

Research Article



Nutraceutical Evaluation and Comparison of Plant Derived Products from Vellore Like *Moringa Olifera*, Banana Inflorescence, Spinach Leaves and Colocasia Fruit for Pharmacological Applications

Sanjeeb Kumar Mandal*, M. Vignesh Kumar, Suneetha V

School of Biosciences and Technology, VIT university, Vellore-632014, Tamil Nadu, India.

*Corresponding author's E-mail: sanjeebkumar.mandal@vit.ac.in

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ABSTRACT

Nutraceutical is an innovative significant product isolated or purified from foods. But now it is generally sold in medicinal forms and it is not usually food-associated. A Nutraceutical is verified beyond doubt to have physiological benefits or provide protection against chronic diseases. Indeed dietary antioxidants and components of fruit and vegetable extract are increasingly suggested to have the capacity to significantly contribute to the modulation of the complex mechanism of pathology. This novel study is based on research with naturally occurring sources like leaves of *Moringa olifera*, banana inflorescence, spinach leaves, fruits of *Colocasia esculenta* and finding the nutrient content present in each component. These natural foods are involved in the Immunopotentiating agent, colloidal benefits of polysaccharides in gastrointestinal processes, sugar, and vitamin, peptide transport by fruit and vegetable fiber, immobilization, glycoside antioxidants provide to the body.

Keywords: Nutraceutical, antioxidants, chronic, immunopotentiating.

INTRODUCTION

The properties of a pharmaceutical drugs and nutrients are partially shared to form a Nutraceutical product. Thus a nutraceutical product shares both the qualities of medicinal value and nutrient healthy values^{1, 2}. The originally term used by Defelice in 1995 with the simple definition: "A food or parts of food that provides medical or health benefits, including the anticipation and/or to cure illness of disease"³.

Antioxidants are the free radical scavengers, which prevent free radicals to disturb the normal metabolic processes in human body. Free radicals are basic fundamental species, which involves in reactive oxygen species (ROS) like the hydroxyl radical (OH), superoxide anion (O₂), hydrogen peroxide (H₂O₂). Mostly natural antioxidants prevents from causes like damage of liver, carcinogenesis, arthritis, connective tissue disorder, aging^{4, 5}. Flavonoids and phenols are the major constituents of organic materials which give shape and smell to it, As well known that nutrients are beneficial in all aspects of living organism in their life. These leaves prevent disease like hepatitis and ictures⁶⁻⁸.

The research is based on naturally occurring sources like leaves of *Moringa olifera*, banana inflorescence, spinach leaves and *Colocasia esculenta* were analyzed for the presence of the nutrient contents like proteins, lipids, carbohydrates, and certain chemical properties like the antioxidants, flavonoids and phenolic characterization is done by different biochemical methods. The *Moringa olifera* are rich in vitamins a and b, treatment of cardiovascular, gastrointestinal, hepato – renal disorder, diabetes mellitus, CNS depressant and antifertility²⁻¹¹.

These samples are selected because they are easily available source and have much nutritional and medicinal

importance, it's been used from historic times in villages to prevent many chronic diseases like prevention of diabetes and chronic heart diseases etc. the hemoglobin deficiency can be rectified by *Moringa* leaves as it contains iron contents higher in percentage comparing to other components^{12, 13}.

The objective of this study is to perform different biochemical methods in bioactive compounds and like to find the antioxidant properties, carbohydrates, proteins, phenols, and vitamins presence in it. The comparison study is performed between the natural occurring products of four samples and analyzed with MS Office Excel statistics tools and relationship between these products was performed¹⁴⁻¹⁶.

MATERIALS AND METHODS

Samples

Four different samples of natural occurring vegetables like drum stick leaves, banana inflorescence, spinach leaves and *Colocasia* fruit part. Sample were purchased in a local market and dried under sunlight for around one week and packed in plastic bottles.

Nutritional and nutraceutical composition

Carbohydrate

A total Carbohydrate content was determined by Anthrone method as Standard Anthrone reagent at 630nm.

Calculation

Amount of carbohydrate present in 100 mg of the sample

$$= \frac{\text{mg of glucose}}{\text{Volume of test sample}} \times 100$$



Proteins

Estimation of proteins present in the different samples was performed by using Bradford Reagent Method having BSA (Bovine Serum Albumin) as Standard at 595nm absorbance.

Vitamins

Ascorbic acid: Estimation of ascorbic acid was done at 520nm. After TCA is added filter whole solution and take only 0.5ml^{17, 18}. Procedure is given below in table-1 format.

