

Formulation and Standardisation of Diaflour Chapathi for Diabetics

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Abstract

In the present study, dried fenugreek powder was incorporated with wheat flour in various proportions such as 5%, 10% and 15% and used for the preparation of diaflourchapathi. The various proportions mixed with wheat flour were undergone for organoleptically evaluated with the trained panel members and the physicochemical properties were also analyzed. The present study concluded that the 5% dried fenugreek powder incorporated chapathi got maximum scoring for overall acceptability. Quantitative analysis showed that the energy, protein, fat, crude fibre, iron and phosphorus contents were 335 Kcal, 11.75 g, 0.5 g, 1 g, 4.5 mg and 308 mg respectively in 100 g of 5% dried fenugreek powder incorporated chapathi. So, 5% fenugreek incorporated chapathi can be used as a supplement for diabetic patients in order to control the blood glucose level.

Keywords: Diabetes, Diaflour, Sprouted Fenugreek Seeds

1 Introduction

Diabetes mellitus is a metabolic disorder characterized by lack of hormone insulin in the blood, which leads to abnormalities in the assimilation of carbohydrate by the body¹. The prevalence of diabetes mellitus in adults is around four percent worldwide, this means over 143 million people is now affected. It is projected that the disease prevalence will be 4.5 percent by the year 2025, with global diabetic population reaching 300 million of which, nearly 77 percent of the global burden of disease is projected to occur in the developing countries. A recent WHO (2004) press release stresses the greatest magnitude of increase approximately 170 percent by the year 2025 AD. More than 90 percent of the diabetes patients in India suffer from Non Insulin dependent diabetes mellitus².

Diabetes mellitus, the most common problem occurs in two main forms: type I and type II. Both are disorders of blood glucose regulation. The main causes for diabetes are heredity, obesity, stress, less physical work, infections in pancreas, chronic pancreatitis, lack of exercise, toxicity of drugs and toxins³. The three cornerstones of diabetes management are diet therapy, physical activity and medication. It is recommended that people with diabetes work with their diabetes management team (Registered Dietician, Nurse, Physicians needed) to develop nutrition as a lifestyle requirement⁴. Wheat provides energy, considerable amounts (twenty percent) of the human requirements of protein, B complex vitamins, calcium and iron⁵.

Fenugreek is the oldest recorded medicinal plant. *Trigonella foenum – graecum* (fenugreek), also known

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as Greek hay is used as a good medicine in homeopathy. The active components in fenugreek seeds are biotin, choline, essential oils, folic acid, inositol, lecithin, iron, pantothenic acid, para aminobenzoic acid and phosphate, protein, trigonelline, trimethylamine, vitamin A, D and B-complex. In seeds, particularly trigonelline, coumarone, steroidal saponin peptide esters have hypoglycemic effect⁶. It reduces blood glucose, plasma glycogen and somatostatin levels as well as carbohydrate induced hyperglycemia resulting in decreased insulin dosages in diabetic patients. Fenugreek also improves digestion and treats reproductive disorders in women. 4-hydroxy isoleucine in fenugreek acts as an antidyslipidemic and antihyperglycemic agent⁷. The main objective of the study was to standardize and formulate diaflour for diabetics using fenugreek powder.

2. Materials and Methods

2.1 Development of Sprouted Fenugreek Seed Powder Incorporated Wheat Flour (Diaflour)

Primarily good quality fenugreek seeds and wheat were purchased from the local market in Madurai. Fenugreek seeds were soaked overnight and germinated. The sprouted fenugreek was dried in shade and powdered. The selected wheat was dried and then milled properly. Sprouted fenugreek seed powder was incorporated with wheat flour in the proportion of 5%, 10% and 15% to formulate a 'diaflour' for the chapathi preparation.

2.2 Nutrient Analysis of Diaflour

Moisture and ash content of the diaflour were determined according to AOAC procedures⁸. Carbohydrate was analyzed by Anthrone method. The amount of protein, fat, beta carotene, copper, zinc, iron and phosphorus were estimated on NIN procedures⁹. The results were tabulated and statistically analyzed.

2.3 Sensory Evaluation

Fenugreek chapathi was prepared with the dough made from diaflour. The prepared chapathis were given to 10 semi-trained panel members for evaluating the organoleptic characteristics of the product. Characteristics like colour, appearance, flavour, taste and texture were evaluated. A five point hedonic rating scale was used for sensory evaluation.

2.4 Storage Studies

The developed Sprouted fenugreek seed powder incorporated wheat flour (Diaflour) was subjected to shelf-life study by storing at room temperature in different packaging materials like 200 gauge and 400 gauge polyethylene bags.

2.5 Microbial Analysis

The microbial loads of the samples were analyzed using plate count method.

3. Results and Discussion

3.1 Organoleptic Evaluation of the Chapathi Prepared from Diaflour

Table 1. Mean score for the sensory evaluation

Organoleptic Properties	T1	T2	T3
Appearance	4.3	4.4	4.2
Taste	4.5	4.3	3.3
Texture	3.9	4.0	3.8
Flavour	4.1	4.1	4.0
Over all acceptability	4.2	4.2	3.2

T1 - 5% Sprouted fenugreek seed powder incorporated chapathi

T2 - 10% Sprouted fenugreek seed powder incorporated chapathi

T3 - 15% Sprouted fenugreek seed powder incorporated chapathi

Table 1 shows that chapathi prepared from 10% incorporated sprouted fenugreek seed powder received the maximum score for appearance and texture whereas chapathi incorporated 5% sprouted fenugreek seed powder got the maximum score for taste. Flavour and overall acceptability of both 5% and 10% sprouted fenugreek seed powder incorporated chapathis were equally good. Among all the five organoleptic properties, 15% sprouted fenugreek seed powder incorporated chapathi got least score than other two varieties.

