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SHELF LIFE STUDY OF A BAKED GLUTEN FREE PRODUCT "DIABETES CRACKLES"

Shazmeen Inamdar^{1*} and Anuradha Shekhar²

*Corresponding Author: **Shazmeen Inamdar**, ✉ inamdarshazmeen28@gmail.com

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A shelf life study was undertaken to standardize an innovative gluten free baked product-'Diabetes Crackles'. This product is completely Organic without any added chemical Preservative and low in Glycemic Index which could serve as a snack for the Diabetic population. The ingredients used are Amaranth flour, Bengal gram flour, Carrot, Kasuri Methi, Flax seed, Black Sesame seed, Curry leaves etc. Shelf life study was done for 1 month which included sensory evaluation by scoring method using a 7 point Hedonic scale. The evaluation was performed for sensory attributes such as Colour, Taste, Texture, After taste, Overall acceptability. Other aspects covered in the studies was Budgeting, Packaging, Nutritional Labelling.

Keywords: Diabetes, Gluten free, Baked, Organic

INTRODUCTION

Diabetes is a disease that occurs when the blood glucose, also called blood sugar, is too high. Blood glucose is the main source of energy and comes from the food we eat. Insulin, a hormone made by the pancreas, helps glucose from food get into our cells to be used for energy. Sometimes our body doesn't make enough insulin or doesn't use insulin well. Glucose then stays in the blood and doesn't reach the cells. Over time, having too much glucose in the blood can cause health problems. Although diabetes has no cure, you can take steps to manage your diabetes and stay healthy (National Institute of Diabetes and Digestive and Kidney Diseases, 2016).

Diabetes Crackles designed like a disc which are circular in shape made as a Snack meal especially targeting Diabetes and Obese patients and can be useful for health conscious public too. It is made up of Amaranth flour, Bengal gram flour, Carrot, Kasuri Methi, Flax seed, Black Sesame seed, Curry leaves, etc. One of the main ingredient used is Amaranth flour, a source of high quality protein, dietary

fibre and lipids rich in Unsaturated fatty acids. Amaranth seeds also contain bioactive components such as Phytosterols, Squalene, Fagopyritols, Saponins and Polyphenols with inclusion of desirable levels of Minerals and Vitamins for human diets (Reta Alemayehu *et al.*, 2014). Amaranth consumption has been shown to improve the plasma lipid profiles in animals. Methanolic extracts of amaranth have demonstrated anti-hyperlipidemic, anti-diabetic and anti-helminthic properties, while aqueous extracts have demonstrated anti-diarrheic, anti-fungal and anti-malarial properties (José Ángel Huerta-Ocampo and Ana Paulina Barba de la Rosa, 2011).

The 2nd main ingredient used was Bengal gram flour, which contains healthy unsaturated fats, helping in lowering the cholesterol level of the body. Owing to its low glycemic index, it is a great food for diabetes. It has high soluble fiber content which is beneficial for the health of the heart. The magnesium content of bengal gram flour helps in maintaining vascular health and it also helps in the regulation of blood pressure (Swati Kapoor, 2015).

¹ Hassan Niyaz Manzil, Uttan Naka, Bhayander West, Thane 401106.

² Department of Food Science and Nutrition, Dr. BMN College of Home Science, Matunga, Mumbai.

Another major ingredient used were Carrots. Carrot is a root vegetable with carotenoids, flavonoids, polyacetylenes, vitamins, and minerals, all of which possess numerous nutritional and health benefits. Besides lending truth that carrots are good for eyes, carotenoids, polyphenols and vitamins present in carrot act as antioxidants, anticarcinogens, and immunoenhancers. anti-diabetic, cholesterol and cardiovascular disease lowering and anti-hypertensive (João Carlos da Silva, 2014).

Kasuri Methi was used as a flavouring agent and it also serves as antidiabetic, anticarcinogenic, hypocholesterolemic, antioxidant, and immunological activities (Shashikumar et al., 2018).

