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RESEARCH ARTICLE

FORMULATION OF NANNARI BASED NUTRIENT RICH SOFT DRINK

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ABSTRACT

Most people consume soft drink for refreshment and quenching thirst. There are many types of soft drinks available in market whose common ingredients are normal water or carbonated water, sweetener, flavoring agents, caffeine, coloring agent and preservative. Since these soft drinks have very low nutritional density and younger generations are addicted to these soft drinks, hence in this investigation we have developed a soft drink with Nannari and lemon as main ingredient. Total seven variants were formulated by using Nannari, lemon, glucose and flavoring agents like vanilla or chocolate. All the variants were subjected for the sensory analysis subsequently obtained data was analyzed by SPSS software version 12. Results of sensory analysis revealed that SET3 and SET6 are the two best formulated soft drink. Formulated soft drinks approved by panelist member were subjected for the nutrient analysis in which protein, Vitamin C and few mineral content such as Na, K and Ca were analyzed. Both the variant SET3 and SET6 approved by panelist member were vanilla flavored but SET6 contained double the concentration of Nannari compaitive to SET3.

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INTRODUCTION

Soft drinks are the most popular one especially among the youth as younger generations are addicted to soft drink. Many soft drinks contain caffeine, and it is mildly addictive, this is also one of the reasons that younger generation get addicted to soft drink. Health experts do not favor consumption of such drinks because of many side effects caused by soft drink like tooth decay (Ran Cheng *et al.*, 2009), weakening of bones, a combination of the symptoms such as high blood pressure, obesity, high cholesterol and insulin resistance (Vanishree *et al.*, 2012). In spite of so many side effects, at present soft drinks dominate both the domestic and international market. Hence in this present study nutrient dense soft drink has been developed with the main ingredients as Nannari syrup, lemon and glucose. Nannari or Indian sarsaparilla (*Hemidesmus indicus*) belongs to family apocynaceae. It is a perennial climbing plant which is native to India and also found in south tropical country such as Pakistan and Sri Lanka. Nannari is commonly used as the main ingredient in the preparation of the cool and refreshing drink Nannari sherbet. Nannari is well known medicinal plant used for antioxidant and anti inflammatory diseases, apart from these, plant also has been traditionally used for the treatment of biliousness, respiratory disorders, eye diseases, epileptic fits in children, kidney and urinary disorders, loss of appetite and burning sensation etc. (Mahsa Zarei *et al.*, 2013). Nannari sherbet is also act as natural coolant for body and also regular intakes of Nannari reduces the burning sensation in stomach and also act as blood purifier. In this present study an attempt has been made to develop a soft drink using Nannari as a main ingredient so the product should have more health benefit instead of side effect. To develop this product various combinations of base ingredient and flavoring agent like chocolate and vanilla were made and sensory analysis is done with the 51 volunteer. This soft drink is rich in protein, Vitamin C and few minerals like Ca, Na and K.

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MATERIALS AND METHODS

Collection of sample

Nannari syrup, Lemon, glucose and flavouring agent (chocolate and vanilla) were purchased from a local market of Vellore (Tamil Nadu). The raw material was stored at room temperature (35 ± 2 °C) for further use.

Preparation of soft drink

Seven combinations were formulated using base ingredient Nannari, lemon, glucose and flavoring agent chocolate or vanilla essence. The test variants were named as SET-1, SET-2, SET-3, SET-4, SET-5 and SET-6 and control sample was named as SET-7. The SET-1, SET-2 and SET-3 were included in one group (Group-A) and the SET-4, SET-5 and SET-6 were included in another (Group-B). Group A contains the same concentration of nannari, while the concentrations and addition of flavoring agent varied. Similarly in Group –B the concentration of nannari was constant but differ then the group-A while the concentration and addition of flavoring agents varied.

Sensory evaluation

Sensory attributes such as Aroma, Color, Taste, Flavor, Sweet, Lime flavor, Freshness, Mouth fell and overall flavor were evaluated using 6 point hedonic scale (where 1=Excellent, 2=Good, 3=Fair, 4=Moderate, 5=Neutral and 6=awful) by 51 volunteer (gender: women-10 and Men-41). Questionnaires and water for mouth rinsing between each testing were provided. Volunteer were asked to read through the questionnaires and the meaning of each questions were explained to the panellists to avoid any misinterpretation prior to evaluation. Samples were randomised. A session was held to familiarize volunteer with the product. The obtained data from sensory analysis were subjected for analysed by SPSS software version 12 for windows.

Nutrient analysis

On the basis of sensory analysis best product were selected for nutrient analysis. Besides protein and few mineral content (Na, K, Ca), Vitamin C was analyzed for the samples approved by the volunteer.

Vitamin C estimation

Analysis of Vitamin C was done by 2, 6-Dichloroindophenol Titrimetric method (Jorg Angritin 2002). For the analysis 5ml of the working standard solution of ascorbic acid was pipette out into a 100 ml of conical flask and 10 ml of 4% oxalic acid solution was added to it and titrated against the dye to pink color end point lasting at least for 10 sec. In similar way test sample were diluted to final volume using 4% oxalic acid solution and the same procedure was repeated.

