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## NUTRITIONAL ASPECTS AND SENSORY ANALYSIS OF HEALTH DRINK CONSUMPTION IN INDIA

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The most vital attributes of any product are the sensory properties, as they are most apparent to the consumers. The current study focuses on nutritional aspects, descriptive statistics and sensory analysis of organoleptic properties of five popular drinks in India. The drinks under analysis for their organoleptic properties, i.e., taste, smell, color and flavor are Lassi, Almond-milk, Carbonated soft drinks, Lemon water and Cappuccino. Sample selected by random sampling was subjected to descriptive analysis by various descriptive tools including mean, standard deviation, variance, skewness and kurtosis. As observed from the results of sensory analysis and descriptive statistical evaluation of data, overall best rating along with best taste and flavor was bagged by carbonated soft drink. Owing to the above results, it can be considered that the over-consumption of energy-dense nutrient-poor foods are likely to contribute to overweight and obesity among young generation, it is a matter of concern.

**Keywords:** Health drinks, Sensory analysis, Organoleptic evaluation, Young consumers

### INTRODUCTION

In a diversified country like India, the concepts of health and energy have never been as popular as they are now. Across international markets it has been seen that the growth of the middle class has driven the uptrend in food industry, particularly, health beverages. The significant combination of scientific concepts and traditional knowledge of the natives, as well as the increasing consciousness of consumers, prompted to look for some natural and beneficial health drinks. Lassi is considered as a popular traditional yogurt based drink, digestive, nutritive and useful in gastrointestinal ailments. According to an estimate 2144 million kg of lassi is being produced in India annually (Steinkraus, 1996). The presence of high amount of probiotic bacteria imparts an additional medicinal value to lassi, besides being a rich source of healthy fatty acids (Madhu

*et al.*, 2013). Almond-milk is considered as a potent source of antioxidants, able to neutralize free radicals in the body. The presence of vitamin E, folic acid and many phenolics such as catechin, protocatechnic acid and prenylated benzoic acid makes almond a valuable nut (Subashinee *et al.*, 2002). Regular use of nuts in the diet can be associated to reduce the risk of certain diseases including cancer and diabetes (Pinelo *et al.*, 2004).

Carbonated soft drinks containing carbonated water, sweetener, colorings and preservatives are very popular among the people. Sugar sweetened soft drinks are a common source of sugar and energy, but provide no other nutritional value other than fluid- so called 'empty' calories (Jacobson, 2005). The over-consumption of carbonated and sugar-sweetened soft drinks is associated with obesity, type 2 diabetes, dental caries and low nutrient levels (Malik

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*et al.*, 2006; Vartanian *et al.*, 2007; Woodward *et al.*, 2010; and Imamura *et al.*, 2015). Lemon water promotes good health due to the presence of many bioactive compounds, such as hydrocinnamic acid, ferulic acid, cyaniding glucoside, flavonoids, Vitamin C, carotenoid, hesperidin and naringin content (Xu *et al.*, 2008). Citrus residues are attractive source of natural antioxidants because of their important crop, with production estimated at 80 million tons per year (Moure *et al.*, 2001; Hayat *et al.*, 2010; and Li *et al.*, 2006). The main uses of citrus in food industries include fresh juice or citrus based drinks (Roy *et al.*, 1996). Coffee is one of the major sources of antioxidants and this activity is related to the presence of chlorogenic, ferulic, caffeic and n-coumaric acids in it (Nicoli *et al.*, 1997). In the present study an attempt has been made to explore the preferences of young consumers for organoleptic properties of drinks that are sweet lassi, almond milk, carbonated soft drink, lemon water and cappuccino.

## MATERIAL AND METHODS

The ingredients for drink preparation like curd, sugar, almond, milk, coffee, carbonated soft drinks, lemon and cocoa powder were purchased from local market.

Random sampling technique was followed for selecting a sample size of 105 candidates of age group 17-21 years. Served the candidates with various drinks prepared as follow.

