

INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN CHEMISTRY AND PHARMACEUTICAL SCIENCES

(p-ISSN: 2348-5213; e-ISSN: 2348-5221)
www.ijrcps.com



Research Article

FORMULATION AND ANALYSIS OF NUTRIENT, ANTIOXIDANT, MICROBIAL LOAD OF WATERMELON AND GOOSEBERRY INCORPORATED RTS BEVERAGE

SAJNEETHA SUKAPRIYA.M AND KRISHNAPRABHA.V*

Dr. N.G.P. Arts and Science College, Coimbatore, Tamilnadu, India

*Corresponding Author

Abstract

Fruits and Fruit Products both are an important supplement to the human diet as they provide almost all the vital components required for normal growth and development of the human body leading to the healthy physique and mind. Blending of fruit juices is practiced to overcome the high cost of some exotic fruit juices, scarcity or seasonal availability, balancing of strong flavours, high acidity, astringency, or bitterness, improving total soluble solids, bland flavour, improving and stabilizing colour. Watermelon is rich in lycopene and contains bioactive components while gooseberry is rich in Vitamin C and both fruits have antioxidant activity. The beverage was prepared like Control (watermelon juice) and gooseberry was incorporated in watermelon juice in three variations namely watermelon and gooseberry V1 (80:20), V2 (70:30), V3 (60:40). Organoleptic evaluation was carried out with 25 semi trained panel members. Among three variations the V1 (80:20) was highly accepted and nutrients were analysed for Variation V1 and Control (watermelon juice). Microbial load was analysed for 60 days, at 15 days interval. The formulated beverage is rich in iron, calcium, and Vitamin A and it can be supplemented to the deficiencies. The antioxidant activity of the Variation V1 (watermelon and Gooseberry) beverage was higher compared with Control (watermelon juice). This formulated beverage can be used to prevent free radical formation and can also prevent from various types of cancer and process.

Keywords: Watermelon, Gooseberry, Ready To Serve, Beverage, Nutrients, Antioxidant

Introduction

The blending technology has become an important tool in modern fruit beverage processing in the developing of new beverages of superior quality having sensory, nutritional and medicinal properties of two or more plant species. The attractive appearance, appealing flavour, nutrients retention, medicinal values and other organoleptic qualities are the main consideration in standardization of different ratios of blend components which meets the consumers preference and improves the marketability of the new blended products. The ready to serve (RTS) beverages are very popular among consumers of all age groups because of its easiness to carry and to consume (Deen Bhagwan and Kumar Awadhesh, 2014). For this present study watermelon and Gooseberry was selected to prepare wonderful delicious tasty healthy beverage.

Watermelon (*Citrullus lanatus*) is an important horticultural crop, mostly known for its sweet and juicy fruit, grown in warm climates all over the world (Robinson *et al.*, 1997). Watermelon originated from Africa, but the exact geographical origin and domestication process of the crop watermelon is not clear. Watermelon spread from Africa to Asia about 800 AD and to Europe in 961 AD and was subsequently brought to America by Europeans in the 17th Century (Wehner TC *et al.*, 2008).

Citrullus lanatus is an annual species containing cultivated, semi domesticates and wild forms, widely distributed in tropical and subtropical areas (Jeffrey C, 2001). It helps in reducing symptoms of asthma, osteoarthritis and rheumatoid arthritis. Being rich in antioxidant, watermelon is said to be good for fighting

the action of free radicals in the body. This reduces the risk of various types of cancers and heart diseases. Watermelon has diuretic and cleansing properties that make it beneficial for those with certain kidney and bladder diseases. This fruit is also used for skin care, as topical application of its juice is found to reduce skin blemishes. It is also used as a remedy for constipation and is believed to be helpful for cleaning the toxic wastes in the body. Watermelon has low glycemic load, because of the high water content and low carbohydrates levels of this fruit, per serving, so now it is said that watermelons can be consumed in small amounts by diabetic patients (**Sabo M U, 2013**). It is an excellent source of Vitamin C (8.1 mg) and Vitamin A (10%) nutritional value per 100 g. It also provides significant amount of Vitamins B, as well as, minerals such as potassium (K), magnesium (Mg), iron (Fe), manganese (Mn), phosphorus (P), sodium (Na), and zinc (Zn). *Citrullus lanatus* (water melon) is popular in indigenous system of folk medicine and it is known to contain bioactive compounds such as cucurbitacin, triterpenes, sterols and alkaloids, vitamins, minerals (**EO. Erhirhie and NE. Ekene, 2013**).

