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Baked Nutri-Cookies for Lifestyle Disorder (Diabetes)

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ABSTRACT

Diabetes mellitus (DM), referred as high blood sugar levels over a prolonged period. Symptoms of high blood sugar include frequent urination, increased thirst, and increased hunger. The product Baked Nutri-Cookies is a modified nutritious product of traditional Nankhatai which provides a good amount of energy, carbohydrates, proteins, and fiber. It is designed for Diabetes Mellitus patients. It consists of Multigrain flour, Oats, further, it also contains Functional Food, Sugar-free gold and Spices were added which are rich in Antioxidants. It is baked product. After standardization of the product, sensory evaluation was done using scoring test on five points scale on following characteristics such as appearance, colour, texture, taste and overall acceptance.

INTRODUCTION:

DIABETES MELLITUS:

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels.

There is autoimmune destruction of the β-cells of the pancreas with consequent insulin deficiency to abnormalities that result in resistance to insulin action. The basis of the abnormalities in carbohydrate, fat, and protein metabolism in diabetes is deficient action of insulin on target tissues. Deficient insulin action results from inadequate insulin secretion and/or diminished tissue responses to insulin at one or more points in the complex pathways of hormone action. Impairment of insulin secretion and defects in insulin action frequently coexist in the same patient, and it is often unclear which abnormality, if either alone, is the primary cause of the hyperglycemia.

As per the International Diabetes Federation (2013), approximately 50% of all people with diabetes live in just three countries: China (98.4 million), India (65.1 million) and the USA (24.4 million)

While comprehensive data are not available, smaller studies have been performed in various states of India to study the prevalence of diabetes. Based on these studies, the highest prevalence reported is from Ernakulum in Kerala (19.5%) and the lowest from Kashmir valley (6.1%). Most other areas have prevalence above 10%.

LITERATURE SURVEY:

The American Diabetes Association lists five classes within the group of disorders that represent the diabetic syndrome. This include:

1. Type 1 diabetes
2. Type 2 diabetes
3. Diabetes associated with contributing clinical states, diseases, drugs, and/or chemicals
4. Gestational diabetes
5. Malnutrition associated diabetes

Diabetes dramatically increases the risk of various cardiovascular problems, including coronary artery disease with chest pain (angina), heart attack, stroke, and narrowing of arteries (atherosclerosis).

Excess sugar can injure the walls of the tiny blood vessels (capillaries) that nourish your nerves, especially in your legs. This can cause tingling, numbness, burning or pain that usually begins at the tips of the toes or fingers and gradually spreads upward.

Diabetes can damage the blood vessels of the retina (diabetic retinopathy), potentially leading to blindness.

Type 2 diabetes may increase the risk of Alzheimer's disease. The poorer your blood sugar control, the greater the risk appears to be.

METHODOLOGY:

DEVELOPING THE FOOD PRODUCT (BAKED NUTRI-COOKIES):

Refined flour and sugar in the traditional method of cooking were replaced by wheat flour, ragi flour, oats, and sugar-free gold powdered.

Curry leaves powder and fenugreek seeds powder, which has anti diabetic potential had been added black til, white til, cardamom to enhance flavor.

The amount of ghee was according to the requirements for kneading the dough for cookies.

Table no: 1 **- Recipes of Baked Nutri Cookies and traditional nan khtai. (50g)**

BAKED NUTRI COOKIES		**TRADITIONAL NAN-KHTAI**	
Wheat flour	10g	Refined flour	30g
Ragi flour	10g	Sugar	30g
Oats	20g	Cardamom	1g
Sugar-free Gold	7g		
Curry leaves powder	2g		
Fenugreek seeds powder	2g		

Black Sesame	2g		
White Sesame	2g		
Cardamom	1g		

Table No: 2 Nutritive Value Table For Traditional Nan Khtai

Ingredients	Amounts(g)	Energy(kcal)	CHO(g)	Protein(g)	Fats(g)	Fiber(g)
Refined flour	30g	100	22	2.7	0.4	0.1
Sugar	30g	120	30	-	-	-
Cardamom	1g	-	-	-	-	-
Ghee	30g	270	-	-	30	-

