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Assessment of Nutritional composition and Antioxidant activity of Pasta incorporated with Fresh Moringa oliefera and Solanum nigrum leaves

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Abstract

The study was carried out with objectives to determine the nutritional composition and antioxidant activity of *Pasta* incorporated with *Moringa oliefera* and *Solanum nigrum* leaves. *Pasta* was prepared by utilization of Refined wheat flour ,*Solanum nigrum* and *Moringa oliefera* at 90:5:5 percent ,85:5:10 percent and 85:10:5 percent level referred to as T_1, T_2 and T_3 respectively .and Control was made with basic ingredients without incorporation of leaves mixture. sensory evaluation for prepared products was done by using 9 Point hedonic scale .Data obtained were statistically analyzed by using ANOVA ,Critical Difference and T test . Best treatment from sensory evaluation and control were carried out for nutritional analysis and Antioxidant activity .Analysis was done by using the standard procedure of **AOAC.** Iron, calcium and Vitamin C contents were determined by Thiocyanate method (colometric), volumetric method and 2, 6-Dichlorophenol dye method respectively. Beta carotene content was analyzed by the method given by Ranganna, 2001 while Polyphenol content and % radical scavenging activity were assessed by the Folin-Ciocalteu method and DPPH method respectively

.In context with organoleptic attributes Treatment T_2 made with fresh leaves mixture (Refined wheat flour +Moringa oliefera and Solanum nigrum with the ratio of 85:10:5) were most acceptable in comparison with other treatment ,Results shows a significant difference between T_0 and best treatment T_2 in context with Moisture , Ash ,Protein ,Carbohydrate, Energy ,Calcium ,Vitamin C and Beta carotene as the calculated value of t is found to be greater than tabulated value of "t" 4.303 which denoted that Moisture , Ash, , Carbohydrate, Energy ,Iron , Calcium ,Vitamin C and Beta carotene content of T_2 is better in comparison with T_0 where as in context with Antioxidant activity Polyphenolic content , flavanoids content T_2 is better in comparison with T_0

Keywords- Moringa olifera, Solanum nigrum, Nutritional Composition, Antioxidant Properties

Introduction:

Underutilized crops often considered as minor/neglected/under exploited crops were once grown more widely or intensively, but are falling into disuse for a variety of agronomic, genetic, economic and cultural reasons. Farmers and consumers are using these crops less, because they are in some way not competitive with other species in the same agricultural environment. *Moringa oliefera*, an edible tree found worldwide in the dry tropics, is increasingly being used for nutritional supplementation. Its nutrient dense leaves are high in protein quality, leading to its widespread used by Doctors, healers, nutritionist and community leaders, to treat under nutrition and a variety of illnesses. *Moringa oliefera* leaves and it highlights the need for a scientific consensus on the nutritional benefits. One such potential candidate for combating both micro as well as macro- nutrient malnutrition is the *Moringa* leaves (drumstick leaves). Studies have reported the significance of drumstick leaves as a source of vitamin A [1]. *Solanum nigrum* commonly known as Makoi**, has** been extensively used traditionally to treat various ailments such as pain, inflammation and fever. The plant is also used in the Oriental systems of medicine for various purposes – as an antitumorigenic, antioxidant, anti-inflammatory, hepatoprotective, diuretic, and antipyretic agent. Various compounds have been identified which are responsible for diverse activities. It contains Phytochemicals constituent like alkaloids, flavonoids, carbohydrates, glycosides, phytosterols, fixed oil and fats, proteins, phenolic compounds, tannis and saponins[2].*Solanum nigrum* an underutilized and unconventional part of the plant, contains a good amount of antioxidants to counteract the damaging effect of free radicals[3].

Objectives

i. To assess organoleptic attributes of *Pasta* incorporated with fresh *Moringa oliefera* and *Solanum nigrum* leaves mixture.
ii. To determine the nutritional composition and antioxidant activity of *Pasta* incorporated with fresh *Moringa oliefera* and *Solanum nigrum* leaves mixture.

Materials and Methods:

The experiments was carried out in the Nutrition Research Laboratory, Department of Foods and Nutrition Ethelind School of Home

Science, Sam Higginbottom Institute of Agriculture Technology and Sciences, Allahabad.

Healthy fresh leaves of Solanum nigrum and Moringa oliefera for the experiment were collected from the university campus of the SHIATS, Allahabad, India.

Development of the food products- Treatment and Replications of the *Pasta*

***Pasta* incorporated with fresh leaves mixture.**

Control (T_0): 100 percent of refined wheat flour.

Treatment (T_1): 90 percent refined wheat flour, 5 percent *Solanum nigrum* and 5 percent *Moringa oliefera*.

Treatment (T_2): 85 percent refined wheat flour, 10 percent *Solanum nigrum* and 5 percent *Moringa oliefera* .

Treatment (T_3): 85 percent refined wheat flour, 5 percent *Solanum nigrum* and 10 percent *Moringa oliefera*.

Sensory evaluation of the prepared ***Pasta*** was done with the help of 9 point Hedonic Scale [5].

The best treatment and control of the Pasta were taken for analysis of their nutritional composition (moisture, ash, protein, carbohydrates, fats, crude fibre, iron, calcium, β carotene, vitamin C, energy) and Antioxidant activity (total phenolic content, Flavanoids and % radical scavenging activity).

