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Formulation of *Gymnema Sylvestre* mix Incorporated Foods for Diabetes Mellitus

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ABSTRACT

Diabetes is defined as a group of metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion and insulin action. In every fifth person who suffered from diabetes in the world today is an Indian. Out of the total number of persons suffering from diabetes in the world, which is around 150 million, roughly 35 million are Indians. The environmental factors that may lead to the development of diabetes mellitus include lack of physical activity, drugs and toxic agents, obesity, viral infection. Phytochemicals identified from traditional medicinal plants are presenting an opportunity for the development of new type of therapeutics for diabetes. *Gymnema sylvestre* supplementation appears to improve glycemic control in patients with type 2 diabetes. Reducing postprandial blood glucose significantly caused a decrease of HbA1C, therefore reducing the complication from diabetes. Hence this study was designed to prepare value added products based on south Indian recipes with the incorporation of *Gymnema sylvestre* helps to prevent the Diabetes mellitus.

1. Introduction

Diabetes mellitus is a metabolic disorder characterized by lack of the hormone insulin io the blood, which leads to abnormalities in the assimilation of carbohydrates by the body. The old terms of 'juvenile onset' and 'maturity onset 'diabetes have been replaced by 'Type I and Type II' because the age of onset is not the initial determinant of the form of diabetes**[1].** The most common causes of diabetes are heredity, improper dietary habits, lack of exercise, side effects of drugs and toxins, effect of hormones, psychological factors, as a sequel to other diseases like pancreatitis and heart attacks**[2].** The main symptom of diabetes mellitus includes polydipsia, polyuria, polyphagia. Other symptoms are blurred vision, skin irritation, general weakness and loss of strength. Finally it leads to water and electrolyte imbalance, ketoacidosis and coma**[3]**. Chronic complications include retinopathy, nephropathy, neuropathy, and recurrent myocardial infarction with an increase in the incidence of congestive heart failure, ulceration, sepsis of feet and even gangrene**[4]**. A high complex carbohydrate and low fat diet, which contains a variety of fruits and vegetables, would be an ideal diet for diabetics**[5]**.

The WHO report suggests that over the 19 percent of the world' diabetes population currently resides in India and it will be increase 80 million in the year of 2030. Side effects of oral hypoglycemic drugs, population below living below poverty line is not able to afford exorbitant cost of drugs and thus rely on herbal medicines. Phytochemicals identified from traditional medicinal plants are presenting an opportunity for the development of new type of therapeutics for diabetes**[5]**.

Madhunasini (*Gymnema sylvestre*) is a plant used for the disease of hyperglycemia. *Gymnema* leaves contain gymnemic acid which is known to suppress the transport of glucose from the intestine in to the bloodstream. It may possibly regenerate or revitalize the insulin producing beta cells of the pancreas and it may decrease the cholesterol and glucose absorption from the GI tract. *Gymnema sylvestre* supplementation appears to improve glycemic control in patients with type 2 diabetes. Reducing postprandial blood glucose significantly caused a decrease of HbA1C, therefore reducing the complication from diabetes**[6]**.

Based on this facts a study was undertaken to formulation of ***Gymnema sylvestre*** corporated foods for diabetes mellitus" with the following objectives.

I. To formulate and standardize the hypoglycemic mix foods incorporated with *Gymnema sylvestre* powder.
II. To determine the physicochemical constituents of *Gymnema* incorporated hypoglycemic foods.
III. To prepare the South Indian recipes based on Thenai, Varagu, Barley with *Gymnema sylvestre* powder.

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IV. To conduct the consumer acceptability trails of the hypoglycemic mix incorporated foods
V. To study the effect of supplementation studies of *Gymnema* incorporated hypoglycemic foods to the selected diabetic patients.

2. Methodology

2.1 Materials used for the study

Fresh madhunasini leaves, barley, thenai, wheat flour, maida, ragiflour, blackgram dhal, vanaspathi, baker's yeast, and baking powder were procured from the local market of Dindigul and it was used for this study.

