



Shelf Life Analysis of a Herbal Hypolipidemic Health Mix

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Abstract

A herbal health mix is developed using powdered parboiled rice (*Sandohguri*), green gram *dal*, *Arjuna*, cinnamon and fenugreek in proportion of 70:30:2:2:2 to treat hyperlipidemia through a holistic, natural healthful and preventative approach. The shelf life study of the developed health product is done to rollout changes in moisture percentage, acid value, peroxide value, free fatty acid content of the health mix after 6 months of storage. The keeping quality and storage life of the health mix after 6 months of storage in air tight condition at normal temperature (room temperature) is found good enough with the moisture content of 9.7%, acid value of 2.2 mg KOH/g (0.22%), peroxide value of 2.4 meq /kg and free fatty acid contents of 1.1%.

Keywords

Health mix, Shelf life, Sandohguri, Hypolipidemic, Organoleptic



Greentree Group

Received 05/03/17 Accepted 30/03/17 Published 10/05/17

INTRODUCTION

Sandohguri is a common traditional roasted parboiled rice product (rice powder) of



Assam, which is popularly used as a breakfast cereal with milk in Assam. *Sandohguri* is an instant food item, which is readily available, easily digestible and affordable. But it is a poor source of protein. So to add up hypolipidemic property, the *Sandohguri* is fortified with green gram *dal*, *Arjuna*, cinnamon and fenugreek in powdered form¹. In this developed health mix, fenugreek, cinnamon and *Arjuna* are added to slot in hypolipidemic effect as dietary factors like antioxidants, dietary fibres etc. which have great impact on hyperlipidemia². The green gram *dal* is added to increase the protein content of the product. *Sanhogguri* is a traditional ready to eat food product, stored for a long time for consumption. The shelf life study of the developed health mix is essential to know the keeping quality of the product as a stored ready to eat hypolipidemic food product.

Shelf life is the period of time up to which an edible product can be kept for consumption. It is the expected length of time during which the product is free from deterioration and retains its all quality characteristics. Shelf life evaluation of any developed food product is very essential as the food may become unsafe during storage because of formation of toxic substances,

growth of pathogenic microorganisms or oxidation of fats and oils. A shelf life study includes various tests done to make out any change that occur in a food product over time. The change in quality of any product is influenced by storage temperature, humidity, packaging, product composition, water activity, processing conditions and ingredient quality. The methods of processing and composition of ingredients play important role in determining shelf life. Generally dry food items have better keeping quality than liquid and semisolid food.

MATERIALS AND METHODS

To study the storage quality of the health mix, the product is kept for six months in sealed airtight packaging at normal (room) temperature and after six months following tests are done.

Test of organoleptic properties of the hypolipidemic health mix

- **Colour:** A small quantity of the health mix powder is taken in a piece of butter paper and viewed in well-illuminated place^{3,4}.
- **Taste, Texture and Aroma:** A pinch of health mix is used to get taste with the help of tongue as well as smelled to get the



aroma. The texture is sensed with hands and tongue. Sensory perception of a food item is shown in Table 1.

Table 1 Sensory perceptions of food

Perception	Example
Vision	Shape, colour, appearance.
Olfaction	Odour (sweet, pungent, floral).
Gustation	Sweet/salt, sharp/bitter, flavours (savour, perfume in mouth).
Hearing	Crunchy.
Sense of touch	Texture (smooth, rough), temperature,
Trigeminal perception	Fresh/hot sensations, astringency.

Moisture by oven drying method at 105⁰C

10 g sample is dried in an oven at 105 ⁰C and cooled in a desiccator. Same process is repeated until a constant weight is achieved. The calculation used to find out moisture percentage is as follows:

$$\text{Moisture \%} = (\text{Initial weight} - \text{Final weight}) \times 100 / \text{Weight of the sample}$$

Acid Value

Principle: The acid value of a fat is the number of mg of KOH required to neutralise the free acid in 1g of the substance.

