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PG & RESEARCH DEPARTMENT OF NUTRITION AND DIETETICS

National Seminar on

RECENT TRENDS IN NUTRITIONAL SECTOR

NUTRISECTOR-2K23

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PG and Research Dept. of Nutrition and Dietetics

has participated in the "National Level Seminar on Recent Trends in Nutritional Sector NUTRISECTOR - 2K23" on 22 February, 2023 as a Delegate/ Resource Person / Presented a Paper entitled

on A STUDY ON THE ANALYTICAL EXAMINATION OF CITRULLUS LANATUS SEED POWDER LADDU *and won* _____, *organized by PG and Research Department of Nutrition and Dietetics, Muslim Arts college, Thiruvithancode, Tamil Nadu, India.*

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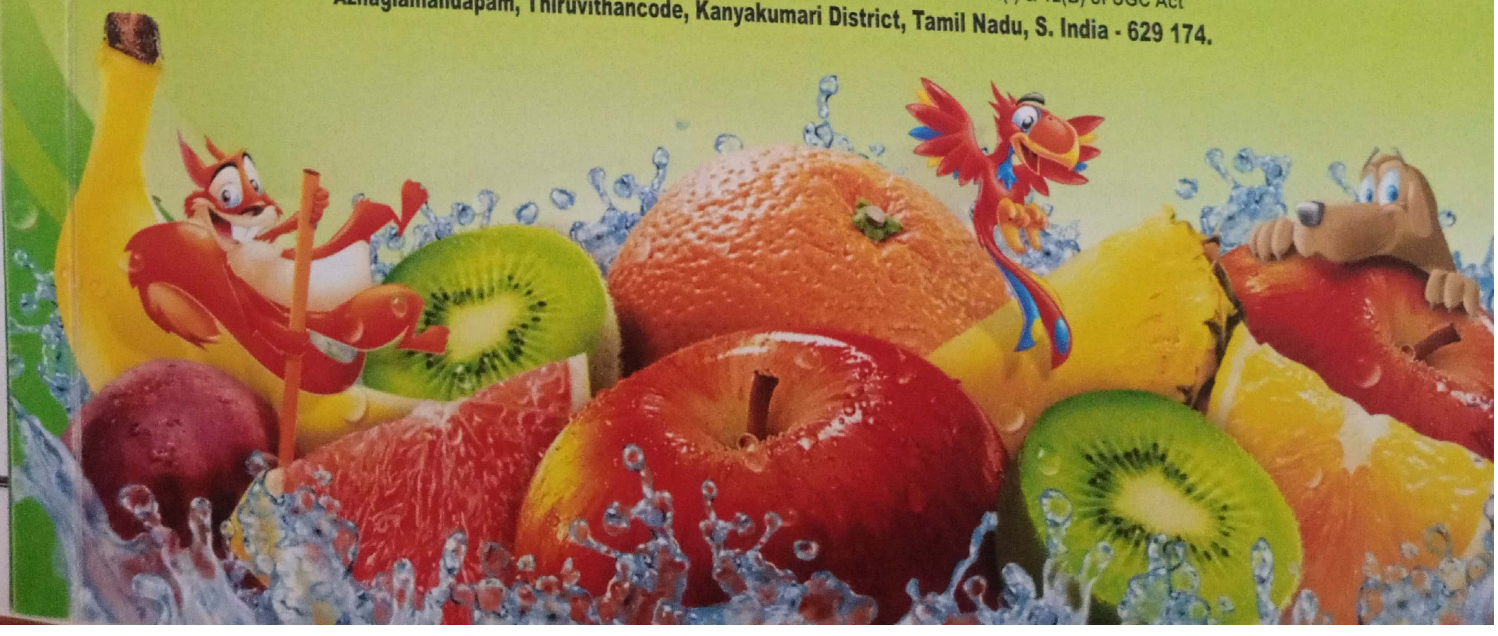

RECENT TRENDS IN NUTRITIONAL SECTOR

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CONTENTS

A STUDY ON THE ANALYTICAL EXAMINATION OF *CITRULLUS LANATUS* SEED POWDER LADDU

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Abstract

Watermelon botanically identified as Citrullus lanatus is a flowering plant species of the Cucurbitaceae family and the name of its edible fruit. Watermelon seeds are one of the most nutrient dense varieties of seeds which cure hypertension and maintain blood pressure. The radical scavenging activity analysis was determined using the standard procedures. It shows the presence of DPPH. Spectrophotometric determination shows the presence of lycopene in Citrullus lanatus seed powder laddu. The presence of crude fibre, vitamin C, fat content, total carbohydrate, proteins and potassium in the Citrullus lanatus seed powder laddu is determined by standard procedures. The product laddu was prepared using Citrullus lanatus and the sensory evaluation of the formulated product was done by 20 selected panel members. The keeping quality and microbial analysis was also done for the prepared product.