### Preparation of Health Drinks

**Lassi:** 5 kg of curd was churned with a wooden churner for about 2-3 minutes until smooth and lump free. Added 100 gm of sucrose and 2500 ml of chilled water, churned again for a couple of minutes to get froth and a homogeneous suspension that was served.

**Almond-Milk:** 1 kg of soaked almonds were blended on high speed for 15 minutes along with 300 ml of pure water. The almond milk was strained through a couple of layers of cheese cloth into a bowl and honey was added as a sweetener, chilled and served.

**Carbonated Soft Drink:** The carbonated beverages were purchased from the local market and served chilled.

**Lemon Water:** In 1000 ml of water added 7.5 ml lemon juice, 30 gms. of sucrose and 5 gms. of black salt. Stirred for 2 minutes with a hand blender, served chilled.

**Cappuccino:** 1000 ml of semi-skimmed milk was heated up to 90 °C-95 °C. In a separate jar a smooth paste of coffee powder and sugar was made by continuous stirring with

few drops of hot water. Poured the hot milk into the jar and stirred till homogeneity. Cocoa powder was sprinkled on top.

## Organoleptic Properties and Sensory Analysis

In the current study, four organoleptic properties considered for sensory analysis were taste, fragrance, color and flavor. Young candidates of age group 17-21 years participated in the research process. The sensory analysis was based on a 5 point hedonic scale, excellent being 1<sup>st</sup> point and poor being the 5<sup>th</sup> point. The preferences specified by each candidate for various organoleptic properties of different drinks were plotted and represented in graphical form. Further interpretation of the results was done to stumble on the utmost preferred drink by the young candidates.

## RESULTS AND DISCUSSIONS

Descriptive statistical analysis was performed for organoleptic properties including, taste, fragrance, color and flavor of lassi, almond milk, carbonated soft drink, lemon water and cappuccino. As also supported with studies by Sweetman *et al.* (2008) who performed a study in children aged 9-12 years using a scale of "Desire to Drink" (DD) in order to measure differences in the quantity and frequency with which children chose several beverages (water, sweetened soft drinks, low-calorie soft drinks, fruit squash, fruit juice and milk).

The results of descriptive analysis for sensory analysis of organoleptic properties were generated through SPSS. The obtained values, particularly the mean, are represented in the Tables 1-4. Sensory analysis was performed by voluntarily selecting 105 candidates, aged between 17-21 years on 5 point hedonic scale, with point 1 for excellent and point 5 for poor. Similar studies were done by Sweetman *et al.* (2008) in which children were presented with a list of drinks and were asked to indicate how much they liked each of them by ticking the appropriate box on a 5-point response scale ('I hate it', 'I don't like it', 'It's ok', 'I like it', 'I love it'). Liking for sweetened soft drinks (e.g., Coca Cola), fruit juice (100% pure), fruit squash (cordial), milk, and water was recorded.

The values of sensory analysis were plotted as histograms that concluded to the fact that carbonated soft drink has an excellent taste and excellent flavor. The obtained results were in agreement with those of Grimm *et al.* (2004) who reported an increase of soft drink consumption in

**Table 1: Descriptive Statistics for Taste of Drinks**

	Lassi	Almond-Milk	Carbonated Soft Drink	Lemon Water	Cappuccino
Mean	2.781	2.4476	3.8667	3.2952	2.6381
Std. Deviation	1.36566	1.36566	1.23309	1.25517	1.44198
Variance	1.865	1.865	1.521	1.575	2.079
Skewness	0.198	0.551	-0.557	-0.282	0.365
Std. Error of Skewness	0.236	0.236	0.236	0.236	0.236
Kurtosis	-1.097	-0.988	-0.382	-0.882	-1.241
Std. Error of Kurtosis	0.467	0.467	0.467	0.467	0.467

