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COMPARATIVE STUDY ON IN VITRO ANTI-DIABETIC ACTIVITY OF *PSIDIUM GUAJAVA* AND *MIMOSA PUDICA*

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ABSTRACT

Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from impaired insulin secretion, insulin resistance, or both, and it remains a major global health challenge. The present study was undertaken to comparatively evaluate the *in vitro* anti-diabetic activity of ethanolic leaf extracts of *Psidium guajava* and *Mimosa pudica* using the glucose uptake assay. Fresh leaves of both plants were collected, authenticated, shade-dried, powdered, and extracted using ethanol by standard extraction procedures. Preliminary phytochemical screening was carried out to identify the presence of bioactive constituents such as flavonoids, phenolic compounds, tannins, alkaloids, saponins, glycosides, and terpenoids, which are known to contribute to glucose regulation and anti-diabetic activity. The glucose uptake assay was performed at different concentrations of both extracts under identical experimental conditions, and Metformin was used as the standard reference drug. The percentage of glucose uptake was calculated and statistically analyzed to compare the efficacy of the two plant extracts. The results demonstrated that both ethanolic leaf extracts exhibited concentration-dependent

enhancement of glucose uptake, confirming significant in vitro anti-diabetic activity. However, *Psidium guajava* showed comparatively higher glucose uptake activity than *Mimosa pudica*, indicating superior anti-diabetic potential under the study conditions. Further studies involving investigation of additional biological activities such as antioxidant and anti-inflammatory effects are recommended to validate their therapeutic potential.

KEYWORDS: *Psidium guajava*; *Mimosa pudica*; Diabetes mellitus; *In vitro* antidiabetic activity; Glucose uptake assay; Ethanolic leaf extract; Phytochemical screening; Metformin; Flavonoids.

INTRODUCTION

Diabetes Mellitus is a Chronic metabolic disorder characterized by high blood glucose level (Hyperglycaemia) due to impaired insulin secretion, insulin action or both. If Diabetes Mellitus is not properly controlled it may lead to a complication such as affecting the heart, kidneys, eyes, nerves, and blood vessels. Synthetic Anti-Diabetic agents like sulphonylureas, Biguanides, and thiazolidinediones are available; however, their long term use may produce the side effect such as gastrointestinal discomfort, weight gain and hepatic toxicity.

Psidium guajava, belonging to the family *Myrtaceae* is well known medicinal plant were utilized in Indian traditional medicine. It contains phytochemicals such as flavonoids, tannins, terpenoids, vitamins, saponins, Alkaloids, carotenoids.

Mimosa pudica, belonging to the family *Fabaceae* is well known medicinal plant were utilized in Indian traditional medicine. It contains phytochemicals such as flavonoids, tannins, terpenoids, glycosides, carbohydrates, minerals, amino acids and proteins and fixed oil.

The present study focuses on comparing the anti-diabetic activity of *Psidium guajava* and *Mimosa pudica* using their plant extracts. The study includes the plant collection, extraction, qualitative phytochemical analysis and in-vitro assays to assess the anti-diabetic potential.

This research may contribute to the development of a safe, effective and standardized herbal medicine for the management of diabetes.

MATERIALS AND METHODS

Collection and Authentication of Plant material

The leaves of *Psidium guajava* and *Mimosa pudica* L. was collected from Cuddalore-

Saankarapuram Rd, Athiyur, Tamil Nadu, 605801, India which was authenticated by Dr.J. Suresh Kumar, M.sc., M. Phil, PhD., PGDCA. The collected plant material was washed thoroughly with water to remove adhering impurities, shade dried and powdered. The dried powder was stored in an airtight container until further extraction.

Preparation of Crude Extracts

The powdered leaves material of *Psidium guajava* and *Mimosa pudica* was subjected to Soxhlet extraction using 70% v/v ethanol as solvent. The extraction process was continued until complete exhaustion of the plant material.

Preliminary Phytochemical Screening

The ethanolic extracts were subjected to preliminary phytochemical screening to identify the presence of various secondary metabolites. The extracts were tested for alkaloids, flavonoids, phenolic compounds, tannins, saponins, terpenoids, steroids, glycosides and carbohydrates using standard qualitative procedures.

