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To study the organoleptic properties of Ladoos made from variations of Flax seeds and multigrain flour

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Abstract
Food product development is necessary for a developing economy and country as people get enagaged more and more in their work schedules. The lack of time leads the people to eat processed and unhealthy food so development of nutritious snacks is the requirement of the society and also the food industry. The present study was carried out to develop Flax seed Ladoos which would be beneficial for heart and lowering the lipid levels in the body. This is a ready to eat snack which can be easily eaten by the individuals. To prepare Flax seed ladoos, multigrain atta was used and they were combined in the ratio 50:50, 60:40, 70:30 and 80:20. The flax seeds were variated till the desired taste was achieved. A panel of twenty experts was taken from the background of Nutrition. They were given Hedonic scale to score the ladoos. The samples was rated on the basis of color, tecture, flavour, Stickiness and Overall acceptability. Sample A (60:40) was rated best among the four samples by the experts.

Keywords: ladoo, multigrain flour, flax seeds, heart diseases, food product development

Introduction
Flax a member of genus linus [family-linaecae]. It is a food and fibre crop that is cultivated in cooler regions of the world. Textiles that are made from flax are known as linen. Flax seed oil is also known as linseed oil. Two basic varieties of flax seed are: brown and yellow. Flax seeds are a rich source of omega-3 fatty acids. If flax seeds are consumed in large quantities without consumption of adequate amount of water then it can lead to bowel obstruction. Flax seeds are stored in cool and dry places. They should be refrigerated and stored in sealed containers. Flax seeds can be consumed in any form eg- roasted, powder and eaten with boiled rice etc. Flax seed help in weight loss and have good fiber and protein content. They help in lowering levels of bad cholesterol and also helps fight some cancers. Some of the important micro-nutrients present are vitamins, B-vitamins, minerals, antioxidants and phyto-chemicals. All in all flax seeds are considered to be a good source of nutrition if consumed in proper way.

Ghee traditionally made from cow's milk, is widely used in Indian cuisines. Production of ghee includes simmering of butter and milk solids so that they can be caramelized which gives it nutty taste and aroma. Ghee is an energy booster and also helps in curing allergies. It reduces inflammation and have antioxidant activity. It boosts immune system and aids in healthy heart maintainance. It prevent macular degeneration and development of cataract. Ghee is used in many of Indian recipies.

Almonds are nutritionally dense food and are rich source of B-vitamins, riboflavin and niacin, vitamin E, minerals, calcium, iron, zinc etc. Almonds are also rich in dietary fibres. They also have cholesterol lowering properties. Sometimes they might cause allery. One should consume a hand full of almons on daily basis whice provide vitaminB6, folate, choline and one of the essential mineral that is potassium. Almonds help prevent heart disease and heart attacks. They support healthy brain function. They maintain skin health. They help control blood sugar level and helps prevent diabetes. Pervents overeating hence helps in weight control. Almonds increase nutrients absoption and increase digestive health. They help fight inflammation as well as cancer. They help to maintain dental and bone health.

Cashews are super nuts and belong to the family of anacardiaceae. They are kidney shaped seeds and are grown in places with tropical climate. They are full of nutrition as they contain protein, minerals, calcium, iron, zinc, magnesium and potassium. They boost immune system. They help to lower risk of formation of gall stones and they also promote formation of red blood cells. They help to maintain good health of bones.

Pistachio member of cashew family. It may lower the risk of heart disease. Even though pistachio have lot of calories but does not lead to obesity or weight gain hence helps in weight management. It also lowers blood pressure. It boosts immune system and gives relief from constipation. It helps improve body's metabolism and reduces risk of strokes and heart attacks. It helps in wound healing and cellular growth. Pistachio are benifitial for intestinal health and digestion.

White sesame seeds add a delicious, nutty taste and crunch to many dishes. They are available throughout the year. They are highly konown for their oil which is also the only oil naturally resistant to rancidity. Scientifically sesame seeds are known as sesamun indicum. They promote healthy and beautiful skin. Good source of high protein vegetarian diet. For oral health sesame seed oil is considered good. They help prevent diabetes. Reduces blood pressure. It keeps heart helthy. Helps prevent cancer. It protects against DNA damage that occurs due to radiations. It cures asthama as it promotes respiratory health. It proves relief from arthritis.