**Table 2: Descriptive Statistics for Fragrance of Drinks**

	Lassi	Almond-Milk	Carbonated Soft Drink	Lemon Water	Cappuccino
Mean	3.5333	2.5143	3.4667	3.4762	1.9905
Std. Deviation	1.28652	1.20985	1.36626	1.24881	1.25954
Variance	1.655	1.464	1.867	1.56	1.586
Skewness	-0.338	0.448	-0.413	-0.519	1.078
Std. Error of Skewness	0.236	0.236	0.236	0.236	0.236
Kurtosis	-1.139	-0.784	-1.045	-0.675	0.041
Std. Error of Kurtosis	0.467	0.467	0.467	0.467	0.467

**Table 3: Descriptive Statistics for Color of Drinks**

	Lassi	Almond-Milk	Carbonated Soft Drink	Lemon Water	Cappuccino
Mean	3.019	2.0762	3.8762	3.9048	2.1238
Std. Deviation	1.17654	1.13252	1.15771	1.02398	1.32066
Variance	1.384	1.283	1.34	1.049	1.744
Skewness	0.179	0.901	-0.967	-0.737	1.07
Std. Error of Skewness	0.236	0.236	0.236	0.236	0.236
Kurtosis	-0.806	0.136	0.202	-0.075	-0.015
Std. Error of Kurtosis	0.467	0.467	0.467	0.467	0.467

children from 8 to 13 years old. Lassi and Lemon water have excellent smell and excellent color respectively. The maximum overall rating for best organoleptic property by the candidates was given to carbonated soft drink followed by lemon water, lassi, almond-milk and cappuccino. Though almond-milk and coffee have several health benefits but

their organoleptic properties are least preferred by the consumers. The overall maximum favored drink by the young candidates is carbonated soft drink, despite of the fact that if consumed in higher amount it leads to ill-health consequences including obesity, type 2 diabetes, metabolic syndrome, osteoporosis and dental caries. Similar results

**Table 4: Descriptive Statistics for Flavor of Drinks**

	Lassi	Almond-Milk	Carbonated Soft Drink	Lemon Water	Cappuccino
Mean	3.1143	2.3238	3.8286	3.4	2.3048
Std. Deviation	1.36095	1.32647	1.27443	1.1897	1.28694
Variance	1.852	1.76	1.624	1.415	1.656
Skewness	-0.071	0.566	-0.637	-0.439	0.706
Std. Error of Skewness	0.236	0.236	0.236	0.236	0.236
Kurtosis	-1.179	-0.919	-0.95	-0.726	-0.571
Std. Error of Kurtosis	0.467	0.467	0.467	0.467	0.467

have been observed in a study performed according for the National Health and Nutrition Examination Survey, showing that the average consumption of regular carbonated beverages increases from childhood to young adolescence for both sexes, as observed by Storey *et al.* (2006). The results also agree with those of Vereecken *et al.* (2005), who found that older pupils (15 years) consumed higher amounts of soft drinks than younger pupils (11-13 years).

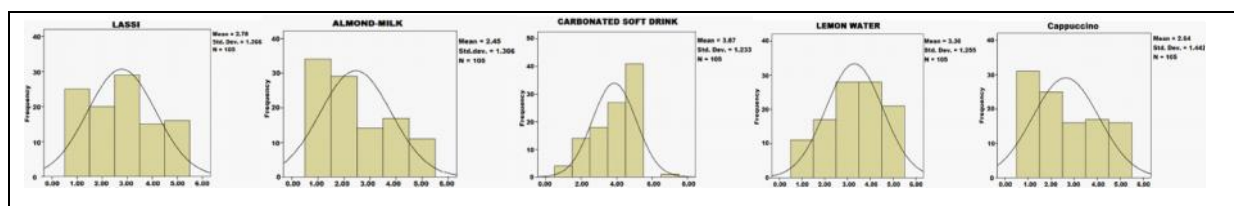
Table 1 represents the results of various statistical tools applied to the data under analysis with relevance to Taste of drinks, i.e., Mean, Standard Deviation, Variance, Skewness and Kurtosis.

Table 2 represents the results of various statistical tools applied to data under analysis with relevance to Fragrance of drinks, i.e., Mean, Standard Deviation, Variance, Skewness and Kurtosis.