Table 1: Vitamin C Estimation

	Blank	1	2	3	4	5	Test 1	Test 2	Test 3	Test 4
Vit. C (ml)	0	1	2	3	4	5	-	-	-	-
Sample (ml)	-	-	-	-	-	-	3	3	3	3
Phosphate Buffer (ml)	5	4	3	2	1	-	2	2	2	2
Pectin (mg)	1	1	1	1	1	1	1	1	1	1
Substrate (whole)	Incubate at 50°C for 30mins									
TCA (ml)	1	1	1	1	1	1	1	1	1	1
Ninhydrin (ml)	1	1	1	1	1	1	1	1	1	1
O.D (520nm)	Optical Density was measured at 520 nm by using UV/Visible Spectrophotometer, Ultraspec 1100 pro, Amersham Biosciences									

Antioxidants

The antioxidant activity methods have been used which has been clearly given in table-2, for monitoring and compare the antioxidant activity of foods and the absorbance was measured at 700 nm^{19, 20}.

Table 2: Antioxidants Assay Estimation

Ingredient	Blank (ml)	Test (ml)	Standard (ml)
Phosphate buffer	2.5	2.5	2.5
Potassium ferricyanide	2.5	2.5	2.5
Trichloro acetic acid	2.5	2.5	2.5
Distilled water	2.5	2.5	2.5
Ferric chloride	0.5	0.5	0.5
Sample (Test)		1	
Mango peels Powder			1

Phenols

The total phenols of all extracts were measured at 765 nm by Folin Ciocalteu reagent^{21, 22}.

Statistical Analysis

For each of the sample analytical procedure, four different samples results were analyzed by various Statistical tools in MS excel 2010.



Figure 1: Powder form of drum stick leaves, Banana inflorescence and Spinach leaves.

RESULTS AND DISCUSSION

All samples are made powder form prior to its analysis to be done as shown in the figure 1.

Estimation and Characterization of Different Nutrient Contents of Sample

Total Carbohydrate Estimation

Polysaccharides and free sugars are exists as carbohydrate in different types samples which has been estimated by Anthrone method as given in Table-3.

Among all sample U22 (1ml of spinach leaves) having higher carbohydrate content.

Protein Estimation

Estimation of protein was determined by Bradford's Reagent at 595nm.

Vitamin Estimation

Ascorbic acid: Estimation of ascorbic acid was done at 520nm using Vitamin C table of 1mg/ml for standard concentration and Ninhydrin Reagent is used.

Estimation of Phenol Content

Phenols act as anti-oxidants and scavenge the hydroxyl radicals so that strain which has maximum phenol concentration exhibited the best antioxidant activity. This test reveal that different culture strain have different phenol concentration. The Gallic acid stock solution standard gives the concentration of phenol in test sample.

0.1ml of Gallic acid = 10 µg/ml phenol.

Table 3: Concentration of different unknown sample where U11(0.5ml) and U12(1ml) of drum stick leaves; U21(0.5ml) and U22(1ml) of Spinach leaves ; U31(0.5ml) and U32(1ml) of banana Inflorence; U41(0.5ml) and U42(1ml) of *Colocasia* fruit.

Test Tube	U11	U12	U21	U22	U31	U32	U41	U42
O.D. at 630nm	0.108	0.137	0.156	0.298	0.116	0.213	0.065	0.222
Unknown Conc.	15.0891	22.6350	27.5789	64.5282	17.17072	42.4107	3.9002	44.7525

Table 4: Unknown concentration of Concentration of different sample where U1(0.2ml) and U2(0.4ml) of drum stick leaves; U3(0.2ml) and U4(0.4ml) of Spinach leaves ; U5(0.2ml) and U6(0.4ml) of *Colocasia* fruit; U7(0.2ml) and U8(0.4ml) of banana Inflorence.

	U1	U2	U3	U4	U5	U6	U7	U8
Absorbance (595nm)	0.015	0.032	0.028	0.032	0.080	0.136	0.018	0.020
Unknown Concentration	0.1708	12.7419	9.7840	12.7419	48.2367	89.6474	2.3893	3.8682

Table 5: Standard Concentration of BSA (Bovine Serum Albumin)

Concentration ($\mu\text{g/ml}$)	0	40	80	120	160	200
O.D.(595nm)	0	0.073	0.139	0.196	0.240	0.252

Table 6: Gradient of different unknown Sample where U1(3ml) of drum stick leaves; U2(3ml) of Spinach leaves ; U3(3ml) of *Colocasia* fruit; U4(3ml) of banana Inflorence.

