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ORGANOLEPTIC PROPERTIES OF PAPAD DEVELOPED FROM *MORINGA OLEIFERA* LEAVES AND FLOWERS

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ABSTRACT

The present study was conducted to prepare a Food product in form of Papads with leaves and flowers of *Moringa oleifera*. The papads weight was 33 gms after the whole processing was carried out. The papads were rich in Vitamin A, Antioxidants and Iron as shown in many studies as well. The papads were prepared by at first drying the leaves and flowers (70:30) in a food dehydrator. After the powder of the leaves was obtained, it was mixed with roasted suji. Suji was roasted without oil on a medium flame. The dried powder and suji was mixed and boiled water was added to the same. Then batter was thin and was spread on polyethene sheets. The papads were sundried and then ready to bake or fry. The sensory evaluation was carried out by twenty panel of experts. Sample D was best scored by the panelists for the various parameters such as taste, color, texture, firmness and crispiness.

KEYWORDS

Papad, Suji, *Moringa oleifera* and Food product.

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INTRODUCTION

Moringa oleifera, which is also known as the miracle tree is extensively grown and highly valuable species of Moringaceae family, that is native to sub Himalayan tracts of India, Pakistan, Bangladesh, and Afganistan. It is a multipurpose and exceptionally nutritious vegetable tree with a variety of potential uses. It is a sub-tropical species known by different regional names as benzolive, drumstick tree, kelor, marango, saighan, etc. It is considered as a pan tropical tree of hot Semi-Arid Regions, which is adaptable to a wide range of environment situations:

from hot dry to hot, humid and wet weather conditions. It has very high nutritional properties including vitamins, proteins, β -carotene, aminoacids and various phenolics such as β -sitosterol, caffeoylquinic acids, kaempferol, quercetin and zeatin. It also contains both omega-3 and omega-6 fatty acids. These have been used to combat malnutrition, especially among infants and nursing mothers. Different parts such as roots, leaves, bark, flowers, fruits of immature pods and seeds possess a number of therapeutic properties such as diuretic, antipyretic, antioxidant, anti-inflammatory, antihypertensive, antitumor, antiulcer. It can also be used as an anticancer agent as it is a natural, reliable and safe at established concentrations. This can be used as an anti-neoproliferative agent, thereby inhibiting the growth of cancer cells. It has been shown to cure both Type 1 and Type 2 diabetes. This is used to treat dementia, as it has been shown to be a promoter of spatial memory. The leaf extracts have shown to decrease the acetylcholine esterase activity, thereby improving cholinergic function and memory. (A review on nutritive importance and its medicinal application by Lakshmi priya Gopal krishnab, 2016¹. Epidemiological studies have indicated that these leaves are a good source of nutrition and exhibit anti-tumor, anti-cancer, anti-inflammatory, anti-ulcer, anti-atherosclerotics anti-convulsant activities. (Chumark, 2008; Dahiru, 2006)^{2,3}. Leaves are biologically active carotenoids, tocopherols, and vitamin C and also have health promoting potential in maintaining a balanced diet and preventing free-radical damage that can initiate many illnesses (Smolin, 2007)⁴. The phytochemical and nutritional properties of the dried leaf powder of *Moringa oleifera* used as nutraceuticals, dietary supplements, functional foods or a source of vegetable in meal preparation. These leaves are helpful in increasing breast milk in the breastfeeding months. One tablespoon of leaf powder can provide 14% of the protein, 40% of the calcium, 23% of the iron and most of the vitamin A needs of a child aged one to three. Moringa leaves also have a low calorific value and can be used as in the diet of obese. Every part of *Moringa oleifera* is a storehouse of important nutrients and antinutrients. It can also be used as a

