

## “Investigation of the Antidiabetic Efficacy of *Bignonia Gracilis* In Streptozotocin-Induced Hyperglycemia”

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### ABSTRACT

The present study investigated the antidiabetic efficacy of *Bignonia gracilis* in streptozotocin-induced hyperglycemic rats through a systematic pharmacological approach. The plant material was subjected to methanolic extraction, yielding 6.47%, indicating efficient recovery of bioactive constituents. Preliminary phytochemical screening confirmed the presence of important secondary metabolites such as alkaloids, glycosides, flavonoids, phenolics, tannins, saponins, and steroids, which are known for their therapeutic potential. Quantitative analysis revealed significant total phenolic content (48.35 mg/g GAE) and total flavonoid content (44.05 mg/g RE), suggesting strong antioxidant properties. The extract exhibited notable free radical scavenging activity in the DPPH assay with an IC<sub>50</sub> value of 15.02 μg/ml, supporting its antioxidant capability. Acute toxicity studies confirmed the safety of the extract at 2000 mg/kg. *In vivo* studies demonstrated that *Bignonia gracilis* significantly reduced blood glucose levels, improved body weight, and restored altered lipid profiles in diabetic rats, with the 500 mg/kg dose showing superior efficacy. Histopathological analysis further revealed regeneration and protection of pancreatic β-cells. Overall, the study highlights that the antidiabetic activity of *Bignonia gracilis* is mediated through its antioxidant potential, phytochemical richness, and protective effects on pancreatic tissue, suggesting its promise as a natural therapeutic agent for diabetes management.

**Keywords:** Antidiabetic activity, *Bignonia gracilis*, Streptozotocin-induced diabetes, phytochemical screening, Total phenolic content, β-cell regeneration, Herbal medicine, Hyperglycemia management.

### I. INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels resulting from impaired insulin secretion, insulin action, or both. It is one of the most prevalent endocrine disorders globally and has

emerged as a major public health problem. The condition is associated with disturbances in carbohydrate, protein, and lipid metabolism and is often accompanied by long-term complications affecting the eyes, kidneys, heart, nerves, and blood vessels (Balaji *et al.*, 2019). According to the World Health Organization (WHO), the number of people living with diabetes has increased dramatically over the past few decades, particularly in developing countries, due to sedentary lifestyles, obesity, and dietary changes. The chronic nature of diabetes and its associated complications place a significant burden on individuals, healthcare systems, and economies worldwide (Pradeepa and Mohan 2024). Two major types of diabetes are recognized: Type 1 diabetes mellitus (T1DM), which results from autoimmune destruction of pancreatic β-cells leading to absolute insulin deficiency, and Type 2 diabetes mellitus (T2DM), which is characterized by insulin resistance and relative insulin deficiency. Among these, T2DM is the most common form, accounting for more than 90% of all cases. In both types, hyperglycemia leads to oxidative stress, inflammation, and the generation of reactive oxygen species (ROS), which further damage pancreatic β-cells and worsen insulin resistance. Thus, oxidative stress plays a pivotal role in the onset and progression of diabetes and its related complications (Newsholme *et al.*, 2019).

Medicinal plants play an important role in both preventive and curative medicinal preparations for human beings. Herbal medicines are the only affordable source of healthcare, especially for the poorest patients (Selviet *et al.*, 2020). Furthermore, herbal medicines are gaining popularity both in developing and developed countries due to their safety, efficacy, quality, very low adverse effects, and easy availability. Some of the currently available drugs such as aspirin, digitalis, quinine (anti-malarial), vincristine, and vinblastine (anti-cancerous) were derived from the plant sources. Plant-derived phytochemicals have beneficial effect against diabetes, microorganism, inflammation, cardiovascular diseases, blood disorders, cerebral

disorders, immune system, oxidative stress, reproductive disorder, and cancer chemotherapy (Roychoudhury *et al.*, 2021). According to the World Health Organization (WHO), more than 21,000 plants are used for medicinal purposes in the world. Ethnobotanical information reports about 800 plants which possess antidiabetic potential (Ndeet *al.*, 2022).

