may be used in the preparing of fruit Juices. It is the unfermented but fermentable food stuff obtained by processes include grinding, sieving, milling the edible part of the fruit without eliminating the juice. The fruit juices shall have the characteristic aroma, color and flavor of juice from the same fruit from that it is made. (Codex standard, 2005). According to American Academy of Pediatrics (AAP) fruit juice defines as natural or 100% concentrate without addition of sweetening agent. Anything less than 100% concentrate is known as beverage, cocktail or drink (AAP, 2001). Fruit beverages are defined as sweetened calorically drink with a low content of fruit juice or juice flavoring with carbonated water (Pompkin et al, 2006). Fruit drinks have less than 20% concentrate and may be fortified with nutrient such as calcium or vitamin C. Fruit beverage, even 100% juice is not equivalent to natural and whole fruits because Fruits supply phytochemicals and fibers to diet, that are removed in juices. Fruit drinks are thought to be valuable and suitable source of minerals. If fruit drinks consumed by children in optimum level, can be an important part of balanced diet. Different studies have shown that presence of flavonoids and vitamin C in juices have beneficial health effects such as decreasing the risk of heart disease and cancer (Ames, 1998). Vitamin C by increasing absorption of iron to about double can reduce the anemia in population with low iron content in its diet (Hollman et al, 1996). This product is perceived as a nutritious, all day beverage, wholesome and is gaining in popularity and use with high increase in sales in recent years. Therefore the aim of this was compare of the physicochemical characteristics properties of some different commercial beverages in Iran.

Material and Methods:

Material

Randomly selected different stores located in Tehran and different kind of fruit beverage include apple , pineapple , mango ,peach ,cherry and orange were obtained from local store. Sampling of each product was down according to International standard number 326.

Methods:

The pH value of samples was measured using pH meter .PH , titratable acidity ,moisture , protein and ash was measured according to the method of international standard . national standars number for grape , apple , pineapple , mango,cherry and orange is1624, 365,10241,10554, 6801 and 507.Calcium and phosphors was measured according to AOAC, 1990.

Data Analysis

Data collected from the aforementioned study samples were analyzed based on 0.05% coefficient of error by a software program. The data analysis was performed using MINITAB statistical software, release 14.2 (MINITAB Inc., state college, PA and USA). At first such software program proved samples normal conditions and then the significant difference among data was precisely studied via Anova – one – way test and p-value was determined.

Results and Discussion

Table 1 and 2 shows the levels of physic –chemical properties of different commercially beverage include cherry, mango, Pineapple, orange, grape and apple. Acidity is a key factor of beverage and juices, and is also easily determined. Acidity of the beverage has an influence on taste and mouth feel of the product. Very high acidity may render the product unpleasant and too sharp and on the other hand if the acidity is very low, the beverage will lack freshness. Between the samples cherry drink show the highest acidity content (1.21%) and statistical measurement showed significant deference between cherry with other samples ($p \leq 0.05$). Acceptable limit in international standard for acidity has shown in table 1 and according to this standard all of the samples were acceptable. Pilo et al in 2009 repoted that the acidity of the orange and grape juice varied from 0.40 to 1.40% , and from 0.40 to 1.02 % , respectively , that was agreed with this result .The different kind of acidity that governs this protection is the pH that shows the level of H⁺ ions in a product. The pH is referring to the different reactions that occur in the solution. These two factors are different: the pH define as inverse logarithmic scale it means if pH is reduced by 1 part, the H⁺ concentration is multiplied by 10 (Jolicoeur, 1997) . Fore the samples the min value of pH was 3.32 and statistically

