IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Development and Nutrient Analysis of Muskmelon And *Centella asiatica* (Vallarai) Incorporated RTS Beverage

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ABSTRACT:

C.asiatica emerged as an effective phytomedicine due to presence of its potential phytoconstituents which includes asiaticoside, asiatic acid, madecassoside, and madecassic acid. The *Centella* leaf juice acts as good health tonic and can be used in the treatment of hypertension and gastrointestinal diseases. Muskmelon belongs to *Cucurbitaeceae* family. Itis juicy and delicious tasty fruit popular for its nutritive and medicinal properties. The edible portion of 100 g of muskmelon contains carbohydrate 8.36gm, protein 0.88gm, lipids 0.28g , energy 35Kcal, dietary fibre 0.8gm and water 89.7%, potassium 309mg and other vitamins and minerals. In the present work, RTS beverage was developed by incorporating muskmelonwith *C.asiatica*. The formulated beverage subjected to its organoleptic evaluation. The nutritive and microbial analysis was carried out by using standard procedure. In standardized and optimized results, the mean score for the appearance and color of the RTS beverage was (7.26±1.61); flavor, consistency and taste was (7.46±1.10, 7.93±0.82and 7.4±1.00 respectively).The Macronutrient content as carbohydrate (11.47%), energy (49.83 kcal), totalfat (0.07%) and the protein content (0.63%). The micronutrient content, vitamin C and beta carotene content was 43.1mg /g and 17.9µg/g respectively. This study revealed that the *C.asiatica* incorporated musk melon was a good source of nutrients especially Protein, Vitamin C and Beta carotene. It indicated that, *C.asiatica* (vallarai) infused musk melon was organoleptically accepted due to its flavor and enhanced taste for healthy consumption of mankind.

Keywords: phytoconstituents, RTS beverage, organoleptic, nutritive source.

INTRODUCTION

Juices are fat-free, nutrient-dense beverages rich in vitamins, minerals and naturally occurring phytonutrients that contribute to good health (Franke *et al.*, 2005). Consumers are now gradually shifting towards the consumption of natural fruit juice based beverages because of their quality, high nutritional content, medicinal importance, and good calorific value over synthetic beverages. The demand for health beverage is growing in the modernized world .There is a limited range of fruit juice based RTS beverages available in the Indian market. Many types of syrupsand soft drinks containing artificial fruit flavors are well known throughout the world but the basic factor considered is the nutritive and therapeutic values, which makes them popular and acceptable (Boghani *et al.*,2012). The functional properties and health benefits of *Centella* are known worldwide. So the present study aimed to develop *Centella* incorporated RTS beverageby adding *Centella* leaves in musk melon juice to reduce the risk of CVD in hypertensive adults.

Muskmelon (*Cucumis melo L.)* commonly called as cantaloupe is a member of Cucurbitaceae family. Consumer preference for this fruit is determined largely by its rich sourceof phytonutrients, sweetness, flavor or aroma and texture (Pandidurai *et al*., 2018). The fruit cropis cultivated widely by farmers in our country particularly during the summer season. Muskmelons are naturally low in fat and have no sodium and cholesterol; they are rich in many essential nutrients like potassium, magnesium, vitamin C, and fatty acids. (Manchali *et al*, 2020).

Green Leafy Vegetables are rich sources of calcium, iron, β- carotene, vitamin C, dietary fiber and many trace minerals(Ibarz *et al*., 2000). *Centella asiatica* (L.) is a tropical medicinal plant from Apiaceae family native to Southeast Asian countries such as India, Sri Lanka, China, Indonesia, and Malaysia as well as South Africa and Madagascar.