*Bignonia gracilis*, a member of the family Bignoniaceae, is an underexplored medicinal plant with potential pharmacological significance (Ravikumara *et al.*, 2025). Although detailed scientific studies on this species are limited, plants belonging to the Bignoniaceae family have been reported to possess a wide range of biological activities, including antidiabetic, anti-inflammatory, antimicrobial, and antioxidant effects. Preliminary phytochemical screening of *Bignonia gracilis* suggests the presence of compounds that may contribute to glucose-lowering activity, thereby warranting further investigation into its therapeutic potential (Das *et al.*, 2025).

For the experimental evaluation of antidiabetic activity, animal models play a crucial role in understanding disease mechanisms and assessing drug efficacy. Among these, streptozotocin (STZ)-induced hyperglycemia is one of the most widely used and reliable models. Streptozotocin is a naturally occurring diabetogenic agent that selectively targets pancreatic  $\beta$ -cells through DNA alkylation and the generation of reactive oxygen species, leading to insulin deficiency and sustained hyperglycemia. This model closely resembles human diabetes, particularly Type 1 diabetes, and is extensively employed for screening potential antidiabetic agents (Zhu, 2022).

The study aims to evaluate its effect on blood glucose levels and related biochemical parameters, as well as to explore its potential mechanisms of action. This research may provide scientific validation for the traditional use of this plant and contribute to the development of novel plant-based therapeutic agents for diabetes management.

## II. MATERIAL AND METHODS

### 2.1 Chemicals

95% Alcohol, Chloroform and Conc. HCl was obtained from a Clorofilt Ind. 1% Copper Sulphate Solution, Ammonia, Sodium Hydroxide and Nitroprusside were procured from Merck, while Conc.  $H_2SO_4$  was supplied by Fizmerck. Methanol was obtained from Molychem. Rankem provided the Glacial acetic acid and

Hydrochloric Acid (HCl). Himediawas obtained from Magnesium. All other reagents and solvents used were of analytical grade.

### 2.2 Plant collection

A total of 380 g of *Bignonia gracilis* leaves were collected, thoroughly cleaned to remove impurities, and shade-dried at room temperature for three days to preserve bioactive compounds. The dried material was stored in airtight glass containers in a cool, dry place to prevent contamination and degradation. The plant was authenticated by a qualified taxonomist to ensure correct identification and reliability of the study.

### 2.3 Extraction

Powdered *Bignonia gracilis* was extracted using the Soxhlet continuous hot percolation method with methanol at 60°C to efficiently isolate bioactive compounds such as flavonoids and phenolics. The extraction was continued until no color change was observed, indicating complete extraction, which was further confirmed by absence of residue after solvent evaporation. The extract was then concentrated using a rotary vacuum evaporator at 40°C to protect heat-sensitive compounds. Finally, the dried extract was weighed, and the percentage yield was calculated.

$$\% \text{ Yield} = \frac{\text{Weight of extract}}{\text{Weight of Plant Material used}} \times 100$$

The prepared methanol extract was evaluated for organoleptic characteristics, including percentage yield, color, and odor, to assess its physical and sensory properties. Following this assessment, the extract was transferred into an airtight container to prevent moisture absorption and degradation, and properly labeled for identification and future use in further studies (Rasul, 2018).

### 2.4 Quantitative Phytochemical Estimation

#### 2.4.1 Total Phenolic Content (TPC) of *Bignonia gracilis* Extract:

The total phenolic content was determined using the Folin-Ciocalteu method. Briefly, 0.2 mL of the extract was mixed with Folin-Ciocalteu reagent, followed by the addition of 7.5% sodium carbonate to create an alkaline medium for color development. The mixture was diluted to 7 mL with distilled water and incubated at room temperature for 2 hours to allow complete formation of the blue chromogen. The absorbance was then measured at 760 nm using a spectrophotometer. A standard calibration curve was prepared using gallic acid (10–90  $\mu\text{g/mL}$ ), and the total phenolic content was expressed as mg of

gallic acid equivalents (GAE) per gram of extract, based on the principle that phenolic compounds reduce the reagent to form a blue-colored complex(Lamuella-Raventós, 2018).

