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Research Paper**Open Access****SHELF LIFE STUDY OF A GLUTEN FREE NUTRITIOUS PRODUCT-GLOBIN BAR****Aayushi Gala¹, Priyanka Sharma^{1*} and Anuradha Shekhar¹****Corresponding Author: Priyanka Sharma, ✉ priyankavinod24@gmail.com*Received on: 5th February, 2019Accepted on: 27th March, 2019

A shelf life study was done to see the consumer acceptance of a healthy gluten free nutritious bar- 'GLOBINBAR'. The aim was to standardize an innovative, preservative free, simple, nutritious blend that is cost-effective. The main ingredients used were dates, garden cress seeds, oats, rice puffs, pumpkin seeds, milk powder and coconut powder. Orange zest was added in small amounts to improve the iron absorption as it contains vitamin C which is required to absorb non-heme iron. Orange zest also helped in improving the flavor and overall acceptability of the globin bar. In this product dates act as a binding agent and provides sweetness and flavor. This product has fair amounts of iron, protein, vitamin C along with other essential vitamins and minerals. The acceptance was studied by conducting a sensory evaluation using a scoring method based on an even point hedonic scale on a naive panel. The Evaluation was performed on sensory attributes like color, texture, flavor, chewiness, appearance and overall acceptance. The other aspects covered in the study were packaging, nutritional labeling, budgeting and marketing. Nutritional label consists of ingredients of the product, nutritional facts, vegetarian mark, price, etc.

Keywords: Garden cress seeds, Gluten free bar, Nutritious bar, Orange zest, Globin bar**INTRODUCTION**

Nutritional anemia may be defined as the condition that results from the inability of the erythropoietin tissue to maintain a normal hemoglobin concentration on inadequate supply of one or more nutrients leading to reduction in the total circulating hemoglobin (Srilakshmi, 2012). Anemia is prevalent throughout the world. Prevalence of anemia in India among women was found to be 63% in lactating women, 59% in pregnant women, and 53% in non pregnant and non lactating women in 2017 (Mohammad Zahid Siddiqui *et al.*, 2017). Inadequate intake of iron is found to be one of the reasons of prevalence of anemia. Globin bar is an innovative modified food product which helps to improve the iron content in the diet. Iron is the mineral which is required to form the hemoglobin in the body. Low level of iron in the body leads to anemia. Adolescent girls are more prone to anemia as compared to other age groups. Anemia mainly

occurs due to the vegetarian diets, less intake of iron rich foods, intestinal worms which leads to less absorption of iron in the body. To overcome anemia and to increase the iron content in diet, globin bar was developed as it contains dates and garden cress seed which are good source of iron along with oats, milk powder, coconut powder and rice puffs which provides a good biological value protein. Vegetarian source contains non-heme iron which is not absorbed completely, so Vitamin C is required for its better absorption. Studies have shown that including vitamin C helps in better absorption of non-heme iron (Hallberg *et al.*, 1989). Orange zest is a good source of Vitamin C which helps in absorption of iron content and it also adds flavor to the bar.

Garden cress is the significant ingredient in globin bar. It is a rich source of iron that is around 100 gm of seeds gives about 17.2 mg of iron. Garden cress seed possess various nutritional properties and is cheaply available in

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India. Study carried out on impact of garden cress seed on anemic adolescent girls. By incorporating it in besan laddoo which was given for 2 months to 60 anemic girls and 40 controls, found that there was no significant change in hemoglobin levels of control group but had improved in experimental group from 10.17 to 10.77 (Travinderjeet Kaur and Mamta Sharma, 2016).

OBJECTIVES

- To standardize an innovative nutritious product for consumer acceptance.
- To study the shelf life of the product by sensory evaluation.
- To understand the marketing and budgeting aspects of the product.
- To design a nutritional label.
- To identify a cost effective packaging material.
- To learn the various entrepreneurship skills.

MATERIALS AND METHODOLOGY

Globin bar was confirmed after 3 trials. The sensory evaluation was done for every trial among 17 naive panel members. The score card consisted of 7 point hedonic scale ranging from dislike extremely to like extremely. Attributes scored were color, flavor, texture, chewiness, appearance and overall acceptance. During the first trial the results of sensory evaluation showed that the bar did not have a pleasant taste. To improve its taste, 2nd trial was done by adding orange zest along with other ingredients used in first trial. Orange zest not only improved the flavor but also Vitamin C content in bar which helped in better absorption of iron in the body. Milk powder was also added in the bar to improve the protein content as formation of hemoglobin not only requires iron but also protein. Even after 2nd trial the texture of bar was soft and was not acceptable (Table 1).

Ingredients	Amount in gm
Dates	140
Coconut powder	10
Garden cress seeds	15
Oats	50
Pumpkin seeds	2

Ingredients	Amount in gm
Dates	140
Garden cress seeds	15
Oats	10
Coconut powder	50
Milk powder	12
Pumpkin seeds	2
Orange zest	1

Ingredients	Amount in gm
Dates	140
Garden cress seeds	15
Oats	50
Milk powder	12
Rice puff	20
Coconut powder	10
Pumpkin seeds	2
Orange zest	1

So to improve the texture, crushed rice puffs were added in the third trial. This resulted in better chewiness and the texture improved and this was finalized based on the sensory evaluation results. This standardized product was further kept for shelf life study.

