Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(2): 26-32
Received: 22-01-2019
Accepted: 24-02-2019

Deshmukh NM
Department of Food Engineering, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Sawate AR
Department of Food Engineering, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Kshirsagar RB
Department of Food Engineering, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Desai GB
Department of Food Engineering, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Patil BM
Department of Food Engineering, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Correspondence
Deshmukh NM
Department of Food Engineering, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Studies on preparation and proximate composition of aonla and *Aloe vera* nectar with stevia (*Stevia rebaudiana*) as a sugar substitute

Deshmukh NM, Sawate AR, Kshirsagar RB, Desai GB and Patil BM

Abstract
The experiment was conducted to standardization of the suitable ratio of sugar and stevia for the preparation of low calorie aonla and *Aloe vera* nectar using stevia as an sugar substitute and observed their proximate composition. The prepared nectars were organoleptic ally evaluated by adopting 9 point hedonic rating scale. Among the different sugar-stevia ratios, nectar prepared by using 50 per cent stevia+ 50 per cent sugar was found to be the best on overall sensory score. Best nectar stored in glass bottles and proximate composition steviosides, protein, fat, carbohydrate, crude fiber, reducing sugar, ash, total soluble solids, acidity, minerals, vitamins. According to the organoleptic score, the aonla and *Aloe vera* 50 per cent stevia+ 50 per cent sugar nectar was found to be acceptable with good appearance, flavour, taste and overall acceptability.

Keywords: *Stevia rebaudiana*, nectar, proximate

Introduction
The last decade in many parts of the world, there is a growing interest for different food and beverages that improve health benefits. The functional food plays an important role, providing a new type of promising tool with beneficial health effects related to particular components present in the food. Therefore, the addition of sweeteners such as *Stevia* a natural sweetener with a low calorific value and a sweetening power 200-300 times higher than sucrose represents a good alternative as a sucrose substitute (Kumar *et al*., 2013) [1].
Besides regular consumption of these extracts of *S. rebaudiana* promotes various beneficial effects on certain physiological systems such as cardiovascular and renal, decreases the content of sugar, radionuclides, and cholesterol in blood, improves cell regeneration and blood coagulation, suppresses neoplastic growth, strengthens blood vessels, and had a significant effect as antioxidant. The extracts can be consumed by healthy persons as well as by diabetics. *Stevia* are safe for consumption by diabetics because they do not increase blood glucose levels or insulin resistance (Furlan *et al*., 2016) [2].
Nectar is juice with pulp obtained by homogenization of fruit creams with sugar syrup and possibly with citric acid or ascorbic acid. The product shall have the characteristic color, aroma and flavor of the fruit from which it is made, taking into consideration the addition of sugars. Nectar is considered a natural tonic that enhances digestibility, supports the immune system and improves the elimination of toxins, also fresh nectars speed healing infections and ulcers. The nutritional value of nectars is given by the composition of fruit that contain important quantities of simple carbohydrates, easily assimilated by the human body, vitamins, fibers and potassium. Carbohydrates are used as an energy source, have a plastic role, they increase the body's resistance to toxic substances. Proteins have a structural and functional role, participating in biochemical reactions, are source of energy. Vitamins are acting in the process of electron transport, enzyme activation and biocatalysis. Fibers stimulate digestion, reduce blood cholesterol levels, and prevent colon cancer and balances blood sugar. Potassium from peaches has an essential role, determinate fruit quality, maintain acid-base balance, in the activation of enzymes, together with sodium helps to regulate water in the body and normalize heart rhythm.
Nectars offered to consumers by commercial networks, are beverages made from juice concentrate or puree, from one or more types of fruits, water and sugar added in different proportion, depending on the preferences of local consumers, government standards, pH, or the type of fruit and varieties used (Costache. A and Iordan. M 2015) [3].

Materials and Methods

Materials

The dark green coloured stevia (*Stevia rebaudiana*) leaves were collected from the Department of Botany, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, and Maharashtra. The other ingredients such as aonla, *Aloe vera* and sugar were collected from the local market of Parbhani. The proposed research was carried out in Department of food engineering, College of Food Technoogy, VNMKV, Parbhani.

Chemicals and glasswares

Chemicals

Chemicals (analytical grade) and glasswares required during experiments were used from College of Food Technology, V.N.M.K.V., Parbhani.

Equipments and machineries

The equipments and machineries hot was used for the present investigation were used from the various departments of College of Food Technology, VNMKV, Parbhani.