It is a perennial creeper with kidney shaped leaves commonly found. *Centella asiatica*, commonly known as "Gotu kola, Asiatic pennywort, Indian pennywort, Indian water navelwort, wild violet, and tiger herb" in English, is a tropical plant. *Centella asiatica L*. is important herbal medicinal plant used for various applications (James *et al*., 2009) and used in Indian Ayurvedic medicine as a nerve tonic (Singh *et al*., 2008). The use of *Centella* in food and beverages has increased over the years basically due to its health benefits such as antioxidant (Pitella *et al*., 2009), as anti-inflammatory (Duke, 2001), wound healing (Kimura *et al*., 2008) memory enhancing property (Singh *et al*., 2008) and many others. The potential of *Centella* as an alternative natural antioxidant especiallyof plant origin and its protection against age-related changes in brain antioxidant defense system, have notably increased in recent years (Subathra *et al*., 2005)

With this background, the present study focused to formulate RTS from the mixed juiceof muskmelon and *Centella asiatica*. The triterpenoid compound, asiaticoside was reported to have anti-hypertensive and cardio protective effects in pulmonary hypertension (Wang *et al.*, 2018).

MATERIALS AND METHODS

The project work was conducted from September 2021 to March 2022, at the Department of Nutrition and Dietetics of PSG College of Arts and Science, Coimbatore (T.N.). The fruit pulp of musk melon which was used as a base material (as Control) and other ingredients used in the preparation of RTS beverage included are Vallarai leaves, Jaggery, and water. All these ingredients were collected from the local market of Coimbatore city.

a) Selection of Ingredients

Vitamin C rich fruit such as muskmelon and β Carotene rich *Centella* were selected for the formulation of the beverage. The way to prevent hypertension would be to consume β carotene rich foods in combination with Vitamin C rich food to enhance the absorption as well for quick and better results. Jaggery was addedto the beverage with standard level.

b) Formulation of Beverage

The RTS beverage was made from the fruit muskmelon and *Centella* leaves. The fresh, ripened fruits as well as clean, washed leaves were selected for the formulation of beverage. The cleaned pulp portion of the fruit, selected leaves and finally jaggery was added for the incorporation.

FIGURE – I VARIATIONS OF BEVERAGE

C) **Sensory Evaluation of the formulated beverage**

The beverage was made with one control and three Variations. The variations were named as "V1","V2","V3"and control as "C". The Muskmelon and *Centella* beverage was prepared in VariationV1 (90:10), V2 (80:20),V3(70:30) ratios. The score card was prepared and the evaluation was made with the help of 9 point hedonic scale by semi trained panel members. With the result of sensory evaluation highly accepted variation, (V1) was selected and further proceeded for nutrient analysis.

D) **Nutrient Analysis of the formulated beverage**

Nutrient Analysis consists of the amount of nutrients in the product and is typically based on 100grams.The analysis is most accurate and representative with a combination of database nutritional analysis and laboratory nutritional analysis. The parameters like Moisture and ash (FSSAI Manual for fruits and vegetables) and the macro nutrients like Energy (ALT/SOP/III/4.d/11 Issue no: 1 Issue date: 10.07.2016),carbohydrate (AOAC 20th edition 986.25 E , IS 1656 Annexure C),Protein (IS 7219), fat(AOAC 20th edition 2016 920.85) and micronutrients like iron(AOAC 21st EDITION 944.02:), phosphorus(AOAC 21st EDITION 944.02:), Vitamin C (AOAC Official Method 967.21, 18th Edition), β carotene (AOAC Official Method 999.15, 18th Edition), calcium(AOAC 21st EDITION - 944.03) were analyzed for

both the control (C) and variation (V1) of the developed product using standard procedures(AOAC 20th edition 2016 and AOAC 21st edition 2019).

E) ***Antioxidant Activity of the formulated beverage***

The antioxidant activity of Muskmelon and *Centella* was estimated with DPPH method. Antioxidant capacity DPPH radical was used as a stable free radical to determine the antioxidant activity of natural compounds. DPPH is considered as a valid and easy assay to evaluate scavenging activity of antioxidants. The antioxidant activity was determined in terms of the ability of the antioxidants in the fruit and leaf to inhibit oxidation.Microbial Load of the formulated beverage

Shelf life of the selected product was analyzed using standard microbial analysis methods.
It was done at initial first day, 15th day and 30th day at proper interval of the study.