Using the amount mentioned in Table 3, Globin Bar was made for sensory evaluation and the results of the sensory evaluation showed that all the characteristics fell in between 5 and 6, i.e., from like slightly to like very much and so this product was further studied for shelf life.

Method of Preparation of Globin Bar

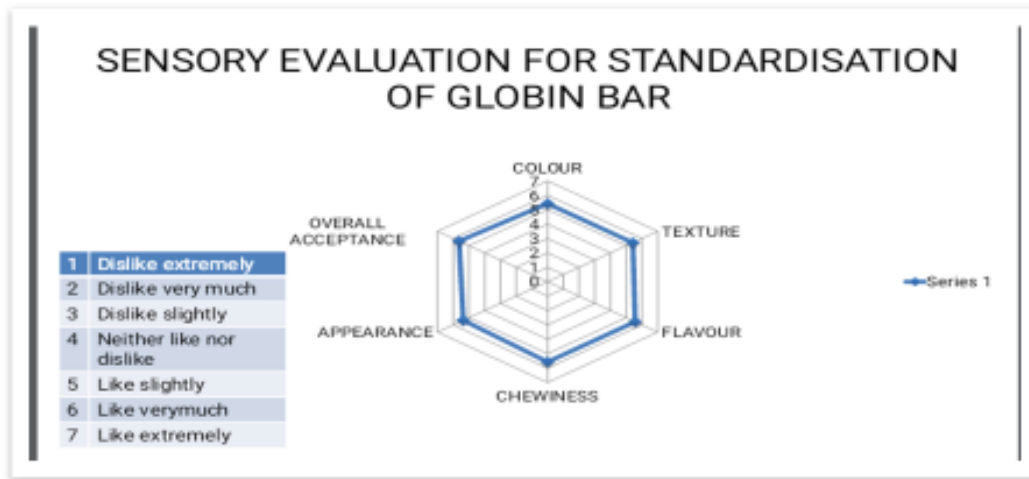
Measure all the ingredients in the given amount

↓

Roasts oats, rice puffs and pumpkin seeds

↓

Figure 1: Results of Sensory Evaluation of the Standardized Product



Heat the dates and mash it till it gets soft



Add all the dry ingredients in the dates and mix it except oranges zest and pumpkin seeds



Spread the mixture into the tray and add pumpkin seeds and orange zest to the bar and allow it to cool



After it is cooled, cut it into appropriate size and pack it

Special Points

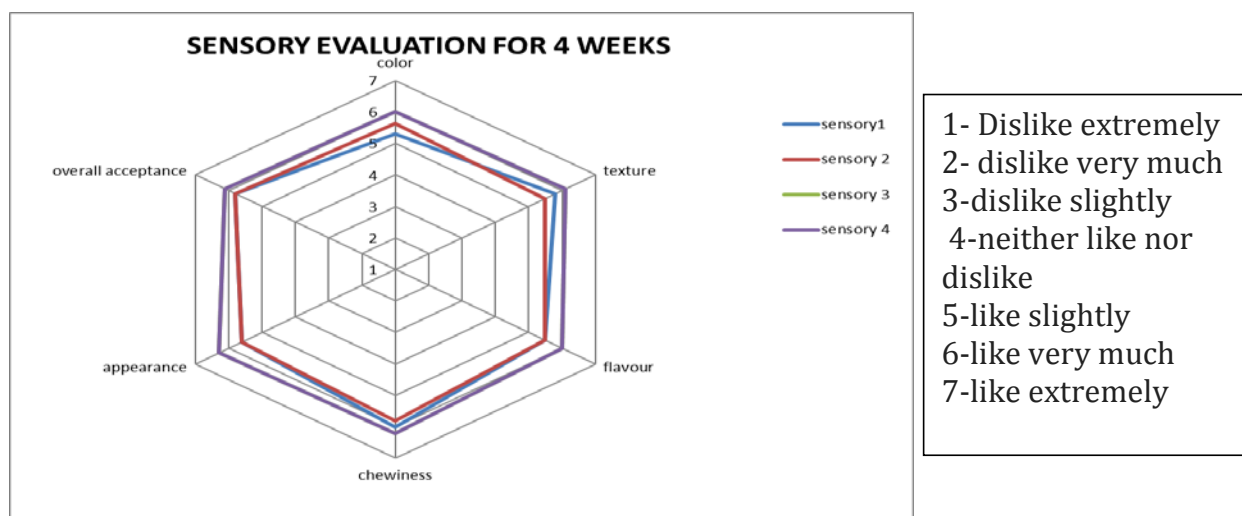
Before adding orange zest, remove the white portion to avoid bitter flavor.

Roast the rice puffs and oats before adding, to get a great texture in the bar.