Emblica officinalis Gaertn. or Phyllanthus emblica Linn, commonly known as Indian gooseberry or amla. Amla is a gift of nature to mankind. It is an indispensable part of the ayurvedic and unani system with amazing remedial qualities. In Sanskrit, it is called Amalaki or Dhartiphala. Amla is perhaps the single most often mentioned herb in "Charak Samhita", the Ayurvedic medicine literature (500 BC). Amla is a wonder herb and one of the precious gifts of nature to humans. Amla is known as "Divya" and "Amrut" or Amrit Phala in Sanskrit, which literally means fruit of heaven or nectar fruit. The Sanskrit name, Amlaki, translates as the Sustainer or the Fruit where the Goddess of Prosperity Resides. In Hindu religious mythology the tree is worshipped as the Earth Mother as its fruit is considered to be so nourishing as to be the nurse of mankind (**Onions, 1994**).

In India, it is common to eat gooseberries steeped in salt water and turmeric to make the sour fruits palatable. There are two varieties of Amla - cultivated (gramya) and wild (vanya). The wild amla is small, while cultivated amla is big, smooth and juicy. Chemical composition of the amla fruit contains more than 80% of water. It also has protein, carbohydrate, fibre and mineral and also contains gallic acid which is a potent polyphenol. Vitamin C is important for human beings. It is necessary for the synthesis of the inter-cellular cementing substance which is responsible for keeping the cells of the body together. The amla fruit is reported to contain nearly 20 times more Vitamin C than orange juice (**Brun V et al., 1987**).

The active ingredient that has significant pharmacological action in amla is designated by Indian scientist as "Phyllemblin". The fruit is rich in quercetin, phyllaemblic compounds, gallic acid, tannins, flavanoids, pectin, and Vitamin C and also contains various polyphenolic compounds. A wide range of phytochemical components including terpenoids, alkaloids, flavonoids, and tannins have been shown to possess useful biological compounds (**Arora S et al., 2003 and Kim HJ et al., 2005**). Amla is the most concentrated form of Vitamin C found in the plant kingdom, and when the whole fruit is used rather than an active ingredient, the Vitamin C is easily assimilated by the human body (**Nisha P et al.2014**).

The Vitamin C in the amla fruit is bonded with tannins that protect it from being destroyed by heat or light. When dry it is said to be gently laxative, according to some sources the fresh fruit is also laxative. The fresh ripe fruits are used extensively in India as a laxative, one or two fruits being sufficient for a dose (**Anil Kumar et al., 2012**).The fresh fruit are eaten for general fatigue, weakness, poor appetite, as a purgative. The dried and ground barks were used orally for a number of mouth diseases and gastrointestinal disorders (**Jayaweera, 1982**). It is also part of multicomponent drugs for hemorrhage, anemia, colic, acute leprosy, jaundice, and cough, indigestion, asthma (**M. krishnaveni and s. Mirunalini, 2011**).This investigation has been conducted to develop new RTS beverage rich in the medicinal and nutritional properties of both Watermelon and Gooseberry. Gooseberry was incorporated in the watermelon juice in different ratios. Watermelon juice was kept as a control and Watermelon and gooseberry incorporated juice was kept as Variations.

Materials and Methods

Selection of Fruits

The fresh, fully ripe watermelon and gooseberry were purchased from local market of Coimbatore. The fruits were free from dirt, dust and damage.