Introduction

Watermelon (*Citrullus lanatus*) is a flowering plant species of the cucurbitaceae family and the name of its edible fruit. It is a highly cultivated fruit worldwide, with more than 1,000 varieties. (Lingli Lou. *et al.*, 2009)Watermelon is grown in favorable climates from tropical to temperate regions worldwide for its large edible fruit, which is a berry with a hard rind and no internal divisions, and is botanically called a pepo. The sweet, juicy flesh is usually deep red to pink, with many black seeds, although seedless varieties exist. The fruit can be eaten raw or pickled, and rind is edible after cooking. It may also be consumed as a juice or as an ingredient in mixed beverages. (Gichimu Bernard M, Owuor Barack O, *et al.*, 2009)

The nutritional value and antinutrient content of watermelon seed have not been given much attention such that these seeds are often discarded while the fruit is eaten. A possible way of achieving nutrition security is through exploitation and utilization of available food sources and resources. As a result, the antinutrient factors must be determined to ensure human and animal nutrition security. Anti–nutritional factors have been described as substances that block or inhibit important metabolic pathways, especially digestion. These substances generally reduce the bioavailability of nutrients such as proteins, vitamins and minerals. The most common anti–nutritional factors include tannins, phytate and oxalate. (Kolawole Sunday E, Obuch Henrietta O, *et al.*, 2013)

Methodology

The methodology of the present study entitled analytical examination of Citrullus lanatus seed powder laddu is as follows.

Selection of samples

The fresh samples of watermelon were selected for the study. The fresh sample of watermelon was procured from Apta supermarket Nagercoil of Kanyakumari district. The other ingredients such as peanut, almond, cashew nut, sugar, ghee used for the research were collected from the nearby supermarket, Thuckalay, Kanyakumari district.

Processing of the sample [watermelon seed]

The procured watermelon should be cut into pieces and collect the seeds. Then the sample should be washed thoroughly in running water 2-3 times. Then it was dried by traditional method of sun drying with careful attention. The dried seeds were powdered using a standard mixer until it becomes a fine powder. The sample should be sieved to remove the outer shells of the seed. The powdered watermelon seed should be stored in room temperature and refrigeration for further analysis.

Formulation of the product

The powdered watermelon seeds were used for the preparation of watermelon seed laddu. The selected recipe of watermelon seed laddu was prepared using various proportions such as 2%, 4%, 6%, and 8%.... of incorporation.

S.No	Ingredients	Amount(g)				
		CLS (Standard)	CLP1 2%	CLP2 4%	CLP3 6%	CLP4 8%
1	Peanut	20	19	20	18	18
2	Almond	20	19	18	18	18
3	Cashewnut	20	20	18	18	18
4	Sugar	20	20	20	20	20
5	Ghee	20	20	20	20	18
6	Watermelon seed (powder)	–	2	4	6	8

Sensory evaluation

Sensory analysis was conducted in a team undistributed environment. The prepared products were coded and presented to the panel members with a score card was the quality parameters were qualified by panelist. Sensory evaluation of the prepared product was given in plate. Score card was formulated with the aspects of appearance, color, flavor, texture, taste and overall acceptability. Sensory attributes range from excellent, very good, good and fair. The formulated products, organoleptically evaluated by using numerical score card to estimate the acceptance of 20 semi trained judges from department of the Nutrition and dietetics, Muslim Arts college, Thiruvithancode. The panel members were asked to evaluate the product for appearance, color, flavor, taste, texture and overall acceptability by using score card.

Nutrient calculation of the developed product

Macro and micro nutrient content of processed food were calculated using the referred value from the nutritive value of the Indian Food National Institute of Nutrition, Indian council of medical research, Hyderabad by Gopalan *et al.*, 2005. Nutrient content of all ingredients in each recipe were calculated and nutritive value of powder were found out. The nutrients as protein, calcium, iron and phosphorus present in the sample were calculated.

Shelf life of the selected product

Keeping quality of each and every sample was done for the selected products. The sample was taken in two separate containers and they were stored at different temperature like room temperature and refrigerator storage. To ascertain the storage behavior the products were kept as such as for two months. These containers were checked once in 15 days for the development of any off-flavor and discoloration of the masala mix.

