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Development and quality evaluation of mulberry, mint and aloe Vera therapeutic RTS

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Abstract

The present investigation “Development and Quality Evaluation of mulberry, mint and aloe vera Therapeutic RTS” was done on the basis of overall sensory quality and vitamin C content. Four varieties of RTS beverage were prepared by blending mulberry juice with mint juice and aloe vera juice to formulate and study therapeutic RTS beverage prepared from mulberry, mint and aloe vera juice and to study the Physio-chemical properties and sensory attributes of therapeutic RTS beverages. In that control sample T₀ containing only mulberry and mint juice (40%,10%), T₁ mulberry juice, mint juice and aloe vera juice in (40%,10%,2.5%), T₂ mulberry juice, mint juice and aloe vera juice in (40%,10%,5%), and T₃ mulberry juice, mint juice and aloe vera juice in (40%,10%,7.5%). After that the sensory analysis was done by 9-point hedonic scale in that individual taste, color, flavour, appearance and overall acceptability was analyzed. In sensory analysis the sample T₃ mulberry juice, mint juice and aloe vera juice in (40%,10%,7.5%) was acceptable as compared to T₁ and T₂ respectively. After that the determined chemical analysis of prepared therapeutic RTS juice like pH, TSS, ascorbic acid, titratable acidity.

Keywords: Ready to serve, mulberry, mint, aloe vera, therapeutic RTS

Introduction

Ready-to-serve (RTS) beverages made up of fruit pulp have greater amount of water that is useful for body balancing by preventing dehydration. Fruit drinks contain high percentage of sugar and provide a few vitamins and minerals. (Sulochanamma *et al.*, 2018) [1].

Various studies have revealed that Aloe vera possesses many pharmaceutical activities including antimicrobial antioxidant, anticancer, antiulcer, hepatoprotective, antidiabetic Immunomodulatory and many more which are attributed to polysaccharides contained in the gel of leaves. Problem is the bitter taste of raw Aloe vera which make in unpleasant to consume (Kausar *et al.*, 2020) [2].

The mulberry belongs to the genus *Morus* of the family *Moraceae*. There are 24 species of *Morus* and one subspecies, with at least 100 known varieties. Mulberry is found from temperate to subtropical regions of the Northern hemisphere to the tropics of the Southern hemisphere and they can grow in a wide range of climatic, topographical and soil conditions (Ercisli & Orhan 2007) [3].

Peppermint (*Mentha piperita* L.), belonging to the *Labiatae* family, is a large family of annual or perennial, herbaceous plants of 30–100 cm high, which is cultivated in temperate climates, in America, Europe and Asia. Peppermint (*Mentha piperita* L.) is a natural hybrid of water mint (*Mentha aquatica* L.) and spearmint (*Mentha spicata* L.) and is cultivated globally for its use as a flavouring in foods and also in some shampoos and soaps. Mint is one of the most important and common flavours in the world coming after vanilla and citrus flavours (Straumite, *et al.*, 2015) [4].

Material and Methods

Preparation of therapeutic RTS beverages

Processing of Mulberry juice

The fresh and mature mulberry was selected by visual appearance on the basis of the colour (reddish-black) without any physical damage or spoilage. The collected mulberry were washed by pure water for removing the dust particles. After washing, grinding of mulberry was done using grinding machine to obtain smooth pulp. Mulberry juice was filtered using muslin cloth to obtain clear juice.

Processing of mint leaves juice

The fresh and mature mulberry was selected by visual appearance on the basis of the colour (reddish-black) without any physical damage or spoilage. The collected mulberry were washed by pure water for removing the dust particles. After washing, grinding of mulberry was done using grinding machine to obtain smooth pulp. Mulberry juice was filtered using muslin cloth to obtain clear juice.

Processing of mint leaves juice

The fresh mint leaves was selected by visual appearance on the basis of colour (dark-green) and for no physical damage on the surface or spoilage. Collected mint were washed by pure water to remove the dust particles. Grinding of the mint was done by the grinder to obtain mint juice. Grinded mint leaves were filtered by muslin cloth to extract clear juice.

Processing of aloe vera juice

The fresh and mature aloe vera leaves were selected on the basis of colour by visual appearance and without any physical damage on the surface. Then the collected aloe vera were washed by pure water for removing of the dust. Then grinding of the aloe vera was done by the grinder to obtain Aloe vera juice. Filtration was done using muslin cloth to obtain clear juice.

