



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(5): 187-191
Received: 11-07-2018
Accepted: 15-08-2018

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Polyherbal formulation of antioxidant and fiber enriched product “Nutri Masala Candy”

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Abstract

Traditionally life threatening diseases have been dealt with herbal medicines which are taken as food not as medicine or drug such products include Chyawanprash, Pachan Goliyan, Hamraaj Churna etc. Nutri masala candy is relishing treat to stimulate the normal salivary action vital for the effective digestive function. Organoleptic evaluation of “*Nutri masala candy*” in relation to sensory attributes which indicates that T₂ (Amla + Apple pulp + Orange peel powder + flax seed powder in the ratio of 75:15:4:6) had the highest score showed that the overall acceptability was highest in T₂ (8.7) followed by T₁ (8.03), T₀ (7.9) and T₃ (7.2) respectively and there was a significant difference, ($p < 0.05$) between the control and the treatment.

The chemical composition of the best product (T₂) increased with the incorporation of prepared mix powder the moisture content in *Nutri masala candy* was found in 0.21 percent, Ash content was found to be 3.7g/100g, Protein and fat content is 4.8g/100g and 1.07g/100g, Fiber in the product found to be 6.2g/100g, carbohydrate 90.22g/100gm, energy content is 386.98. Vitamin C content in product is 10.65mg/100gm, Polyphenol was found to be 1175mg/100g and DPPH radical scavenging activity was found to be 279 percent. The cost of the *Nutri masala candy* T₀ (control) Rs. 31.57, Rs. 28.89 for T₁, Rs.29.08 for T₂ and Rs.29.27 for T₃. Nutri masala candy should be recommended for all age groups as it helps to improve digestive function and proper growth.

Keywords: nutri masala candy, organoleptic, chemical composition, cost calculation

Introduction

Amla Masala Candy is a relishing treat to stimulate the normal salivary action vital for the effective digestive function. According to traditional Medicine, a combo of Amla, flax seed powder, orange peel powder, apple pulp, corom seeds, pepper, black salts, asafoetida aids digestive function by balancing the tridoshas (Vata, Pitta & Kapha), aids in weight loss, good for hair health, prevents muscle spasms and cramps, Stimulates hunger. The stem yields good quality fiber having high strength and durability. The seed provides oil rich in omega-3, digestible proteins, and lignans. In addition to being one of the richest sources of α -linolenic acid oil and lignans, flaxseed is an essential source of high quality protein and soluble fiber and has considerable potential as a source of phenolic compounds (Singh *et al.*, 2011) [1].

Amla berry has been studied for its anti-oxidant benefits, Immunomodulator and anti-cancer activity, hypolipidemic activity, Hepato-protective benefits. (Middha and Purohit 2011) amla reveals its analgesic, anti-tussive, antiatherogenic, adaptogenic; cardio, gastro, nephro and neuroprotective, chemopreventive, radio and chemo modulatory and anticancer properties. Amla is also reported to possess potent free radical scavenging, antioxidant, anti-inflammatory, anti-mutagenic, immunomodulatory activities, which are efficacious in the prevention and treatment of various diseases like cancer, atherosclerosis, diabetes, liver and heart diseases (Dasaroju and Gottumukkala 2014) [3]

Orange peel in the diet lowers the risk of human cancers, namely skin, breast and colon cancer. Orange peel contains nobiletin, a type of polymethoxylated flavones (PMFs), compounds which are found to exert positive effect on the heart. These compounds lower your risk of heart disease and inflammation in addition to lowering the blood cholesterol levels (LDL – Low Density Lipoprotein) in the body (Reshman 2014). Apples have been found to have very strong antioxidant activity, inhibit cancer cell proliferation, decrease lipid oxidation, and lower cholesterol. Apples contain a variety of phytochemicals, including quercetin, catechin, phloridzin and chlorogenic acid, all of which are strong antioxidants (Boyer and Liu, 2004) [5]. The sesame oil is rich in unsaturated fatty acids (85%) and has a mild taste 9. It is said to be plant breeder’s dream crop because of its great genetic diversity. It is used as a substitute for olive oil, as a salad oil and for cooking fish and vegetables in many parts of the world. Sesame oil is used as a solvent for intramuscular injections and has nutritive, demulcent, and emollient properties and as a laxative.

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It is also used for the treatment of blurred vision, dizziness and headaches. The oil is more efficient than isotonic chloride solution in curing nasal mucosa dryness due to winter. The high polyunsaturated fat content in oil reduces cholesterol. Sesame oil has been used by Indians as an antibacterial mouthwash, to relieve anxiety and insomnia (Noon, 2003) [6].