3.2 Nutrient Content of Diaflour

Table 2 presents proximate principles of the selected samples for this study

Table 2. Nutrient content of sprouted fenugreek seed powder incorporated wheat flour (diaflour) per 100g

Nutrient	T1	T2	C
Moisture (100g)	7.8	8	8.8
Ash (g)	1.6	1.6	1.4
Energy (Kcal)	335	346.25	332.5
Protein (g)	11.73	12.08	10.86
Fat (g)	0.5	2.5	5
Crude fiber (g)	1	1.8	0.8
Iron (mg)	4.5	5	4
Phosphorus (mg)	308	324	264

Among the samples the moisture content of 5% sprouted fenugreek seed powder incorporated wheat flour was 7.8 g, whereas the 10% sprouted fenugreek seed powder incorporated wheat flour and the control had 8 g and 8.8 g of moisture. The ash content of control was 1.4 g but the ash content of both 5% and 10% sprouted fenugreek seed powder incorporated wheat flour were equal with 1.6 g. The crude fiber content in 5% fenugreek seed powder incorporated wheat flour was 1 g and in 10% fenugreek seed powder incorporated wheat flour and the control were 1.8 g and 0.8 g respectively.

It was observed that the diaflour incorporated with 5% sprouted fenugreek seed powder contained 11.73 g of protein and the diaflour incorporated with 10% sprouted fenugreek seed powder had 12.08 g of protein. The fat content of the 5% incorporated diaflour was 0.5 g whereas for 10% incorporated diaflour was 2.5 g and the iron content of the 5% Sprouted fenugreek seed powder incorporated wheat flour and the 10% Sprouted fenugreek seed powder incorporated wheat flour were 4.5 mg and 5 mg.

In general the phosphorus content of the 5% Sprouted fenugreek seed powder incorporated wheat flour was 308 mg and that of the 10% Sprouted fenugreek seed powder incorporated wheat flour was 324 mg. The energy content of the control sample was 332.5 Kcal and the energy content of 5 % and 10 % diaflour were 335 Kcal and 346.25 Kcal per 100 g respectively.

3.3 Microbial Load of the Selected Samples

Table 3. Microbial load after storage

Microorganism	No. of Days	T1	T1	T2	T2
		P1	P2	P1	P2
Bacteria (10^6 cfu/g)	0 th day	0	0	0	0
	15 th day	0	0	0	0
	30 th day	2	3	3	3
	45 th day	5	8	6	9
Fungi (10^3 cfu/g)	0 th day	0	0	0	0
	15 th day	0	0	0	0
	30 th day	2	2	3	4
	45 th day	3	5	5	6
Yeast (10^4 cfu/g)	0 th day	0	0	0	0
	15 th day	0	0	0	0
	30 th day	1	2	3	4
	45 th day	3	4	4	5

P1 – 200 gauge polyethylene package

P2 – 400 gauge polyethylene package

T1 – 5% sprouted fenugreek seed powder incorporated wheat flour

T2 – 10% sprouted fenugreek seed powder incorporated wheat flour

The findings of the storage study shows (Table 3) that the selected samples kept in 200 gauge, 400 gauge polyethylene package got contaminated with bacteria, fungi and yeast and had an some changes in flavor and colour occurs within one month of period.

4. Conclusion

The results of the present study revealed that the 10% sprouted fenugreek seed powder incorporated wheat flour was highly acceptable compared to 15% incorporation. Further the microbial load was nil in 200 and 400 gauge polyethylene packages up to 15th day of storage.

5. References

- Goel PK, Garg SK, Singh JV, Bhatnagar H, Bajpai SK. Unmet needs of the elderly in a rural population of Merrut.

- Ind Jour Comm Med. 2005; 28(4):165–7.
2. Available from: <http://diabetes.niddk.nih.gov/dm/pubs/statistics>
3. Duenwald M, Lacy PE. Innovator in treatment of type 1 diabetes. New York Times, Feb 18. Sect A; 2005. p. 25.
4. Anderson JW, Kendall CW, Jenkins DJ. Importance of weight management in type 2 diabetes: Review with meta-analysis of clinical studies. J Am Coll Nutr. 2003; 22:31–9. <https://doi.org/10.1080/07315724.2003.10719316>
5. Manay S. Food facts and Principles. New Delhi: New Age International Publishers; 2001. p. 21–3.
6. Rajagopalan MS. Fenugreek: A savory medicinal. Supplement Industry Executiv. 2001; 5(6):43–4.
7. Raghuram TC, Sharma RD, Pasricha S, Menon KK, Radhaiah G. Glycemic index of fenugreek recipes and its relation to dietary fibre. Intl J Diab Dev Countries. 1992; 12:1–4.
8. NIN Laboratory Manual. Hyderabad: NIH. 2003. p. 319–20.
9. AOAC (Association of Officials Analytical Chemists). Washington DC Officials Methods of Analysis. 14th ed. Washington; 2000.