



ISSN: 2456-0057
 IJPNPE 2019; 4(2): 187-190
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 www.journalofsports.com
 Received: 01-05-2019
 Accepted: 05-06-2019

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Product development, nutrient and sensory analysis of sports drink based on chia seeds (*Salvia hispanica L.*)

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Abstract

The paper headline stated the Nutrient and Sensory analysis of sports drink using salvia seeds, cucumber (*Cucumis sativus*), pomegranate (*Punica granatum*) and dextrose are directed. The aim is to prepare the sports drink for electrolyte replenishment of an individual. Hydration is the main concern after physical activity, Sports drink is an acidic drink and essential for an athlete to recover the depletion of electrolytes after the consumption. This promotes athlete's replenishment of electrolytes as well as rehydration, sugar and other nutrients that are depleted after intense training or performance. Drink is formulated by using fruit juices and dextrose powder with the flavoring of mint leaves & pink salt and incorporation of chia seeds of different ratio in each sample. Pomegranate juice and cucumber juice procures minerals especially potassium and sodium, even natural color and flavor benefited for the enhancement of performance. The decision of adding seeds in the drink due to comprising good amount of carbohydrates and antioxidants. Drink was conceived according to the hypertonic drink. Sensory and Nutrient evaluation of the developed product is examined. Sensory evaluation studies is based on hedonic scale. In the evaluation, all the samples including standard product is perceived by the trained subjects and filled the forms according to hedonic 9 points. Product with the incorporation of 4 grams of chia seeds named sample B was most acceptable as compared to sample A and sample B with 2 grams & 6 grams of chia seeds because of the good taste, texture, aroma, color and flavor. Nutritional analysis was based on AOAC laboratory method in opal research lab, located in Ghaziabad. The evaluation revealed each samples and standard consisting certain amount of nutrient and sugar content. Comprising 15 grams of sugar makes them hypertonic drink. Most acceptable drink contains 101.75 mg of sodium, 44.58 mg of potassium. This product is good for replenishment of electrolytes and for the recovery after performance.

Keywords: Sports drink, chia seeds, performance, electrolytes, endurance, sodium

1. Introduction

Sport drink is a functional drink created to promote rehydration of an individual, sugars content and electrolyte replenishment with various nutrients that worned out after difficult and hard performance & activity. The popularity between people regarding sports drink due to it contains good amount of electrolyte which upgraded individual's performance. They protect to sustain individual's body steady and accommodate fluid in the great number ^[1]. For the sportsperson, nutrition is an essential component for thier exercise and performance. In training, recovery, and performance the right balance among energy intake and energy demands is crucial therefore nutrition plays a vital role. Macronutrient and micronutrient are very essential to make the body work. After heavy exercises or performances an athlete loose electrolytes level and water by sweating and loss of electrolytes and liquid content from the body causes dehydration ^[7].

a. Chia seeds

Chia seeds (*salvia hispanica L.*) is an annually grassy plant which is classified under the Lamiaceae (Mint) family of flowering plant ^[8, 9].

1.1 Health benefits of chia seeds

These seeds is explored with the suggestion because of its advanced gradation of protein (that can help in losing weight and drastically decrease appetite and cravings), vitamins, protein, antioxidants and important micronutrients are essential to build strong, dense bones

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those are minerals and calcium [11]; because of oil present in seeds consist of more amount of omega 3 fatty acid with the comparison with other real sources as known [12]. Seeds comprise more amounts of antioxidants which promote to save the fragile fats in it [13].

b. Cucumber: Cucumber (fruit) a widely farmed plant in the family of gourd, cucurbitaceae [25].

1.2 Health benefits of cucumber juice: Cucumber is very good fruit for the consumption for athletes due to its mineral content of potassium, magnesium, and phosphorus mainly. Potassium is too supportive for clearing carbon dioxide in the blood, triggers the work of muscles and nerves and regulates osmotic pressure with sodium. Cucumber is also beneficial as a detoxification because the water content in cucumber is in very high amount up to 90% make cucumber contain diuretic effect [26].

c. Pomegranate: Pomegranate with botanical name *Punica granatum*, is a fruit bearing deciduous shrub.