Methods and Materials

The study entitled was Polyherbal Formulation of Antioxidant and Fiber Enriched Product “Nutri Masala Candy” conducted in the Nutrition Research Laboratory, Department of Food Nutrition and Public Health, Ethelind Collage of Home Science, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad-211007, U.P. India. The details of materials, equipment, procedure and techniques adopted during the course of present investigation have been elaborated in this chapter under the following headings:

1. Experimental site

The present investigation was carried out in the Nutritional Research Laboratory of the Department of Food Nutrition and Public Health, Ethelind College of Home Science, SHUATS, Allahabad.

2. Procurement of raw materials

Indian gooseberry, flaxseeds powder, orange peel, sesame seed oil, and other raw materials were purchased from the local market of Allahabad (U.P.)

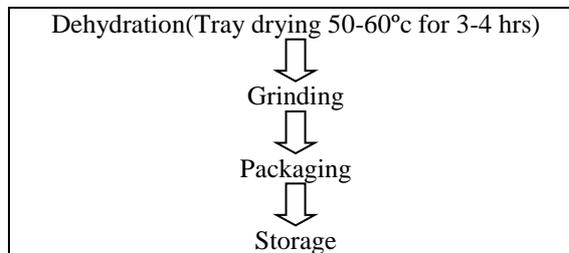
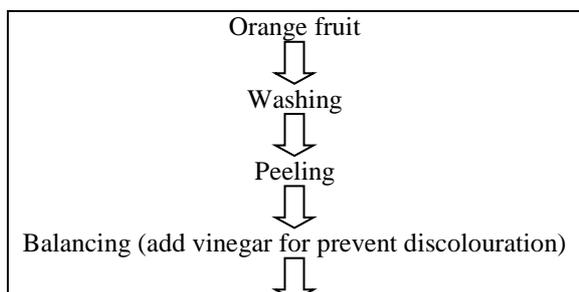
3.1 Preparation of flax seed powder

Flow diagram for preparation of flax seed flour



Sources: Srivastava and Kumar (2003)

3.2 Preparation of the orange peel powder



Source: Srivastava and Kumar (2009)

4. Preparation of food products: Preparation of herbal food products nutri masala candy with the incorporation of Indian gooseberry, apple pulp, flaxseeds powder, orange peel, sesame seed oil, and other raw materials. For each basic recipe (Control To) has three variations T₁, T₂, T₃ respectively, where the amount of one or more ingredients was varied.

5. Treatment for Nutri masala candy

Treatments	Amla (%)	Apple pulp (%)	Orange peel powder (%)	Flax seed powder (%)
To	100	-	-	-
T1	85	10	2	3
T2	75	15	4	6
T3	65	20	6	9

6. Sensory evaluation of developed herbal food products:

Sensory evaluation of the food products for their acceptability done by a panel of judges. The score card based on the 9 point Hedonic scale was used for sensory evaluation on the basis of evaluation of attributes like colour and appearance, texture, taste and flavor and allover acceptability (Srilaxmi, 2007) [7].

7. Determination of nutrient content of prepared herbal food Products:

Methods described by AOAC (2007) were used for determination of nutritional composition of the developed extruded products. This included estimation of moisture, ash, fat, crude fibre, and protein, iron, calcium and vitamin C of the products.

8. Calculation of the cost of prepared candy:

Cost of the prepared products was calculated taking into account the cost of individual raw ingredients used in the preparation of food products as the prevailing market price.

9. Statistical Analysis:

The data was analyzed by Analysis of variance technique (ANOVA), Critical Difference and other appropriate statistical analytical methods and interpret the data (Gupta *et al.*, 2002) [9].

Preparation of Nutri masala candy

Nutri Masala Candy prepared by using different ratios of antioxidant and fiber rich fruits and by product of fruits. Nutri Masala Candy is a classical Ayurvedic formulation comprising ingredients such as. Amla, Dashmula, Wala, Karakata Shringi, Jivanti, Agarkasta, kachur, Hari pinki, Gurchi, Vashak, Neelkamal, kakasa, Pastimadhu, Barahikanda, Bidarikanda, Satawara, Ashwagandha, Tejhatta, Vanshlochan, Akarkara, Naagkeshar, Chandansaar, Daalchini, Peepar, Sonth, Badi ilaichi, Choti ilaichi, Ghee, Til ka tel, Shahad. In the current study, Nutri Masala candy formulated by adding some extra nutrient rich powder like flax seed powder, orange peel powder and other fruit pulp i.e. apple pulp. Clean the Gooseberry and apple pressure cook it in

water till 2whistle. Taking the "for the spices" ingredients and grind them to a powder. Once the amla and apple are cooked let them cool and de-seed them, mash the amla and apple pulp. Take a non-stick pan and heat the ghee in it. Add the mashed Gooseberry and apple pulp and mix it till the oil leaves the sides of the pan. Add the jaggery, asafoetida, black salt and suger into this mash and let it cook for about 4-5

mins. Now add the ground dry spice mixture, mix honey and sesame oil in it and let it cook till the contents get a bit sticky and come off the sides of the pan. Nutri Masala Candy incorporated with antioxidant and fiber rich fruits foods T₂ (Amla + Apple pulp+ Orange peel powder + flax seed powder in the ratio of 75:15:4:6) had the highest score extremely liked. At last, prepared small goli of cooked paste. {fig 1(a)}.