Shelf Life Study for 4 Consecutive Weeks

To study the shelf life of globin bar, sensory evaluation was conducted for 4 consecutive weeks which was done by semi trained panel members (total number 8). Scoring method

Figure 2: Periodic Sensory Evaluation of the Standardized Product for 4 Weeks



was used with a 7 point hedonic scale. Attributes considered were color, flavor, texture, chewiness, appearance and overall acceptance where the scores represented are (1) Dislike extremely, (2) dislike very much, (3) dislike slightly, (4) neither like nor dislike, (5) like slightly, (6) like very much, (7) like extremely.

It can be observed that there were many changes in characteristics of globin bar after sensory evaluation (Figure 2).

- As can be seen from Figure 2, during the 1st week all the characteristics were rated between like very much and like slightly that is between 5 and 6 and was found to be highly acceptable.
- In the second week color enhanced whereas texture and chewiness showed slight decline may be due to moisture absorption. Rest of the all attributes remained the same as in week 1. The results was still in between like slightly to like very much.
- During the 3rd week there was an improvement seen in all the attributes that were assigned for the Globin bar and it was liked very much by the panel.
- 4th week results were also the same as in the 3rd week proving that this product can prove to be highly marketable.

Packaging

Packaging minimizes the damage to the product that can be physical, chemical or microbial. The packaging paper used for the globin bar was brown Kraft paper which has aluminum foil laminated inside and has a high barrier against moisture oxygen and light. The shelf life of product is improved by using the Kraft paper. Sealing machine was used to seal the packaging paper.

Figure 3: Brown Kraft Paper Laminated with Aluminum Foil Inside



Figure 4: Packaging of Globin Bar



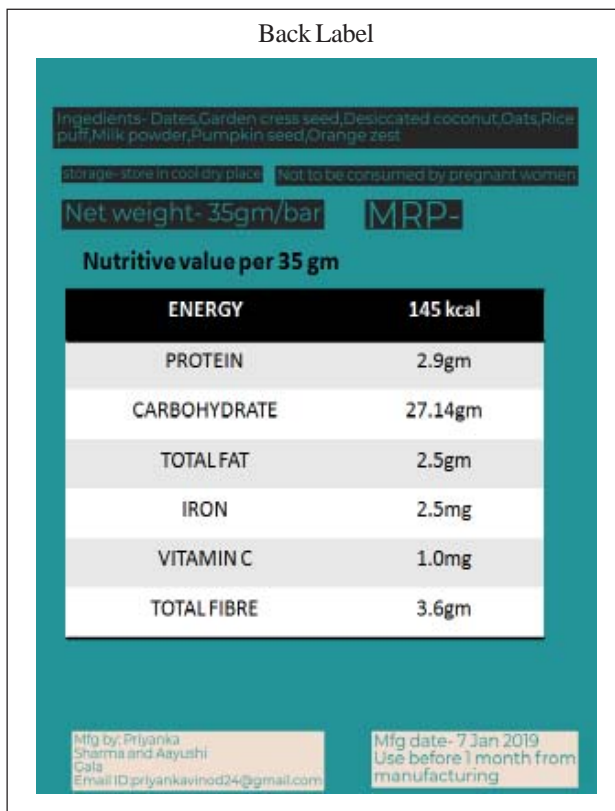
Nutrition Label

Nutrition label helps in getting information about the product to the consumer. It is a way of health tool to promote a balanced diet, hence enhancing public health. Nutrition label also helps consumer to understand the nutritional value of

Figure 5: Nutrition Label of Globin Bar



Figure 5 (Cont.)



the food. It enables consumers to compare the nutritional values of similar food products and then make healthy food choices based on the nutrition information. For the food manufacturer it encourages them to improve the nutrient profile of their products. A nutritional label was designed for 'Globin bar' which consisted of ingredients, nutritive value table, positive points, who cannot consume, packaging date, expiry date, price, vegetarian mark, manufactured by, manufacturing address and contact details (Figure 3).

Budgeting

Budgeting is important to decide the price of the product. The price of the product should not be too high that consumer could not afford it. Budgeting included various things such as cost of ingredients, labor cost, electricity, rent, traveling charges, etc. For a bulk product, food ingredients were bought from whole sale market to reduce the cost and increase the profit. Batch was made for 7 bars and cost was calculated accordingly (Table 4).

- Total cost for 7 bars- Rs. 151
- Cost price per bar- Rs. 22

Expenditure	Price
Raw ingredients	74
Packaging material	20
Labeling	15
Travelling	10
Electricity cost	5
Labor cost	10
Rent	5
Miscellaneous cost	2
Total	151

- Profit- Rs. 3
- Selling price per bar- Rs. 25

CONCLUSION

Globin bar is a nutrient rich bar that can be recommended to all the age groups. It can help to improve the hemoglobin levels, as it has good amount of iron, protein and vitamin C. It can be a good snack as it is appetizing and nutrient rich. Shelf life of gluten free Globin bar for a month proved it had a very good shelf life and the taste also did not deteriorate throughout the study period. It might have a longer shelf life for which longer duration studies might have to be done. Globin Bar can be a good start-up idea and it could be a viable option for a mid-day meal scheme for school children.

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