Flaxseed is an excellent source of Alpha Linoleic Acid (ALA), a polyunsaturated omega-3 fatty acid (OM-3 FA), dietary fiber and is the richest source of plant lignin. Flaxseed is known to exhibit protective effects against a multitude of chronic ailments. Studies have shown that flax seed reduces the risk of Insulin Dependent Diabetes Mellitus (IDDM) (Anushka et al., 2014).

Sesame seed is mainly composed of fats, being considered a rich source of antioxidants (Luciana de Almeida Vittori et al., 2016). Curry leaves are highly aromatic and have many medicinal properties. It stimulates digestive enzymes and helps in breakdown of food more easily, good remedy for nausea and indigestion. It also improves eye-sight and prevents cataract. Eating curry leaves lowers blood glucose level (Manimekalai, 2016).

OBJECTIVES

- To Standardize an Innovative Nutritious product for any age group which is also cost effective and has a high Consumer acceptance.
- To study the Shelf life of the product using Sensory Evaluation.
- To design a Nutrition label.
- To select a cost effective Packaging material.
- To understand the Marketing and Budgeting aspects of the product.
- To develop Entrepreneurship skills.

METHODOLOGY

Initially many Products such as Carrot chips, Masala Makhana and Nachos disc were tried out of which Nachos

disc was finalized as per Sensory evaluation and later named as 'Diabetes Crackles'. Diabetes Crackles is a low calorie baked snack prepared specially targeting Diabetic population due to its Low Glycemic Index.

MATERIALS

Materials/Ingredients used in this product are Amaranth flour, Bengal gram flour, Carrot, Kasuri Methi, Flax seed, Black Sesame seed, Curry leaves, etc.

Standardization Procedure

The First Standardization results though found it to be acceptable lacked in flavor, which resulted in addition of

Table 1: First Standardization Ingredients

Ingredients	Amount
Amaranth flour	55 g
Bengal gram flour	10 g
Carrot	20 g
Sesame seed (black)	10 g
Oil	5 g
Black salt	5 g
Water	1 tbsp.

Table 2: Second Standardization Ingredients

Ingredients	Amount
Amaranth flour	25 g
Bengal gram flour	25 g
Carrot	20 g
Sesame seed (black)	5 g
Kasuri Methi	5 g
Black Salt	5 g
Amchur powder	5 g
Flax seed	5 g
Curry leaves	2 g
Oil	5 g
Water	1 tbsp.

Kasuri Methi in the Product to enhance the flavor component.

The results of the Second Standardized recipe with addition of kasuri Methi was too over powering and gave a bitter After taste. Black salt and Amchur powder together made the crackles taste too salty, so the product again went through some changes.

The Final Standardized Product was Made with The Following Ingredients

Table 3: Final Standardization Ingredients	
Ingredients	Amount
Amaranth flour	12 g
Bengal gram flour	12 g
Carrot	17.5 g
Sesame seed (black)	2.5 g
Kasuri Methi	0.5 g
Black Salt	1 g
Flax seed	1 g
Curry leaves	1 g
Ghee	2.5 g
Water	1/2 tbsp
Total	50 g

Method of Preparation

Weigh each ingredients according to the table of Standardization.



Wash and Remove the peel of Carrot and Grate it.



Wash and roast weighed Curry leaves and grind it in a Mixer.



Roast flax seed and keep aside.



Mix Amaranth flour + Bengal gram flour + grated Carrot + black Sesame seed + Kasuri Methi + Black salt + roasted

flax seed + grinded Curry leaves + melted Ghee + water and kneed until a soft dough is ready.



Divide the dough in 2-3 parts and roll it.



Now cut the dough in a round shape using a cutter and keep it aside.



Grease the container of the Microwave and keep the cut pieces of crackles and set the temperature of double coiler microwave at 60-80 degree Celsius for 30-40 mins.

Let it cool and It’s ready to serve. It can even be kept at Normal room temperature away from direct sunlight for up to 1 month.