Formulation of mulberry, mint and aloe vera therapeutic RTS

The Therapeutic RTS was prepared with different proportions of mulberry juice, mint juice and aloe vera Juice. All the prepared ingredients were mixed properly to form the mixture of Therapeutic RTS.

T₀ (Control) – 40% Mulberry juice +10% Mint+ 50% Water

T₁ – 40% Mulberry juice + 10% Mint juice +2.5% Aloe vera+ 47.5% Water

T₂ – 40% Mulberry juice + 10% Mint juice +5% Aloe vera+ 45% Water

T₃ – 40% Mulberry juice + 10% Mint juice +7.5% Aloe vera+ 42.5% Water

Chemical Analysis Of RTS

The chemical analysis of RTS includes the determination of total soluble solids (TSS), titrate acidity, pH and ascorbic acid.

Determination of total soluble solids (TSS)

The TSS value is defined as the amount of sugar, protein and soluble minerals etc. present in fruit pulp and fruit beverages and was estimated as the procedure mentioned by Ritika *et al* (2010). For measuring TSS in Brix, a hand refractometer was used. The refractometer was calibrated by placing a few drops of distilled water on prism in the specimen chamber of title refractometer. The distilled water reading should be zero. For determining the TSS, a drop of sample is placed on the prism and the brix of dry substance in it read directly.

Determination of titrable acidity

Titrable acidity was determined by titration method as suggested by Ranganna (2002). Acidity of juice was analyzed by titrating a known volume of sample (10 ml) against the standard 0.1 N NaOH solution using phenolphthalein as an indicator and it was expressed in terms of anhydrous citric acid.

Determination of pH

The pH of Therapeutic juice was done by using pocket size digital pH meter.

Determination of ascorbic acid

The ascorbic acid was determined using method suggested by Ranganna (2002) titrating a known volume of sample with 2,6-dichlorophenol indophenol dye using metaphosphoric acid as stabilizing agent. 20 ml of sample was taken and made to 100ml with 3% HPO₃ and filtered using filter paper. 2-10 ml aliquot with HPO₃ extracts of the sample and was titrated with the standard dye to a pink colour at the end point and percent ascorbic acid was determined.

Sensory evaluation of prepared RTS

The Sensory/ Organoleptic evaluation of prepared sample was done by a panel of judges using 9-point Hedonic scale as shown in (table 3) to evaluate the product as per score card rating given below. The organoleptic form contains the information like name of the product, date of preparation. The judgment was made by rating product on a 9-point Hedonic scale with corresponding descriptive term ranging from 9 “Extremely like” to 1 “Extremely Disliked.

Procedure

Mineral extract (0.1ml, obtained from acid digestion) was pipetted in a test tube and volume was made to four ml with water. Four ml reagent C was added and mixed well. The contents were incubated at 37 °C in water bath for 90 minutes. It was removed and allowed to cool to room temperature and absorbance was read at 720 nm against a suitable blank. Standard curve was plotted using one to eight µg P.

Result and Discussion

This research (observational study) has clearly indicated the overall quality and acceptance of RTS juice. Study on physico-chemical parameter and sensory attributes are presented with graphical representation in this chapter. Graphs have been prepared for each parameter. The results were reported under following heads.

Physico-chemical characteristics of raw materials

Physical Characteristics of mulberry fruit

The physical properties of mulberry were measured by Vernier calliper. Physical parameters of fresh mulberry characterized by their colour, shape, breadth, length, fruit weight, juice yield etc tabulated in table 1. All these characteristics were studied and average values are reported. The above study was slightly same as the study carried out by Rohela *et al.* (2020) [5].

Table 1: Physical Characteristics of Mulberry

Parameters	Mulberry
Colour	Reddish-Black
Shape	Oblong
Breadth (mm)	8.35
Length (mm)	13.08
Fruit Weight (g)	1.429

* Each Value represents the average of three determinations.

Chemical Analysis of mulberry fruit

The result containing various chemical composition such as TSS, Ph, acidity and ascorbic acid and result obtained were

tabulated in table 2. The result was good in accordance with the result reported by Hamid *et al.* (2017) [6] and the value of pH, TSS and acidity were 4.10, 12.01 and 0.30 respectively.