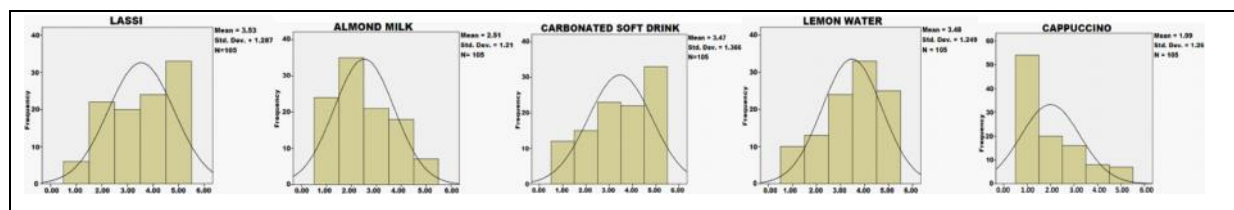
Table 3 represents the results of various statistical tools applied to the data under analysis with relevance to Color of drinks, i.e., Mean, Standard Deviation, Variance, Skewness and Kurtosis

Table 4 represents the results of various statistical tools applied to the data under analysis with relevance to flavor of drinks, i.e., Mean, Standard Deviation, Variance, Skewness and Kurtosis.

**Figure 1: Sensory Analysis for Taste of Drinks (Note: X-Axis Shows the Frequency of Rating for Taste and Y Axis Shows the Sample Mean)**

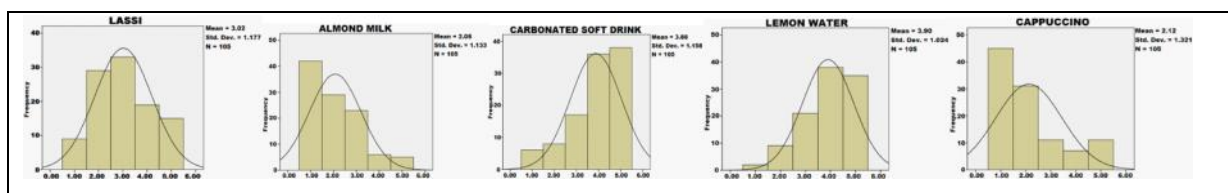


**Figure 2: Sensory Analysis for Fragrance of Drinks (Note: X-Axis Shows the Frequency of Rating for Fragrance and Y Axis Shows the Sample Mean)**

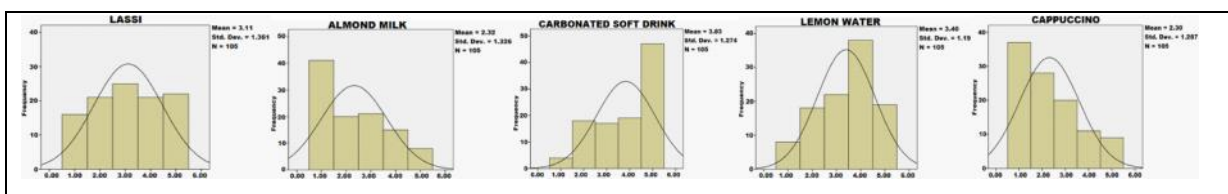




**Figure 3: Sensory Analysis for Color of Drinks (Note: X-Axis Shows the Frequency of Rating for Color and Y Axis Shows the Sample Mean)**



**Figure 4: Sensory Analysis for Flavor of Drinks (Note: X-Axis Shows the Frequency of Rating for Flavor and Y Axis Shows the Sample Mean)**



## CONCLUSION

After reviewing all the results, current study concludes to the fact that according to the descriptive statistics of sensory properties of popular drinks in India, the carbonated soft drink has overall excellent rating and is most preferred by the youngsters. This study also reveals that taste and mouth feel sensations are the main factors influencing the preference to choose a particular drink. Moreover, there is a need for formulation of strategies to reduce soft drink consumption among youngsters as its over-consumption is a matter of national concern due to the ill health consequences of soft drink consumption.

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