The nutrient composition such as Determination of moisture and Ash was done by using standard procedure [6],Determination of protein [7],Determination of crude fat by Soxhlet method,Determination of fibre Extraction method [6].Determination of carbohydrate by % Carbohydrates = 100 - the sum of (% moisture + % crude protein + % fat + % ash + % crude fiber),Determination of energy value –calculated by multiplying the figure of percentage of protein ,fat and carbohydrate by 4,9,and 4respectively and adding the figure obtained ,Determination of calcium by method [8], Determination of iron by by Thiocyanate method (Colorimeter) [6].Determination of vitamin c by titration method[4],Determination of Beta carotene [6] . anti nutritional factors such as oxalates [9] and Phytate was determined [9]. Total phenolic content will be determined by using Folin-ciocalteau reagent [10], Estimation of flavanoids will be done by aluminium chloride method [11], Determination of percent radical scavenging activity by DPPH Radical Scavenging method [12].

The data obtained were statistically analyzed by using analysis of variance technique (two way classifications) and critical difference and T- test [13].

Results and Discussions :

The organoleptic scores obtained by value added "*Pasta*" made from fresh leaves mixture (Table-1) shows that in context with over all acceptability , treatment T_2 had the highest

Table no 1. Average sensory scores of different parameters in control and treatments of *Pasta* made from Fresh leaves mixture.

Control and treatments	Colour and appearance	Body and texture	Taste and flavor	Overall acceptability
T_0	7.80	7.49	7.9	7.7
T_1	7.5	7.3	7.3	7.5
T_2	7.81	7.53	7.8	7.8
T_3	6.3	6.1	7.0	6.46
Result	S	S	S	S
P<0.05 ,C.D	0.499	0.304	0.282	0.402

S=Significant, NS=Non Significant

Table no 2.The average nutritional composition of control and the best treatment samples of the value added *Pasta* made from Fresh leaves mixture using t-test.

Nutrients	T_0	T_2	Difference (T_0–T_2)	T (Calculated)	T (tabulated)	Results
Moisture %	54.68	60.25	-5.57	8.43	4.303	S
Ash%	12.11	18.57	-6.46	14.92	4.303	S
Protein (g)	11	12.49	-1.49	6.32	4.303	S
Fat(g)	10.5	9.07	1.43	5.36	4.303	NS
Crude fiber(g)	2.3	3.5	-1.2	2.12	4.303	NS
Carbohydrates(g)	67.66	49.46	18.2	29.84	4.303	S
Energy(Kcal)	255.2	240.1	15.1	12.87	4.303	S
Iron(mg)	12.61	13.49	-0.88	2.47	4.303	NS
Calcium(mg)	65.5	325	-259.5	261.12	4.303	S
Vitamin C(mg)	2.5	52.9	-50.4	49.95	4.303	S
Beta Carotene(µg)	25.9	549.8	-523.9	519.12	4.303	S

S=Significant, NS =Non Significant

score (7.8) followed by T_0(7.7), T_1(7.3) andT_3(7.0). It is reveled from the results that Treatment T_2 was liked very much where as T_0, T_1, T_3 was moderately liked by the panel of judges This is due to the incorporation of dehydrated *Moringa oliefera and Solanum nigrum* leaves at different proportion which may alter the overall acceptability of the treatments differently but all the treatments are in the acceptable range in context with overall acceptability according to the panel of judges .There is significant difference between the control and treatments indicating that the addition of different proportions of fresh leaves mixture affects the overall acceptability of the prepared products as the colour and appearance, body and texture, taste and flavour everything changes as the amount of fresh leaves mixture varies. A study on "**Standardization and Organoleptic Evaluation of Drumstick (*Moringaoleifera*) LeavesIncorporated Into Traditional Indian Recipes"incorporated 20 g of freshly blanched *Moringa oliefera* leaves in Indian recepies ,and found that all recepies were overall acceptable by the panel of judges**[14].

The table also shows a significant difference between treatment T_0 and best treatment T_2 in context with Moisture (8.43) , Ash(14.92), Protein(6.32) , Carbohydrate(29.84), Energy(12.87) , Calcium(261.12) ,Vitamin C (49.95)and Beta carotene (519.12) as the calculated value of t is found to be greater than tabulated value of "t" 4.303 which denoted that Moisture , Ash, Protein , Fiber, Carbohydrate, Energy ,Iron , Calcium ,Vitamin C and Beta carotene content of treatment T_2 is better in comparison with T_0.

The above table shows a non significant difference between T_0 and best treatment T_2 on applying "t"-test in context with fat and crude fiber as the calculated value of "t" is found to be less than tabulated value of "t" at 5% probability.

Conclusion:

It is concluded from the findings that fresh leaves mixture of Moringa oliefera and solanum nigrum can be successful incorporated in various recpies like *Pasta*.. In context with organoleptic attributes Treatment T_2 made with

The table also shows a significant difference between Polyphenols content, which denoted that Polyphenols content(8.51) ,and flavanoids (10.7) content T_2 is better in comparison with T_0.

Antioxidants	T_0	T_2	T_2- T_0	t(calculated)	T(tabulated) value of 5%	Result
Polyphenol (mg/100g)	70.6	81.3	11.3	8.51	4.303	S
Radical scavenging activity (%)	40%	41.3%	1.3	0.9	4.303	NS
Flavanoids (mg)	23	36	13	10.7	4.303	S

fresh leaves mixture (Refined Wheat flour+Moringa oliefera and Solanum nigrum with the ratio of 85:10:5) were most acceptable in comparison with other treatment ,Results shows a significant difference between T_0 and best treatment T_2 in context with Moisture , Ash, Protein, Carbohydrate, Energy , Calcium ,Vitamin C and Beta carotene as the calculated value of t is found to be greater than tabulated value of "t" 4.303 which denoted that Moisture , Ash, , Carbohydrate, Energy ,Iron , Calcium ,Vitamin C and Beta carotene content of T_2 is better in comparison with T_0 where as in context with Antioxidant activity Polyphenolic content , and flavanoids content T_2 is better in comparison with T_0.

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