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QUALITATIVE COMPARISON BETWEEN FRUIT BASED CARBONATED SOFT DRINKS AND COMMERCIALLY AVAILABLE SOFT DRINKS

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ABSTRACT

The present study was conducted to determine and compare the quality parameter of nine (3 cola and 6 non-cola) commercially available carbonated soft drinks with the developed aonla based carbonated fruit drink. Aonla juice was extracted, filtered and used to prepare sugar based fruit syrup. This fruit syrup with TSS (0 Brix) of 50% was used to prepare carbonated drink. The amla syrup (60 ml) was further carbonated at 60-100psi pressure CO_2 gas and sealed. The samples were analysed for physico-chemical, nutritional and caffeine content. It was found that the drinks were acidic. Vitamin C was found to be absent in commercial drinks whereas in aonla drink contained 267.93 mg/100 ml of vitamin C. Total, reducing and non reducing sugars were found to be more in aonla based drink. Regarding minerals it was found that as compared to commercial carbonated drinks aonla drink is richer in copper, calcium, potassium and low in sodium and phosphorus. Caffeine was present in all the commercial drinks ranging from 15.25 to 2.17 mg/100ml but was absent in aonla fruit drink. Hence , it can be concluded that there is need to popularize nutritionally superior aonla based carbonated beverage as a better substitute for commercial carbonated beverage.

Key words : *Carbonated soft drink, aonla, qualitative assessment.*

Soft drinks are today's trend or much better one can call them 'fashion'. For many people, nothing is more refreshing than a bottle or can of their favorite soft drink. Huge increases in soft drink consumption have not happened by chance, they are due to intense marketing efforts by soft drink co-operations. India cannot be excluded from the growing storm of trend of soft drink consumption and production. The cold drink sector in India is a much bigger money spinner than the bottled water segment.

(1) reported the consumer's habits and practices regarding the consumption of carbonated soft drinks. They described that soft drinks are purchased in impulse. Though the market is marred by brand loyalty, the purchase decision itself is a low involvement decision. This attitude of impulse buying is slowly changing to occasion led buying and also to some extent to consumption through home refrigeration particularly in urban areas. Availability in chilled form affects the purchase decision the purchase decision.

Soft drinks are usually consumed for refreshment and enjoyment not for nutritional value but they do have value. They are a significant source of essential water in the diet. Many people who consume soft drinks on the job or while travelling may have limited choice of safe or appealing liquid alternative. Soft drink supply quick energy in the form of readily absorbable carbohydrates (sugars) which can be valuable to athletes and those with calorie deficient diet. Soft drinks have often provided much needed relief to victims of flood and natural disasters who have no clean source of water for drinking or preparing meals (2).

Carbonated soft drinks make no nutritional claims. They do not contain vitamin, minerals or fiber. Lots of soda pop means lots of sugars means lots of calories. Heavy soft drink consumption also co-relates with low intake of magnesium, ascorbic acid, riboflavin and vitamin A as well as high intake of calories, fat and carbohydrates. Several additives in soft drinks raise health concerns. Caffeine, a mildly addictive stimulant drug is present in most cola and some orange sodas and other products. (3) has detected pesticides residues in commercial soft drinks and found that non-cola drinks especially Fanta and Mirinda had pesticidal residues of organophospheric and organochloric pesticides. As stated by (4) the most commonly associated health risks are obesity, diabetes and other blood sugar disorders, tooth decay, osteoporosis and bone fractures, nutritional deficiencies, heart diseases, food addictions and eating disorders, neurotransmitters dysfunction from chemical sweetness and neurological and adrenal disorders from excessive caffeine. It is a fact that carbonated soft drinks provide enormous amount of

Table-1 : Physico-chemical Characteristics of commercially as well as aonla based carbonated soft drinks

S. No.	Carbonated Soft Drinks	pH	TSS (%)	Titratable acidity (%citric acid)	TSS/ acid ratio
		mean	mean	mean	mean
Commercial					
1. Cola type products					
	A	2.8	5.0	0.343	14.57
	B	2.5	5.4	0.254	21.26
	C	2.5	5.0	0.179	28.14
2. Non-Cola Type products					
(a) Orange flavored					
	A	2.8	9.2	0.254	36.16
	B	2.7	13.0	0.178	73.17
(b) Cloudy Lime					
	A	2.9	10.4	0.217	47.78
	B	3.0	6.0	0.193	31.68
(c) Clear Lime					
	A	3.4	7.0	0.280	23.74
	B	3.2	6.8	0.218	31.09
Aonla Based	3.0	15.70	0.256	61.32	

Values are the mean of samples in triplicates.