RESULT AND DISCUSSION

TABLE I - The overall organoleptic evaluation of theformulated beverages

S.no	Sample	Mean overall acceptability score
1.	**Control (C)**	8.1±0.6
2.	**V1**	**7.46±0.89**
3.	**V2**	7.4±0.8
4.	**V3**	7.1±1.2

From the above table, the highest mean score of Overall acceptability was recorded in Variation V1 (**7.46±0.89**) followed by Variation V2 (7.4±0.89) and Variation V3 (7.1±1.24).

Table II -Mean organoleptic score of the formulated beverage

CRITERIA	CONTROL	VARIATION I	VARIATIONII	VARIATIONIII
Appearance and colour	7.86±0.93	**7.26±1.61**	7.3±1.46	7.3±1.70
Flavour	8.03± 0.99	**7.46 ±1.10**	7.2 ±1.03	6.9 ±1.18
Consistency	8.03 ±0.88	**7.93 ±0.82**	7.7 ±0.91	7.3 ±1.39
Taste	8.26 ±0.86	**7.4 ±1.00**	7.2± 1.04	6.86 ±1.54

Among the organoleptic score of the beverage in the variations, Variation V1 had got the highest score namely 7.26±1.61in appearance and taste, 7.46 ±1.10 in flavour, 7.93 ±0.82 in consistency and 7.4 ±1.00 in taste respectively.

TABLE III - NUTRIENT ANALYSIS OF THE FORMULATED BEVERAGE :

S.NO	PARAMETER	CONTROL(MUSKMELON JUICE)	VARIATION I (MUSKMELONAND VALLARAI JUICE)
1.	ENERGY	51.73 Kcal	**49.83 Kcal**
2.	PROTEIN	0.34%	**0.63%**
3.	CARBOHYDRATE	12.27%	**11.47%**
4.	FAT	0.05%	**0.07%**
5.	MOISTURE	86.87%	**87.43%**
6.	ASH	0.47%	0.40%
7.	CALCIUM	30.46 mg/100g	24.68mg/100g
8.	IRON	1.04mg/100g	0.63mg/100g
9.	PHOSPHOROUS	32.61 mg/100g	20.15 mg/100g
10.	BETA CAROTENE	17.3 µg/g	**17.9 µg/g**
11.	VITAMIN C	39.5 mg/g	**43.1 mg/g**