Table No :3 Nutritive Value Table For Baked Nutri Cookies

Ingredients	Amounts(g)	Energy(kcal)	CHO(g)	Protein(g)	Fats(g)	Fiber(g)
Wheat flour	10g	25	5.5	0.67	0.1	0.19
Ragi flour	10g	25	5.5	0.67	0.1	0.36
Oats	20g	60	18	2	0.3	6.4
Sugar free Gold	7g	25	15	2.1	-	-
Curry leaves powder	2g	-	-	-	-	-
Fenugreek seeds powder	2g	10	0.7	0.8	1	0.9
Black til	2g	12.5	0.7	0.8	1.8	0.8
White til	2g	12.5	0.7	0.8	1.8	0.9
Cardamom Ghee	1g 10g	- 90	- -	- -	- 10	- -

Table No: 4 Comparison Between Traditional Nankhatai And Baked Nutri Cookies

SR.NO	Nutrients	Unit	Baked Nutri Cookies	Traditional Nan-Khatai	RDA for MEN	RDA for WOMEN
1	Energy	Kcal	260	490	2320	1900
2	CHO	Grams	46.1	52	-	-
3	Protein	Grams	7.84	2.7	60	55
4	Fats	Grams	15	30.4	25	20
5	Fiber	Grams	9.6	0.1	-	-

METHOD OF PREPARATION:

Take the required amount of ghee and sugar-free gold, whisk them properly for few minutes.

↓

Add oats, cardamom, and all other flours together.

↓

Whisk all the ingredients together and make the dough.

↓

Pre-heat oven at 180 degree Celsius for 15 minutes.

↓

Give round shape and place them in a baking tray and sprinkle white til and black til.

↓

Bake at 180 degree Celsius for 25 minutes.

↓

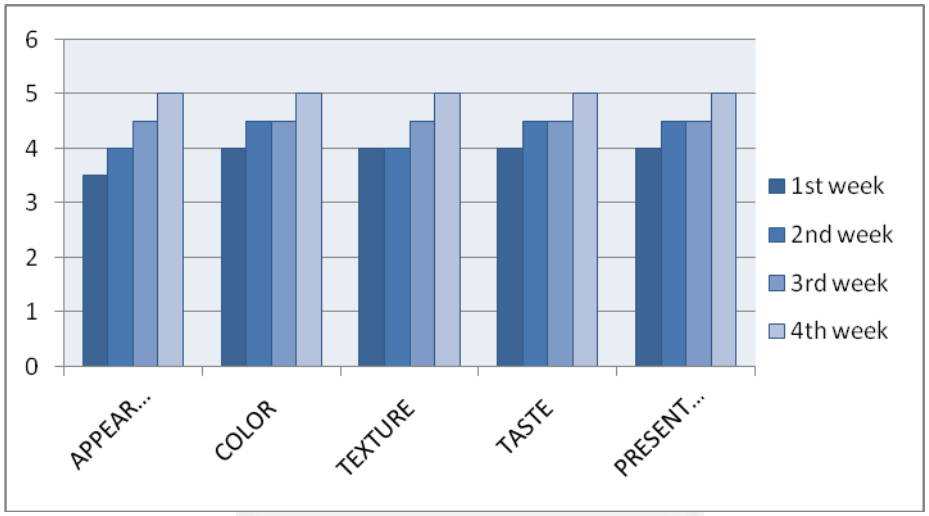
Serve them hot/cold.

EVALUATION OF THE PRODUCT:

Baked Nutri Cookies was subjected to sensory evaluation based on 5 point scale for the concept, appearance, texture, taste, and mouthfeel using 24-panel members. The score was based on the criteria, 5-very good, 4-good, 3-average, 2-poor, 1-very poor. There was a gradual improvement from week after week. At the last week, all the panels rated the population as “very good”.

RESULTS AND DISCUSSION:

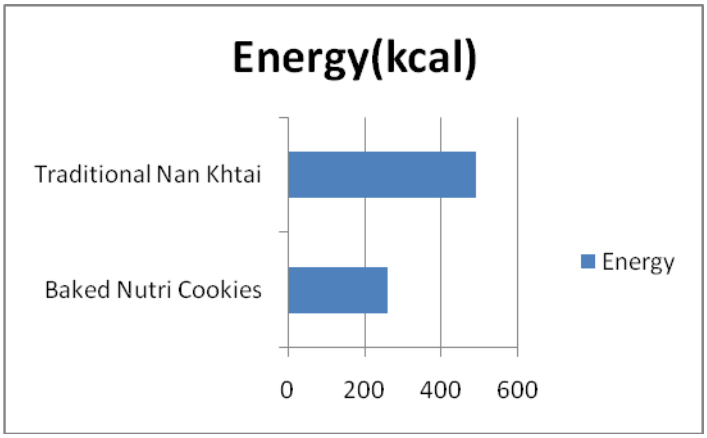
Certainly, modified food product has lowered the total energy and carbohydrates as compared to traditional recipe. In addition, the modified food product also contains high protein and total dietary fiber (TDF). In comparison to the traditional product. The baking method used for the traditional recipe was replaced by baking with minimum usage of ghee thereby reducing the total fat content of the recipe. In sensory evaluation, the modified product was ranked "very good" by both the panel members. The product was acceptable.