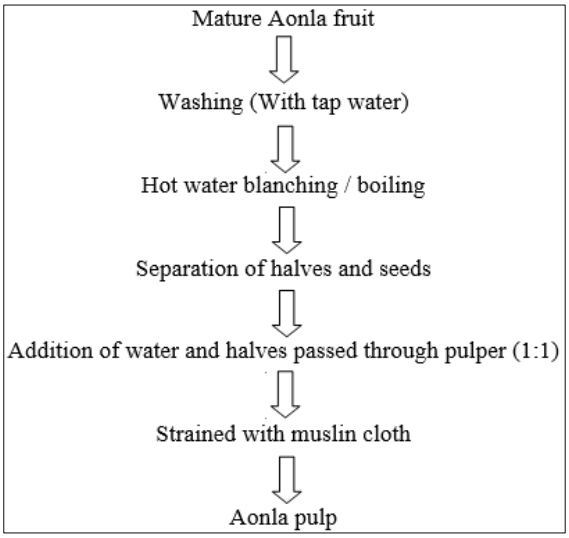
Methods

Process for preparation of stevia added aonla and *Aloe vera* nectar

Preparation of aonla pulp

The aonla pulp was prepared according to the method given by Singh *et al*., (2014) [4]. with some modification as given in Flowsheet 1. The fully mature, fresh and uniform fruits of aonla (*Kanchan*) were taken from the Department of Fruit and Vegetable Processing, College of Horticulture, VNMKV, Parbhani. Fruits were inspected thoroughly for any damage and spoilage and washed with tap water thoroughly to remove dirt and dust particles adhering to the surface of fruits are washed with chlorinated water and allowed to dry the surface. Juice of individual fruits was extracted by coil type juice extractor, filtered through a cleaned muslin cloth and kept for few hours in refrigerator (4 ± 2^0C) for sedimentation then after blended as per recipe treatments.

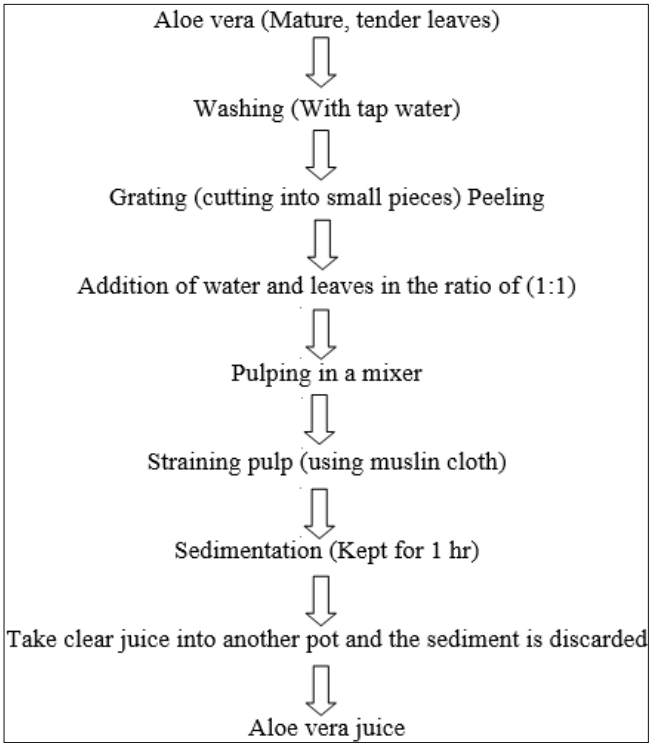
Mature Aonla fruit



Flow sheet 1: Preparation of aonla pulp

Extraction of *Aloe vera* juice

The techniques adopted for extraction of *Aloe vera* juice for preparation of nectar are given in Flowsheet-2 by (Ramachandra and Srinivasa 2008) [5]. Fresh and sound quality *Aloe vera* leaves were selected for preparation of juice. *Aloe vera* was washed to remove impurities, then peeling and cutting was carried out. Cut pieces of *Aloe vera* were passed through mixer with addition of water. The pulp was passed through muslin cloth to get clear *Aloe vera* juice.



Flow sheet 2: Preparation of *Aloe vera* juice

Standardization of recipe for preparation of stevia added fruit based nectar

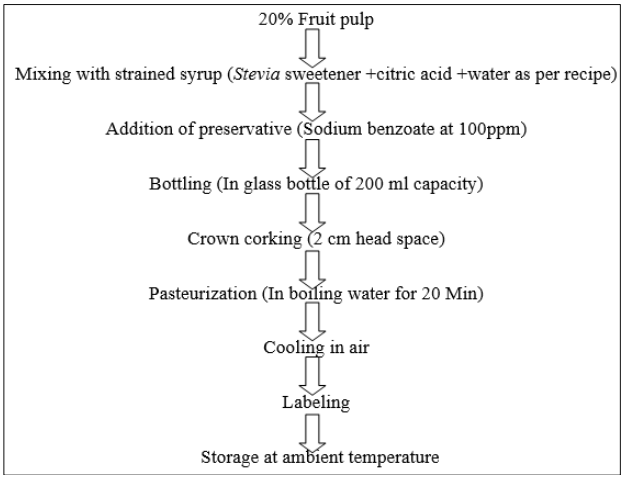
The nectar was prepared by varying the concentration of stevia powder @ 0,100, 75, 50, and 25%. The other ingredients such as aonla juice used 70% as fruit juice, *Aloe vera* were used at 30% concentration to improve the nutritional value and acceptability of fruit based nectar. The standardized recipe for preparation of stevia added fruit based nectar is given in Table 1.