all of them were similar ($p \leq 0.05$), However the lowest pH refer to cherry that was drink 2.98 It means cherry drink has more sour taste than other beverage. Also according to standard all of the samples were suitable. The beverage in this study showed pH values similar to those found by other studied. Pilo et al in 2009 found that The pH of the orange and grape juice varied from 2.94 to 3.85, and from 2.85 to 3.95, respectively. Adou et al ,2012 reported that pH and acidity of apple juice was 4.4 , 0.6 . Also Zarate-Rodroguez et al ,1999 and Carvlho et al , 2011 both of them reported that acidity of apple juice was 0.5 % . El-Faki and Eisa, 2010, approved that pH of cherry was about 3% that was agreed with our study. Akhter et al, 2010, found that acidity of mango juice was about 0.15 % that was lower than this result. The pH and acidity of pineapple beverage of this study was similar to the results found by Lee, 2005 that was 0.47%, 3.75 respectively. Generally beverage are fat free or has low level of fat, in this study all of samples were far free. The average level of protein content was 0.33 % and it varies between 0.23 5 to 0.50 5 and statistically were different ($p \leq 0/05$). The protein content of beverage was low; of course, this product isn't main source of protein. Total solid (TS) define as weight of whole solids component include organic or inorganic and suspended or dissolved per unit volume of water that generally measured by the evaporation of a determined volume of water at 105 C up to reached the constant weight .TS content in different beverage range from 10.30 5 to 17.32% that refer to Pineapple and mango respectively , it means mango beverage was more concentrated than another samples .Comparison of this parameter shows a significant variation ($P < 0.05$) between the samples . According to inter national standard the lowest level for TS for cherry, pineapple and apple is 12.5%, and for orange and grape is 10.5 % and 15.5% respectively, therefore all of samples except pineapple sample was according to inter national standard . Akhter et al , 2010 ,reported that Ts of mango juice was about 15 % .Adou et al ,2012 aproved that TS of apple juice was about 9 % that was lower than this study. Lee , 2005 has observed that TS content of pineapple juice was 13.64 % that was little higher than our result .Refract index directly show transparency and directly refer to total solid. Refract index of all samples statistically were similar and its ranged was 1.352 (pineapple)and 1.3653(cherry).Costescu et al ,2006 reported that Refract index of orange juice was 1.347 , that was similar with our study. Total sugar content of the entire sample statistically was similar ($p \leq 0/05$), and its min value was 8.26 % .Total sugar for pineapple and mango was 7.31 5 and 9.42 % respectively. According to the international standard minimum percent of total sugar for pineapple and mango is 12 % and 11 5 respectively and therefore both of them not acceptable, but another samples were in acceptable range. Akhter et al , 2010 ,found that total sugar of mango juice was about 12 % that was higher than our result. Higher content sugar reductant related to mango beverage and this difference with

other samples was significant ($p \leq 0/05$). According to international standard at least level for sugar reductant for mango and grape juice are 3.5 % and 13 % respectively and so both of this samples not acceptable. Akhter et al , 2010 ,reported that reductant sugar of mango juice was 2.32 % that was very lower than our result .Carvalho et al , 2011 , found that reductant sugar of apple juice was 12.5 % that was higher than this result .In relation to soluble solids (Brix), a relative wide range of variation was found and statistically analysis show significant difference ($P < 0.05$).The highest Brix refer to cherry that was 19.54 % and the lowest related to mango beverage that was 12.40 % .The high content of total soluble solids found in cherry is possibly due to the addition of high level sugar in excess to the beverage, because cherry in nature has sour taste. According to international standard the lowest acceptable Brix for mango is 13.5 % , in term of Brix, mango beverage not acceptable, but other samples are in the acceptable range. Akhter et al , 2010 ,reported that Brix of mango juice was 15.5 % that was higher than our study. Pilo et al in 2009 found that the Brix of orange and grape juice varied from 4.93 to 17.45 and from 9.8 to 17.06 ° , respectively. Adou et al, 2012 and Zarate-Rodrigues et al, 1999 reported that Brix of apple juice was 10 % and 12 % respectively , El-Faki and Eisa, 2010, approved that Brix of cherry was 13%, Also Lee , 2005 found that Brix of pineapple juice was 9 % that all of them were a litter lower than this study .Mango beverage has significant higher ash content than other samples ($p \leq 0/05$) and it was 0.81% .According to national standard all of samples was in acceptable range. Adou et al ,2012 reported that ash content of apples juice sample was 1.5%, that was very higher than this study and also higher than international standard .Calcium is an important mineral in the human life, necessary for suitable growth and firmness of the teeth and skeleton ,as well as muscle and nerve..The min value of Calcium and Phosphorous was 0.03 % and 0.05 % receptively and all of them were similar.