Preparation of Juice

The fruits are washed and the seeds are removed. And cut in to pieces,grinded in a juicer. The juice was prepared in three variations, in following ratios watermelon and gooseberry (80:20), (70:30), (60:40). The Organoleptic evaluation was conducted with 25 semi trained panel members. The sensory parameter such as appearance, colour, flavour, consistency and taste was evaluated using 9 point hedonic scale. The **Table I** shows the Organoleptic evaluation of the formulated RTS beverage.

Nutrient Analysis

The nutrients like energy, protein, iron, Vitamin A, Vitamin C, moisture, calcium, phosphorus, fibre and total soluble solids were analysed for the highly accepted variation that is the (80:20) and control watermelon juice.

Microbial Load

Microbial load was analysed for the Control and Variation V1. Total bacterial count was analysed using spread plate method for 30 days at 15 days interval. The total bacterial count from initial to 30th day is presented in the Table III.

Antioxidant Activity

The antioxidant activity of watermelon and gooseberry was estimated with DPPH method. Antioxidant capacity DPPH radical was used as a stable free radical to determine antioxidant activity of natural compounds. DPPH is considered 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 to inhibit oxidation. The comparison of antioxidant activity of fruit extracts is presented in Figure I.

Results

From the mean Organoleptic evaluation the appearance and colour of the Control (7.84±2.38), Variation V1 (7.12±2.33), V2 (6.44±2.24), V3 (6.44±2.24). Flavour for the Control (8±1.78) and Variation V1 was (7.36±1.9), V2 (6.44±2.42), V3 (6.16±2.39). Consistency for Control (6.96±2.72) and Variation V1 was (7.52±1.74), V2 (6.76±2.21), V3

(6.76±1.88). Taste for Control (8±1.85) and Variation V1 (6.84±2.64), V2 (5.96±2.2) and V3 (5.48±2.62). From the Table I, the Organoleptic score of the beverage Variation I had got highest score namely 7.12±2.33 in appearance and colour, 7.36±1.91 in Flavour, 7.52±1.74 in consistency and 6.84±2.64 in taste.

The nutrients were analysed for the control and Variation I. Control contains energy of (45.13kcal), Protein (9.95 gm), Iron (7.3 mg), Vitamin A (780.0 IU), Vitamin C (11.0 mg), moisture (85.23 gm), calcium (18.0 mg), phosphorus (9.0 mg), fibre (1.0 gm) and Total soluble solids (9.12 brix). Variation I contains energy of (56.64kcal), protein (13.57 gm), Iron (7.9 mg), Vitamin A (1110.0 IU), Vitamin C (31.90 mg), moisture (77.53 gm), calcium (40.0 mg), phosphorus (20.0 mg), fibre (3.0 gm) and Total soluble solids (15.20 brix). When compared with control all the nutrients, where higher in Variation I (watermelon and Gooseberry juice). The total bacterial count of the control (watermelon juice) and Variation I (Watermelon and Gooseberry) on the initial day was 5×10^4 cfu/ml and 03×10^4 cfu/ml it increased gradually on 15th day of storage the total bacterial count was 11×10^4 cfu/ml and 07×10^4 cfu/ml and on 30th day the total bacterial count was 18×10^4 cfu/ml and 12×10^4 cfu/ml respectively. The antioxidant activity was estimated with DPPH method the Variation I showed the higher antioxidant activity and it can be used for various types of cancer. This beverage can be supplemented to prevent from various micronutrient deficiency disorders.