Table 1: Formulation of stevia added fruit based nectar

Samples	Aonla juice (%)	*Aloe vera* juice (%)	Sugar (%)	Stevia (%)	Citric Acid (%)	Sodium Benzoate (%)
T0	70	30	100	0	0.3	0.01
T1	70	30	0	100	0.3	0.01
T2	70	30	25	75	0.3	0.01
T3	70	30	50	50	0.3	0.01
T4	70	30	75	25	0.3	0.01

The methodology used is summarized in Flowsheet 3. The fully mature, fresh and uniform fruits of aonla (*Kanchan*) were taken from the Department of fruit and vegetable Processing, College of Horticulture, VNMKV, Parbhani. Fruits were inspected thoroughly for any damage and spoilage and washed with tap water thoroughly to remove dirt and dust particles adhering to the surface of fruits are washed with chlorinated water and allowed to dry the surface. Juice of individual fruits was extracted by coil type juice extractor. Fresh and sound quality *Aloe vera* leaves were selected for preparation of juice. *Aloe vera* was washed to remove impurities, then peeling and cutting was carried out. Cut pieces of *Aloe vera* were passed through mixer with addition

of water. The pulp was passed through muslin cloth to get clear *Aloe vera* juice. The stevia powder, sugar, citric acid and sodium benzoate were added to aonla and *Aloe vera* juice as per given proportion. Stevia used as sugar replacer nectars were prepared by standard procedure with 20 per cent pulp, 0.25 per cent acidity and 14 per cent TSS. 14 per cent TSS of nectar was maintained by the calculated amount of stevia substitution of sugar (Swaroop *et al*., 2012) [6].



Flow sheet 3: Preparation for fruit based nectar

Analysis of stevia added fruit based nectar

Determination of Physico-chemical characteristics

Total Soluble Solid (TSS)

Total soluble solid (TSS) of juice was determined by digital hand refract meter (Model No. SK-109R, Jamnagar (Gujrat), India) of range 0-30^0 Bx. The reading was corrected to 20^{0}C and the mean value was expressed as the per cent ^{0}Bx (AOAC, 2000) [7].

pH

The pH values were determined with the help of a digital pH meter (Labman, Mumbai Maharashtra, India after calibrating it with buffer solution of pH 4 and 9.2 (AOAC, 2000).

Titratable Acidity

Titratable acidity was estimated by titrating 5 ml aliquot of the sample against standard 0.1N sodium hydroxide solution using phenolphthalein as an indicator. The total titratable acidity was expressed as per cent citric acid present in 100 ml liquid sample (Ranganna, 2011) [8]. It was calculated by formula

$$\text{Acidity (\%)} = \frac{\text{Titre value x N of alkali x Volume made up x Equivalent weight. of acid x 100}}{\text{Aliquot x Volume of sample taken x 1000}}$$

Reducing sugar

The reducing sugar content was determined by the method given by Ranganna (2011) using Fehling's A and Fehling's B solution.

Standardization of Fehling's Solution

Equal quantities (20 mL each) of Fehling's solution A and B were mixed in a 250 mL conical flask with 100 mL water. The mixed Fehling's solution was then titrated with standard glucose solution (1%) till blue colour just disappears. Content in the flask was then heated on a hot plate with wire gauge. When liquid begin to boil, 3 drops of methylene blue indicator were added without removing flask from hot plate. Then further titration is continued with glucose solution till the brick red colour is observed and dye colour is decolorized. The volume of glucose solution required to reduce the Fehling's solution was noted as titre value.

$$\text{Fehling's factor} = \frac{\text{Titre value of std. glucose solution x 2.5}}{1000}$$

Preparation of sample

25 g of macerated sample was taken and homogenized with few quantity of distilled water and then transferred to 250 mL volumetric flask. The sample was neutralized with 0.1 N NaOH and decolorized by adding 2 mL lead acetate. After shaking, the sample was allowed to stand for 10 min. The excess lead was removed by adding potassium oxalate and final volume was made up to 250 mL with distilled water.

Assay

The neutralized and decolorized sample was filled in burette and titrated against mixture of Fehling's solution as did for standardization of Fehling's solution. The per cent reducing sugar present in sample was determined by using following formula.

$$\text{Reducing sugar (\%)} = \frac{\text{Fehling's factor x Dilution of sample made x 10}}{\text{Titre value of sample x Wt. of sample x 100}}$$

Determination of proximate composition of stevia added aonla and *Aloe vera* based nectar

The carbohydraye, protein, fat, crude fibre and ash content will be determined according to AOAC (2005).