Melon seeds are good source of nutrition hence one should not through them away. They can be used on various ways. They can be consumed as it is or can be roasted. They can be added to soups, gravies. They are basically used to bring thickness. They are good source of protein, vitamins and minerals. They helps fight cardiovascular diseases. They help grow nails and hair. They help in weight loss. They are very gud source of antioxidants, vitamin A, C and E.

Barley is a member of grass family. It have a rich, nutty flavour

and a dense, chewy texture. It is used as animal fodder and as a source of fermentable material for beer and certain distilled beverages. Barley is also a component of various health foods. It is a high source of fiber. It can improve digestion. Barley helps to control blood sugar levels. It helps lower high cholesterol and prevents heart diseases. Barley provides antioxidants. It has high amount of vitamins and minerals. It also protect against some cancers. Barley naturally contains the protein gluten.

Oats are used as both animal and human nutrition. Oats were used for medicinal purpose earlier, but now they are used as food. Oats enhance the immune response to infections. Oats are very nutritious, as they contain copper, iron, zinc, phosphorus and vitamins. They are good source of carbs, fiber and proteins. They are rich in antioxidants. Oats are good source of soluble fibers known as beta-glucan. They lower cholesterol level hence protects LDL cholesterol from damage. They helps improve blood sugar levels. They are very filling hence help in weight loss. They help with skin care. They also have the tendency to decrease the risk of childhood asthma. They help in relieving comstipation.

Sorghum is used for human nutrition all over the world. It requires less warter to grow. It is also known as a powerhouse in terms of nutrition as it provides vitamins, magnesium, iron, copper, calcium, phosphorous and potassium. It fulfils half the requirement of daily protein and dietary fiber intake. Sorghum helps to improve digestive health. It helps to prevent cancer and also control diabetes. It helps improve bone health and protects against osteoporosis and arthritis. It helps in development and circulation of red blood cells. It increases energy levels hence keeps the person energetic throughout the day. As sorghum is a grass so some people might get allergy but it is very rare. Sorghum is used for flours, porridges and side dish, as malted and distilled beverages and specialty food such as popped grain. It should be consumed in moderate amount.

Wheat bran is a source of insoluble fiber. Bran can be purchased in toasted as well as fresh form. Bran is outer shell of the grain and is also used to make medicines. Wheat brain can be used for various purposes. When consumed for first time, it might cause flatulence and stomach discomfort. It helps prevent irritable bowel syndrome and constipation. It lowers blood pressure. To some extent it also prevents stomach cancer. It prevents from gestro-intestinal disorders and cardio vascular diseases. It also prevents from weight gain or obesity.

Soya bean also known as glycine max is a species of legume. It is a rich source of protein. It is fat free as well as cheap. It contains significant amount of phytic acid, dietary minerals and B-vitamins. Most soybean are yellow in colour but some can be brown, black or green. Fresh soybean should be refrigerated and used within few days whereas dried or frozen can be kept for several months. It helps to prevent osteoporosis and improves bone health. It boots metabolic activity in body and also improves digestive health. It helps to maintain weight and cures diabetes. It prevent neural tube defect in infants. It helps prevent strokes and heart attacks.

Material and methods

Raw materials such as ghee, almonds, goond, melon seeds, lotus buds, white sesame seeds, grated coconut, pistachio, sugar free powder, flax seeds and multigrain Atta[containing 7 grains flour] were all purchased from the local market, Bathinda, Punjab, India. The raw material were physically examined to ensure they were disease-free and then were stored in cool temperature and used within 24 hours.

All the preparations were done in the nutrition lab [Amity University]. There were 4 different combination using different ratio of multigrain Atta and flax seeds. The different ratio of multigrain Atta were 50%, 60%, 70%, 80% whereas ratio of flax seeds were 50%, 40%, 30%, 20%. The appropriate amounts were weighed using an electronic balance to give the various ratios of the flour and flax seeds for use.

Recipe

Ghee-3/4 cup [150g], Almonds-3/4 cup [150g], Cashews-1/4 cup [50g]
Goond-2 tbsp [tablespoon] [20g]
Melon seeds-1 tbsp [10g]
Lotus buds-1/2 cup [100g]
White sesame seeds-1 tbsp [10g]
Grated coconut-1 tbsp [10g]
Sugar-free powder-1/4 cup [50g]
Pistachio [for garnish]
Multigrain Atta and flax seed as per the ratio [50:50] [60:40] [70:30] [80:20].