Table-2 : Nutritional Composition of commercially as well as aonla based carbonated soft drinks

S. No.	Carbonated Soft Drinks	Vitamin C (mg/100ml)	Total sugar (g/100 ml)	Reducing sugars (g/100ml)	Non-reducing sugars (g/100ml)
		mean	mean	mean	mean
Commercial					
1. Cola type products					
	A	-	11.36	9.97	1.38
	B	-	8.34	6.3	2.04
	C	-	10.84	9.34	1.50
2. Non-Cola Type products					
(a) Orange flavored					
	A	-	15.55	13.40	2.15
	B	-	14.63	13.41	1.22
(b) Cloudy Lime					
	A	-	9.77	8.75	1.02
	B	-	12.54	11.44	1.10
(c) Clear Lime					
	A	-	10.87	9.67	1.20
	B	-	10.52	9.08	1.43
Aonla Based		267.93	16.36	15.29	1.07

Values are the mean of samples in triplicates

sugars and calories to world that does not meet the national goal and that is experiencing diseases.

Time is ripe for total integration of food processing and waste utilization to make the processing eco-friendly. Strengthening of post-harvest agro food system through viable food chain establishments can be one of potential factors for the economic progress of India. The “rainbow revolution” in the aftermath of the green and white revolution stresses on the need to conserve the vast resources of fruits and vegetables with emphasis on the reduction of post harvest losses. Fruit juices occupy a unique position among those products classified as beverages. Being a source of energy, vitamins and minerals, juices are not only indispensable for the maintenance of health but also considered as the beverages for refreshment which quenches thirst and encourages liquid intake. The commercial viability of fruit juices in the preparation of carbonated drinks is practically limited. Inclusion of a fruit juice in soft drinks will not only impart its characteristics color, taste and aroma but also obviates use of synthetic additives and has some nutritional value. If fruit juices are added to these sweetened aerated waters, they not only impart nutrition but there is no need of synthetic additives. It may provide some more diversification to the soft drinks. Finally one could think of a new product development through carbonation in the form of a natural health drink which would also serve as appetizer. Juicy fruits like amla can be successfully transformed into drinks. Such fruits are both refreshing and thirst quenching and are bound to cool stomach, tongue, set homes and offices tingling.

Aonla, because of its highly acidic and astringent nature, the consumers do not relish this fruit in fresh form. Therefore, aonla juice for the preparation of carbonated fruit based drinks could be thought to be a convenient alternative for utilization of these fruits. Looking to the scenario of commercially carbonated soft drinks and its adverse consequences on health, there is a great potential scope to develop some fruit based carbonated soft drinks which have commercial viability. Therefore, the study was carried out to assess and compare the physico-chemical and nutritional quality of commercial carbonated soft drinks with fruit based carbonated soft drinks.

MATERIALS AND METHODS

Procurement of commercially available Carbonated Soft Drinks : Nine commercial soft drinks beverages were purchased from the market and segmented as cola products (3) and non-cola products (6). Under non cola drinks they were further classified into : (a) Orange flavoured, (b) Cloudy lime, (c) Clear lime.

Table-3 : Mineral Content (mg/100ml) of commercially as well as aonla based carbonated soft drinks

S. No.	Carbonated Soft Drinks	Iron	Copper	Zinc	Phos-phorus	Sodium	Potass-ium	Calcium
		mean	mean	mean	mean	mean	mean	mean
1. Cola type products								
	A	0.022	0.065	0.021	21.85	3.59	5.25	4.62
	B	0.078	0.076	0.022	12.82	6.21	5.61	5.91
	C	0.025	0.073	0.030	11.45	8.02	2.81	7.56
2. Non-Cola Type products								
(a) Orange flavored								
	A	0.044	0.080	0.022	18.37	3.79	4.07	2.63
	B	0.028	0.071	0.011	15.55	2.64	5.63	3.69
(b) Cloudy Lime								
	A	0.073	0.074	0.011	8.42	15.51	1.09	11.62
	B	0.074	0.065	0.010	9.46	18.63	2.53	12.90
(c) Clear Lime								
	A	0.087	0.062	0.025	5.27	18.54	0.683	14.65
	B	0.118	0.068	0.218	6.77	19.98	1.68	15.23
Aonla Based		0.71	2.73	0.044	11.34	2.75	124.4	31.23

Values are the mean of samples in triplicates.

In order to prepare the samples for analysis, CO_2 gas was removed by pouring the carbonated soft drinks from one beaker to another till the effervescence ceased.

Development of Fruit based carbonated soft drink : Aonla fruits were procured from the local market in a single lot to avoid any varietal difference. The fruits were cleaned to make them free from dust, dirt, washed and dried. The juice was extracted and filtered. The juice was used to prepare sugar based fruit syrup. This fruit syrup with TSS (0 Brix) of 50% was used to prepare carbonated drink. The amla syrup (60 ml) was further carbonated at 60-100psi pressure CO_2 gas and sealed. The developed drinks were analyzed for physic- chemical and nutrient composition.