Reagents:

1. A mixture of equal volume of alcohol (95%) and ether.
2. 1% phenolphthalein in alcohol.
3. 0.1N KOH.

Procedure: 50 ml of mixture of alcohol (95%) and ether is neutralised with 1 ml of

1% phenolphthalein in alcohol and added to 10 g of the sample. To dissolve the substance completely it is warmed in a water bath. The solution is titrated with 0.1 N KOH until the pink colour persists for 15 seconds. The titration value in ml (A) is noted. The calculation used to find out the acid value is as follows:

$$\text{Acid value} = A \times 0.00561 \times 1000 / \text{Wt of the sample in gram}$$

Peroxide Value

Principle: The peroxides present in a sample are determined by titration against thiosulphate in the presence of KI. Starch is used as indicator.

Reagent:

1. Solvent mixture: Gglacial acetic acid and chloroform are mixed in 2:1 ratio.
2. 5% potassium iodide solution.
3. 1% starch solution.
4. N/500 sodium thiosulphate solution (prepare on the day of use).

Procedure: 1 g sample is taken in a clean dry boiling tube and added 1g potassium iodide powder and 20 ml of solvent mixture. It is allowed to boil vigorously in a water bath not more than 30 seconds and transferred quickly to a conical flask containing 20 ml 5% Potassium iodide solution. The tube is washed twice with 25



ml water each time and collected it into the flask. Titration is done against N/500 sodium thiosulphate solution until the yellow colour almost disappears. The calculation used to find out the peroxide value is as follows:

Peroxide value = $S \times N \times 1000 / g$ of sample used

(Where S is ml of sodium thiosulphate solution and N is its normality)

Free Fatty Acid Analysis

Percentage of free fatty acid (FFA) = $AV \times 0.503$

RESULTS AND DISCUSSION

The organoleptic evaluation of the health mix is done after 6 months of shelf life and finds are presented in Table 2.

Table 2 Organoleptic evaluation of health mix after 6 month storage

Colour	Off white, light brown
Texture	Free flow, smooth powder
Aroma	Cinnamon and malt.
Taste	Slightly better.
Overall acceptability	Good

After 6 months of storage, the health mix retains its all quality characteristics, hence the product can be stored up to 6 months at normal (room) temperature, but it should be in sealed and airtight condition.

Cereals and pulse grains or flours have very low chance of spoilage if stored or kept

properly. It is because the moisture content of these products is too low to support growth of molds or any other microorganism. To improve the keeping quality of the developed health mix, care is taken during processing and storage. During processing of the health mix, ingredients are washed properly before sun drying to remove all foreign matters. Roasting is done on low flame for long time to reduce moisture percentage to 8.93% which inactivates the enzyme present in the health mix and kills germs. To find out the keeping quality of the health mix, the moisture percentage, acid value, peroxide value & free fatty percentage of the mix are also determined after 6 months of storage, which is shown in Table 3.

Table 3 Moisture percentage, acid value, peroxide value & free fatty percentage of the health mix after 6 months of storage

Properties	Results
Moisture	9.70%
Acid value	2.2 mg KOH/g
Peroxide value	2.4 meq/kg
Free fatty acid analysis	1.11%

The moisture percentage is increased to 9.7% during storage and likelihood of microbial contamination is insignificant at this moisture percentage. International Rice Research Institute, Philippines⁵ recommends moisture percentage below 12% in room



temperature for 1 year safe storage. Green gram *dal* and rice flour should not contain more than 14% and 13% moisture, respectively during storage⁶. According to Food Act of Srilanka⁷, the moisture value of an instant mix should be below 12%. The product is packed in polyethene beg and kept in air tight condition for 6 months at temperature below 30°C. According to O. Peter Snyder⁸, cinnamon is a strong organic preservative which can prevent bacteria, yeast and mold growth in food items. The active antimicrobial compound in cinnamon is cinnamaldehydeugenol. It is also rich in antioxidant and prevents oxidative rancidity. Furthermore fenugreek is commonly used in Iraq and Arab to preserve many drugs owing to its antimicrobial properties. Fenugreek can be used as a potent preservative to preserve fruits and vegetables, meat products, dairy products, edible substances and other perishable substances⁹. The existence of these two herbs with preservative property and low moisture percentage enhances the shelf life quality of the health mix.

