



FORMULATION AND SHELF LIFE STUDY OF ENERGY BALLS (MORINGA LADOO)

¹Akshada Anil Panchal ²Anuradha Shekhar
Dr. BMN college of Home Science (Matunga) Mumbai
Department of Food Science and Nutrition

ABSTRACT

Moringa oleifera is a plant that has been praised for its health benefits for thousands of years. It is widely used as food and medicine. Nearly every part of the moringa tree is edible. It is rich in antioxidants and other nutrients which are commonly missing in the diets. Moringa leaves when dried can be ground into a fine powder and will keep many months without refrigeration. Also can be used in different food products. So, a shelf life study was conducted on a standardized ladoo using moringa leaves powder. The aim was to make an innovative product which was named **ENERGY BALLS** and check its consumer acceptability. The sensory evaluation was done using a five point scoring test on attributes such as colour, texture, taste, mouthfeel and overall acceptance. The other areas of study included packaging, labelling, budgeting and marketing aspects.

KEYWORDS: Moringa oleifera, sensory evaluation, Moringa ladoo, shelflife study, Drumstick

INTRODUCTION

Moringa oleifera also called a Miracle tree is grows mostly in India and in the tropical and subtropical regions of the world. It is commonly known as ‘drumstick tree’ or ‘horseradish tree’. Because of its high nutritive values, every part of the tree is suitable for either nutritional or commercial purposes. The leaves are rich in minerals, vitamins and other essential phytochemicals. Extracts from the leaves are used to treat malnutrition, augment breast milk in lactating mothers. It is used as potential antioxidant, anticancer, anti-inflammatory, antiviral, antifungal, antidepressant, antidiabetic and antimicrobial agent. In fact, moringa is said to provide 7 times more vitamin C than oranges, 10 times more vitamin A than carrots, 17 times more calcium than milk, 9 times more protein than yoghurt, 15 times more potassium than bananas and 25 times more iron than spinach.^[1]

Medicinal use of Moringa leaves are used in treatment of asthma, hyperglycemia, dyslipidemia, flu, heart burn, syphilis, malaria, pneumonia, diarrhea, headaches, scurvy, skin diseases, bronchitis, eye and ear infections. It also reduces blood pressure and cholesterol and acts as an anticancer, antimicrobial, antioxidant, antidiabetic and anti-atherosclerotic agents, neuroprotectant. Moringa leaves contain fiber, fat, proteins and minerals like Ca, Mg, P, K, Cu, Fe, and S. Vitamins like Vitamin-A (Beta-carotene), vitamin B-choline, vitamin B1-thiamine, riboflavin, nicotinic acid and ascorbic acid are present. Various amino acids like Arg, His, Lys, Trp, Phe, Thr, Leu, Met, Ile, Val are present. Phytochemicals like tannins, sterols, saponins, terpenoids, phenolics, alkaloids and flavanoids like quercetin, isoquercetin, kaemfericetin, isothiocyanates and glycoside compounds are present. The presence of flavanoids gives leaves the antidiabetic and antioxidant properties. The isothiocyanates are anticancer agents. Flavanoids like quercetin and others are known for anti-proliferative, anticancer agent. The presence of minerals and vitamins help in boosting the immune system and cure a myriad of diseases.^[1]

Also in this product ragi flour was mainly used, which has an antidiabetic, antibacterial and antioxidant properties. Ragi is use in a large number of traditional food preparations and also in weaning food products and health food products now a days. It contains important amino acids viz., isoleucine, leucine, methionine and phenylalanine which are deficient in other starchy meals. Ragi has gained importance because of its slowly digestible and resistant starch (Wadikar et al., 2007) and has low glycemic index which makes it suitable for diabetic patients (Pradhan et al., 2010) additional benefits are its antioxidant and antibacterial functions. It is an extremely nutritious food and could be enjoyed in different forms and preparations.^[3] Also this energy balls contain nuts and dry fruits which are nutrient-rich foods and constitute an excellent means to deliver health-promoting bioactive compounds. Also they serve as important healthful snack items, besides being part of many traditional recipes. According to research frequent consumption of nuts and dried fruits is highly recommended to obtain the full benefit of the nutrients, bioactives, and antioxidants that they contain, together with their desirable flavour.^[2]

This Moringa ladoos prepared are loaded with calories because it has Ragi, Moringa leaves powder, Nuts and dry fruits and fat. Therefore the name ENERGY BALLS. This laddoo can be eaten as snack or along with morning breakfast, lunch or dinner. This product can be considered as a healthy snacking option.

OBJECTIVES OF THE STUDY

- 1] To Study the shelf life of the product by sensory evaluation.
- 2] To design a nutritional label.
- 3] To make an innovative nutritious product and check consumer acceptability.
- 4] To understand marketing and budgeting strategies.
- 5] To select a packaging material.