Statistical analysis

The primary data thus collected were consolidate and subjected to statistical analysis namely mean, standard deviation and standard error mean.

Nutrient analysis

Determination of crude fiber content:

0.5g of the test sample was weighed and taken in a beaker. 12.5 ml of 10% v/v nitric acid was added and boiled with constant stirring up to 30 minutes. It was then filtered through a fine cotton cloth. The residues present on the cloth was washed with boiling water and then transferred to a fresh beaker. 12.5 ml of 2.5% v/v sodium hydroxide solution was added then and boiled for 30 minutes with constant stirring. The residues were dried in an oven and the weight was measured. The percentage weight of the crude fiber present was calculated with the formula given below.

Estimation of Vitamin C

1ml of the sample homogenate was mixed with 10 ml of 4% oxalic acid and the final volume of the extract was made up to 25 mL with 4% oxalic acid in a standard flask.

Determination of ascorbic acid content:

Ascorbic acid content of the samples was determined by 2, 6-dichlorophenol indophenol (DCPIP) titration method described by Rao, B. and Deshpande, V., 2006). 5 mL of the ascorbic acid working standard (500µg/5 mL) and 10 mL of 4% oxalic acid were pipette out into a 100 mL conical flask. The contents in the flask were titrated against the dye solution (V1) until the appearance of a pale pink color that persisted for a few min.

Estimation of total carbohydrate (Anthrone method)

Weighed 100mg of the sample into a boiling tube, hydrolyzed by keeping it in boiling water bath for 2-3 hours with 5.0 ml of 2.5 N HCl and cooled to room temperature. Neutralize it with solid sodium-carbonate until the effervescence cease. Make up the volume to 100 ml and centrifuge and collected the supernatant and take 0.1 ml for analysis. Prepare the standards by taking 20-1000 µg/ml from the working standard of glucose (1mg / mL) and make up to 1mLwith distilled water. 1.0 ml of water serves as a blank make up the volume to 1.0 ml in all the tubes with distilled water, and then added 4.0 ml of anthrone reagent, heated for 8- 10 minute in a boiling water-bath. Cool rapidly and read the green to dark green colour at 630 nm.

Estimation of Proteins (Bradford's method)

Weigh 0.5 g sample. Homogenize in mortar and pestle with 5ml phosphate buffer. Decant the supernatant in centrifuge tube. Re-extract the residue 3-4 times with 5ml phosphate buffer. Combine all the decanted supernatant in centrifuge tube. Centrifuge at 5000 RPM for 20 minutes. Collect the supernatant in volumetric flask. Make the volume 25ml with phosphate buffer. Mix well. Take 1.0ml aliquot and transfer in centrifuge tube and 1ml 20% TCA, mix and keep for 30 minutes. Centrifuge at 5000 RPM for 30 minutes; pellet was collected.

Determination of potassium (Flame photometry):

It is of the utmost importance to become familiar with the flame photometer and ancillary equipment prior to analysis. If familiarity is not achieved, inaccuracy of results or even a hazard to safety could result. Therefore, always read the instrument's instruction manual.

Phytochemical analysis

DPPH radical scavenging assay

For DPPH assay the ascorbic acid was used as reference standard. The ascorbic acid stock solution was prepared in distilled water (1 mg/ ml; w/v). A 60µM solution of DPPH in methanol was freshly prepared and a 200µl of this solution was mixed with 50µl of test sample at various concentrations (1.56, 3.12, 6.25, 12.5, 25, 50,100,200,400,800 µg/ml). The plates were kept in the dark for 15 minutes at room temperature and the decrease in absorbance was measured at 515 nm. Control was prepared with DPPH solution only, without any extract or ascorbic acid. 95% methanol was used as blank.

Estimation of Lycopene

To the well homogenized tomato juice take 100 µL of the sample. Dispense the sample into a screw cap tube. Also prepare several blank samples with 100 µL water instead of tomato pulp. Add 8.0 ml of hexane:ethanol:acetone (2:1:1). Cap and vortex the tube immediately then incubate out of bright light. After atleast 10 minutes add 1.0 ml water to each sample and vortex again. Let samples stand 10 minutes to allow phases to separate and all air bubbles to disappear.Rinse the cuvette with the upper layer from one of the blank samples. Discard, and then use a fresh blank to zero the spectrophotometer at 503 nm. Determine the A503 of the upper layers of the lycopene samples.