potent neuroprotectant as with its antioxidants, it can reduce the reactive oxygen species, thereby protecting the brain. Moringa leaves can provide 1000 mg whereas its powder can provide more than 4000 mg calcium. It can also be used as a substitute for iron tablets, hence a treatment for anaemia. It has also been reported that it provides around 25.5-31.03mg of zinc/kg, which is the daily requirement in our diet. *Moringa oleifera* treat hyperglycemia, asthma, flu, heart burn, Dyslipidemia, malaria, syphilis, diarrhoea, pneumonia, scurvy, headaches, bronchitis, skin diseases, eye and ear infections. It also reduces blood pressure and cholesterol. Moringa leaves contain fiber, fat, proteins and minerals like Mg, Ca, K, P, Fe, Cu, and S, it also contains all the 10 amino acids in a good proportion, which are the building blocks of proteins and it also contains nicotinic acid and ascorbic acid. Phytochemicals like sterols, tannins, terpenoids, saponins, alkaloids, phenolics and flavonoids like isoquercetin, isothiocyanates, quercetin, and glycoside compounds are also present. Research report by (Rockwood, 2013)⁵ confirmed that, *Moringa oleifera* dry leaves contain 9 times protein more than yogurt, 10 times vitamin A than carrot, 25 times iron than spinach, 15 times potassium than bananas, 17 times calcium than milk and 7 times more vitamin C than 2 oranges. Because of rich in proteins it is suggested to cope up with the problems of malnutrition worldwide. A recent research on dietary iron supplements and *Moringa oleifera* leaves influence the liver revealed that iron from *Moringa oleifera* leaves powder can overcome the deficiency of iron (Saini, 2016)⁶ and Similarly, research has been done on the bioavailability of folate from the traditional food plant *Moringa oleifera* indicate that the relative bioavailability of folate from *Moringa oleifera* leaves is high and therefore can be a potential source of dietary folate. According to Hartwell (1967-1971)⁷, the leaves were in traditional remedies for tumors (Faizi., 1998)⁸ and extensively used as a natural sleep aid, applied as a poultice to sores, rubbed on temples for headaches, and as a purgative cleanser. It was also reported that the leaves of *Moringa* contains about 30-40% oil, 82% unsaturated fatty acids and 13% saturated fats (Villafurte LR and Villafurte-

Abonal L, 2009)⁹, also a number of natural compounds have been isolated from *Moringa oleifera* leaves including fully acetylated glycosides bearing thiocarbamates, carbamates or nitriles. The edible leaves contain essential provitamins, including ascorbic acid, carotenoids and tocopherols. These leaves also have health promoting potential in maintaining a balanced diet and preventing free-radical damage that can initiate many illness. The leaves could be a great which fights a host of illness including colds and flu; vitamin A, which acts as a shield against eye disease, skin disease, heart ailments, diarrhoea, and many other diseases; Calcium, which builds strong bones and teeth and helps prevent osteoporosis; Potassium, which is essential for functioning of the brain and nerves, Proteins, the basic building blocks of all our body cells. These leaves could be a great boon to people who do not get protein from meat. It even contains arginine and histidine; two amino acids especially important for infants, who are unable to make enough protein for their growth requirements. The amino acid content of leaves is 44%. Phytochemicals such as tannins, sterols, terpenoids, flavonoids, saponins, anthraquinones, alkaloids and reducing sugar present along with anti-cancerous agents like glucosinolates, isothiocyanates, glycoside compounds and glycerol-1-9-octadecanoate. *Moringa oleifera* flowers act as antiarthritic; hypocholesterolemic agents can cure urinary and cold problems. *Moringa oleifera* has also promoted by World Health Organisation (WHO) as an alternative to imported food source to treat malnutrition.

Semolina is the coarse, purified wheat middlings of durum wheat used in making pastas, breakfast cereals and many puddings also. When boiled turns into porridge, known as cream of wheat. In Germany, Hungary, Bosnia, Bulgaria, Serbia and Romania, semolina is known as Grieß (a word which is related to “grits”). The particles are fairly coarse, between 0.25 and 0.75 millimetres in diameter. This raw material is used for preparation of various Indian products such as upma, sweets, etc. Shelf life of this product is 2 months.

Sunflower oil is a healthy and natural oil extracted from sunflower seeds. It is light in taste and

appearance and supplies more vitamin E than any other vegetable oil. It is a combination of monosaturated and polyunsaturated fats with low saturated fat levels. The versatility of this healthy oil is recognised. It is typically a liquid at room temperature. There are three types of sunflower oils available; NuSun, linoleic and high oleic sunflower oil. They are just differ in oleic levels. This oil is healthier than most of the other food oils available in the market. This oil is used as frying oil, and it behaves as a typical vegetable triglyceride. This oil is also low in saturated fat.

MATERIAL AND METHODS^{10,11}

Procurement of raw material

Semolina was purchased at departmental store in Amity University, Gurgaon. *Moringa oleifera* leaves were obtained from a tree planted near railway station, Panipat. The leaves were then dried in shade and powdered using household grinder for processing.

Standardization of food product

The recipe for papad was standardized using the following ingredients. Semolina, salt, baking soda, black pepper, carom seeds, powdered cumin seeds.

Development of food product (Papad)

Using the above standardised recipe, papads were developed by incorporating the *Moringa oleifera* leaves powder at 4 levels i.e. 2.5, 5, 7.5, 10gms.