The acid value of the health mix is a measure to detect the hydrolytic rancidity. Acid value is measured to check the food quality during storage. Free fatty acids

formed in food by the hydrolysis of the oil are not very toxic compound; however it becomes a cause of reduction of flavour and taste¹⁰. According to Food Safety and Standard Authority of India¹¹, the maximum acid value of biscuits should not exceed 1.5%. The acid value of instant noodles shall not be more than 3%¹². Free fatty acid (FFA) content up to 2.26% (Acid value = 4.5) of flaxoat nutty bar is found shelf stable for the period of 12 months storage¹³. Similarly free fatty acid content up to 2.82% (Acid value = 5.6) of wheat and coconut *Ladoo* is found safe to eat after 4 months storage period¹⁰. Since no rancid odours developed during storage of the health mix up to 6 months under normal temperature (room temperature) and air tight conditions, there is no doubt to consider the acid value of 2.2 and 1.1066% of FFA content safe. Peroxide value is done to monitor the formation of the primary oil oxidized product, namely lipid hydroperoxide. Peroxide value below 10 is safe for human consumption¹¹. Peroxide value of instant mix should be below 10 meq/kg⁷. Consequently, peroxide value 2.4 meq/kg of the health mix after 6 months is safe for human consumption.



CONCLUSION

The overall keeping quality of the product is checked after 6 months storage period and the nutritive value is found analogous with fresh health mix. The moisture percentage of 9.7% after 6 months of storage life gives the impression of non possibility of any microbial growth. Other parameters, such as acid value (2.2 mg KOH/g), peroxide value (2.4 meq/kg) and free fatty acid percentage (1.1%) are with the same limit as per different scientific evidences. No change in colour, texture, flavour and test of the product has been observed during storage. No rancid odour has been developed during storage of the health mix at normal temperature (room temperature) in sealed and airtight condition. So, at normal temperature (room temperature) and in air tight condition the storage life of the health mix is six months.

ACKNOWLEDGMENT

The authors are grateful to Prof. (Dr.) Umesh Ch. Sarma, Hon'ble Vice-Chancellor, Srimanta Sankaradeva University of Health Sciences, Guwahati for his encouragement to carry out this work. The authors would like to thank Prof. (Dr.)

O.P. Gupta, Former HoD, Department of Kayachikitsa, Govt. Ayurvedic College, Guwahati for his advice and fruitful discussions.



REFERENCES

1. Borkotoky, P., Sarma, B. P.(2016) Development and Nutritive Value Analysis of a Herbal Hypolipidemic Health Mix. International Journal of Ayurveda and Pharma Research, 4(10): 44-49.
2. Lukmanul, H., Girija, A., Boopathy, R.(2008) Antioxidant property of selected Ocimum species and their secondary metabolite content. J Med Plants Res, 2(9): 250-257.
3. Chandira, R. M., Venkataeswarlu, B. S., Kumudhavalli, M.V., Bhowmik, D., Jayakar, B.(2008) Formulation and Evaluation of the Fast Dissolving Tablets of Atenolol. American Journal of Drug Delivery, 15: 15-20.
4. Shukla, P., Dandagi, P.M., Thomas, R., Sharath, C.P. (2012) Effect of various Superdisintegrants on the Drug Release Profile and Disintegration Time of Metaproterenol Sulfate Orally Disintegrating Tablets. International Journal of Biological & Pharmaceutical Research, 3(1): 169-176.
5. Food Safety and Standard Rules of India (2011).
6. Javier, E.Q. (2004) Let's promote brown rice to combat hidden hunger brown rice. Rice Today, 3(1):38.
7. Food Act No. 26 of 1980, Srilanka.
8. Snyder, O. P(1997) Antimicrobial effects of spices and herbs. Hospitality Institute of Technology and Management. St. Paul, Minnesota.
9. Shukla, K. (2002) Fenugreek impregnated material for the preservation of perishable substances. US 6372220 B1.
10. Srivastava, Y., Semwal, A.D., Sharma, G.K., Bawa, A.S. (2011) Utilization of Virgin Coconut Meal (VCM) in the Production of Ready-to-Eat Indian Traditional Sweet Meat Using Response Surface Methodology. Food and Nutrition Sciences, 2:214-221.
11. Food Safety and Standard Authority of India (2012).
12. Codex Committee on Food Additives and Contaminants (2005) Thirty-seventh Session, The Hague, The Netherlands.
13. Padmashree, A., Sharma, G.K., Govindara, T. (2013) Development and Evaluation of Shelf Stability of Flaxoat Nutty Bar in Different Packaging Materials. Food and Nutrition Sciences, 4: 538-546.