Identification and quantification of stevia glycosides by HPLC

Agilent 1260 High-Performance Liquid Chromatography was used for the analysis of stevia glycosides. Acetonitrile and HPLC grade water were used as a mobile phase. HPLC specifications used in this experiment were quaternary pump flow rate: 1 ml/min, injection volume: 20 µl, pressure: 300 bars, column: C18, 4.6 x 50 mm and DAD signal: 205 nm. 20 µl of the standards and unknown samples were injected for the analysis6-8. From the chromatogram, the percentage mass of Steviol glycosides present *in vitro* leaf samples were calculated using the following formula, (Ramya *et al*., 2014) [9].

$$\text{Standard content} = \frac{A2}{A1} \times \frac{M1}{M2} \times P$$

Where, A1 = peak area of glycosides in reference standard solution,

A2 = peak area of glycoside in sample solution, M1 = mass, in mg of the reference standard glycoside, M2 = mass, in mg, of the sample, P = Purity of reference standard

Analysis of vitamins

Determination of vitamin B_1 (Thiamin)

Five grams of the sample was homogenized with sodium hydroxide (50 ml) it was filtered into a 100 ml flask. 10 ml of the filtrate was pipette and the colour developed by addition of 10 ml of potassium dichromate was read at 360 nm in a spectrophotometer. A blank sample was prepared and the colour also developed and read at the same wavelength.

Determination of vitamin B_{12} (Folic acid)

Take the 100 mg sample containing folic acid in a 100 ml flask. Add about 50 ml of K_2HPO_4 solution, and heat the

mixture to the temperature 60°C with swirling until the sample is properly dispersed. Cool to room temperature, and make up the volume to 100 ml with K_2HPO_4 solution. Filter or centrifuge the solution. Transfer an aliquot of the clear solution containing about 1 mg of folic acid to 100 ml volumetric flask. Dilute to volume with K_2HPO_4 solution. Use solution for colour development and estimation.

Determination of vitamin C (Ascorbic acid)

The method of Hussian *et al*. (2006) [10]. Was used for determination of vitamin E. 1g of each ground sample was weighed in a 25 ml conical flask. Then 10 ml of the oxalic acid (0.05 M)-EDTA (0.02 M) solution was added and the mixture allowed standing for 24 h, to provide the required reaction time. After 24 h, the samples were filtered through 0.45 µm Whatman filter paper No.1. Then 2.5 ml of each sample was transferred to a separate 25 ml volumetric brown flask, after which 2.5 ml of the oxalic acid (0.05 M)-EDTA (0.02 M) solution was added. Subsequently, Meta phosphoric acid was added separately with acetic acid (0.5 ml), sulphuric acid (5% v/v) solution (1 ml) and ammonium molybdate solution (2 ml) in each volumetric brown flask and the volume was made up to 25 ml with distilled water. The absorbance was measured at 760 nm in a visible spectrophotometer.

Analysis of minerals

Mineral content of samples was estimated by method given by Ranganna, (1986) [11].

Estimation of Phosphorous

It was done by spectrophotometric method. 5 ml of ash solution was obtained by dry ashing. 5 ml of molybdate reagent was added into ash solution and mix. Then 2 ml of aminonaphthol sulphonic acid solution was mixed and made volume up to 50 ml. A similar blank was prepared using water in place of sample. The solutions were allowed to stand for 10 minute and colour was measured at 650 nm by setting the blank at 100 per cent transmission.

$$\text{Phosphorous (mg/100g)} = \frac{\text{mg of phosphorous in aliquot taken for estimation} \times \text{total volume of ash solution} \times 100}{\text{ml of ash solution taken for estimation} \times \text{weight of sample}}$$

Estimation of Calcium

Titrometric determination of calcium was done. Aliquot of 25 ml of mineral solution was taken and diluted to 150 ml with distilled water. 2-3 drops of methyl red indicator were added in it. Strong ammonia was added to neutralize the solution which changes pink to yellow. Then the mixture was allowed to boil for few minutes and 10 ml of ammonium oxalate was added. Mixture was again boiled for 2 minutes and glacial acetic acid was added till the colour become pink. The mixture was kept aside in warm place (overnight) and when precipitate settled down, the supernatant was tested with a drop of ammonium oxalate to ensure the completion of precipitation. Precipitate was then filtered with Whatman No.4 filter paper and washed with warm distilled water. The contents were filtered through filter paper and given washings of warm distilled water. The precipitate was transferred to a beaker by making a hole in the centre of filter paper and by giving washings of H_2SO_4 (2 N, 5ml) twice. Then solution was heated to 70^0C and titrated against N/100 $KMnO_4$. The end point of titration was persistent pink colour. Simultaneously a blank was also run.