The iron content of leaves of *Moringa oleifera* is high. Therefore these leaves were taken as a substrate for product development.

The recipe followed to develop papads

First of all, we collected all the fresh leaves of *Moringa oleifera*. Then these leaves were separated from the pods and the stems. Then the collected leaves were washed under running tap water till the removal of dirt. After this leaves were soaked in 1% saline solution (NaCl) for 5 minutes to remove microbes.

Then the excess water was removed by spreading the leaves on the clean and dry floor in a ventilated room. Leaves were kept in that room for maximum 4-5 days. Then the dried leaves were grinded by a household grinder to make a fine powder. Then for making *Moringa* leaves powder, we took semolina,

salt, black pepper, cumin seeds, carom seeds, prepared moringa leaves powder, baking soda and water.

First of all, we roasted the semolina in a heavy bottomed pan over low flame just to prevent it from over roasting. Then we added Moringa leaf powder, salt, black pepper, cumin seeds, carrom seeds in a bowl and put the roasted semolina in that mixture also. On the other side, we put a pan filled with water to let it boil. Once the water is boiled completely, we put baking soda in that. In that prepared mixture we added water upto desirable amount. Once the batter is ready, we left it for 5-10 minutes. Then on a dry and hot place we spread a plastic sheet greased with oil. Then on that sheet, we spread the batter in the shape of pancakes and allow the batter to get it dried. Once the papad is dried from one side, we changed the side. We kept the papads under sunlight for 2 days. Then after sun drying the papads, we roasted and fried them.

Using the above standaradised recipe, papads were developed by incorporating the *Moringa oleifera* leaves powder at 4 different levels i.e. 2.5gms, 5gms, 7.5gms, 10gms. The formulation was grouped into A, B, C, D.

The recipe followed was the same as followed above. In sample A, the content of moringa powder is 2.5gms. In sample B, the content of moringa powder is 5gms. In sample C, the content of moringa powder is 7.5gms. In sample D, the content of moringa powder is 10gms.

RESULTS AND DISCUSSION

After the sensory evaluation was conducted. The products were statically analysed using mean and standard deviation. The mean and standard deviation of product are as follows.

According to above information, we got to know that following samples have following attributes:-

Sample A

Taste

Sample A was given mean 8.35 ± 0.79 scores depicting the taste factor. It was felt by the experts that the papads were least bitter in taste and there wasno aftertaste in this papads.

Colour

The Sample was given mean 8.5 ± 1.07 scores in the colour aspect and it is pale yellow in colour as the content of Moringa powder is very less in it. As colour factor is very important because the food is at first seen by the eyes.

Texture

This sample scored as mean 8.66 ± 1.24 in texture which is just next to the highest scored papads. The papads were observed as thin and crumbly in texture.

Firmness

These sample was given highest mean 8.72 ± 0.90 scores depicting firmness aspect and firmness was ideal as it was supposed to be as the papads were easily broken.

Crispiness

These papads were reviewed as the crispiest among all the samples and were given mean 8.8 ± 0.87 scores to this sample.

Overall

Overall these papads were not so much accepted by the penalists and were given mean 8.33 ± 0.94 .

Sample B

Taste

These papads were given least in taste and were given mean 8.2 ± 0.92 scores.

Colour

These papads were given least in colour i.e. 8.25 ± 0.88 mean scores and were light green in shade.

Texture

These papads were given mean 8.25 ± 0.88 scores.

Firmness

The papads were given mean 8.25 ± 0.76 scores.

Crispiness

The papads were given mean 8.5 ± 0.80 scores and these papads were least crispy in taste.

Overall

The papads were not accepted by the penalists as it was rated as least in all the aspects and were given 8.35 ± 1.01 mean scores.

Sample C

Taste

The sample was given 8.5 ± 0.73 mean scores in taste as it was observed after tasting that this sample had

better taste than the last two samples so it satisfies the taste aspect.

Colour

This sample was given 8.4±0.86 mean scores in colour as it was not so attractive to eyes.

Texture

This sample was given 8.6±0.78 mean scores in texture. It was found to have better texture than sample B.

Firmness

This sample was given 8.55 ± 0.92 mean scores in firmness.

Crispiness

This sample was given 8.9 ± 0.58 mean scores in crispiness. The crispiness of this papad was next to the best one.

Overall

On the whole, this sample was accepted by the panellists as it was given 8.8 ± 0.77 mean scores which was just next to the highly accepted sample.