Result and Discussion

Investigation of "*Citrullus lanatus* laddu" (Lycopene estimation)

Sample	Weight of sample (gm)	OD at 503nm	Lycopene (mg/kg fresh wt.)
Sample 1	0.1	0.290	39.846

Nutrient analysis of the formulated product

Determination of the crude fiber content

Sl. No.	Sample	Initial Weight (g)	Weight of crude fiber (g)	Percentage weight of crude fiber (%)
1	CLL	1	0.232	23.2

Estimation of vitamin C

Sl. No.	Sample name	V1 (mL)	V2 (mL)	Amount of ascorbic acid content (mg/100ml)
1	CLL	16.6	0.5	7.53

Determination of fat content

Sl. No.	Sample	Initial Weight (g)	Final weight (g)	Fat content (%)
1	CLL	0.5	0.031	6.2

Estimation of total Carbohydrate (Anthrone method)

Sl. No:	Concentration of glucose (µg/ml)	OD at 630nm
1	20	0.051
2	40	0.085
3	60	0.12
4	80	0.17
5	100	0.202
6	200	1.088
7	400	1.626
8	600	2.244
9	800	3.356
10	1000	4.123
CLL	0.866	211.22

Estimation of proteins (Bradford's method)

Sl. No	Concentration (mg/ml)	OD at 595nm
1	1	0.089
2	2	0.197
3	3	0.286
4	4	0.409
5	5	0.546
CLL	0.392	3.89

DPPH Radical scavenging assay

Sample	Concentration (µg/ml)	OD 1	OD 2	OD 3	OD at 515nm	% of Inhibition
Control	-					
CLL	1.56	0.8851	0.8858	0.8855	0.8855	0.43
	3.12	0.8751	0.8758	0.8755	0.8755	1.18
	6.25	0.8566	0.8560	0.8563	0.8563	2.61
	12.5	0.8474	0.8470	0.8478	0.8474	3.36
	25	0.8312	0.8318	0.8316	0.8315	4.46
	50	0.8021	0.8028	0.8025	0.8025	6.64
	100	0.7821	0.7823	0.7829	0.7824	8.12
	200	0.6999	0.6993	0.6991	0.6994	14.36
	400	0.6619	0.6623	0.6620	0.6621	17.14
	800	0.5981	0.5986	0.5987	0.5985	21.89
	1000	0.5732	0.5731	0.5737	0.5733	23.76
	IC 50	-				

Estimation of lycopene

Sample	Weight of sample (gm)	OD at 503 nm	Lycopene (mg/kg fresh wt.)
Sample-1	0.1	0.290	39.846

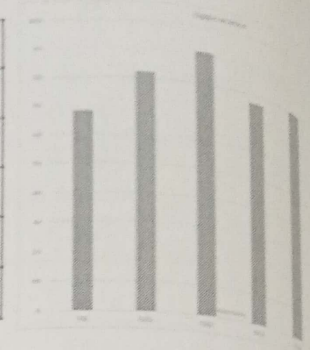
Determination of potassium

Sample code	Element	Special preparation	Diluents	Dilution factor	Standards	Result (ppm/10ml of test sample)
CLL	K	None (No ash preparation done)	Distilled water	001	100 ppm, 50ppm KCl	58.52

Organoleptic estimation of the formulated product

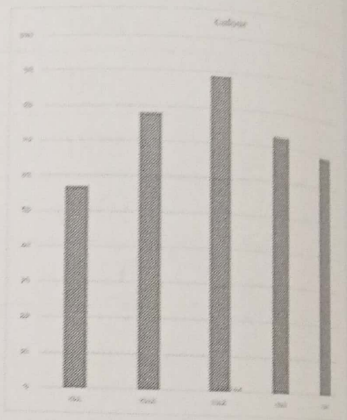
Appearance of *Citrullus lanatus* seed powder laddu

Sl. No.	Sample	Mean ± SD	SME
1	CLL	0.68 ± 0.73	0.168
2	CLL1	0.82 ± 0.94	0.21
3	CLL2	0.91 ± 0.67	0.149
4	CLL3	0.77 ± 1.06	0.23
5	CLL4	0.80 ± 0.94	0.20



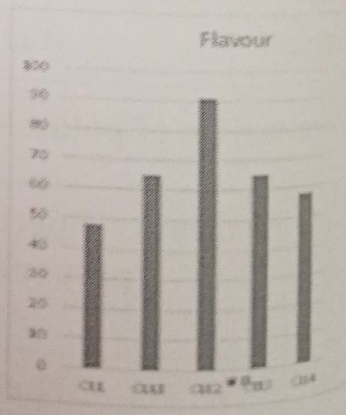
Color of *Citrullus lanatus* seed powder laddu