1 ml of 0.01N $KMnO_4$ = 0.2004 mg calcium

Estimation of Iron

It was done by orthophenanthroline method. 5 ml of acid extract was pipette out in 25 ml volumetric flask. 1 ml of hydroxylamine hydrochloride was added in it. After 5 min 5 ml of acetate buffer and 1 ml of phenanthroline reagent was added. Volume was made 25 ml with distil water and color was read on spectrophotometer at 550 nm with standard solution.

Estimation of Magnesium

Magnesium was estimated by colorimetric method. Measure 10 ml of ash solution into a 15 ml graduated centrifuge tube. Add 1 drop of methyl red indicator. Neutralise solution with NH_4OH and ammonium oxalate and make the solution to a volume of 13 ml. Mix and allow to stand overnight. Centrifuge for 10 min. and discard precipitate. Measure 1 ml of the supernatant liquid from above into a 15 ml centrifuge tube. Add 3 ml of water, 1 ml of ammonium phosphate and 2 ml of NH_4OH. Mix and allow standing overnight. Centrifuge for 7 min, discard the supernatant liquid, mix with 5 ml of dilute NH_4OH, centrifuge for 7 min and discard supernatant liquid. Dry the precipitate by placing the tube to container of hot water. Add 1 ml of dilute HCl and 5 ml of water to dissolve the precipitate. Add 1 ml of molybdic acid solution, 0.5 ml hydroquinone and 0.5 ml sodium sulphite solution. Mix and allow standing for 30 min. Transfer the solution to colorimeter tube and read the absorbance in a colorimeter using a No. 66 red filter. Set the instrument scale at zero with scale.

Estimation of Zinc

To the aqueous phase, following the removal of Ni and Co (pH 8.0 - 8.3), add 2.0 ml of the dithizone solution and 10 ml of CCI_4 and Shake for 2 min. Allow the phases to seprate and removes the aqueous layer as completely as possible. Withdraw the liquid by means of a pipette attached to a vacuum line. Wash down the sides of the separating funnel with approximately 25 ml of water and again draw of the aqueous layer without shaking. Then add 25 ml of the 0.04 N HCI and shake for 1 min to transfer the zinc to the acid-aqueous layer. Drain off and discard the solvent. carefully dislodge and remove the drop that usually floats on the surface to the acid solution containing zinc, add 5.0 ml of the ammonium citrate solution, 10.0 ml $CC1_4$ (pH 8.8 - 9.0) and 1.5 times the dithizone required to extract 20 mg of zinc. Shake for 2 min and allow to separate. Draw Off the CCl_4 layer. Dilute 5.0 ml of this with 10.0 ml of CCl_4 and measure the colour at 540 nm.

Organoleptic evaluation

The nectar samples were evaluated for their organoleptic attributes namely colour, flavour, taste, mouthfeel and overall acceptability by semi-trained panel of 10 judges by following 9-point Hedonic rating scale (Amarine *et al*., 1987) [12]. as given below.

Statistical analysis

The analysis of variance of the data obtained was done by using Completely Randomized Design (CRD) and interpreted in the chapter results and discussion.

Results and Discussion

Analysis of stevia added aonla and *Aloe vera* nectar

Physico-chemical properties of stevia added aonla and *Aloe vera* nectar

The Physico-chemical properties of stevia added aonla and *Aloe vera* nectar were analysed for important physico-chemical characteristics. The obtained results are tabulated in Table 2.

Table 2: Physico-chemical properties of stevia added aonla and *Aloe vera* nectars

Parameters	T_0 (Control)	T_1	T_2	T_3	T_4
TSS (^{0}Bx)	15.1	14.7	14.3	14.1	13.8
pH	3.55	3.38	3.42	3.44	3.49
Titratable Acidity (%)	0.3	0.3	0.3	0.3	0.3

*Each value is average of three determinations

T_0 (Control) – 100% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)

T_1 – 100% Stevia nectar (70% Aonla + 30% *Aloe vera* Blending nectar)

T_2 – 75% Stevia + 25% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)

T_3 – 50% Stevia + s50% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)

T_4 – 25% Stevia + 75% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)

The total soluble solids (TSS) were decreased by increasing the substitution level of stevia powder. Total Soluble Solids (TSS) were ranged from (15.1 ^{0}Bx), (14.7 ^{0}Bx), (14.3 ^{0}Bx), (14.1 ^{0}Bx) and (13.8 ^{0}Bx) respectively for sample T_0, T_1, T_2, T_3 and T_4. Similar results are reported by Barakat *et al*. (2017) [13]. The pH and Titratable acidity prepared nectars were illustrated in a table. No 2 significant difference have been found among different substituted nectars reflects that incorporation of stevia in nectars had no significant impact on pH and Titratable acidity. The Titratable acidity value was not affected by replacing stevia in all formulated nectars. Similar findings are also reported by Swaroop *et al*. (2012).