Sample D

Taste

The sample was given 8.7±0.9 mean scores which is the highest scores given among all the samples.

Colour

The sample was given 8.7±0.95 mean scores which is the highest scores given among all the samples. As the colour was so attractive to the eyes and the content of Moringa powder is highest.

Texture

The sample was given 8.8±0.81 mean scores which is the highest scores given among all the samples as the texture of this papad was best among all.

Firmness

The sample was given 8.7±0.78 mean scores which is next to the first ranked sample.

Crispiness

The sample was given 9±1.04 mean scores which is highest among all the samples because the papads were reviewed crispiest among all.

Overall

The sample was given 8.85±0.85 mean scores which is the highest among all the samples because this sample was most accepted by the panellists.

Table No.1: Sensory evaluation of the different variations of *Moringa oleifera*

S.No	Attributes	A (2.5gms)	B (5gms)	C (7.5gms)	D (10gms)
1	Taste	8.35±0.79	8.2±0.92	8.5±0.73	8.7±0.9
2	Colour	8.5±1.07	8.25±0.88	8.4±0.86	8.7±0.95
3	Texture	8.66±1.1	8.25±0.88	8.6±0.78	8.8±0.81
4	Firmness	8.72±0.90	8.25±0.76	8.55±0.92	8.7±0.78
5	Crispiness	9±1.04	8.5±0.80	8.9±0.58	8.8±0.87
6	Overall	8.33±0.94	8.35±1.01	8.8±0.77	8.85±0.85



Figure No.1: Papads with Suji and *Moringa oleifera* leaves powder

CONCLUSION

Food product development is the need of the world today to fight malnutrition or under nutrition. The plants foods are often neglected by the Indian society so we developed a food product which are nutritious and healthy to consume. The *Moringa oleifera* leaves and flowers are rich antioxidants, vitamin A and many other nutrients. The papads can be consumed by any age group of the society. It is a low cost product and affordable by the weaker sections of the society. Therefore present study was carried out to prepare a food product beneficial to the society and food industry.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

BIBLIOGRAPHY

1. Lakshmi Priya, Gopalakrishnanb, Kruthi Doriya, Devarai Santhosh Kumara. Bangalore, India, *New trends in natural products chemistry*, 1998.
2. Chumark P, Khunawat P, Sanvarinda Y, Phornchirasilp S, Morales P N, Phivthong-ngam L, Ratanachamnong P, Srisawat S, Pongrapeeporn K U. The *in vitro* and *ex vivo* antioxidant properties, hypolipidaemic and antiatherosclerotic activities of the water extract of *Moringa oleifera* Lam. Leaves, *J. of Ethnopharmacology*, 116(3), 2008, 439-46.
3. Dahiru D, Obnubiyi J A, Umaru H A. Phytochemical screening and antiulcerogenic effect of *Moringa*, *African Journal of Traditional Complimentary and Alternatives Medicines*, 3(3), 2006, 70-75.
4. Smolin L A, Grosvenor M B. *Nutrition: Science and Application*, 4th Edition, 2007.
5. Rockwood J L, Anderson B G, Casamatta D A. Potential uses of *Moringa oleifera* and an examination of antibiotic efficacy conferred by *Moringa oleifera* seed and leaf extracts using crude extraction techniques available to underserved indigenous populations, *International Journal of Phytotherapy Research*, 3(2), 2013, 61-71.
6. Saini R, Manoj P, Shetty N, Srinivasan K, Giridhar P. Relative bioavailability of folate from the traditional food plant *Moringa oleifera* leaves, *J Food Sci Technol*, 53(1), 2016, 511-20.
7. Hartwell J L. Plants used against cancer, A survey, *Lloydia*, 34(4), 1971, 386-425.
8. Faizi S, Siddiqui B S, Saleem R, Siddiqui S, Shaheen K, Aftab K, Giliani A H. Bioactive compounds from the leaves and pods of *Moringa oleifera*, *Planta Med*, 64(3), 1998, 225-8.
9. Villafuerte LR, Villafuerte-Abonal L. Data taken from the Forestry Agency of Japan in *Moringa*, Malunggay Phillipines, *Apples of Gold Publishing, Singapore* 2009, 240, ISBN-13:9789710512041.
10. Kumari D J. "Hypoglycemic Effect of *Moringa oleifera* and *Azadirachta indica* in Type-2 Diabetes," *Bioscan*, 5(2), 2010, 211-214.
11. Phivthong-ngam L, Ratanachamnong P, Srisawat S, Pongrapeeporn K S. 2016.

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