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**Department of Biochemistry, Bharathidasan University Constituent College for Women,
Orathanadu - 614 625, Tamil Nadu, India**

Research Article

**Screening Of
Phytochemical And
Glucose Absorption
Inhibitory Potential Of
Vigna radiata (L.)
R. Wilczek**

**M. Leena^{1*}, K. Keerthana², J. Suguna Bai¹,
S. Senthil Rani¹, P. Kalaimathi¹, C. Sangeetha¹,
P. Deepika¹, R. Praveena¹**

1. Seethalakshmi Ramaswami College, Tiruchirappalli, Tamilnadu, India
2. Srimad Andavan Arts and Science College, Tiruchirappalli, Tamilnadu, India

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Abstract

Diabetes mellitus is a common and widespread disease affecting the citizens of both developing and developed countries. It is estimated that 25 % of the world population is affected by this disease. It is characterized by group of metabolic disorders. The deficiency or insensitivity of insulin causes glucose to accumulate in the blood, leading to various complications. The inhibition of carbohydrate hydrolyzing enzymes such as α – amylase and α – glucosidase can also be an important strategy to

lower postprandial blood glucose levels. Therefore, it is the need of time to identify and explore the drugs from natural sources without side effects. For this present study a common plant with high nutritive value and fiber content *Vigna radiata*(L.) R. Wilczek. belongs to the family Fabaceae was selected and evaluated for its antidiabetic activity. Preliminary phytochemical constituents of plant were analyzed and showed the presence of sterol, tannin, flavonoid, coumarin, quinine, alkaloid, glycosides, sugar and phenols. *In vitro* evidence of antidiabetic potential was assessed by assaying the inhibition of α – amylase and α – glucosidase enzyme and the result was exhibited in a concentration dependent manner.

Keywords: Anti Diabetes, α – Amylase, α – Glucosidase, Phytochemical Screening.

INTRODUCTION

Diabetes mellitus is a metabolic disorder characterized by the loss of glucose homeostasis with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both ¹. Insulin is a hormone produced by the beta cells of the pancreas, which is required to utilize glucose from digested food as an energy source. Chronic hyperglycemia is associated with microvascular and macrovascular complications that can lead to visual impairment, blindness, kidney disease, nerve damage, amputations, heart disease, and stroke ². Insulin deficiency and/or insulin resistance is associated with the pathogenesis of diabetic dyslipidemia and micro/macrovascular complications ³.

CLASSIFICATION OF DIABETES MELLITUS

Diabetes mellitus may be categorized into several

types but the two major types are type 1 and type 2.

Type – I IDDM – Insulin Dependent Diabetes Mellitus. (Juvenile -onset diabetes)

Type – II NIDDM – Non Insulin Dependent Diabetes Mellitus. (Maturity – onset diabetes).

HERBAL MEDICINE

Nature always stands as a golden mark to exemplify the outstanding phenomena of symbiosis. Natural products from plant have been the basis of the treatment of human disease. About 80 % of people in developing countries still relies on traditional medicine based largely on species of plants and animals for their primary health care. Herbal medicines are currently in demand and their popularity is increasing day by day. About 500 plants with medicinal use are mentioned in ancient literature and around 800 plants have been used in indigenous systems of medicine. India is a vast repository of medicinal plants that are used in traditional medical treatments⁴. The present study is to investigate one common plant source *Vigna radiata* (L.) R. Wilczek. which is known for its nutritional property has been chosen to evaluate its antidiabetic potential.

Materials and methods

Identification and authentication

Plant *Vigna radiata* (L.) R. Wilczek. selected for the

present study was collected from in and around Trichy, identified with the help of Flora of Presidency of Madras and authenticated by Taxonomist Rev. Fr. Dr. John Britto, Director, RAPINAT Herbarium, St. Joseph's college, Trichy, Tamil nadu, India.

Preparation Of Plant Extract

Fresh plant material was shade dried and powdered coarsely using electric blender. For the preparation of aqueous extract 200gm of *Vigna radiata* (L.) R. Wilczek. was taken and extracted with water. To one part of the powdered plant material six parts of water was added, boiled and reduced to one third and filtrate was evaporated to dryness. Paste form of the extract obtained was subjected to pre-clinical screening.