Protein estimation

Protein content of the sample was estimation by Biuret method (Sam K.C. Chang 2002). 5 ml of Biuret reagent is mixed with 1ml of sample, and after standing at the room temperature for 25 min the absorbance is read at 540 nm against a reagent blank and a standard curve of concentration versus absorbance is constructed using bovine serum albumin (BSA) and based on the standard graph the amount of protein in the sample was estimated.

Calcium estimation

Calcium content of the sample was estimated by complexing calcium with EDTA. 2.5 gm of dried calcium carbonate was dissolved in 50 ml of 3N HCL. Standard solutions containing 2.5, 5, 7.5 and 10 mg of calcium were used to prepare the standard curve. pH was adjusted to 12.5 to 13 by adding KOH and KCN solution (dissolved 28g KOH and 6.6 g KCN in 100 ml of H₂O while stirring with magnetic stirrer) and added 100 mg of ascorbic acid and about 250 mg of hydroxynaphthol blue indicator followed by titration of the standard solution as well as test solution immediately with 0.001M EDTA solution. The end point is in this titration was deep blue. Based on the standard curve the amount of calcium in test sample was calculated.

Sodium and Potassium estimation

Sodium and potassium content of the solution was determined by the Flame photometry method. Sodium potassium stock solution (1000mg/L) was successively diluted further with double distilled water to have a series of working standard solution of 25, 50, 70 and 100 ppm. Similarly 5 ml of test solution were taken and diluted to final volume using double distilled water. Then the series of working standard solution and test solution were aspirated into the flame photometer and emissions readings are noted. Based on the standard graph concentration of sodium and potassium were estimated.

Statistical Analysis

Data obtained from sensory analysis was analyzed by SPSS software version 12 for windows. The data represented as mean score (average score of acceptance) for each variant. To determine the difference between mean score one way analysis of variance (ANOVA) was used for all sensory attribute at $p \leq 0.005$.

RESULTS AND DISCUSSION

Results of sensory evaluation by volunteer are summarized in Table 1. The data shows average likeness of the different combination with respect to Aroma, color, taste, flavor, sweetness, lime flavor, freshness, mouth feel and overall flavor. Mean scores ranges of all attributes were evaluated, lesser the mean score higher the acceptability of product as hedonic scale varies, 1=Excellent, 2=Good, 3=Fair, 4=Moderate, 5=Neutral and 6=awful.

Aroma

Smell is an integral part of taste and general acceptance of the food before it is put in to the mouth. It is therefore an important parameter when testing acceptability of formulated foods product. Results of sensory evaluation indicated that smell of some variants varied significantly while some variants have same smell. Outcome of sensory evaluation suggest that SET4 and SET6 is most accepted in terms of smell whose score of acceptance is almost equal (SET4-2.6863 and SET6-2.6667) followed by SET3 at 2nd best position with average score of acceptance 2.5882.

Taste

Taste is an important parameter when evaluating sensory attribute of any kind of food product. The product might be appealing and having high energy density but without good taste such product is likely to be unacceptable. So based on sensory evaluation outcome indicate that SET6 is most accepted with the average score of acceptance 2.6275 followed by SET4 and SET1 as second choice which average score of acceptance does not varies significantly. Clustered graph of taste analysis has been depicted in Figure 1.

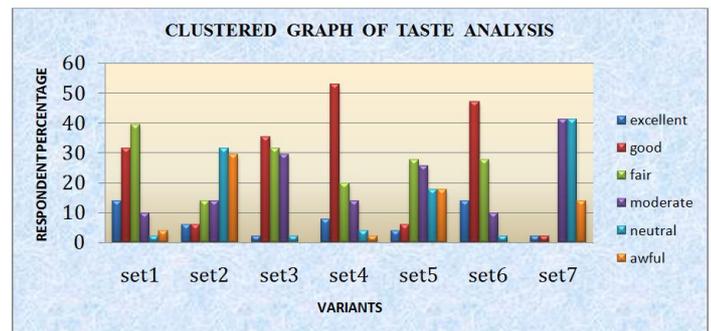


Figure 1. Taste analysis of different formulated variant

Sweetness

Sweetness is one of the basic tastes and it is almost universally regarded as a pleasurable experience. It is therefore an important parameter when testing acceptability of formulated foods product. Results of sensory evaluation indicated that sweetness of certain variants varied significantly from others while some of variants having same taste even though the amount of glucose added in all the variants were same. This might be due to difference in concentration of nannari or flavoring agent. Result revealed that SET6 is mostly liked by volunteer with average score of acceptance 2.8627 where as SET3 and SET4 is second best choice in terms of sweetness which has equal average score of acceptance. Sweetness analysis of different variant is depicted in Figure 2.

Table 1. Mean score of different attribute for different variants.