MATERIALS

This product contain Moringa leaves powder which has fiber, protein and various minerals. It also reduces blood pressure and cholesterol and act as an antioxidant. Ragi flour contain amino acids and antioxidant and antibacterial functions. Many nuts and dry fruits which have many nutrients, bioactives and antioxidants are included in this Moringa Ladoo.

table.1 - ingredient table

NO.	INGREDIENT	AMOUNT
1	Ragi floor	2 tablespoon
2	Moringa leaves powder	1 ½ tablespoon
3	Dry figs	3 pieces
4	Dates	6 pieces
5	Dry dates	5-6 no
6	Raisins	12 no
7	Cashews	5-6 no
8	Almonds	5-6 no
9	Pistachios	5-6 no
10	Dry coconut	1 tablespoon
11	Jaggery powder	1 ½ tablespoon
12	Cardamom powder	½ tablespoon
13	Ghee	3 tablespoon

Methodology

Pre preparation

Moringa Leaves Powder

- 1] Take fresh Moringa Leaves, pluck the leaves and remove stem and stalks.
- 2] Wash the leaves 2-3 times thoroughly with enough water.
- 3] Keep it under a Fan for some time and then sundry it with cover for 2-3 days until leaves becomes crispy and dry.



fig.1



fig. 2

- 4] After drying, powder the leaves in mixer and store it in air tight container.



fig.3



fig. 4

MAIN PREPARATION



fig.5

Take dry figs and dates and remove seeds from dates.



fig.6

Soak the dry figs and dates in water for 20 to 25 minutes. After soaking add raisins and blend it to a smooth paste.



fig.7

Take all the dry fruits and nuts as per the amount mentioned.



fig.8

Roast all dry fruits on slow flame till golden brown. After cooling transfer it to mixer jar.

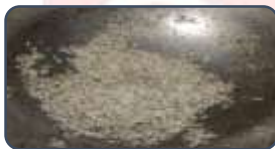


fig.9

Add dry coconut in same vessel and roast it. When it turns aromatic put it in plate and let this cool down.



fig.10

Put dry coconut in the mixer jar with dry fruits and blend it to a coarse powder. Remove it in a bowl.



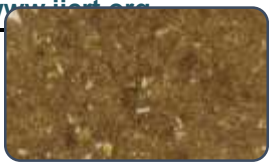
fig.11

Heat 1 tablespoon of ghee add ragi flour and roast. Add moringa powder and mix well. Roast it for 3-4 mins on low flame.



fig.12

Add 1 tablespoon of ghee add dry fruit paste, stir and cook well on medium flame till water dries up. This forms a mass and become hard.



Add dry nut powder, roasted ragi mixture and cardamom powder and jaggery powder. Add 1 tablespoon of ghee and mix everything well.

fig.13

Bind the mixture in small balls. After cooling down. Pack and store them in a air tight container.



fig.14

SENSORY EVALUATION

Sensory evaluation was done by 7 naive panel members using five point scoring test on attributes such as colour, texture, taste, mouthfeel and overall acceptance. Five point scale where:

5=Excellent, 4=Very good, 3=Good, 2=Fair, 1=Poor.

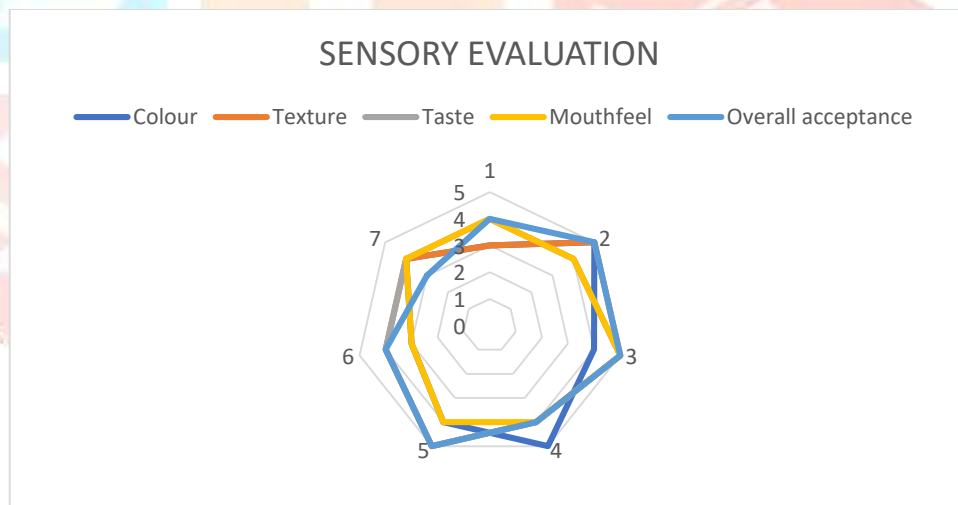


figure.15 result of sensory evaluation of product

As can be seen in Figure.15 all the sensory attributes got a highly acceptable rating on a five point scale which are poor, fair, good, very good, excellent.