TABLE I Mean Organoleptic Evaluation of the Formulated Beverage

Criteria	Control	Variation I	Variation II	Variation III
Appearance & Colour	7.84±2.38	7.12±2.33	6.44±2.24	6.44±1.25
Flavour	8±1.78	7.36±1.91	6.44±2.42	6.16±2.39
Consistency	6.96±2.72	7.52±1.74	6.76±2.21	6.76±1.88
Taste	8±1.85	6.84±2.64	5.96±2.2	5.48±2.62

TABLE II Nutrient content of the formulated beverage

S.No	PARAMETER	CONTROL(WATERMELON JUICE)	VARIATION(WATERMELON AND GOOSEBERRY JUICE)
1	ENERGY	45.13Kcal	55.64 kcal
2	PROTEIN	9.95gm	13.57 gm
3	IRON	7.3mg	7.9 mg
4	VITAMIN A	780.0 IU	1110.0 IU
5	VITAMIN C	11.0gm	31.90 mg
6	MOITURE	85.23gm	77.53 gm
7	CALCIUM	18.0gm	40.0 mg
8	PHOSPHORUS	9.0 gm	20.0 mg
9	FIBRE	1.0 gm	3.0 gm
10	TSS	9.12 brix	15.20 Brix

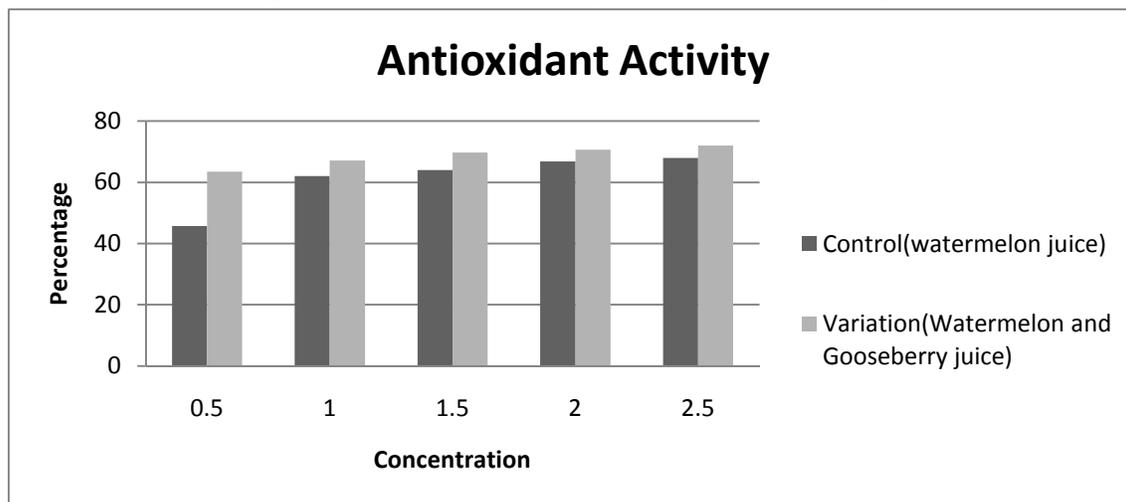
Kcal-kilocalories, gm- gram, mg-milligram, IU-International Unit, TSS-Total Soluble Solids

Int. J. Curr.Res.Chem.Pharma.Sci. 2(4): (2015):38–42
**TABLE III Microbial load of the formulated beverage
 (Total Bacterial Count)**

SAMPLE	CONTROL(WATERMELON JUICE)	VARIATION(WATERMELON & GOOSEBERRY)
1 st day	5×10 ⁴ cfu/ml	03×10 ⁴ cfu/ml
15 th day	11×10 ⁴ cfu/ml	07×10 ⁴ cfu/ml
30 th day	18×10 ⁴ cfu/ml	12×10 ⁴ cfu/ml

cfu- Colony forming unit

Figure –I Antioxidant activity of formulated beverage



Discussion

The formulated beverage can be supplemented to Vitamin A deficiency, iron deficiency anaemia and Calcium deficiency. In India micro nutrient deficiency is more prevalent and proper supplementation by this, the prevalence rate can be reduced. Many studies reported that watermelon and gooseberry has the high antioxidant activity and it can be used to prevent various cancer other diseases like diabetes and cardiovascular diseases.

Acknowledgments

I would like to thank Mrs. Krishnaprabha .V for guiding me throughout the study and I would also like to thank laboratory Technicians for the analysis.

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