As per the requirement all the ingredients were weighed and kept aside for use. The different ratios were taken in 4 different bowls.

First we heat the pan and add ghee to it. Once it heats we fry goond and lotus buds in it and then keep it aside. Now, we add Atta to it and cook on low flame till golden brown. Add grinded goond, almonds, cashews, lotus buds, melon seed, sesame seed, grated coconut, flax sees [all roasted]. Cook for few minutes and then turn off the flame. Now add sugar-free powder and mix well. Make ladoos of desired shape and size. Wrap in pistachio. Repeat all these steps for rest of the different ratios that have to be made. Put the prepared samples in 4 different bowls and name them as A, B, C and D.

Then, sensory evaluation of the product was conducted.

For each sample, 20 hedonic test were conducted by 20 different panelists and semi-based panel of judges. Total 18-20 were made out of the given recipe and the weight of 1 ladoo was 45g. Hedonic test was done on the bases of:

After conducting the sensory evaluation, statistical analysis was done.This was done on the basis of mean and standard deviation of all attributes. The mean value and standard deviation was calculated from all the ratings given by 20 different individuals. Pictures of all the samples were clicked and the reviews were considered for further possible outcomes.

Results

The main reason behind making this recipe was its nutritive value. The recipe is a rich source of protein and energy. It was basically made for pregnant and lactating women, but anyone can consume it for better health.

The nutritive values of the raw material are as follow:

Table 1

Ingredients	Protein(g)	Fat(g)	Calcium(g)	Energy(kcal)
Ghee		10		180
Multigrain Atta	4.2	0.6		
Flax seeds	2.27	6	0.04	
Almonds	2.08	5.89	0.23	65.5
Cashew	2.12	9.69	0.05	59.6
Pistachio	1.98	5.35	0.14	62.6
Total	12.65	37.53	0.46	367.7

Reference: ICMR, NIN – Nutritive value of Indian foods - 1989

As we can see, 1 ladoo almost give 40% of daily requirement of protein.

The final results were calculated on the basis of sensory evaluation. The best out of four samples was selected as the main sample

The results are as follow:

Table 2

Sample / List	A[60:40]	B[70:30]	C[80:20]	D[50:50]
Taste	10.50 ± 4.89^a	9.25 ± 2.44^b	8.55 ± 1.14^c	7.95 ± 2.87^d
Colour	10.25 ± 4.36^a	9.45 ± 2.99^b	9.25 ± 2.84^c	8.05 ± 2.37^d
Texture	9.7 ± 3.9^a	9.25 ± 2.78^b	9.05 ± 2.81^c	8.05 ± 2.62^d
Firmness	9.35 ± 3.99^a	9.4 ± 3.42^b	8.88 ± 2.82^c	8.35 ± 3.63^d
Stickiness	9.6 ± 2.99^a	9.1 ± 3.07^b	8.9 ± 2.65^c	8.45 ± 3.41^d
Overall	9.35 ± 2.38^a	9.15 ± 2.43^b	8.8 ± 2.21^c	8.45 ± 3.74^d

The results were calculated on the basis of average value and standard deviation.

Sample A

Was the one with ratio of 60:40 that is 60% was multigrain Atta and 40% were flax seeds.

- **Taste:** The mean value of the taste developed from Sample A was 10.50 ± 4.89. The mixture of flours had a particular taste which enhanced its importance which is needed in food product development.
- **Colour:** The mean value of the colour developed was 10.25 ± 4.36. The colour should be shuch that it should appeal the eyes, for its better acceptability.
- **Texture:** The mean value of texture developed was 9.7 ± 3.9. It had a alluring texture and it should be crunchy as well. This gives ladoos a gud sense of feel.
- **Firmness:** The mean value of the firmness developed was 9.35 ± 3.99. The ladoos should be firm and steady which means they should not break easily or should not take much time to break.
- **Stickiness:** The mean value of the stickiness developed was 9.6 ± 2.99. Ladoos should not be very sticky, means they should not stuck in teeths after eating.
- **Overall:** The overall mean value developed product was 9.35 ± 2.38. The recipe should be exepted in relation to all the above given factors. This sample was liked most by panalists.

Sample B

Was the one with ratio of 70:30 where 70% was multigrain atta and 30% were flax seeds.