S.NO	TEST	OBSERVATION	INFERENCE
1	**ALKALOIDS** **Hager's Test** Few ml of filtrate with 2ml Hager's reagent	Creamy white precipitate	Presence of alkaloids
2	**FLAVANOIDS** **Lead acetate test** 1ml of extract with 10% lead acetate solution	Yellow precipitate is formed	Presence of flavonoids
3	**CARBOHYDRATES** **Barford's test** 1ml of filtrate with 1ml of reagent heat for 2mins	Red precipitate is formed	Presence of carbohydrates
4	**PROTEINS** **Millions test** 2ml of filtrate with few drops of millions reagent	White precipitate is formed	Presence of proteins
5	**PHENOLICS** **Iodine test** 1ml of extract with diluted iodine solution	Translucent red colour is formed	Presence of phenolics
6	**STEROIDS** **Liebermann-Burchard test** A plant extract with dissolved anhydrous chloroform and add 1ml of acetic anhydride and add 1ml of conc. H2SO4 solution	Green or Reddish blue colour is formed	Presence of Steroids

7	**SAPONINS** **Foam test** 2ml of extract 15 sec shake it stands for 5mins	Foam is formed	Presence of saponins
8	**TERPENOIDS** **Salkowski test** 2ml of extract with 1ml of chloroform then add conc. H2SO4	Reddish brown colour	Presence of terpenoids
9	**GLYLCOSIDES** **Keller- killiani test** A plant extract and add glacial acetic acid containing trace of ferric chloride and add Conc.H2SO4	Brown ring at the junction	Presence of Glycosides
10	**TANNINS** **Lead acetate test** Plant extract with lead acetate solution	Cream coloured or Gelatinous precipitate	Presence of Tannins

IN-VITRO ANTI-DIABETIC ACTIVITY

In-vitro evaluation of anti-diabetic activity by glucose uptake assay using yeast cell

The glucose uptake activity of *Psidium guajava* and *Mimosa pudica* leaves extracts was evaluated by glucose uptake assay. Different time intervals of ethanolic extracts (30-150mins) were prepared. Metformin was used as the standard drug.

The reaction mixture containing glucose solution and extract was incubated for predetermined time intervals. The glucose concentration was estimated by measuring absorbance at 540 nm. The percentage glucose uptake was calculated using the formula:

% Glucose uptake = [(Initial glucose concentration – Final glucose concentration) / Initial glucose concentration] × 100

RESULTS

PERCENTAGE YIELD OF EXTRACTS

The percentage yield of ethanolic extracts obtained from *Psidium guajava* and *Mimosa pudica leaves* was calculated after Soxhlet extraction.

Table 1: Percentage yield of different extracts of *Psidium guajava* and *Mimosa pudica* leaves.

S.No.	*PSIDIUM GUGAVA AND MIMOSA PUDICA* EXTRACTS	INITIAL WEIGHT(g)	EXTRACT OBTAINED(g)	PERCENTAGE YEILD (%)
1	Ethanol	200	11	5.5%
2	Ethanol	150	6.3	4.2%

PRELIMINARY PHYTOCHEMICAL SCREENING

The preliminary phytochemical screening revealed the presence of various secondary metabolites. Ethanolic extract showed the presence of phenolics, flavonoids, tannins, saponins, alkaloids and glycosides, showed limited phytoconstituents.

Table 2: Phytochemical profile of *Mimosa pudica* stem extracts.

S.No.	Phytochemical test	*Psidium guajava*	*Mimosa pudica*
1	Alkaloids	+	+
2	Flavonoids	+	+
3	Saponins	+	+
4	Tannins	+	+
5	Phenolic compounds	+	+
6	Terpenoids	+	+
7	Steroids	+	+
8	Glycosides	+	+
9	Proteins	_	+
10	Carbohydrates	_	+

IN VITRO ANTIDIABETIC ACTIVITY

DNS Calibration Curve

The glucose estimation was carried out using the 3,5-dinitrosalicylic acid (DNS) method. The calibration curve was constructed using glucose concentrations ranging from different time intervals (0-150 mins).