Sl. No.	Sample	Mean ± SD	SME
1	CLL	0.57 ± 0.72	0.16
2	CLL1	0.78 ± 0.76	0.16
3	CLL2	0.89 ± 0.5	0.11
4	CLL3	0.73 ± 0.67	0.14
5	CLL4	0.69 ± 0.8	0.178



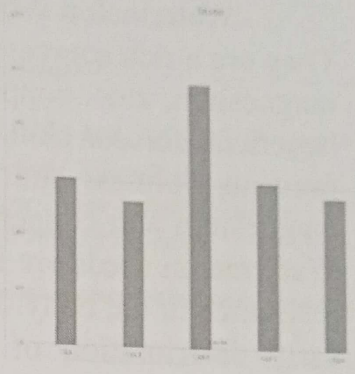
Flavor of *Citrullus lanatus* seed powder laddu

Sl. No.	Sample	Mean ± SD	SME
1	CLL	0.48 ± 0.89	0.19
2	CLL1	0.65 ± 1.14	0.25
3	CLL2	0.91 ± 0.5	0.111
4	CLL3	0.65 ± 1.09	0.24
5	CLL4	0.58 ± 0.99	0.22



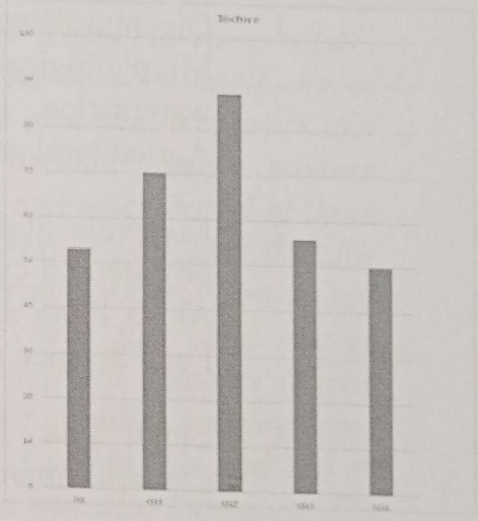
Taste of *Citrullus lanatus* seed powder laddu:

Sl. No.	Sample	Mean ± SD	SME
1	CLL	0.61 ± 1.09	0.24
2	CLL1	0.53 ± 1.10	0.24
3	CLL2	0.97 ± 0.35	0.07
4	CLL3	0.61 ± 1.32	0.29
5	CLL4	0.56 ± 0.81	0.18



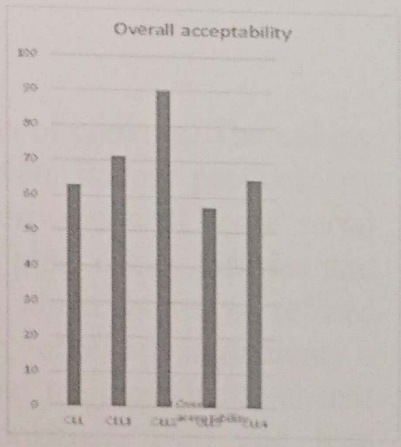
Sensory parameter of texture for the prepared *Citrullus lanatus* seed powder laddu.

Sl. No.	Sample	Mean ± SD	SME
1	CLL	0.53 ± 1.25	0.27
2	CLL1	0.70 ± 2.60	0.58
3	CLL2	0.88 ± 0.48	0.107
4	CLL3	0.56 ± 1.24	0.277
5	CLL4	0.5 ± 1.02	0.23



Overall acceptability of *Citrullus lanatus* seed powder laddu

Sl. No.	Sample	Mean ± SD	SME
1	CLL	0.63 ± 1.01	0.22
2	CLL1	0.71 ± 1.20	0.26
3	CLL2	0.9 ± 0.59	0.13
4	CLL3	0.57 ± 1.20	0.26
5	CLL4	0.65 ± 1.31	0.29



Conclusion

Watermelon seeds are one of the most nutrient dense varieties of seeds. They are a rich sources of proteins, vitamins, omega 3 and omega 6, fatty acids, magnesium, zinc, copper, potassium and more. Watermelon seeds can be very beneficial for our skin. It prevents the outbreak of acne, moisturizes our skin, prevents dullness and prevents early signs of ageing as well. Protein, iron, magnesium and copper are some of the most important nutrients for our hair. Watermelon seeds are linked to better blood sugar control and reduced insulin resistance in the body. Eating dried watermelon seeds regularly can prevent the early deterioration of our bones. Watermelon seeds are also linked with stronger immunity and better health.

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