#### 2.4.2 Total Flavonoid Content (TFC) of *Bignonia gracilis* Extract:

The total flavonoid content of *Bignonia gracilis* extract was determined using the aluminum chloride colorimetric method. In this procedure, 0.5 mL of the extract was mixed with distilled water, followed by the addition of sodium nitrite and aluminum chloride to facilitate complex formation with flavonoids. After incubation, sodium hydroxide was added to enhance color development, producing a yellow-orange complex. The absorbance was measured at 510 nm using a UV-visible spectrophotometer. A standard calibration curve was prepared using rutin (10–90 µg/mL), and the flavonoid content was calculated and expressed as mg rutin equivalent (RE) per gram of extract, based on the principle that flavonoids form stable complexes with aluminum ions(Ghafaret *et al.*, 2017).

#### 2.5 DPPH free radical scavenging test

The antioxidant activity of *Bignonia gracilis* extract was determined using the DPPH free radical scavenging test. A 1 mg/mL methanol solution of extracts/standard was prepared. *Bignonia gracilis* extracts/standards (10–90µg/ml) were produced from a 1mg/ml stock solution with 2ml of 0.1mm DPPH solution added. The resulting mixture was vortexed, incubated for 30 minutes at room temperature in a relatively dark environment, and then measured at 517 nm using a UV spectrophotometer. For the control, add 3 mL of 0.1mm DPPH solution and incubate in the dark at room temperature for 30 minutes. The absorbance of the control was measured against methanol (as a blank) at 517(Gulcin, 2023).

The percentage antioxidant activity of the sample/standard was estimated using the following formula:

$$\% \text{ Inhibition} = \frac{[(\text{Ab of control} - \text{Ab of sample}) / \text{Ab of control} \times 100]}{100}$$

#### 2.6 Acute Toxicity Study

The acute oral toxicity of the test compound was evaluated using the OECD 423 Acute Toxic Class method. In this stepwise procedure, groups of three animals of the same sex were administered the compound orally at fixed dose levels (5, 50, 300, or 2000 mg/kg body weight). Based on the presence or absence of mortality or toxic symptoms, additional groups were dosed at the same, higher, or lower

levels to establish the toxicity profile. The animals were closely observed for behavioral changes, clinical signs, and mortality over a specified period to estimate the median lethal dose (LD<sub>50</sub>)(Lawal *et al.*, 2016).

#### 2.7 Experimental work

##### ➤ Animals Protocol

**IAEC Approval**All animal experiments were approved by Institutional Animal Ethics Committee (IAEC).

##### ➤ Animal used

**Weight** -190±65 gm

**Strain** -Wistar rat

**Sex**—Either

##### ➤ Housing Condition-

The study was conducted using male Wistar albino rats aged 2–3 months, with body weights ranging from 190±65 g. Prior to the experiment, the animals were maintained under standard laboratory conditions, including a 12-hour light–dark cycle, with free access to standard rodent chow and water. The animals were acclimatized to the laboratory environment for several days before the start of the study to minimize stress and ensure stable physiological conditions.

##### ➤ Streptozotocin Induced Diabetes

Streptozotocin (STZ) was obtained from Sisco Research Laboratories Pvt. Ltd. and freshly prepared in 0.1 M citrate buffer (pH 4.5) immediately before use. It was administered at a dose of 50 mg/kg body weight in a total volume of 0.4 mL, given promptly to minimize degradation. The control group received an equal volume of citrate buffer. Fasting blood glucose levels were measured on the third day post-administration, and animals with elevated glucose levels were considered diabetic and selected for further study.