Figure 1: Standardized Product “Diabetes Crackles”



Sensory Evaluation

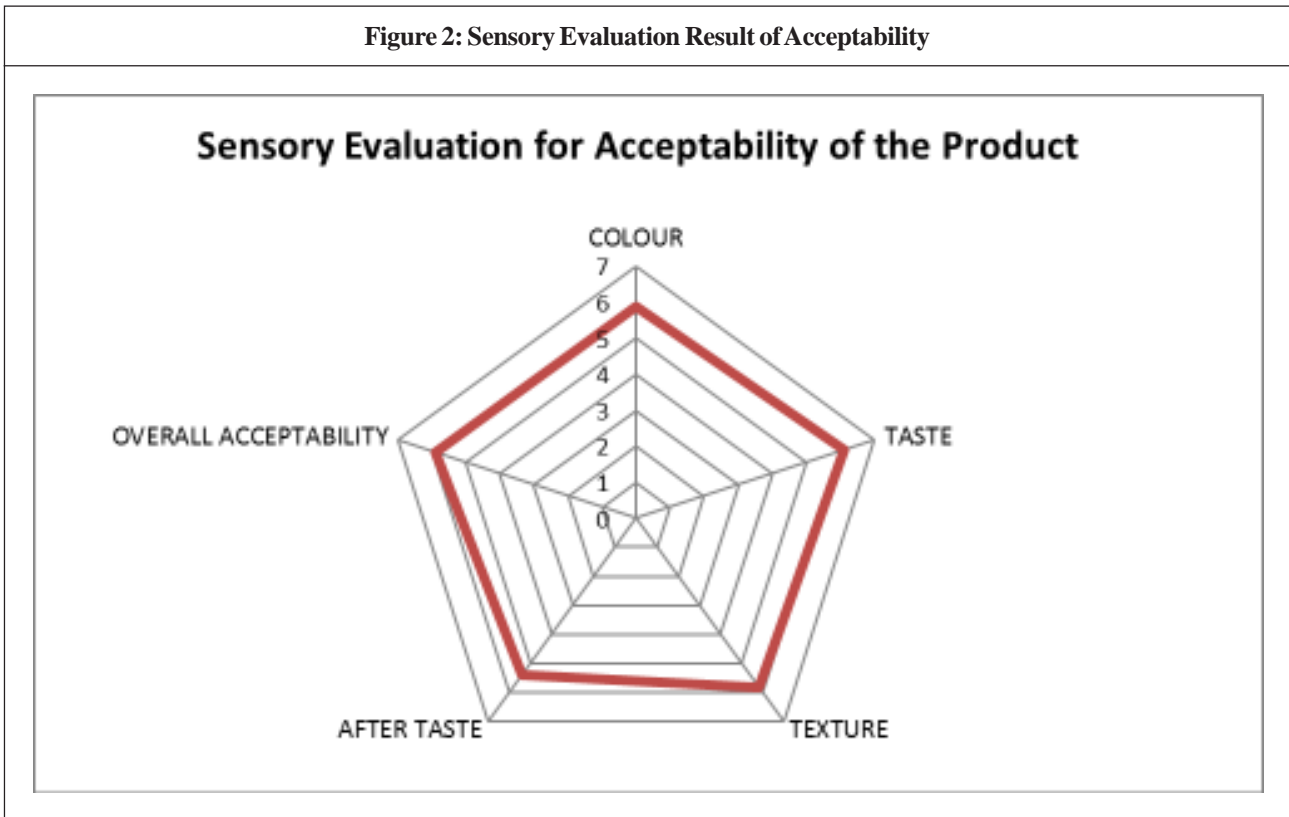
The Sensory Evaluation of the product was done to check the acceptability of the product. The shelf life study of the Product was done for a month with 10 semi-trained panel members using sensory evaluation . Scoring method with a 7 point hedonic scale was used and attributes covered were Color, Taste, Texture, After taste, Overall acceptability. Scoring from 1-7 where,

1 = dislike extremely, 2 = dislike very much, 3 = dislike slightly, 4 = Nor like neither dislike, 5 = like slightly, 6 = like very much, 7 = like extremely.