Table 2: Chemical Analysis of Mulberry fruit

Sr. No.	Parameters	Observations
1	TSS	12.5
2	pH	5
3	Acidity	2.1
4	Ascorbic Acid	22.5

* Each Value represents the average of three determinations

Physical Characteristics of Mint leaves

The physical properties of mint were measured by Vernier calliper Physical features of fresh mint were characterized by their colour, shape, breadth, length, fruit weight, juice yield etc. tabulated in table 3. All these characteristics were studied and average values are reported.

Table 3: Physical Characteristics of Mint

Parameters	Mint
Colour	Dark Green
Shape	Lanceolate
Breadth (cm)	3
Length (cm)	2
Leaf Weight (g)	1.25

* Each Value represents the average of three determinations

Chemical Analysis of Mint

The data containing various chemical composition such as TSS, Ph, acidity and ascorbic acid and result obtained were tabulated in table 4. The result was good in accordance with the result reported by Sharma *et al.* (2021) and the value of pH, TSS and acidity were 1.81, 4.7 and 0.119 respectively.

Table 4: Chemical Analysis of Mint

Sr. No.	Parameters	Observations
1	TSS	5.6
2	pH	4.5
3	Acidity	0.22
4	Ascorbic Acid	21.7

* Each Value represents the average of three determinations

Physical Characteristics of Aloe Vera

The physical properties of aloe vera were measured by Vernier calliper. Physical features of Aloe vera were characterized by their colour, shape, breadth, length, fruit weight, juice yield etc. tabulated in table 5. All these characteristics were studied and average values are reported.

Table 5: Physical Characteristics of Aloe vera

Parameters	Aloe Vera
Colour	Green
Shape	Lance-shaped
Breadth (inch)	6
Length (inch)	3
Leaf Weight (g)	80

*Each Value represents the average of three determinations

Chemical Analysis of Aloe-vera

The data containing various chemical composition such as TSS, Ph, acidity and ascorbic acid and result obtained were tabulated in table 6. The result was good in accordance with the result reported by Tasneem *et al.* (2019) and the value of

pH, TSS and acidity were 4.9, 12.23 and 0.6 respectively.

Table 6: Chemical Analysis of Aloe-vera

Sr. No.	Parameters	Observations
1	TSS	18.11
2	pH	4.7
3	Acidity	1.2
4	Ascorbic Acid	6

*Each value represents the average of three determinations

Chemical Analysis of Therapeutic RTS

The result of chemical analysis of Therapeutic RTS such as TSS, acidity and pH were evaluated and the results obtained are tabulated in Table 7.

Table 7: Chemical Analysis of Therapeutic RTS

Sr. No.	Treatments	TSS	pH	Acidity (%)	Vitamin C
1	T ₀	10	2.5	0.45	11.7
2	T ₁	8.5	2.8	0.37	12.5
3	T ₂	9.5	3.0	0.40	13.2
4	T ₃	9	3.2	0.34	14.0
	F-test	S	S	S	S
	S.E.D	0.2143034	0.20367	0.0272166	0.20
	CD	0.7945	0.4984	0.0666	0.49

Conclusion

The study was undertaken for development and quality evaluation of Mulberry, Mint and Aloe vera therapeutic RTS. According to the above observation it was found that the total soluble solids (TSS), pH, Acidity and Ascorbic acid was 12.5, 5.0, 2.1 and 22.5 respectively of freshly harvested mulberry. In chemical analysis of Aloe Vera juice, it was observed that total soluble solids (TSS), pH, Acidity and Ascorbic acid were 18.11, 4.7, 1.2 and 6.0 respectively. Data with respect to chemical analysis of mint juice was calculated that the total soluble solids (TSS), pH, Acidity, Ascorbic acid were 5.6, 4.5, 0.22 and 21.7 respectively. Sensory evaluation carried on 9-point hedonic scale showed organoleptic evaluation of RTS by using different level of Mulberry, Mint, Aloe vera juice in which it was observed that the maximum score was recorded for T₃ (8.8) followed by sample T₁ (8.5) which was higher than sample T₂ (8.1) and control (8.7). The sample T₃ was highly accepted by the panelists because the sample secured the highest sensory score for each sensory attribute as color, flavor, taste and overall acceptability such as 8.7, 8.5, 8.1 and 8.8 respectively. ANOVA (two-way classification) showed that concentration has significant role to influence the overall acceptability of therapeutic RTS.

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