##### ➤ Experimental design of Antidiabetic Activity

The study comprises 5 groups with 6 animals in each group.

- **Group 1** served as normal control and was treated with 1 ml distilled water orally fed using a feeding tube

- **Group 2** STZ (50 mg/kg b.w.) induced diabetic rats and served as diabetic control

- **Group 3** Diabetic rats treated with Glibenclamide (10 mg/ kg b.w) in aqueous solution orally for 14 days as the reference drug every morning

- **Group 4** represented test treatment in which rats were treated with *Bignonia gracilis* extracts at dosages of 250 mg/kg bw.

• **Group 5** represented test treatment in which rats were treated with *Bignonia gracilis* extracts at dosages of 500 mg/kg bw.

The extracts were administered to the animals once every morning via mandatory oral intubation prior to meals. The treatment was continued for fourteen (14) consecutive days.

➤ **In Vivo Antidiabetic Activity**

Blood glucose levels in STZ-induced diabetic rats were measured after 12-hour fasting at regular intervals (days 0, 1, 3, 5, 7, and 14) using tail vein sampling, where the second drop of blood was applied to an Accu-Chek glucometer for immediate analysis, followed by ethanol treatment to prevent infection. For biochemical evaluation, blood samples were collected under anesthesia on days 0 and 14 via the retro-orbital plexus, allowed to clot, and centrifuged to obtain serum, which was then analyzed for triglycerides, HDL, and total cholesterol using a Mission Cholesterol Meter (Hasan *et al.*, 2018).

This method provides accurate measurement of serum lipid parameters in experimental rats with minimal sample handling.

Very Low-Density Lipoprotein (VLDL) was determined as Triglycerides (TG); TG/5 and LDL

were estimated using the Friedewald formula as follows:

$$\text{LDL (mg/dl)} = \text{TC} - (\text{HDL} + \text{VLDL})$$

**2.8 Histopathological Examination**

After completion of the treatment period, pancreatic tissues were excised and immediately fixed in 10% formalin to preserve their structure. The tissues were then processed through dehydration, clearing, and paraffin embedding, followed by sectioning (4–5 μm) using a microtome. The sections were stained with hematoxylin and eosin (H&E) and examined under a light microscope to assess morphological changes such as islet cell damage, necrosis, and inflammation. Photomicrographs were taken to document the findings, enabling evaluation of the treatment's effect on pancreatic tissue (Jones *et al.*, 2007).

**III. RESULTS**

**3.1 Percentage Yield**

In phytochemical extraction, percentage yield serves as an important parameter for assessing extraction efficiency across different plant species, plant parts, and solvents. It provides insight into the ability of a particular solvent to extract bioactive constituents effectively.

**Table1: Percentage Yield of crude extracts of *Bignonia gracilis* extract**

Plant name	Solvent	Theoretical weight	Yield(gm)	% yield
<i>Bignonia gracilis</i>	Methanol	380	24.6	6.47 %

**3.2 Preliminary Phytochemical study**

**Table 2: Phytochemical testing extract of methanol**

Experiment	Presence or absence of phytochemical test	
	Methanol extract	
<b>Carbohydrates</b>		
Molish's test	Present (+ ve)	
Fehling's test	Present (+ ve)	
Benedict's test	Present (+ ve)	
Barfoed's test	Present (+ ve)	
<b>Glycoside</b>		
Borntrager test	Present (+ ve)	
Legal's test	Present (+ ve)	
Killer-Killiani test	Present (+ ve)	
<b>Alkaloids</b>		
Dragendroff's test	Present (+ ve)	
Mayer's reagent test	Present (+ ve)	
Wagner's reagent test	Present (+ ve)	
Hager's reagent test	Present (+ ve)	
<b>Proteins and Amino Acids</b>		
Biuret test	Absent (- ve)	
Ninhydrin test	Absent (- ve)	
<b>Test for Triterpenoids and Steroids</b>		
Alkaline reagent test	Present (+ ve)	