RESULTS

Below figure show the Sensory Evaluation for the Acceptability of the Product. The product was highly

Figure 2: Sensory Evaluation Result of Acceptability

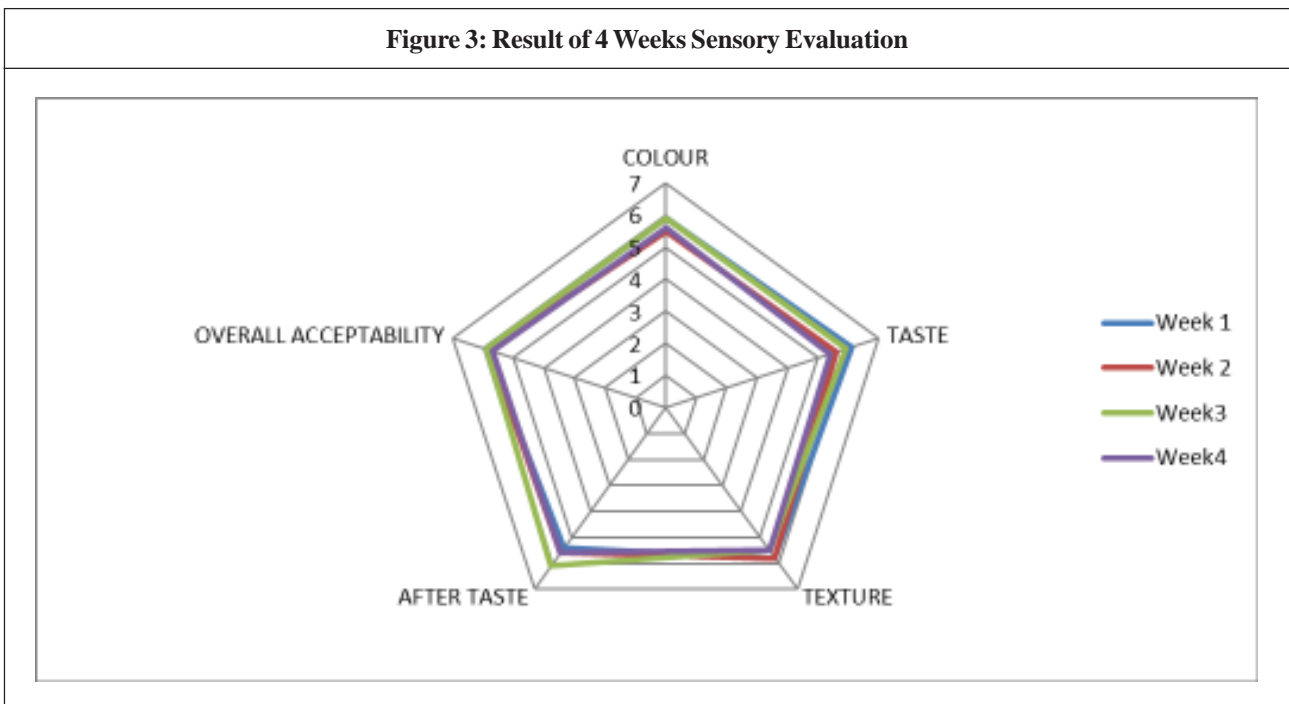


acceptable with an average score of 6. After taste was the only attribute which was scored 5.5 due to Kasuri Methi, other all the attributes was liked and accepted with 6 score.

Sensory Evaluation for 4 Weeks

Figures 3 and 4 represent the same sensory evaluation in a two different format for better understanding.