PACKAGING MATERIAL

Packaging is an essential component of the food product, assuring the safe handling and delivery of fresh and processed food products from the point of production to the end user. Packaging also help to reduce losses, maintain quality of food, add value and extent shelf

life.^[4] Packaging material which is used to package this product is Polyethylene wrapper and a nylon band to tie the ladoo. This wrapper is made up of high quality polythene which is of 51 micron. It is slightly stretchable normally tough and flexible, often opaque. It has a good resistance to sunlight, air, relative humidity. This packaging material is cost effective and resistant to other sources.

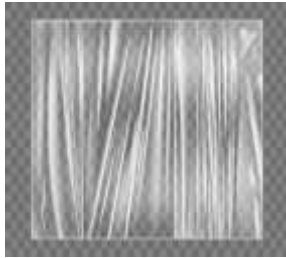


fig.16



fig.17


NUTRITIONAL LABEL

Nutrition information on food labels is an important public health tool to promote a balanced diet, hence enhancing public health. Food labels are a legal requirement and they are important for many reasons. They help consumers make informed choices about the food they buy, help them to store and use it safely and allows people to plan when they will consume it – all of which help to reduce food wastage. Nutrition facts labels help to maintain better eating habits and aid in attaining a balanced energy level. Food high in sugar and fat content tend to be more palatable and therefore become favourite staples, so it's even more important to be aware of their nutritional output.

The Nutritional labelling which is designed for this product has information about ingredients, nutrients, packaging date of the product, expiry date and price of the product. This nutrition label can help in product marketing.

DR. BMN COLLEGE OF HOME SCIENCE
MORINGA LADOO
NUTRITIONAL VALUE

Serving Size 1 Approx values per 1 ladoo



MRP
20RS.

SR NO	PARAMETERS	VALUES
1	Energy	66 kcal
2	Carbohydrates	9.82 gm
3	Protein	1.09 gm
4	Fat	1.25 gm

Ingredients used: Moringa leaves powder, Ragi flour, Dry figs, Dates, Dry dates, Raisins Cashews, Almonds, Pistachios, Dry coconut, Jaggery powder, Ghee.

*No added colours *Completely organic * No preservative

Mfg Date: 14 May 2021 Best Before 1 month

Email Id: akshadapanchal5@gmail.com

figure.18 nutritional label

SENSORY EVALUATION FOR SHELF LIFE STUDY

To study the shelf life of Moringa Ladoo, sensory evaluation was conducted for 4 consecutive weeks. Scoring method was used with a 5 point scale. Attributes to be considered were colour, texture, taste, mouthfeel and overall acceptance.

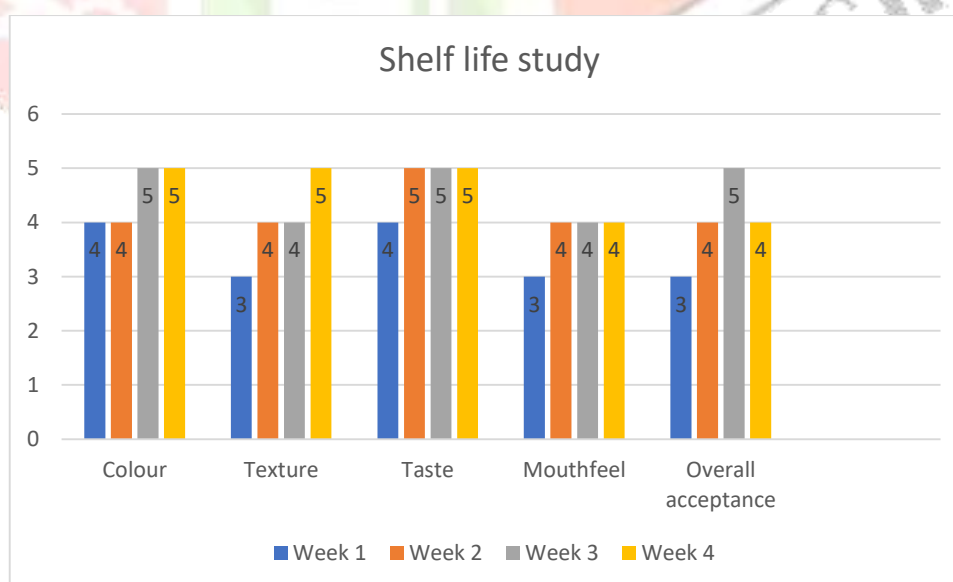


figure.19 result of shelf life study

Sensory evaluation of this shelf life study was done by using 5 point scale:

5= Excellent , 4= Very Good , 3= Good , 2= Fair , 1=Poor.