Carbonation and Bottling

The desired amount (60 ml)of aonla syrup were poured into the previously sterilized and clean glass bottles (250 ml) and then filled with the chilled carbonated water and sealed by crown corking.

Carbonation was done with an automatic machine named carbonater-cum-crowner. Carbonation was done by incorporating carbon dioxide gas through a cylinder containing carbon dioxide under high pressure (60psi, 3 ½ volume). To increase the solubility of CO2 in water, the water in the storage tank was cooled before the start of bottling operation. At 60 pounds per sq.inch and 400 F approximately 3 ½ vol. of CO2 gas was dissolved by one volume of water. The commercial carbonated soft drink and Aonla based carbonated soft drink samples were subjected to following quality characteristics :

- **Physico-chemical characteristics :** The samples were analysed for pH, Titratable acidity, TSS and TSS/ Acid ratio.
- **Nutritional Composition :** The samples were analysed for total, reducing and non-reducing sugars using methods as described by (5) and vitamin C content as given by (6). Under minerals, phosphorus was determined colorimetrically by the method of (7), iron, zinc and copper by atomic

Table-4 : Caffeine content (mg/100ml) of commercially as well as aonla based carbonated soft drinks

S. No.	Carbonated Soft Drinks	Caffeine content mean
Commercial-		
1. Cola type products		
	A	15.25
	B	10.14
	C	9.39
2. Non-Cola Type products		
(a) **Orange flavored**		
	A	7.59
	B	7.88
(b) **Cloudy Lime**		
	A	5.69
	B	5.54
(c) **Clear Lime**		
	A	1.05
	B	2.17
Aonla Based		

Values are the mean of samples in triplicates

absorption spectrophotometer according to the method of (8) and Sodium, potassium and calcium by flame photometer.

- **Caffeine estimation :** The commercial carbonated drinks were analyzed for caffeine content by the method as described by (9).

Statistical Analysis

All the determination was made in triplicates. All the data were analyzed for mean, critical difference and analysis of variance using completely randomized design (CRD).

RESULTS AND DISCUSSION

Physico-chemical characteristics : Table-1 furnishes the information regarding pH of commercially as well as fruit based carbonated soft drinks. It can be inferred from the table that all the carbonated drinks irrespective of commercial or aonla based were highly acidic. The TSS (total soluble solids) varied a lot ranging from 5.0 to 10.4 0 brix in commercial carbonated whereas in aonla drink it was 15.70 brix.

Nutritional Composition : It can be seen from table 2 that all the commercial drink lacked vitamin C whereas anola based drink was very rich in vitamin C content (267.93mg/100ml). It can be noted that aonla is a rare fruit which is rich in stable form of vitamin C. Total, reducing and non-reducing sugars were however less in commercial drinks as compared to aonla drink. Total sugars of commercial drink ranged between 8.34 to 15.55 gm/100ml whereas in aonla drink it was 16.36gm/100ml. Reducing and non reducing sugars in commercial varied between 6.30 to 13.41gm/100ml and 1.02 to 2.15 gm /100ml whereas in aonla drink it was 15.29 and 1.07 gm/100ml respectively. It is true that aonla drink is providing more sugars than the commercial ones. More sugars means more calories but one must also not forget that the aonla carbonated drink have been made from aonla syrup (50% TSS) and also that this fruit drink is contributing other nutrients also which commercial ones do not provide.

Regarding minerals it can be inferred from the table 3 that as compared to commercial carbonated drinks aonla drink is richer in copper, calcium, potassium and low in sodium and phosphorus.

Caffeine Content : Caffeine occurs naturally in a variety of beverages and foods. Caffeine can cause nervousness, irritability, sleeplessness and a rapid heartbeat. Excess caffeine has been shown to increase bone calcium loss. From table 4 it can be clearly seen that caffeine was present in all the commercial drinks ranging from 15.25 to 2.17 mg/100ml but was absent in aonla fruit. Data also depicts that the brands of cola products are more caffeinated than non- cola products. Caffeine has adverse effect on health. It can cause insomnia; behavioral problem etc. In aonla drink caffeine was absent thus making this drink more nutritious and healthier.

CONCLUSION

It can be conclude that fruit based carbonated soft drinks are superior to commercial carbonated soft drinks. They are rich in minerals, vitamin especially vitamin C and other nutrient. Fruit based carbonated drink is beneficial in the form of a natural health drink, which would also serve as appetizer. This can also turn out as an enterprise.

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