- **Taste:** The mean value of taste developed was 9.25 ± 2.44. The taste of this sample varied slightly because of the difference in the ratio.
- **Colour:** The mean value of colour developed was 9.45 ± 2.99. There was a slight variation in the colour as well.
- **Texture:** The mean value of texture developed was 9.25 ± 2.78. The consistency was not that good and was not very alluring.
- **Firmness:** The mean value of firmness developed was 9.4 ± 3.42. It was a bit less firm and panalists found it to be a bit hard.
- **Stickiness:** The mean value of stickiness developed was 9.1 ± 3.07. Panalists found out the sample to be a bit sticky.
- **Overall:** The overall mean value developed product was 9.15 ± 2.43. It was liked by panalistes but was not accepted whole heartedly.

Sample C

Was the one with ratio of 80:20 where 80% was multigrain atta and 20% wew flax seeds.

- **Taste:** The mean value of taste developed was 8.55 ± 1.14. The taste was not very good or very bad. It was neutral.
- **Colour:** The mean value of colour developed was 9.25 ± 2.84. The colour was not that bad it was still appealing to eyes.
- **Texture:** The mean value of texture developed was 9.05 ± 2.81. The consistency kept on decreasing as the ratio of multigrain atta was increased.
- **Firmness:** The mean value of firmness developed was 8.88 ± 2.82. It was less firm as compared to other samples.
- **Stickiness:** The mean value of stickiness developed was 8.9 ± 2.65. This sample was sticky as said by some of the panalists.
- **Overall:** The overall mean value of developed product was 8.8 ± 2.21. It was accepted by few panalists only as there were certain things that need to be improved.

Sample D

Was the one with ratio of 50:50 were 50% was multigrain atta and 50% were flax seeds.

- **Taste:** The mean value of taste developed was 7.95 ± 2.87. This sample was the one which was not liked by most of the panalists. It had a bad, pungent after taste.
- **Colour:** The mean value of colour developed was 7.95 ± 2.87. As compared to other samples the colour was not appealing to eyes.
- **Texture:** The mean value of texture developed was 8.05 ± 2.62. The consistency decreased even more and it was hard.
- **Firmness:** The mean value of firmness developed was 8.35 ± 3.63. It was not firm or very less firm.
- **Stickiness:** The mean value of stickiness developed was 8.45 ± 3.41. According to most of the panalists it was sticky and get stuck in teeths.
- **Overall:** The overall mean value of the developed product was 8.45 ± 3.74. It was not accepted by most of the panalists because there was a lot to change in this sample.

The storage capacity of ladoo was also calculated, and it was observed that without adding any preservative these ladoo's can last for months.

These can be best benefited when consumed twice a day, that is one the morning and one in the evening.

Fig 1: Sample A which was rated best by the experts (60:40)

Conclusion

As we can see, sample A was liked by most of the panelists, whereas the least liked was sample D. As we have seen the main purpose behind making this recipe was to provide good nutrition. All the ingridints that were used have high nutritive value and serves various health benefits to the body. Benefits such as help in weight loss, diseases related to heart. The increases the no. of red blood cells in body, they helps cure diabetes and various other health benefits. On the other hand they were costly and were not readly accepted by people as they were bitter in taste. Main idea behind making these ladoos was to provide good nutrition to pregnant and lactating womens.

References

1. Barber E. Prehistoric Textiles: The Development of Cloth in the Neolithic and Bronze Ages with Special Reference to the Aegean. Princeton University Press, 1991, 12
2. Wisseman S. Ancient Technologies and Archaeological Materials. Routledge, 2013, 124
3. Illustration from Franz Eugen Köhler, Köhler's Medizinal-Pflanzen, 1897.
4. Plant Village, The Huck Institutes of the Life Sciences, Pennsylvania State University. 2011. Retrieved 4 March 2015.
5. Pistachios, FAOSTAT Production/Crops. United Nations Food and Agricultural Organization, Statistics Division (FAOSTAT). 2015. Retrieved 7 October 2015.
6. Bhatty RS. β-glucan and flour yield of hull-less barley. Cereal Chemistry. 2011; 76(2):314-315. doi:10.1094/CCHEM.1999.76.2.314.
7. Whole Grains Bureau. Accessed 4/14/06. History of Whole Grains.
8. National Sorghum Producers. 2006. What is Sorghum? www.sorghumgrowers.com/Sorghum+101, (Accessed May 18, 2006).
9. International Journal of Food Science & Technology, 2015; 50(12), Version of Record online: 14 NOV.
10. https://www.organicfacts.net