Fig 1(a): Nutri Masala candy prepared by incorporating Amla, flax seed powder, orange peel powder and apple pulp

Result and discussion of organoleptic evaluation of Nutri masala candy

The basic recipe for *Nutri masala* candy with the incorporation of tamarind and amla served as control. *Nutri masala candy* with the three treatments of each products i.e., T₁ (Amla + Apple pulp+ Orange peel powder+ flax seed powder in ratio of 85:10:2:3), T₂ (Amla + Apple pulp+ Orange peel powder + flax seed powder in the ratio of 75:15: 4:6), T₃ (Amla + Apple pulp+ Orange peel powder+ flax seed powder in the ratio of 65:20:6:9) The organoleptic evaluation of the products with regard to attributes of color, body and texture, taste and overall acceptability were done using a nine

point hedonic scale. The findings of the entire study are reported as follows. The observations were recorded, tabulated and results were statistically analyzed by analysis of variance technique, critical difference and t- test. Sensory evaluation of *Nutri masala candy* with or without the incorporation of prepared mix powder showed that the overall acceptability was highest in T₂ (8.7) followed by T₁(8.03), T₀ (7.9) and T₀ (7.2) respectively and there was a significant difference, ($p < 0.05$) between the control and the treatment. The overall acceptability of T₁ was significantly better than control (T₀).

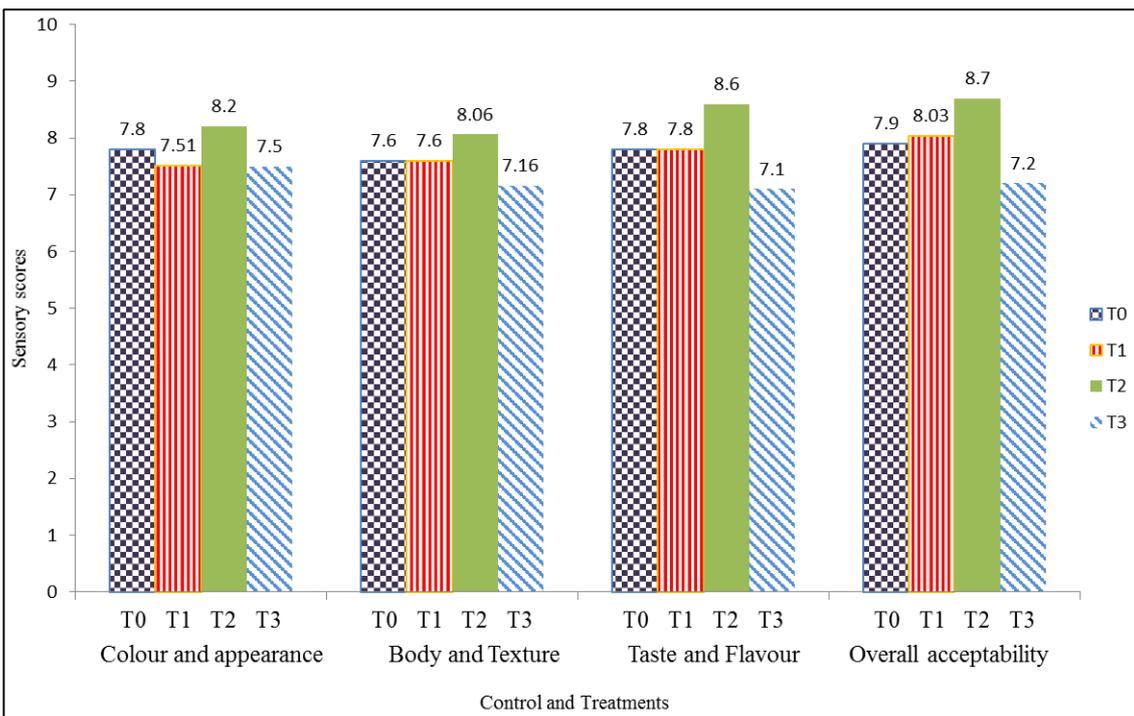


Fig 1(b): Average sensory scores for different attributes of ‘Nutri masala candy’

The chemical composition of the best product (T₂) increased with the incorporation of prepared mix powder the moisture content in *Nutri masala candy* was found in 0.21 percent, Ash content was found to be 3.7g/100g, Protein content is 4.8g/100g, Fat content is 1.07g/100g, Fibre in the product found to be 6.2g/100g, carbohydrate 90.22g/100gm, energy content is 386.98 Iron and Calcium were found 2.2mg/100g and 270mg/100g, Vitamin C content in product is

10.65mg/100gm, Polyphenol was found to be 1175mg/100g and DPPH radical scavenging activity was found to be 279 percent. On applying the 't' test it was found that moisture, protein, fat, carbohydrate, vitamin C, Polyphenol content significantly increased.