1.3 Health benefits of cucumber juice: Pomegranate (*punica granatum* L) contains considerable amount of sugars, acids, vitamins, polyphenols and important minerals [30]. It provides a rich source of polyphenol and mineral such as potassium, sodium, iron, copper [31]. Pomegranate helps to treat and prevent diseases risk factor of high level of cholesterol & blood pressure, imbalance of free radicals, inflammatory activities or antioxidant status [32].

d) Dextrose: Glucose is a simple carbohydrates also named as dextrose with having molecular formula $C_6H_{12}O_6$. Glucose is most essential source of energy [42]. It consist 25% less sugary than glucose but it's not involving with either lactose or fructose.

1.3 Health benefits of dextrose: It comprises glycemic index (GI) with high rating which indicated that it implant the bloodstream very easily & quickly and is bearable by majority of an athletes with basic blood sugar reactions. Thereby dextrose makes energy easily available for muscle to work or promotes to preserve the storage of glycogen. It showed by an athletic performance possibility hence, it can advantage fuel intense training, for maintaining endurance exercise, and helps to recover from exercise [43].

2. Material and Methodology

The product was innovated being a research study that included as a section of program 2019, M.Sc (sports nutrition and dietetics) in "Manav Rachna International Institute of Research and Studies, Faridabad".

The sports drink formulated by using juice of pomegranate, cucumber, chia seeds and dextrose [15, 25]. The analysis of sports drink for proximate principles like carbohydrate, protein, energy. Also analysis of minerals like sodium, potassium was performed by using standard laboratory method. The effects of sports drink on endurance events of the athletes were studied.

In all 4 variations of sports drink were made. The composition is given in the table below-

Table 1: Composition of standard and variants of sports drink

Standard	Variation A (1%)	Variation B (2%)	Variation C (3%)
10 ml of pomegranate and cucumber juice mixed in equal proportions with 15 grams of dextrose and plain water added upto 200ml	2 Gms of chia seeds added to the standard	4 Gms of chia seeds added to the standard	6 Gms of chia seeds added to the standard

2.1 Sensory evaluation: The sensory analysis refers as proficient regimentation employed to instance, scale, examine and translate the responses of features of product making and equipment that are recognized by tasting, smelling, touching, hearing and sighting and loco motoring the reaction produced through it.

It was supervised by the panel of 50 semi trained subject. All the variables has been computed on the basis according to the 9-point scale of hedonic, through the 9 "like extremely" to "dislike extremely". The results were tabulated and statistically showed through IBM SPSS software.

2.2 Nutrient evaluation: The product is tested to know the amount of nutrient is present. The nutrient evaluation of sports drink for Total energy, protein, potassium, sodium, sugar and carbohydrates were performed using standard laboratory method.

3. Result and Discussion

The product is only valuable if the taste and physical attributes are right and acceptable by the masses. Hence the test sports drinks were directly compared to the standard. All the attributes *viz*, colour, consistency, taste and over all acceptability were given equal weightage and their mean scores were calculated for further analysis. Variation C with 6 gms of chia seeds was less acceptable with a significant

difference followed by Variation A, Variation B and Standard (S) for all the attributes. The dislike for Variation C was primarily due to the bitter taste and high consistency owing to the water absorption quality of chia seeds making the juice little thick. Mean Scores for Standard (S), Variation A and Variation B Sports drink were very similar in terms of color, consistency, odor and full admission through an insignificant difference. More amount of involvement of the seeds bearable about 4 grams in 200 ml juice (2% conc.).