FIGURE-2

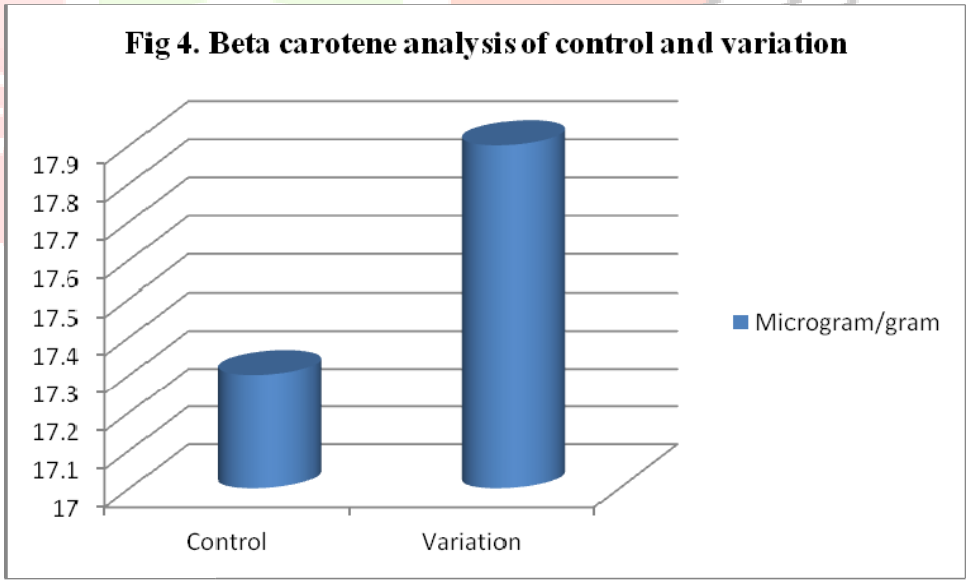

TABLE IV- The physical parameters evaluation of the formulatedbeverage

S.NO	PARAMETER	CONTROL(MUSKMELON JUICE)	VARIATION(MUSKMELON AND VALLARAI JUICE)
1.	pH	4.33	4.05
2.	TSS	15.0	14.0
3.	ACIDITY	0.43%	**0.56%**
4.	REDUCING SUGARS	9.31%	**10.43%**
5.	TOTAL SUGAR	9.81%	**12.68%**

The parameters like pH, TSS, acidity, reducing sugar and total sugar were analyzed andcompared for control and variation. All these parameters were analyzed with the help of FSSAI manual for fruits and vegetables. The acidity, reducing sugar and total sugar of the control are 0.43% , 9.31% ,9.81% whereas for the Variation are 0.56% ,10.43% , 12.68% respectively

Table V- Antioxidant activity of the formulated beverage

S.No.	Parameter	Control	V_1
1	Beta carotene	2569.10± 95.15c**	2800.00±123.10a**
2	Vitamin C	35.00 ± 1.01c**	22.00 ± 1.06a**
3	Total antioxidant value	3410.0 ± 3.43c**	5340.0± 5.39**

The antioxidant activity was analyzed by DPPH method. The parameters like β carotene, vitamin C and Total antioxidant values were analyzed. From the above table, it is concluded that the antioxidant value was high in variation (5340.0± 5.39) when compared to control (3410.0 ± 3.43c) because of the addition of antioxidant rich *Centella* leaves to the muskmelon beverage.

Table VI- The microbial analysis of the formulated beverage

S.No	Parameter	Storage period (days)	Control	V1
1	Total bacteriological count (CFU/mL)	0	2.00×10^4	1.92×10^4
		15	7.22×10^4	2.34×10^4
		30	8.27×10^4	2.62×10^4
2	Yeast / Mold count (CFU/mL)	0	9	ND
		15	15	7
		30	24	23

The microbial load was analyzed for control and variation (V1) for the period of 30 days at15 days interval. The total bacteriological count in control on 0^{th} day, 15th day and 30^{th} day was observed.

CONCLUSION:

The Beta carotene present in musk melon had protective roles of reducing the risk of certain types of cancers and cardiovascular diseases. The biomolecule cucurbitacin present in musk melon is a potential therapeutic in the treatment of human cancer diseases.

C. asiatica improves nervous system performance, as it is used to treat a variety of neurological illnesses. It shows more promise in the treatment of endocrine illnesses, particularly type 2diabetes and obesity. *Asiatica* extract helps to reduce oxidative stress, lower blood sugar levels, lower blood pressure levels, prevent weight gain, and reduces inflammation.

The *centella* infused Musk melon was organoleptically accepted with high overall acceptability scores due to its flavor and taste. The formulated beverage(*centella* infused Muskmelon) was superior in sensory , nutritional and microbial parameters. The study revealed that the formulated beverage having a good source of nutrients especially Protein, Vitamin C and Beta carotene. The Nutrition Education mainly focused on imparting knowledge to the community about the plausible health benefits of RTS beverage than any other synthetic or artificial beverages. Then the developed RTS beverage, its nutritional composition as well as health benefits were popularized among the community**.**

ACKNOWLEDGEMENT:

I would like to thank Dr.L.Uthira for guiding me throughout the study and I would like to thank laboratory technicians for the analysis.

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