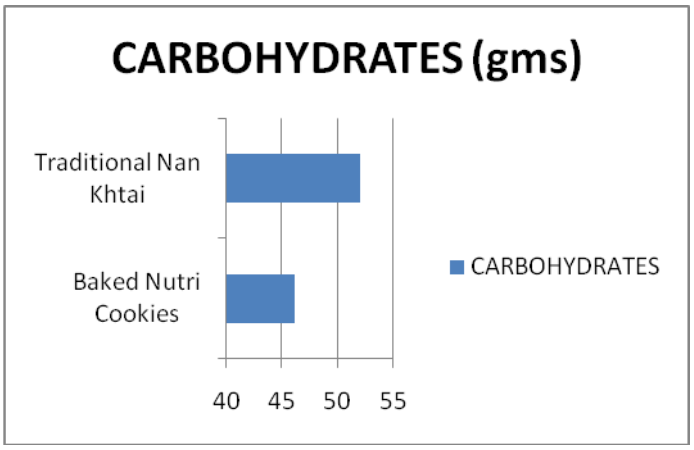
Improvements were done every week on the product and on the fourth week the product was ranked "very good" by both the panel members

Figure No :2 Nutrients Present In The Baked Nutri Cookies

GRAPH FOR ENERGY:



GRAPH FOR CARBOHYDRATE:



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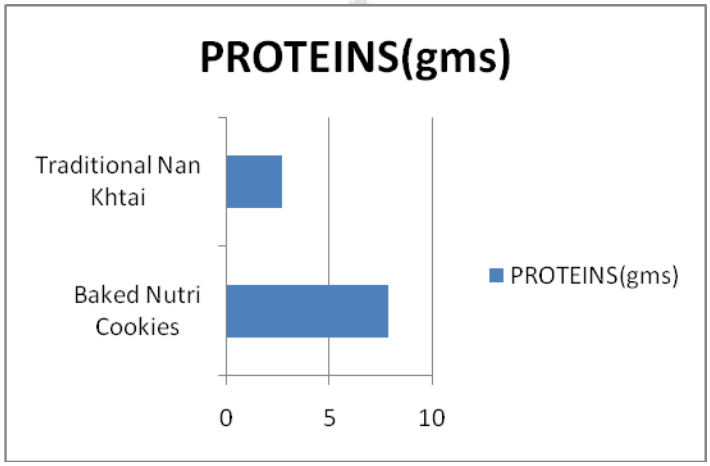

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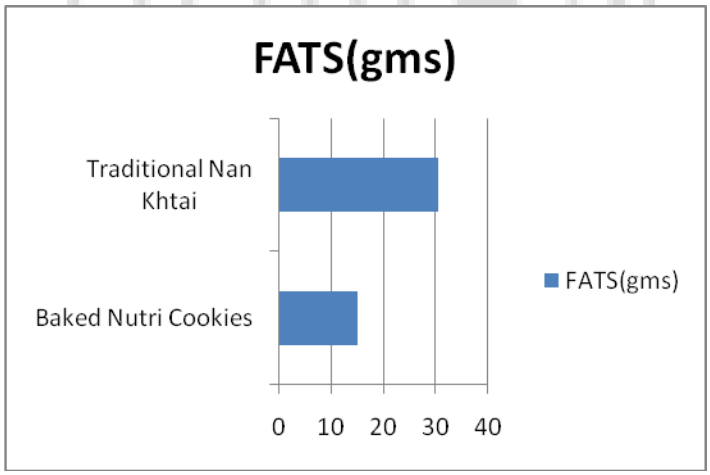