Proximate composition of stevia added aonla and *Aloe vera* nectars

The Proximate composition of stevia added aonla and *Aloe vera* nectar were analysed for important physico-chemical characteristics. The obtained results are tabulated in Table 3.

Table 3: Proximate composition of stevia added aonla and *Aloe vera* nectar

Samples	Chemical characteristics (%)					
	Fat	Protein	Carbohydrates	Reducing sugar	Crude fiber	Ash
T_0 (Control)	0.29	12.20	11.19	2.78	<0.1	<0.25
T_1	0.24	13.25	2.41	1.70	<0.1	<0.25
T_2	0.21	12.38	3.29	1.26	<0.1	<0.25
T_3	0.18	11.69	4.37	0.85	<0.1	<0.25
T_4	0.14	10.28	4.89	0.63	<0.1	<0.25
S.E.±	0.00459	0.0298	0.10641	0.0225	-	-
C.D.	0.01345	0.08742	0.31209	0.06598	-	-

*Each value is average of five determinations

T_0 (Control) – 100% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)

T_1 – 100% Stevia nectar (70% Aonla + 30% *Aloe vera* Blending nectar)

T_2 –75% Stevia + 25% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)

T_3 –50% Stevia + 50% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)

T_4 – 25% Stevia + 75% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)

The protein, fat, carbohydrate, crude fiber, reducing sugar and ash of different types of stevia added aonla and *Aloe vera* nectar were compiled. Protein (%) of T_0, T_1, T_2, T_3 and T_4 nectars was 12.20, 13.25, 12.38, 11.69 and 10.28 significantly difference in values respectively. The fat (%) of T_0, T_1, T_2, T_3 and T_4 nectars was 0.29, 0.24, 0.21, 0.18 and 0.014 respectively the fat content of the nectars was statistically not significant. Significantly difference in values Carbohydrate (%) of T_0, T_1, T_2, T_3 and T_4 nectars was 11.19, 2.41, 3.29, 4.37 and 4.89 respectively. It was observed that the protein and fat of nectars were significantly decreased but a significantly increasing trend was observed in the carbohydrate nectar with variation in combinations of stevia and sugar ratio combination. Reducing sugar (%) of T_0, T_1, T_2, T_3 and T_4 nectars was 2.78, 1.70, 1.26, 0.85 and 0.63 respectively. It was observed that the crude fiber (%) and ash (%) of T_0, T_1, T_2, T_3 and T_4 nectars was <0.1 and <0.25 respectively, significant decreasing trend was observed nectar with variation in combinations of stevia and sugar ratio combination. Similar results are reported by Majumder *et al*. (2017) [14] and Barakat *et al*. (2017).

Total glycosides (Steviosides) composition of of stevia added aonla and *Aloe vera* nectars

The composition steviosides in stevia added aonla and *Aloe vera* nectar were analysed. The obtained results are tabulated in Table 4.

Table 4: Total glycosides (Steviosides) composition of of stevia added aonla and *Aloe vera* nectars

Samples	Steviosides (g/100 ml)
T_0 (Control)	0
T_1	1.80
T_2	1.35
T_3	0.90
T_4	0.45
S.E.±	0.0178
C.D.	0.05219

*Each value is average of three determinations

The steviosides is on of the main sweetening component in stevia leaves. Content of steviosides in T_0, T_1, T_2, T_3 and T_4 nectars was significantly difference in values 0, 1.80, 1.35, 0.90 and 0.45 g/100 ml respectively. Study is aiming for preparation of low-calorie aonla and *Aloe vera* nectars for diabetes and weight maintaining approaches as well as consumer satisfaction. Similar results are reported by Balaswamy *et al*. (2014) [15] and Barakat *et al*. (2017).

Minerals composition of stevia added aonla and *Aloe vera* nectars

Minerals play a key role in various physiological functions of the body especially in the building and regulation processes. Iron content in stevia leaves were 186.20, 5816.63 and 1030.06 mg/kg respectively. The phosphorus content contributed in bone formation, energy metabolism and nucleic acid metabolism. The calcium content result suggest that the leaves may be of greater physiological significance to cure diseases related to bone system. Iron functions as haemoglobin in the transport of oxygen and is an important constituent of succinate dehydrogenase as well as a part of the heme of haemoglobin (Hb), myoglobin and the cytochromes (Tadhani and Subhash, 2006) [16]. The results pertaining to mineral content of stevia leaves are presented in Table 5.