	Aroma	Taste	Flavor	Sweet	Lime Flavor	Freshness	Mouthfeel	Overall Flavor
SET1	3.0000	2.6667	2.9608	3.4902	2.5882	2.7843	3.2549	3.0980
SET2	4.0980	4.4706	4.2941	4.1176	4.1176	3.8824	4.4118	4.5098
SET3	2.5882	2.9412	3.0196	2.9216	3.8235	2.2353	3.0588	3.0980
SET4	2.6863	2.5882	2.5882	2.9216	2.5294	2.7647	2.6471	3.0196
SET5	4.5686	4.9804	4.1176	4.0588	4.2549	4.1961	4.4314	4.1569
SET6	2.6667	2.3922	2.6863	2.8627	2.9020	2.9020	3.0392	2.7255
SET7	4.7451	4.5882	4.9216	3.3529	4.6863	4.0392	4.2549	4.7059

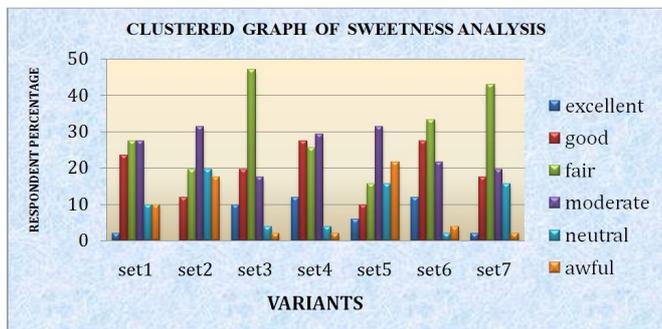


Figure 2. Sweet analysis of formulated variant

Lime Flavor and Freshness

Lime flavor is an integral part of taste and general acceptance of this soft drink while freshness is an important attribute of soft drink because most of people consume soft drink as refreshing agent. Outcome of sensory evaluation indicate that lime flavor of SET1 and SET4 is the most liked by panelist member with the average score of acceptance almost equal (SET1=2.5882, SET4=2.5294) followed by SET6 as 2nd best with the average score of acceptance is 2.9024 While SET3 is mostly rated for freshness by panelist member with average score of acceptance 2.2353 followed by SET1 and SET4 as 2nd best with average score of acceptance almost equal (SET1=2.7843, SET4=2.7647).

Mouth feel and Overall flavour

Result of sensory evaluation indicate that the SET4 is highly rated by volunteer for mouth feel among all the formulated variants with average score of acceptance 2.6471 followed by SET3 and SET6 as second preference and does not have significance difference in average score of acceptance (SET3=3.0588, SET6=3.0392), while SET6 is highly liked by panelist member for overall flavor with average score of acceptance 2.7255 followed by SET1, SET3 and SET4 which has average score of acceptance almost equal (SET1=3.0980, SET3=3.0980, SET4=3.0196) and does not show significant difference. Flavor analysis of all the formulated variants has been depicted in Figure 3.

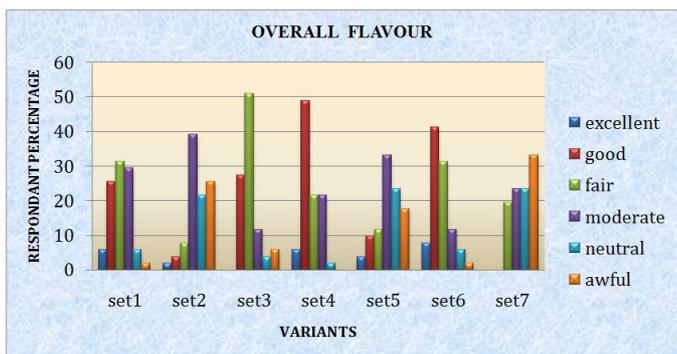


Figure 3. Overall flavour analysis

Nutrient analysis

Based on the overall statistical analysis of all the variants SET6 and SET3 was subjected to nutrient analysis because SET6 and SET3 were mostly rated by volunteer as first and second preference respectively. Besides protein and vitamin C, few mineral content such as Na, K, Ca of this variants were analyzed by standard procedure. The Table 2

shows the proximate composition of protein, Vitamin C, Sodium, Calcium, and Potassium. The protein, sodium and potassium content of the SET6 are almost double to the SET3 which may be attributed to the increase in the concentration of Nannari.

Table 2. Nutritive value of SET3 and SET 6

	SET6 (mg/100ml)	SET3 (mg/100ml)
Vitamin C	4.15±0.03	3.87±0.18
Protein	52±0.24	25±0.10
Sodium	18.5±0.28	10.2±0.30
Potassium	34±0.17	16.8±0.22
Calcium	18.5±0.19	18.7±0.09

Conclusion

Based on overall statistical analysis of all attributes SET6 was mostly preferred by volunteer and SET3 as second preference. Both of them were vanilla flavored. Result of this study has revealed that addition of vanilla flavor has increased the acceptance of formulated drink as compared to other variants more over formulate drink is rich in nutrient like protein, Vitamin C and mineral such as Na, Ca, K etc. Further investigation is required on this drink to optimize the concentration of flavoring agent.

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