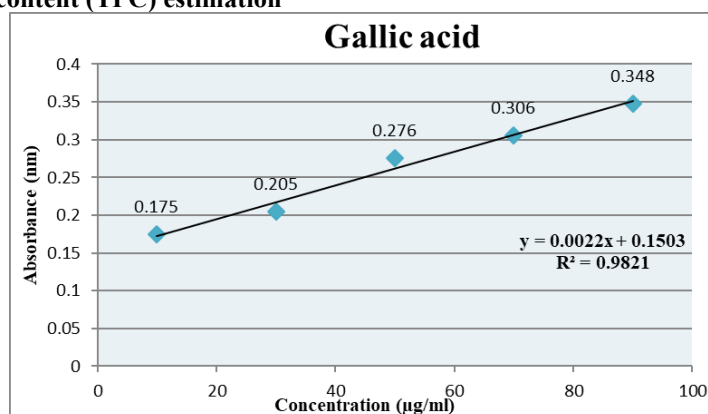
Lead Acetate test	Present (+ ve)
<b>Tannin and Phenolic Compounds</b>	
Ferric Chloride test	Present (+ ve)
<b>Saponin</b>	
Foam test	Present (+ ve)
<b>Flavonoids</b>	
Salkowski's test	Present (+ ve)
Libbermann-Burchard's test	Present (+ ve)

### 3.3 Quantitative Analysis

Preliminary phytochemical screening of the crude plant extracts confirmed the presence of phenolic compounds and flavonoids. Quantitative assays were subsequently carried out to determine the total phenolic content (TPC) and total flavonoid content

(TFC). These analyses provide an estimate of the concentration of major bioactive constituents present in the extracts. The results help in understanding the antioxidant potential and therapeutic relevance of the plant material.

#### 3.3.1 Total Phenolic content (TPC) estimation



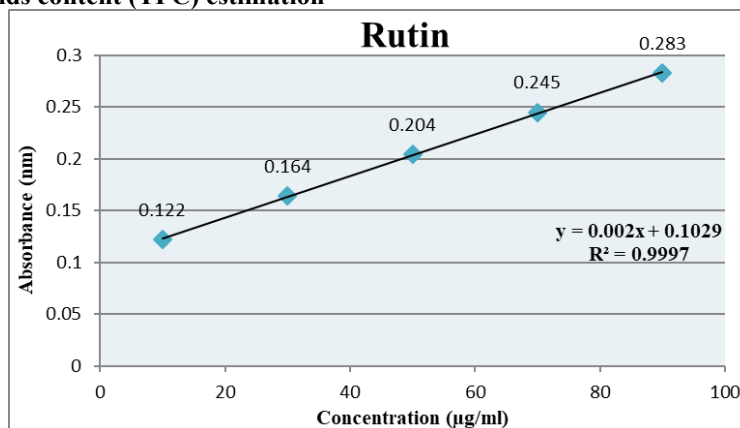
Graph1: Represent standard curve of Gallic acid

##### 3.3.1.1 Total Phenolic Content in extract

Table 3: Total Phenolic Content

Absorbance	TPC in mg/gm equivalent of Gallic Acid
0.193	48.35 mg/gm
0.243	
0.307	

#### 3.3.2 Total Flavonoids content (TFC) estimation



Graph 2: Represent standard curve of Rutin

### 3.3.2.1 Total Flavonoid Content in extract

**Table 4: Total Flavonoid Content**

Absorbance	TFC in mg/gm equivalent of Rutin
0.148	<b>44.05 mg/gm</b>
0.198	
0.229	