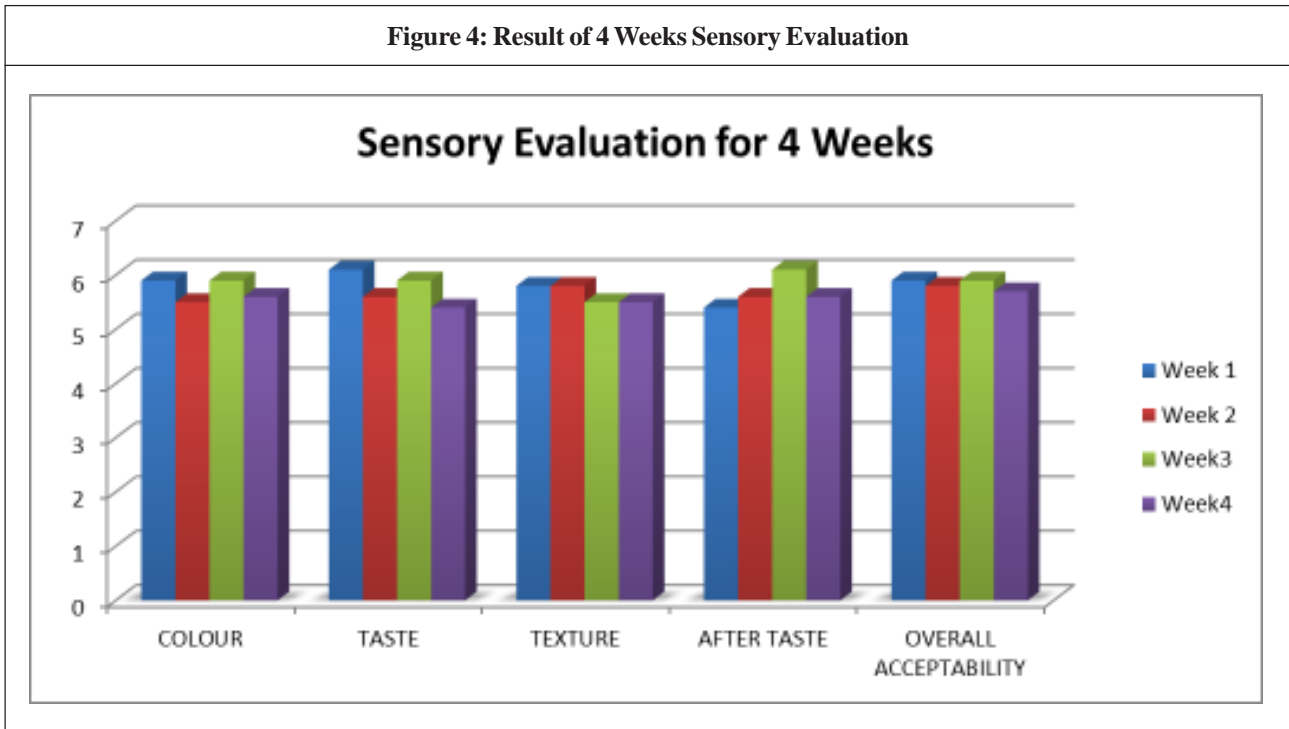
Figure 3: Result of 4 Weeks Sensory Evaluation



Through the sensory it was observed that there was no significant changes observed from Week 1 to 4. There were slight changes in taste and after taste of the product whereas texture reduced slightly in 2nd and 4th week whereas Overall acceptability stayed the same. It can

be clearly seen that all the attributes was more acceptable during its 3rd week. Thus the product had a good shelf life and can be stored for one month or even more. A longer shelf life can determine how long the product lasts.

Figure 4: Result of 4 Weeks Sensory Evaluation



Nutrition Labelling

Nutrition label is an important tool which provides the Customer Information about the product he/she is purchasing and thus helps them to make better and healthier food choices.