Conclusions

This study showed the physico-chemical properties of commercial fruit beverages in Iran.

This product has nutritional potential of this fruit such as ash , organic acids, sugar and dry matter. Juices showed a significant difference in all measured factors that related to natural of fruit

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Table 1: physicochemical properties of fruit beverage

Properties (%)	cherry	Cherry standard	mango	Mango standard	Pineapple	pineapple standard
Total solid	14.00±2.42 ^b	Min 12.5	17.32±1.40 ^a	-	10.30±3.12 ^b	Min 12.5
pH	2.98±0.01 ^a	2.6 -3.7	3.31±0.00 ^a	Max 3.7	3.45±0.12 ^a	3-4
Refract index	1.3653±0.00 ^a		1.358±0.01 ^a		1.352 ±0.00 ^a	-
Acidity	1.21±0.05 ^a	0.4 -1.5	0.32±0.01 ^b	0.25 – 0.5	0.41±0.01 ^b	0.3 -0.5
Fat	0.00	0.00	0.00	0.00	0.00	0.00
Protein	0.27±0.04 ^a	-	0.41±0.03 ^a	-	0.50±0.01 ^a	-
Ash	0.54±0.03 ^b	0.1-0.6	0.81±0.05 ^a	-	0.17±0.01 ^b	0.1-0.3
Calcium	0.01±0.00 ^a	-	0.04±0.00 ^a	-	0.07±0.01 ^a	-
Phosphorous	0.03±0.00 ^a	-	0.07±0.00 ^a	-	0.08±0.00 ^a	-
Brix	19.54±3.01 ^a	Min 12	12.40±3.61 ^b	Min 13.5	12.70±1.90 ^b	-
Total sugar	8.03±0.89 ^a	-	9.42±1.60 ^a	Min 11	7.31±1.53 ^a	Min 12
Sugar redaction	5.91±0.23 ^b	Min 3.5	7.92±0.15 ^a	-	6.22±0.26 ^b	Min 6

Table 2: physic- chemical properties of fruit beverage

Properties (%)	orange	orange standard	grape	grape standard	Apple	Apple standard
Total solid	13.5±0.91 ^b	Min 10.5	17.00±1.07 ^a	Min 15.5	14.90±3.70 ^b	Min 12.5
pH	3.18±0.01 ^a	2.8 -4	3.19±0.03 ^a	2.8 – 3.8	3.81±0.00 ^a	3.2-4.2
Refract index	1.3615±0.01 ^a	-	1.355±0.01 ^a	-	1.360±0.02 ^a	-
Acidity	0.61±0.03 ^b	Min 0.5	0.65±0.03 ^b	0.35 – 1.2	0.41±0.01 ^b	0.2 – 0.5
Fat	0.00	0.00	0.00	0.00	0.00	0.00
Protein	0.26±0.02 ^a	-	0.23±0.01 ^b	-	0.32±0.05 ^b	-
Ash	0.33±0.01 ^b	0.2-0.5	0.21±0.03 ^b	0.2-0.3	0.31±0.02 ^b	0.2 -0.35
Calcium	0.03±0.00 ^a	-	0.02±0.00 ^a	-	0.04±0.00 ^a	-
Phosphorous	0.06±0.00 ^a	-	0.05±0.00 ^a	-	0.05±0.01 ^a	-
Brix	18.71±3.12 ^a	Min 10	14.5±3.05 ^b	-	19.01±1.09 ^a	Min 11
Total sugar	7.12±0.99 ^a	-	8.17±2.64 ^a	-	9.52±2.61 ^a	-
Sugar redaction	5.72±0.71 ^b	Min 3.5	6.80±1.01 ^b	Min 13	8.11±0.87 ^{ab}	Min 8