Test Tube	U1	U2	U3	U4
Absorbance (520nm)	0.271	0.294	0.266	0.291
Unknown Conc.	60.0537	66.0062	58.7597	65.2298

Table 7: Standard Concentration of Vit. C

Test Tube	Blank	S1	S2	S3	S4	S5
Ascorbic Acid Conc. ($\mu\text{g/ml}$)	0	10	20	60	80	100
O.D.(520nm)	0	0.22	0.25	0.26	0.273	0.274

Table 8: Standard Calibration of Phenol

Test Tube	Blank	S1	S2	S3	S4	S5
Conc. ($\mu\text{g/ml}$)	0	10	20	60	80	100
O.D.(520nm)	0	1.036	1.227	1.390	1.486	1.594

Table 9: Different unknown sample with absorbance at 795nm.

Materials Content	O.D. at 795nm
Drum Stick leaves	0.027
Spinach leaves	0.048
<i>Colocasia</i> fruit	0.025
Banana Inflorence	0.028

Table 10: Optical Density at 700nm for Antioxidant activity test

Test Tube (mg/ml)	Drum Stick leaves	<i>Colocasia</i> fruit	Banana Inflorence	Spinach Leaves	Standard
0.2	0.018	0.020	0.072	0.028	0.160
0.4	0.095	0.022	0.124	0.066	0.207
0.6	0.100	0.037	0.158	0.081	0.238
0.8	0.108	0.043	0.220	0.115	0.377
1.0	0.244	0.056	0.301	0.263	0.411

Table 11: Scavenging Activity of different sample

µg/ml	Drum Stick leaves	Colocasia fruit	Banana Inflorescence	Spinach Leaves
20	88.75%	87.50%	55.00%	82.50%
40	54.10%	89.37%	40.10%	68.12%
60	57.98%	84.45%	33.61%	65.96%
80	71.35%	88.59%	41.64%	69.50%
100	40.63%	86.37%	26.76%	36.01%

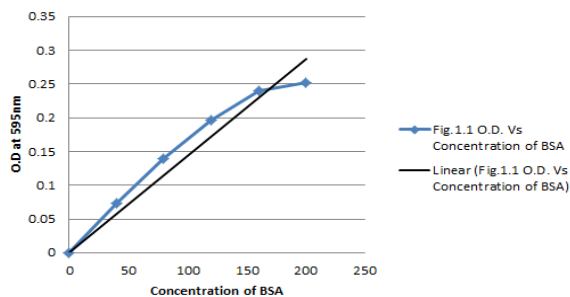


Figure 2: Standard Graph of BSA at 595nm

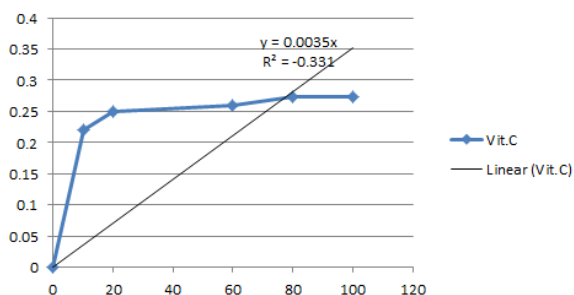


Figure 3: Standard Graph of estimation for Ascorbic Acid Estimation at 520nm.

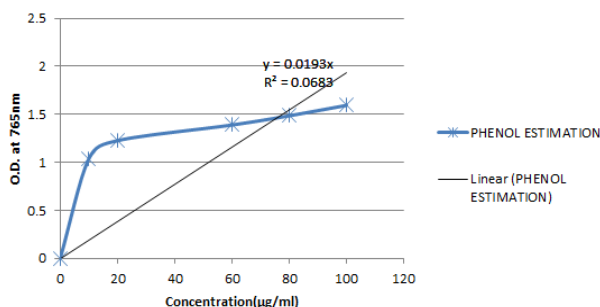


Figure 4: Standard Curve of Phenol.

Anti-oxidant activity test

Anti-oxidant activity test showed strain dependent radical scavenging activity. It ranges from 89.37% to 84.45% on *Colocasia* fruit and decreased to the range of 26.76% to 55% on Banana Inflorescence. The sample which shows maximum scavenging activity are more promising strains of probiotics. Mango peels are taken as standard for anti-oxidant activity.

Scavenging activity

Scavenging activity can be calculated from formula given below:

$$\text{Scavenging \% activity} = (A_{\text{control}} - A_{\text{sample}}) / (A_{\text{control}}) \times 100$$

CONCLUSION

This study was useful to configure the presence of nutrients like carbohydrates, proteins, vitamins and other properties like antioxidant activity. The phenolic characteristic was studied, for the naturally occurring products like Moringa leaves, banana inflorescence, spinach leaves and *Colocasia esculenta* fruit. Thus a comparative study was analyzed and relationship between these samples was calculated. The scope of this work is that these samples can be mixed with soya milk and can be compared with milk product of market. There is increment in nutritious value in soya milk with comparison with market milk.

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