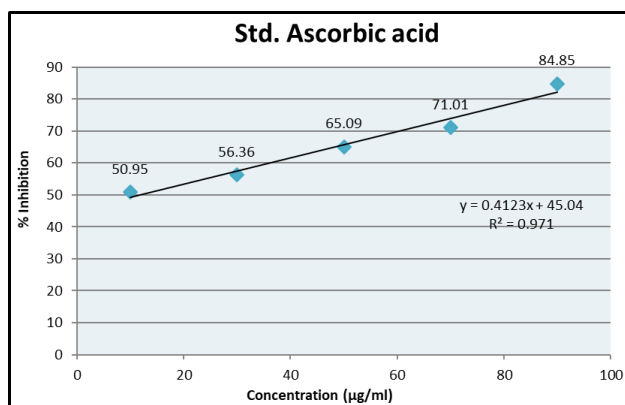
### 3.4 In vitro Antioxidant Assays

The present investigation evaluated the *in vitro* antioxidant activity of *Bignonia gracilis* extracts using the DPPH free radical scavenging assay. This method was employed to determine the ability of the extracts to neutralize free radicals. The antioxidant activity was assessed at different concentrations, and the results are systematically presented in the tables. These findings provide insight into the free radical scavenging potential of the plant extracts.

#### 3.4.1 DPPH 1, 1- diphenyl-2-picryl hydrazyl Assay

**Table 5: DPPH radical scavenging activity of Std. Ascorbic acid**

Concentration (µg/ml)	Absorbance	% Inhibition
<b>10</b>	0.489	50.95
<b>30</b>	0.435	56.36
<b>50</b>	0.348	65.09
<b>70</b>	0.289	71.01
<b>90</b>	0.151	84.85
<b>Control</b>	<b>0.997</b>	
<b>IC50</b>		<b>12.03</b>

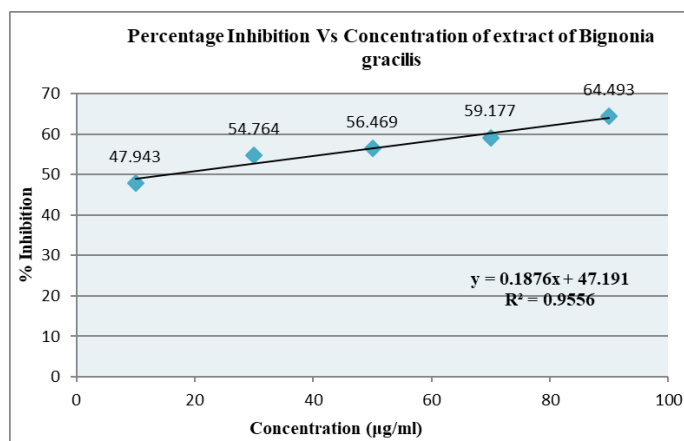


**Graph 3: DPPH radical scavenging activity of Std. Ascorbic acid**

**Table 6: DPPH radical scavenging activity of methanol extract of *Bignonia gracilis***

Concentration (µg/ml)	Absorbance	% Inhibition
10	0.519	47.943
30	0.451	54.764
50	0.434	56.469
70	0.407	59.177
90	0.354	64.493

Control	0.997
IC50	15



Graph 4: represents the Percentage Inhibition Vs Concentration of extract of *Bignonia gracilis*  
3.5 *In vivo* acute oral toxicity (OECD 423)

Table 7: Parameter of acute oral toxicity, extract dose 2000 mg/kg per body weight