It can be observed that various characteristics are changed throughout shelf life study.

- 1] The product had good colour, texture, taste, mouthfeel and overall acceptance in the 1st week.
- 2] In the 2nd week the product were rated as very good and excellent.
- 3] In the 3rd week the factors like colour, taste and overall acceptance were enhanced.
- 4] In the 4th week colour, taste and mouthfeel were same and texture is slightly improved but overall acceptance is slightly declined.
- 5] This product has a good shelf life and can be stored for 4 weeks i.e 1 month.

BUDGETING

Budgeting is the process of creating a plan to spend money. It ensures that will always have enough money for the things need. Budgeting is important because it helps to track spending, save more money and reach the goals faster.

table. 2 budgeting of moringa laddoo

SR NO	INGREDIENTS	AMOUNT
1	Moringa leaves	10
2	Ragi flour	10
3	Dry figs	50
4	Other dry fruits	100
5	Dry coconut	10
6	Jaggery Powder	10
7	Cardmom powder	5
8	Ghee	10
9	Electricity	10
10	Packaging material	10
11	Gas	10
12	Label	10
13	Labour	10
	TOTAL	255 RS

Total 255 /- was used to make 15 laddoos. So actual price of each laddoo is 17/- . 15 samples were prepared and sold at 20/- each. Total income was 300/- so the profit is 45 /-. This budgeting aspect help to know more about product sales.

MARKETING

Due to lockdown this product is sold in a society along with information about importance of healthy snacking and advantages of Moringa laddoo and ingredients which were used also its benefits. Also it was advertised on WhatsApp family group and other friends. People sent a positive feedback for this product.

CONCLUSION

It is concluded that that Moringa laddoo has more benefits. It is a good source of fiber, protein, various vitamins and minerals. Also this laddoo is a good snacking option for everyone.

It has good shelf life. This Moringa ladoo (Energy Balls) can be made on large scale for making better profit margin.

REFERENCES

Research papers:

- 1] Gopalakrishnan, L., Doriya, K., & Kumar, D. S. (2016). Moringa oleifera: A review on nutritive importance and its medicinal application. *Food science and human wellness*, 5(2), 49-56.
- 2] Alasalvar, C., Salvadó, J. S., & Ros, E. (2020). Bioactives and health benefits of nuts and dried fruits. *Food chemistry*, 314, 126192.
- 3] Thomas, Nimmy and Karuna, M.S. (2019). Finger millet (Ragi, Eleusine coracana L.). A review of health benefits, processing and product developments. *Internat. J. Appl. Home Sci.*, 6 (9-12) : 306-311.
- 4] Opara, U. L. (2013). A review on the role of packaging in securing food system: Adding value to food products and reducing losses and waste. *African Journal of Agricultural Research*, 8(22), 2621-2630.

Internet Sites and Articles

- 4] <https://www.medicalnewstoday.com/articles/319916#what-are-the-benefits>
- 5] https://www.healthline.com/nutrition/6-benefits-of-moringa-oleifera#TOC_TITLE_HDR_2
- 6] <https://www.webmd.com/diet/health-benefits-moringa-powder#1>
- 7] <https://www.highspeedtraining.co.uk/hub/importance-of-food-labels/>
- 8] <https://www.menusano.com/blog/the-benefits-of-labeling-featuring-your-off-the-shelf-food-products-and-nutrition-facts/>
- 9] <https://www.mymoneycoach.ca/budgeting/what-is-a-budget-planning-forecasting#:~:text=Budgeting%20is%20the%20process%20of,your%20expenses%20with%20your%20income.>
- 10] <https://www.kindafrugal.com/why-is-budgeting-important/>
- 11] <https://www.palatesdesire.com/moringa-ladoo-how-to-make-moringa-energy-balls/>
- 12] <https://www.slideshare.net/LAKENDRASINGH/food-labelling-full-information-about-the-topic>

Book

- 13] https://books.google.co.in/books?hl=en&lr=&id=BZzSDwAAQBAJ&oi=fnd&pg=PT6&dq=nuts+and+dry+fruit+benefits&ots=ezo_cwKjTe&sig=Ta83anWX3_jY3rzX-pmfqCtKsOI&redir_esc=y#v=onepage&q=nuts%20and%20dry%20fruit%20benefits&f=false