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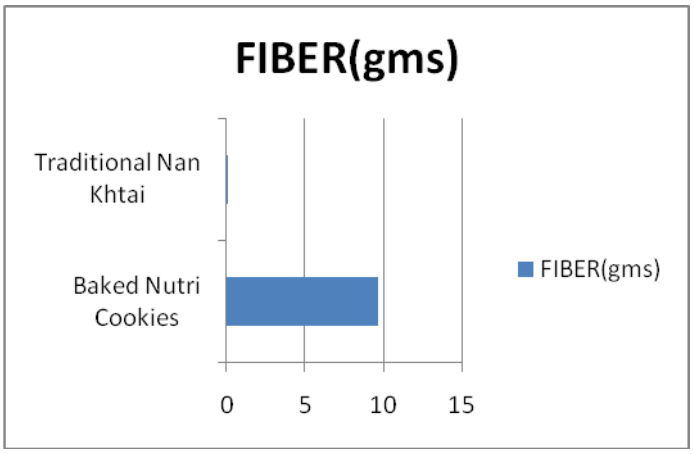

DISCUSSION:

Hypertension is approximately twice as frequent in patients with diabetes compared with patients without the disease. Conversely, recent data suggest that hypertensive persons are more predisposed to the development of diabetes than are normotensive persons. Furthermore, up to 75% of CVD in diabetes may be attributable to hypertension, leading to recommendations for more aggressive treatment (ie, reducing blood pressure to <130/85 mm Hg) in persons with coexistent diabetes and hypertension.

In a study 12 men and 1 woman (9 non-Hispanic whites and 4 blacks) with type 2 diabetes at the general clinical research center of the University of Texas Southwestern Medical Center at Dallas. The protocol for the study was approved by the institutional review board of the medical center, and each patient gave written informed consent. In all patients the onset of diabetes was insidious; the disease developed in most of the patients after 40 years of age. Their mean (±SD) age was 61±9 years (range, 45 to 70). Their mean body weight was 93.5±12.7 kg, and the mean body-mass index (the weight in kilograms divided by the square of the height in meters) was 32.3±3.9. Three patients were treated with diet alone, and the other 10 patients were treated with 2.5 to 20 mg of glyburide daily in addition to the diet. The dose of glyburide was not changed during the study.(Manisha Chandalia, M.D., Abhimanyu Garg, M.D., Dieter Lutjohann, Ph.D., Klaus von Bergmann, M.D., Scott M. Grundy, M.D., Ph.D., and Linda J. Brinkley, R.D.)

In the presence of hyperglycemia, other serum proteins besides hemoglobin are also glycated. Measurement of these glycated proteins can be used as an alternative to the HbA1c for assessment of glycemic control over time. For example, albumin is a serum protein with a half-life of 2 to 3 weeks. The fructose amine test measures glycated albumin and this test reflects glycemic control over a shorter interval (weeks) than the HbA1c test (months). The fructose amine test is sometimes used when an objective measurement that reflects a shorter period of time is needed, for example, during pregnancy, initiation of a new therapy, or a medical illness. It may also be used in instances when the HbA1c test may not be reliable, such as when anemia is present. The normal range for the fructosamine test is between 200 and 300 mmol/l.(Brian L. Mealey and Thomas W. Oates).

A clinical study titled "Effects of fenugreek seeds on blood glucose and serum lipids in type I diabetes" by Sharma RD, Raghuram TC, Rao NS published in Eur J Clin Nutr. 1990 Apr;44(4):301-6. The study shows fenugreek diet significantly reduces fasting blood sugar and improves the glucose tolerance test. There was a 54 percent reduction in 24-h urinary glucose excretion. It significantly reduces serum total cholesterol, LDL & VLDL cholesterol and triglycerides. These results indicate the usefulness of fenugreek seeds in the management of diabetes as well as high cholesterol.

A clinical study titled "Effect of Trigonella foenum-graecum (fenugreek) seeds on glycemic control and insulin resistance in type 2 diabetes mellitus" by Gupta A, Gupta R, Lal B published in J Assoc Physicians India. 2001 Nov; 49:1057-61. The study shows adjunct use of fenugreek seeds improves glycemic control and decreases insulin resistance in mild type-2 diabetic patients. There is also a favorable effect on hypertriglyceridemia.

CONCLUSION:

Baked Nutri Cookies thus with its multi-flour combination and functional foods is beneficial for diabetic patients.

Thus this product which is an amalgamation of all these ingredients is widely suitable for people who are suffering from lifestyle disease.

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