This is the functional drink frame worked for promoting sportsperson hydration level even the electrolyte replenishment and other important nutrients which is decreased through tough competitions & trainings. Keeping this to mind the consequence of electrolytes, the necessity of energy recovery and the antibacterial property, all leading to an enhancement in the performance of the athletes. The developed sports drink was hypertonic with 15g of sugar. The content of minerals and nutrients were studied. Sports drink with the carbohydrate content helps increasing abdomen precipitating, improving the consumption of fluid and even gives potential to muscle to work. The developed drink contains a very small amount of protein as compared to other nutrients.

Sensory analysis with 50 panel members using 9 point hedonic scale is systemized.

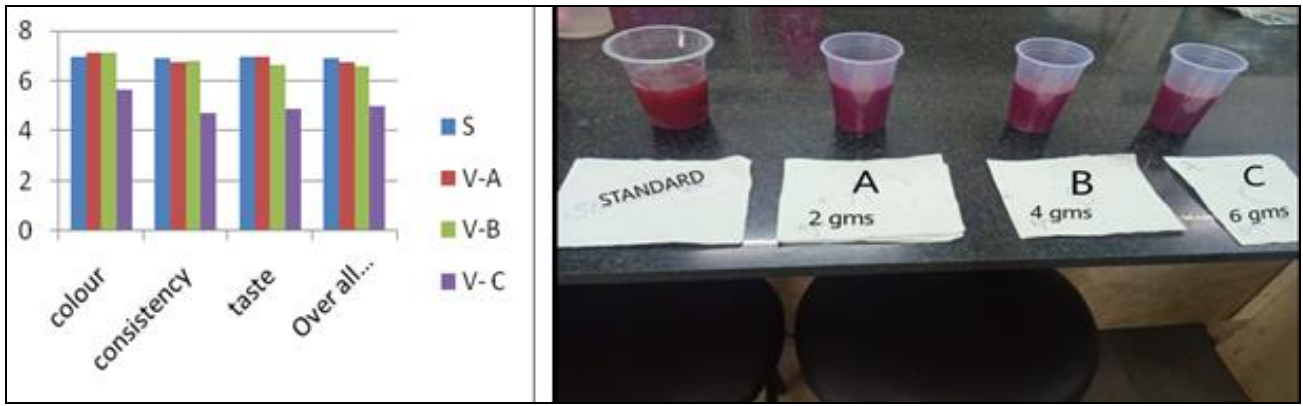


Fig 1: Sensory analysis of sports drink variants with standard

Nutrient analysis studied the fact that chia seeds added to the nutritive content of drink significantly. Addition of 2 gms, 4 gms and 6 gms of chia seeds enlarged the nutritive content in terms of energy, proteins, potassium, sodium, and sugar, carbohydrates significantly ($p < 0.05$) as stated in the graphs

below. The drink with 4 gms of chia seeds which is acceptable provides 0.6gms of proteins, 3.38 grams of carbohydrate which provides good instant nutrition to an athlete.