2.2 Methods of formulation of hypoglycemic foods

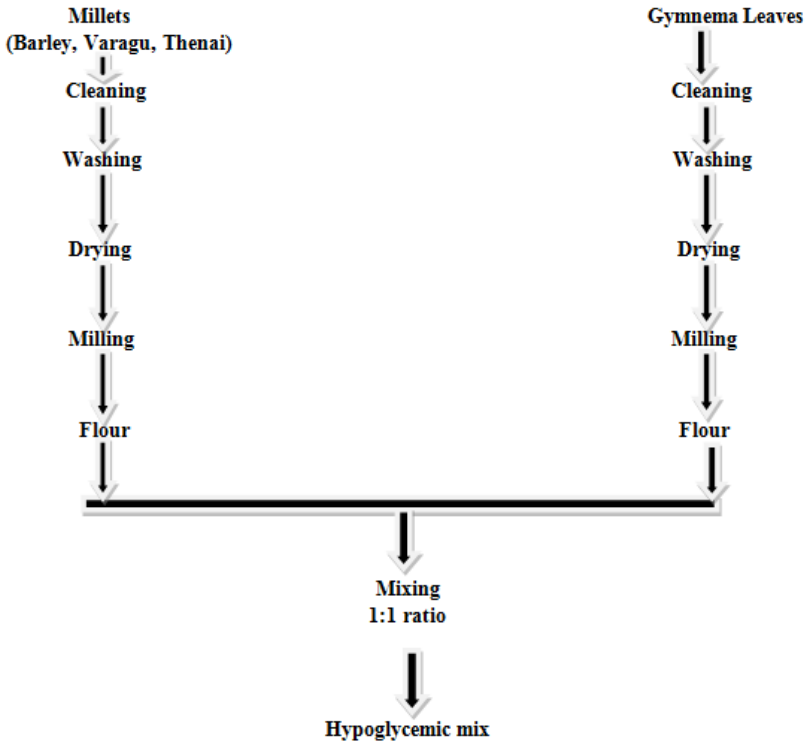
(a). Formulation of hypoglycemic mix

Preparation of minor millet flour

Barley, varagu and thenai were cleaned, washed and dried. The dried millets were ground into flour by local mill.

Formula developed for hypoglycemic mix

T1 - A blend of 50 per cent of barley flour and 50 per cent of madhunasini powder
T2 - A blend of 50 per cent of varagu flour and 50 per cent of madhunasini powder
T3 - A blend of 50 per cent of thenai flour and 50 per cent of madhunasini powder



Flow chart for the preparation of Hypoglycemic Mix

This hypoglycemic mix T1, T2 and T3 were incorporated at 1,2 and 3% to fresh batter, wheat flour, ragi flour, maida and it was used for the preparation of idli, chapathi, ragirotti, biscuits and bread.

Physicochemical composition of hypoglycemic mix and it incorporated foods

Moisture, pH, acidity, total and reducing sugars, fibre, protein, fat and minerals were determined by the standard methods.

3. Results and Discussion

Physicochemical composition of hypoglycemic mix incorporated recipes

Testing the organoleptic evaluation of the prepared foods by the diabetic patients

The hypoglycemic mix incorporated foods evaluated by 15 dianetic patients to the age group of 35 to 55 years. The hedonic scale was used to grade the prepared products.

Cost analysis

Costs of the prepared foods were calculated systematically.

Table 1: Physicochemical composition of *Gymnema sylvestre* powder

S.No	Parameters	Value in %
1.	Moisture	4.7
2.	Protein	11.64
3.	Fat	5.55
4.	Crude fibre	2.32
5.	Total sugars	7.57
6.	Acidity	2.34
7.	pH	6.12

Table 2: Physicochemical composition of hypoglycemic mix incorporated idli

S.No.	Parameters	Control in %	Value in %
1.	Moisture	21.32	21.79
2.	Protein	10.88	12.05
3.	Fat	0.14	0.69
4.	Crude fibre	0.75	0.98
5.	Total sugars	5.44	6.20
6.	Acidity	0.1	0.33
7.	pH	5.05	5.17

Table 3: Physicochemical composition of hypoglycemic mix incorporated chapati

S.No.	Parameters	Control in %	Value in %
1.	Moisture	9.33	9.80
2.	Protein	12.3	13.47
3.	Fat	2.39	2.94
4.	Crude fibre	1.1	1.33
5.	Total sugars	8.93	9.69
6.	Acidity	0.11	0.12
7.	pH	6.11	6.21

Table 4: Physicochemical composition of hypoglycemic mix incorporated ragirotti

S.No.	Parameters	Control in %	Value in %
1.	Moisture	10.48	10.95
2.	Protein	2.28	2.83
3.	Fat	0.79	1.95
4.	Crude fibre	2.81	3.04
5.	Total sugars	6.66	7.42
6.	Acidity	0.06	0.29
7.	pH	6.02	6.13

Table 5: Physicochemical composition of hypoglycemic mix incorporated bread

S.No.	Parameters	Control in %	Value in %
1.	Moisture	10.51	10.98
2.	Protein	6.34	7.50
3.	Fat	8.63	9.18
4.	Crude fibre	0.38	0.61
5.	Total sugars	4.45	5.21
6.	Acidity	0.14	0.09
7.	pH	5.64	5.76

Table 6: Physicochemical composition of hypoglycemic mix incorporated biscuit

S.No.	Parameters	Control in %	Value in %
1.	Moisture	9.50	9.97
2.	Protein	6.81	7.98
3.	Fat	10.02	10.57
4.	Crude fibre	0.49	0.72
5.	Total sugars	5.61	6.37
6.	Acidity	0.12	0.11
7.	pH	5.73	5.87

Organoleptic evaluation of the prepared foods

The overall acceptability of the hypoglycemic mix incorporated foods had significant higher acceptability in T1 than T2 and T3. The quality parameters like color, texture, flavor, taste were accepted highly in 1% incorporated foods.

Cost analysis of the prepared foods

The fixed cost was by addition of depreciation on building, equipments and interest at 12% on fixed investment. The variable cost involved for purchasing raw materials, labor were added with fixed cost form the total cost of each products were worked out and the sale price of each products were fixed with 30% of profit.

4. Conclusion

Madhunasini was a traditional medicinal plant and it leaves have wonderful medicinal properties and it was very effective for the treatment of diabetics. Hence the *Gymnema* leaves may be used for the preparing hypoglycemic mix incorporated foods. The findings of the study reveal that these food preparations may help to inculcate the habit of taking herbal mix which is curative and therapeutic use for the diabetic patients. So we have to create the awareness on use of locally available underutilized medicinal herbs.

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