Table 3: Glucose uptake activity of *Psidium guajava* and *Mimosa pudica* leaves extracts.

MIN	STD	*PSIDIUM GUGAVA*	*MIMOSA PUDICA*
0	0	0	0
30	0.7	0.75	0.77
60	0.65	0.7	0.73
90	0.6	0.66	0.7
120	0.56	0.62	0.67
150	0.52	0.58	0.64

$= (C_0\text{-}C_t)/C_0 \times 100$,

where C_0=1.0

Table 4: Concentration-dependent Anti-diabetic activity of extracts compared with metformin.

Time (min)	STD (%)	*Psidium guajava* (%)	*Mimosa pudica* (%)
0	0	0	0

30	30	25	23
60	35	30	27
90	40	34	30
120	44	38	33
150	48	42	36

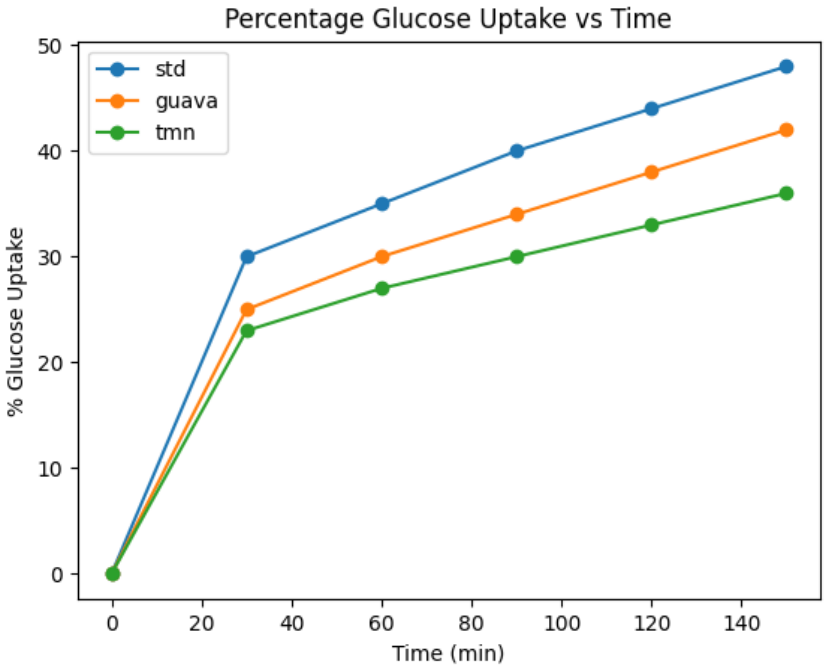

Figure 1: Different time interval -dependent Anti-diabetic activity of extracts compared with metformin.

Interpretation

- **STD** → highest uptake (**48%**)
- **Guava** → moderate uptake (**42%**)
- **TMN** → lowest uptake (**36%**)

The percentage glucose uptake increased with time in all groups. The standard showed the highest uptake (48%), followed by guava extract (42%), while TMN exhibited the lowest uptake (36%). This indicates that Guava extract has moderate glucose uptake enhancing activity compared to the standard.

DISCUSSION

The glucose uptake assay showed a gradual increase in glucose uptake with increasing incubation time in all groups. The standard drug exhibited the highest activity (48%), while Psidium guajava (42%) showed greater glucose uptake than Mimosa pudica (36%). The

higher activity of Psidium guajava may be attributed to the presence of phytoconstituents such as flavonoids and phenolic compounds, which are known to enhance glucose utilization. Although both extracts were less effective than the standard, they demonstrated promising in vitro antidiabetic potential**.**

CONCLUSION

The present study confirms that both *Psidium guajava* and *Mimosa pudica* possess in vitro antidiabetic activity by enhancing glucose uptake. Among the two extracts, Psidium guajava exhibited better activity than Mimosa pudica. These findings suggest that Psidium guajava may serve as a promising natural source for antidiabetic agents, and further in vivo studies and isolation of active phytoconstituents are recommended to validate its therapeutic potential.

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