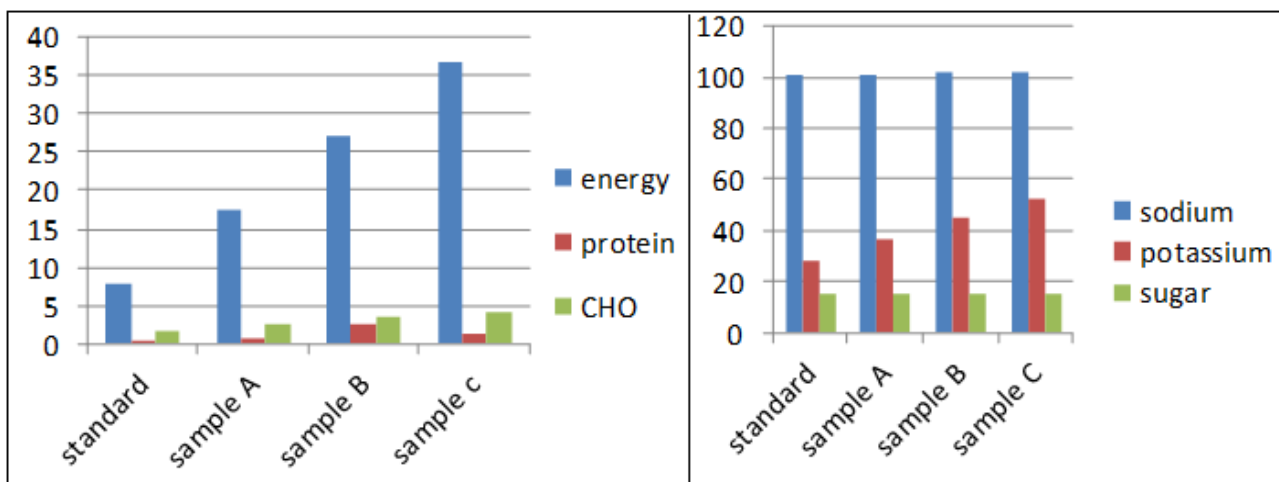


Fig 2: Nutrient Analysis of sports drink variants with standard

“Sports drinks” benefited for replenishment of electrolytes which can be finished by lot of sweating. Electrolytes lost through sweating mainly comprise of sodium, potassium, calcium and chloride. The NA in the baverage subscribed to good taste and also encourages consuming for replacement of goods which exhaust by sweating. Potassium affects aids muscle contraction and heartbeat.

4. Conclusion

This study aim was to develop the sports drink made by pomegranate juice, cucumber juice, dextrose and different ratios of chia seeds and some mint leaves juice and pink salt in the developed drink. “sports drink” can also be of carbohydrate loading, protein consumption, electrolytes replacement and many others drinks are commercialized for the requirements of an individual or athletes needs. The study has been done to evaluate the enhancement of endurance performance and replacement of electrolytes which reduce after the training session. In this chapter, the amount of sugar was 15 grams as per the hypertonic drink comprises 8 grams of sugar per 100 ml in the form of carbohydrate. Hypertonic drink is the solution which comes up with energy intake and can be consumed after the exercise session because of instant energy and fulfillment of electrolytes in the body. It digested further slowly than water in the body. Examination of the sensory evaluation (Taste, Appearance, Aroma, Color,

Overall Acceptability) of the product. Also the nutrient analysis by AOAC lab method in which amount of carbohydrates, protein, sugar, potassium, sodium and energy are checked in every sample. For a sports drink to be influenced, it should hold good amount of carbohydrate, electrolytes and be optimally consumed. By the resultant acquired the sports baverage formulated with the juices of pomegranate & cucumber, dextrose with the addition of 2gms, 4gms and 6gms of chia seeds proved to be an innovative drink. Consumption by subjects of samples, 2gms of chia seeds and 4gms of chia seeds was good in taste and scored highly in sensory analysis with the comparison of 6gms of chia seeds drink sample. Sample C scored less in evaluation of sensory and standard product didn’t contain any incorporation ratio of chia seeds. After the sensory assessment all the samples were checked by laboratory method and perceived the nutrients value of them including standard product. It’s also enriched the juice with omega 3 fatty acids, calcium, phosphorus and fiber but also did not change the sensory qualities. Here upon, most of the addition of 4 gms of salvia seeds in the sports drink was well tolerated. It contained 27.24 kcal of energy, 0.86 gms proteins, 44.58mg potassium and 101.75 mg sodium in 200 ml of juice along with other essential electrolytes & minerals (Especially sodium and potassium).