A nutrition label was designed for 'Diabetes Crackles' which contained the information like Slogan: Eat Right, Choose Wise! special aspect of the product such as: Low in Glycemix Index, Gluten free, Baked, Preservative free, Low in Calories, Ingredients used, Net weight of the product,

Figure 5: Front Side of the Label

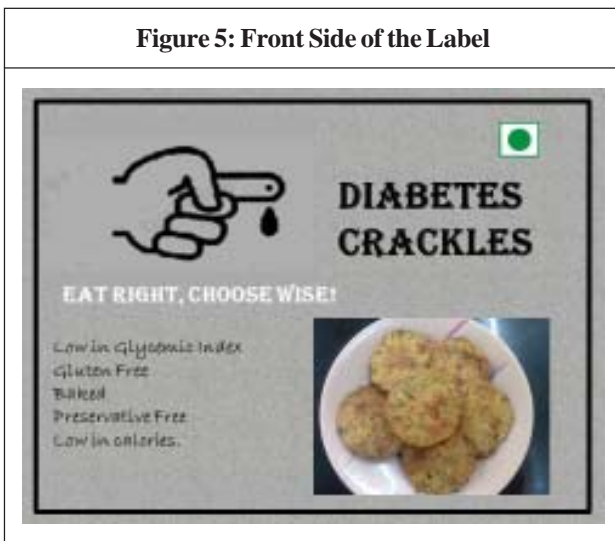
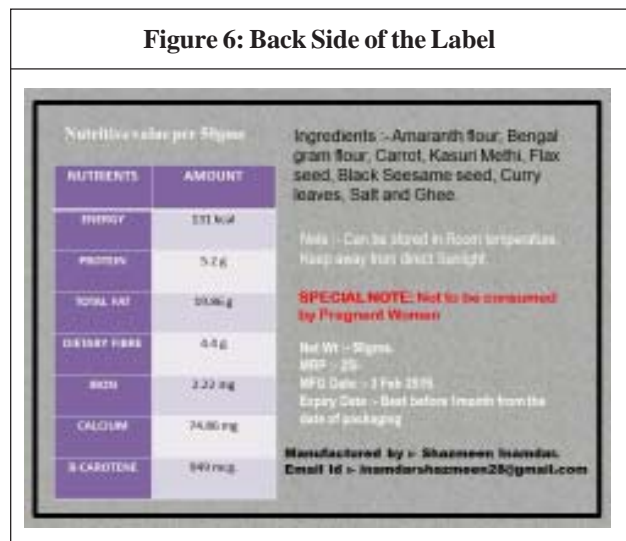


Figure 6: Back Side of the Label



MRP, vegetarian green mark, manufacturing date, expiry date, Nutritive value per 50 gms table which give amount of nutrients present in the product such as: Energy, Protein, Total fat, Fiber, Iron, Calcium and B-Carotene. It even displays some Special note to be follow:

Packaging

The main function of Packaging material is to protect the product from outside environment. It minimizes physical, chemical and microbiological damages.

The packaging material used for the present product was Silver pouches. Though Silver pouches are not eco-friendly but are better than one time usable plastics and are cost-effective too. Silver pouches are made up of 12 micron metalized polyester laminated with 20 micron low density polythene. It can withstand temperature up to 100 degree Celsius and are non-toxic and leakage free. They are easy to pack, easy to seal which keep food fresh for a longer period of time. They provide protection form compression, temperature, and other issues. They also act as a barrier against oxygen, water vapor, dust, moisture and other food contaminants.

Figure 7: Packaging Material



Budgeting

To reduce the Cost of the product and make it affordable, all the raw ingredients were purchased from Wholesale market.

Table 4: Budget and Cost of 1 Packet that is 50 grams are Given Below

Ingredients	Amount
Amaranth flour (12)	1.3
Bengal gram flour (12)	1.5
Kasuri Methi (0.5)	0.5
Carrot (17.5)	1
Black salt (1)	0.3
Black Seesame seed (2.5)	1.01
Flax seed (1)	0.1
Curry leaves (1)	1
Ghee (2.5)	1.14
Labor	2
Rent	1
Electricity Bill	1
Gas	1
Bakery	1
Label	1
Packaging material	1
Profit	9.15
Total	25

The final Costing of the product is Rs.15.85 considering the profit margin of Rs.9.15, the product was decided to be sold at Rs.25/- each for 50 gms packet.

CONCLUSION

A Product was successfully developed for Diabetic population and was found to be accepted. The shelf life study showed that it can last even in room temperature for one month and further for which , a longer shelf life study may have to be done.

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