Preliminary Phytochemical Screening⁵

Preliminary phytochemical screenings of aqueous extracts and drug powder were carried out as per the standard textual procedure

Screening Of Inhibitory Assay

Different concentrations of extract and fractions were subjected to α -amylase and α -glucosidase inhibitory assay^{6,7}. The absorbance was measured at 540 and 405 nm using multiplate reader and the percentage of α - amylase and α - glucosidase inhibitory activity and IC₅₀ values of extract and fractions were calculated.

RESULT AND DISSCUSION

TABLE 1 - Preliminary Phytochemical Screening of *Vignaradiata* (L.) R. Wilczek.

S.No	Test for	Drug powder	Aqueous Extract
1	Saponin	-	-
2	Tannin	-	+
3	Sterol	+	+
4	Terpene	-	-
5	Flavonoid	+	+
6	Coumarin	+	+
7	Quinone	+	+
8	Lignin	-	-
9	Alkaloid	+	+
10	Glycosides	+	+
11	Sugar	+	+
12	Phenols	+	+

Note: (-) Absence, (+) Presence

The preliminary phytochemical screening of the test drug was tabulated **Table 1**, which revealed the presence of Tannin, sterol, flavonoid, coumarin, quinine, alkaloid, glucosides, sugar and phenols and absence of Saponin, Terpene, Lignin. Presence of phytoconstituents which are known to exhibit medicinal and physiological properties of the plants. The results suggested that the phytochemical compounds may be the bioactive constituents responsible for the antidiabetic efficacy of the plants.

The inhibitory effect of *Vigna radiata* (L.) R. Wilczek

on α – amylase enzyme was given in the Table 2. From the results it is clear that the aqueous extract of plant were found to exhibit highest inhibition on α – amylase enzyme with increased concentration and maximum activity at 500 $\mu\text{g/ml}$. The IC_{50} value was found to be **368.9 $\mu\text{g/ml}$** .

From Table 3 α - glucosidase inhibitory activity of *Vigna radiata* (L) Wilczek was visualized. There was a dose dependent increase in the inhibitory activity against α – glucosidase. The extract exhibited an IC_{50} value at **613.4 $\mu\text{g/ml}$** concentration.

Table 2 -Effect Of *Vigna Radiata*(L.) R. Wilczek. On Alpha Amylase Enzyme Inhibitory Activity

S.NO	CONCENTRATION($\mu\text{g/ml}$)	% INHIBITION
1	100	13.24 $\pm$ 1.62
2	200	28.72 $\pm$ 1.68
3	300	34.41 $\pm$ 1.32
4	400	54.21 $\pm$ 1.22
5	500	68.12 $\pm$ 1.92

$$\text{IC}_{50} = 368.9 \mu\text{g/ml}$$

Table 3 - Effect Of *Vigna Radiata*(L.) R. Wilczek. On Alpha Glucosidase Enzyme Inhibitory Activity

S.NO	CONCENTRATION($\mu\text{g/ml}$)	% INHIBITION
1	200	15.14 $\pm$ 0.89
2	400	33.52 $\pm$ 0.71
3	600	48.91 $\pm$ 0.62
4	800	65.13 $\pm$ 1.23
5	1000	79.18 $\pm$ 1.12

$$\text{IC}_{50} = 613.4 \mu\text{g/ml}$$

SUMMARY AND CONCLUSION

This present study was carried out to investigate the antidiabetic potential of the aqueous extract of *Vigna radiata* (L.) R. Wilczek. The results of preliminary phytochemical screening of the plant extract showed the presence of several bioactive compounds like Tannin, sterol, flavonoid, coumarin, quinine, alkaloid, glucosides, sugar and phenols which could be responsible for the versatile antidiabetic properties of this plant. *In vitro* antidiabetic inhibitory activity of α – amylase, α – glucosidase in the aqueous extract of *Vigna radiata* (L.) R. Wilczek. revealed the significant inhibitory activity

on carbohydrate metabolizing enzymes to reduce the postprandial blood sugar level.

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