Total 5: Minerals composition of stevia added aonla and *Aloe vera* nectars

Samples	Minerals (g/100 gm)				
	Phosphorous	Calcium	Iron	Magnesium	Zinc
T_0 (Control)	13.27	97.96	71.85	89.27	7.89
T_1	12.14	93.31	70.69	85.23	6.89
T_2	11.69	91.98	68.71	84.22	6.12
T_3	9.81	91.85	66.36	83.35	5.59
T_4	7.68	87.12	62.69	79.63	4.93
S.E.±	0.06004	0.61411	0.28287	0.76786	0.09999
C.D.	0.17612	1.80125	0.82969	2.25219	0.29329

*Each value is average of three determinations

Phosphorous content of T_0, T_1, T_2, T_3 and T_4 nectars was 13.27, 12.14, 11.69, 9.81 and 7.68 (g/100 gm) respectively, also the other minerals including calcium, iron, magnesium and zinc were decreaseing sequence but related to T_0 control treatment sample the result will be different from all the other treatments as per shown in the table. Similar findings are also reported by Ekasi and Kirtis (2016) [17].

Vitamins composition of stevia added aonla and *Aloe vera* nectars

The vitamins do not provide energy but are necessary in the use of energy. The quantitative estimation of vitamins present in stevia added aonla and *Aloe vera* nectars were presented in Table 6.

Table 6: Vitamins composition of stevia added aonla and *Aloe vera* nectars

Samples	Vitamins (mg/100gm)		
	vitamin (B_1) Thiamine	vitamin (B_{12}) Folic acid	vitamin (C) Ascorbic acid
T_0 (Control)	0.39	2.8	29.21
T_1	0.26	2.02	26.8
T_2	0.21	1.51	26.4
T_3	0.14	0.99	26.8
T_4	0.9	0.43	25.3
S.E.±	0.00854	0.06413	0.40215
C.D.	0.02504	0.1881	1.17955

*Each value is average of three determinations

The data in Table 6 showed, stevia added aonla and *Aloe vera* nectars contained water soluble vitamins vit (B_1) Thiamine, vit (B_{12}) Folic acid and vit (C) Ascorbic acid. The order of magnitude of the studied vitamins is vitamin C > B_{12} > B_1. The vitamin (B_1) content of stevia added aonla and *Aloe vera* nectars T_0, T_1, T_2, T_3 and T_4 nectars were found to be 0.39, 0.26, 0.21, 0.14 and 0.9 mg/100g non-significant respectively. Vitamin (B_1) is necessary for keeping the liver, skin, hairs and eyes healthy. The vitamin (B_{12}) content of stevia added aonla and *Aloe vera* nectars T_0, T_1, T_2, T_3 and T_4 nectars were found to be 2.8, 2.02, 1.51, 0.99 and 0.43 mg/100g significant difference in values respectively. Vitamin (B_{12}) is necessary for formation of red blood celles in humen body, also helpful boosting the energy level and bone health. They are believed to play a role in certain conditions related to aging, gout and arthritis. The results are similar with the data given by USDA (2014) [18].

Stevia added aonla and *Aloe vera* nectars were found to contain higher amount of water soluble vitamins. The vitamin (C) content of stevia added aonla and *Aloe vera* nectars was 29.21, 26.8, 26.4, 26.8 and 25.3 mg/100g respectively. Vitamin C content aids in wound healing and also helps in resisting infection. This indicated that, the stevia added aonla and *Aloe vera* nectars has lack of level of fat soluble vitamins. Similar findings are also reported by Swaroop *et al*. (2012).

Organoleptic evaluation of stevia added aonla and *Aloe vera* nectars

Stevia added aonla and *Aloe vera* nectars were prepared by using the stevia powder at the 0, 100, 75, 50 and 25% concentration and the prepared nectars were judged by semi-trained panel members for assuring best quality parameters with respect to colour, flavour, taste, mouthfeel and overall acceptability. The organoleptic evaluation of stevia added aonla and *Aloe vera* nectars were performed for different quality attributes such as colour, flavour, taste, mouthfeel and overall acceptability. The results of the organoleptic evaluation was depicted in Table 7.

Table 7: Organoleptic evaluation of stevia added aonla and *Aloe vera* nectars

Samples	Colour	Flavour	Taste	Mouthfeel	Overall Acceptability
T_0 (Control)	8.0	8.0	8.5	8.0	8.0
T_1	8.0	8.0	7.5	7.8	7.5
T_2	8.0	7.8	7.5	7.0	7.2
T_3	8.0	8.0	8.5	8.5	8.5
T_4	8.0	7.5	7.0	7.2	7.0
SE±	0.0641	0.1141	0.109	0.1325	0.1203
CD at 5%	0.1882	0.1141	0.3197	0.3887	0.3530

*Each value is average of ten determinations

T_0 (Control) – 100% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)
T_1 – 100% Stevia nectar (70% Aonla + 30% *Aloe vera* Blending nectar)
T_2 – 75% Stevia + 25% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)
T_3 – 50% Stevia + 50% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)
T_4 – 25% Stevia + 75% Sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar)

It is evident from the results that, the score of colour was observed all treatments of samples T_1 to T_4 which was same and also statistically non-significant. The sample T_0, T_1 and

T_3 was significant over T_2 and T_4 with respect to flavor. The taste, mouth feel and overall acceptability which was best for treatment sample T_3. The flavour of nectar was accepted by panellists at the 50% stevia + 50% sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar). The mouth feel of T_3 was found the best with score 8.5 followed by T_0 (8.0) and lowest score was observed for sample T_4 due to low concentration of stevia addition. The panellists gave the highest overall acceptability for T_3 (8.5) sample. It was cleared from the data that, the 50% stevia + 50% sugar nectar (70% Aonla + 30% *Aloe vera* Blending nectar) was acceptable.