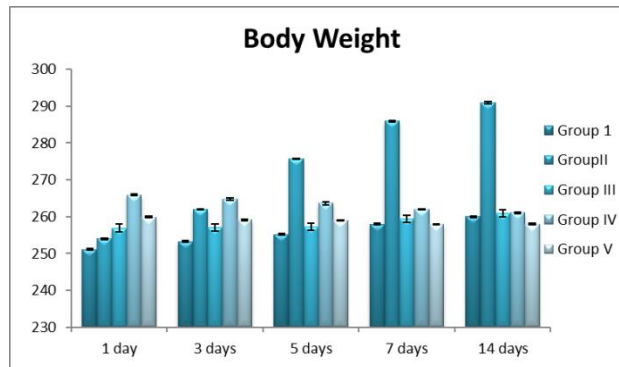
Extract Dose 2000 mg/kg							
TC. PARAMETER	1 DAY	3DAY	5DAY	7DAY	9DAY	11DAY	14DAY
BODY WEIGHT	175 gm	176 gm	176.5 gm	178 gm	178 gm	179gm	180 gm
SKIN & FUR	N	N	R	R	R	N	N
EYE	N	N	R	R	N	N	N
MUCOUS MEMBRANE	N	N	N	N	N	N	N
SALIVATION	N	N	N	N	N	N	N
STOOL	N	R	R	R	R	R	R
URINATION	N	N	R	R	R	N	N
SLEEP	N	N	N	N	N	N	N
BEHAVIOUR	N	N	R	R	R	N	N
S.M. ACTIVITY	N	N	R	R	R	N	N
MORTALITY	N	N	N	N	N	N	N

### 3.6 Streptozotocin Induced Diabetes Model

#### 3.7 *In vivo* anti -diabetic study

Table 8: Effect of *Bignonia gracilis* extract on Body weight of the rats

		Body weight (Mg/dL)				
Groups	Treatments	1 day	3 days	5 days	7 days	14 days
Group I	Normal control	251.12±0.262	253.23±0.234	255.19±0.221	257.99±0.212	259.99±0.252
Group II	Diabetic control (Streptozocin) 50 mg/kg	253.96±0.215	261.99±0.139	275.69±0.189	285.88±0.251	290.87±0.264
Group III	Glibenclamide (10 mg/kg)	256.94±0.249	257.02±0.272	257.23±0.187	259.48±0.205	260.90±0.273
Group IV	<i>Bignonia gracilis</i> 250mg/kg	265.91±0.224	264.77±0.264	263.66±0.395	262.03±0.158	261.06±0.242
Group V	<i>Bignonia gracilis</i> 500mg/kg	259.92±0.256	259.11±0.208	258.99±0.139	257.88±0.122	257.98±0.229

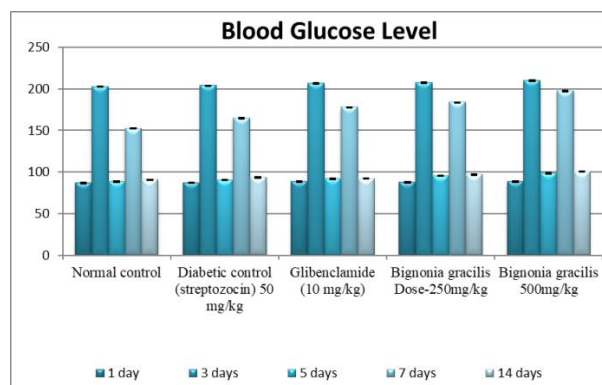


Graph 5: Graphical representation of effect of *Bignonia gracilis* extract on Body weight of the rats

### 3.8 Blood Glucose Level

Table 9: Effect of test samples of extract on Blood Glucose Level in experimental rats

Blood Glucose Level (gms)						
Groups	Treatment	1 day	3 days	5 days	7 days	14 days
Group I	Normal control	87.08±0.193	87.46±0.209	88.99±0.335	88.49±0.195	87.77±0.270
Group II	Diabetic control (streptozocin) 50 mg/kg	202.88±0.180	203.88±0.261	206.77±0.239	207.66±0.307	210.90±0.229
Group III	Glibenclamide (10 mg/kg)	89.06±0.227	90.77±0.105	91.89±0.497	92.90±0.288	90.79±0.094
Group IV	<i>Bignonia gracilis</i> Dose-250mg/kg	152.68±0.096	164.90±0.602	183.99±0.202	177.90±0.236	167.46±0.209
Group V	<i>Bignonia gracilis</i> 500mg/kg	90.99±0.361	93.78±0.274	92.44±0.221	97.22±0.257	100.91±0.35