Nutritional composition of developed product '*Nutri masala candy*'

Table 1: The average nutritional composition of control and the best treatment samples of '*Nutri masala candy*' per 100 g.

Nutrients	(T ₀)	(T ₂)	Difference (T ₂ -T ₀ =D)	t(calculated)	t(tabulated value at 5%)	Result
Moisture (%)	0.20	0.21	0.01	31.14	4.303	S
Ash (g)	2.8	3.7	0.9	5.94	4.303	S
Protein (g)	3.2	4.8	1.6	24.15	4.303	S
Fat (g)	0.7	1.07	1.0	1.73	4.303	NS
Crude fibre (g)	2.0	6.20	4.2	139.65	4.303	S
Carbohydrates (g)	93.1	90.22	-2.88	113.2	4.303	S
Energy(kcal)	391.5	386.98	4.52	0.25	4.303	NS
Iron (mg)	1.2	2.2	1.0	5.19	4.303	S
Calcium (mg)	40	270	230	13.54	4.303	S
Vitamin C (mg)	8.7	10.65	-1.95	30.62	4.303	S

S = Significant; NS = Non- Significant

Table 2: The antioxidants content of the control and best treatment in '*Nutri masala candy*'

Antioxidants	T ₀	T ₂	difference (t ₀ - t ₂)	T(cal)	T (tab)	Results
Polyphenols (mg)	1020	1175	155	1.87	4.303	NS
DPPH radical scavenging activity (%)	173	279	106	9.1	4.303	S

Cost evaluation of Nutri masala candy: The cost of the *Nutri masala candy* per 100g of dry ingredients at the prevailing cost of the raw materials was T₀ (control) Rs. 32.57, Rs. 29.89 for T₁, Rs.30.08 for T₂ and Rs.30.27 for T₃.

The incorporation levels of flax seed powder, orange peel powder and apple pulp increased the cost also increased but it is comparatively cheaper than the control even though it was marginal.

Table 3: Cost of the prepared product namely '*Nutri masala candy*'

Ingredients	Actual rate/kg (Rs)	T ₀		T ₂		T ₂		T ₃	
		Amt. (g)	Cost (Rs)	Amt.(g)	Cost(Rs.)	Amt. (g)	Cost (Rs)	Amt.(g)	Cost(Rs)
Amla	50	100	5.00	85	4.25	75	3.75	65	3.25
Flax seed	90	-	-	3	0.27	6	0.54	9	0.81
Apple pulp	80	-	-	10	0.8	15	1.2	20	1.6
Orange peel	10	-	-	2	0.02	4	0.04	6	0.06
Sesame oil	25	10	0.25	10	0.25	10	0.25	10	0.25
Herbs and spices	300	40	12	40	12	40	12	40	12
Honey	500	10	5	10	5	10	5	10	5
Jaggery	80	15	1.20	15	1.20	15	1.20	15	1.20
Suger	40	20	0.8	20	0.8	20	0.8	20	0.8
Tamarind	100	10	1	10	1	10	1	10	1
Ghee	430	10	4.3	10	4.3	10	4.3	10	4.3
Total amount (Rs.)			32.57		29.89		30.08		30.27

Conclusion

On the basis of findings, it is concluded that amla, apple pulp, flax seed powder, orange peel powder was found to be rich in iron, calcium, fiber, protein and antioxidant content and it was successfully incorporated in the preparation of the herbal products like *Nutri masala candy*. Sensory evaluation showed that the treatment T₂ (Amla + Apple pulp+ Orange peel powder + flax seed powder in the ratio of 75:15:4:6) was the most acceptable in *Nutri masala candy*, showed that the treatment T₂ was found most highly acceptable. The content of iron, calcium, carbohydrate, potassium and zinc increased significantly in *Nutri masala candy*. The antioxidant content such as total polyphenol and anti radical scavenging activity were also increased significantly in *Nutri masala candy*. The incorporation levels of flax seed powder, orange peel powder and apple pulp increased the cost also increased but it is

comparatively cheaper than the control even though it was marginal.

Recommendations

- Incorporation of flax seed powder and orange peel powder will enhance the nutritive value of traditional recipes by improving their micronutrient content.
- Incorporation of apple pulp flax seed powder and orange peel powder to products can be helpful for providing variety in the daily dietary in addition to their nutritional benefits.
- Orange peel is by product which can be used in treatment and prevention of specific ailments and diseases.
- Flax seed and orange peel are nutritious and will help to overcome nutrient deficiency.

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