5. References

1. Vaibhavi V Gujar, Bhakti V Gala. Product Development, Biochemical and Organoleptic Analysis of a Sports Drink. IOSR Journal of Sports and Physical Education (IOSR-JSPE). 2014; 1(4):01-05. e-ISSN: 2347-6737, p-ISSN: 2347-6745.
2. Ersoy N, Ersoy G. Sports drinks for hydration and alternative drinks review *Turkiye Klinikleri J Sports Sci.* 2013; 5:96-100.
3. Snell PG, Ward R, Kandaswami C, Stohs SJ. Comparative effects of selected non-caffeinated rehydration sports drinks on short-term performance following moderate dehydration. *J Int. Soc. Sports Nutr.* 2010; 7:28
4. *Journal of Food Science.* 2014, Article ID 241053, 5 pages, <http://dx.doi.org/10.1155/2014/241053>
5. Sandoval-Oliveros MR, Paredes-Lopez O. Isolation and characterization of proteins from chia seeds (*Salvia hispanica* L.), *Journal of Agricultural and Food Chemistry.* 2013; 61(1):193-201.
6. Segura-Campos MR, Ciau-Solis N, Rosado-Rubio G, Chel-Guerrero L, Betancur-Ancona D. Chemical, Functional Properties of Chia Seed (*Salvia hispanica* L.) Gum. *International Journal of Food Science,* 2014. Article ID 241053, 2014, 5. <http://dx.doi.org/10.1155/2014/241053>
7. Martínez-Cruz O, Paredes-López O. Phytochemical profile and nutraceutical potential of chia seeds (*Salvia hispanica* L.) by ultra-high performance liquid chromatography. *J Chromatogr A.* 2014; 1346:43-8. Doi: 10.1016/j.chroma.2014.04.007
8. Raechel Love Joy. Kinds of Cucumber Plants. www.sfjate.com/kinds.cucumber-plants-22327html, 2015.
9. Kholish N. Lifetime smoking Hypertension with Herbal Therapy. Yogyakarta: Real Book, 2011.
10. Vardin H, Fenerctoglu H. Study on the development of pomegranate juice processing technology: Clarification of pomegranate juice. *Nahrung.* 2003; 47:300-3.
11. Heyn B. *Ayurveda: The Indian Art of Natural Medicine and Life Extension*, Healing Art Press, Rochester, Vermont, 1990, 178.
12. Aviram M, Rosenblat M, Gaitini D, Nitecki S, Hoffman A, Dornfeld L *et al.* Pomegranate juice consumption for 3 years by patients with carotid artery stenosis reduces common carotid intima-media thickness, blood pressure and LDL oxidation. *Clin Nutr.* 2004; 23(3):423-33. Pmid: 15158307.
13. Domb Abraham J, Kost Joseph. Wiseman, David. *Handbook of Biodegradable Polymers.* 1998; 2(4):275. ISBN 978-1-4200-4936-7
14. Dextrose powder–energy production* by the site of NOW®
15. Darla Leal. Pomegranate juice and muscular strength. Medically reviewed by a board-certified physician | Updated April, 2019, 13.
16. Stephen daniells. Watermelon-pomegranate juice show athletic benefits:study.06-jun-2017- last updated, 2017
17. Sara. Sports drink replacement: cucumber lime electrolyte refresher, 2014.
18. Les. Cucumber lime infused water (Tbb hydration challenge). 2017, 8.
19. Dave. Chia Fresca / Iskiate – A Natural Chia Seed Energy Drink (5 Minutes, Vegan), 2015.
20. Runonveg. DIY “Gatorade” Chia Fresca, 26, 2015.
21. Ginger with spice. Cucumber Pomegranate Vodka Lemonade + Mocktail Version, 2018.
22. Willow Arlen. Will Cook For Friends-cooking, baking & the pursuit of jastiness. Cucumber & Mint Mojito – Summer In A Glass, 2016.
23. Cheyanne. Cucumber & Raspberry Mojito. August 4, 2016. Last Updated. 2017, 6,
24. Lalaine. Cucumber Lime and Chia Fresca. Last updated, 2017.
25. Abha Nakra Jolly. Cucumber Chia Drink, 2018.