Conclusion

It could be finally concluded from the results obtained during this study that stevia as a sugar substitute possess all the potential characteristics to be well utilized in preparation of fruit based nectar. It was noticed that sample added with 50 per cent of stevia leaf powder and 50 per cent of sugar can be utilized with retaining desirable sensory, nutritional and textural properties. Stevia as a natural substitute for replacement of sugar can have beneficial effects on certain physiological disorders.

References

1. Kumar R, Bawa AS, Kathiravan T, Nadanasabapathi S. Thermal processing of mango nectar (*Mangifera indica*) and its effect on chemical, microbiological and sensory quality characteristic. International Journal of Advanced Research. 2013; (8)1:261-273.
2. Furlan RL, Baracco Y, Zaritzky N, Campderros ME. Development of free sugar white chocolate, suitable for diabetics, using *Stevia* and sucralose as sweeteners: study of the thermal degradation kinetic. International Journal of Research in Advent Technology. 2016; 4(7):49-57.
3. Costache A, Iordan M. Qualitative evaluation of peach nectars, soft drinks, with high nutritional value. Journal of Analysis of Food Science and Technology. 2015; 6(2):319-325.
4. Singh O, Singh R. Development and evaluation of aonla based blended nectar drink from different fruits using *Stevia* for low calorie. Plant Archives. 2014; (14)1:115-119.
5. Ramachandra CT, Srinivasa Rao P. Processing of *Aloe vera* leaf gel: A Review. American Journal of Agricultural and Biological Sciences. 2008; 3(2):502-510.
6. Swaroop J, Pathak S, Jakhar MS, Kumar S. Studies on preparation and preservation of low calorie guava (*Psidium guajava L*.) nectar using *Stevia* as low calorie sweetener. International Journal of Processing and Post-Harvest Technology. 2012; (3)2:283-285.
7. AOAC. Official Methods of Analysis of the AOAC International, 18thed. Association of Official Analytical Chemists, Gaithersburg, MD, 2005.
8. Ranganna S. Handbook of analysis and quality control for fruits and vegetable products. IInd edition. Tata McGraw-Hill Publ. Co., New Delhi, India, 2011.
9. Ramya M, Manogaran S, Joey K, Wooi T, Katherasan S. Studies on Biochemical and Medici-nal Properties of *Stevia rebaudiana* Grown In -Vitro. International Journal of Ayurveda and Pharmaceuticals. 2014; 5(2): 169-175.
10. Hussian I, Saleem M, Iqbal Y, Khalil SJ. Comparison of Vitamin C Contents in Commercial Tea Brands and Fresh Tea Leaves. Journal of the Chemical Society of Pakistan. 2006; 28:421-425.
11. Ranganna S. Handbook of analysis and quality control for fruits and vegetables. Tata McGraw- Hill Publication, New Delhi, India, 1979, 345.
12. Amarine MA, Pangborn RM, Roessler EB. Principle of sensory evaluation of food. Academic Press. New York, USA, 1987.
13. Barakat H, Furaydi AA, Harbi AA, Shedookhi AA. Nutritional, Chemical and organoleptical characteristics of low-calorie fruit nectars incorporating *Stevioside* as a natural sweetener. Journal of Food and Nutrition Sciences. 2017; 8:126-140.
14. Majumder S, Kumar P, Seelam B, Peter S. Development of herbal nectar prepared from a blend of bottle gourd, mint and lime. The Pharmaceutical Innovation Journal. 2017; 6(9):260-263.
15. Balaswamy K, Rao PP, Rao GN, Akula S. Production of low calorie Ready-to-Serve fruit beverages using a natural sweetener, *Stevia* (*Stevia rebaudiana L*). Journal of Focusing on Modern Food Industry. 2014; 3:59-65.
16. Tadhani M, Subhash R. Preliminary studies on *Stevia rebaudiana* Leaves: Proximal Composition, Mineral analysis and Phytochemical Screening. Journal of Medical Science. 2006; 6:321-326.
17. Eksi A, Kirtiş E. Determination of the mineral profile and prediction of the fruit content in sour cherry juice. European Journal of Food Science and Technology. 2016; 4(1):52-60.
18. USDA. National Nutrient Database for Standard Reference, Release 27, The National Agricultural Library, Washington, D. C, 2014.