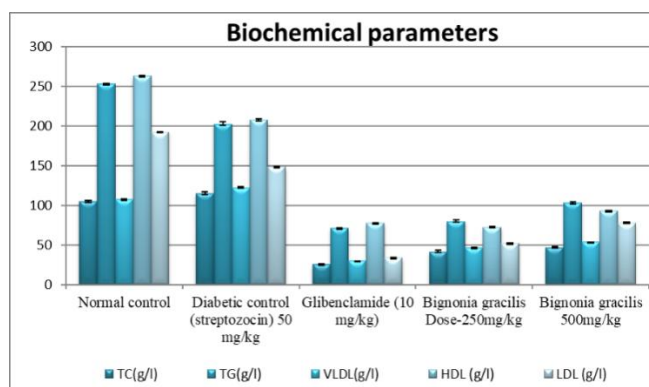
Graph 6: Graphical representation of effect of *Bignonia gracilis* extract on Blood Glucose Level of the rats.

### 3.9 Biochemical Parameters

Table 10: Effect of test samples of extract on Biochemical Parameters in experimental rats

Treatment groups	Biochemical parameters				
	TC(g/l)	TG(g/l)	VLDL(g/l)	HDL (g/l)	LDL (g/l)
Normal control	105±1.27	115±0.92	25.54±0.27	41.67±0.83	47±0.46
Diabetic control (Streptozocin) 50 mg/kg	252.65±2.04	202.14±2.79	70.89±0.60	79.90±1.68	102.79±0.99

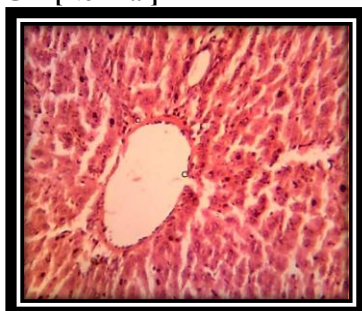
Glibenclamide (10 mg/kg)	109.54±1.12	122.55±0.99	29.98±0.27	46.78±0.89	53.68±0.67
<i>Bignonia gracilis</i> Dose-250mg/kg	216.77±1.99	186.65±2.02	53.65±0.51	69.57±1.26	92.88±1.16
<i>Bignonia gracilis</i> 500mg/kg	172.54 ±1.52	148.24±1.51	33.87±0.35	51.89±0.99	77.88±1.17



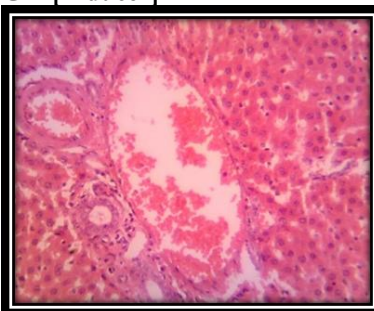
Graph 7: Graphical representation of effect of *Bignonia gracilis* extract on Biochemical Parameters of the rats.

### 3.10 Histopathological examination

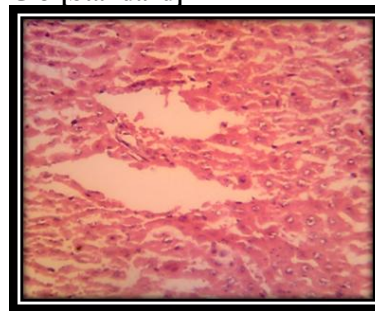
G-1 [Normal]



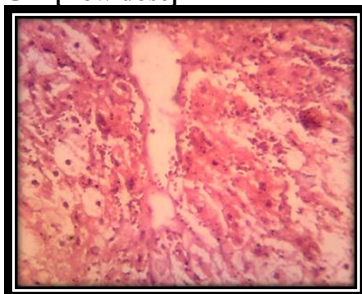
G-2 [Inducer]



G-3 [Standard]



G-4 [Low dose]



G-5 [High dose]

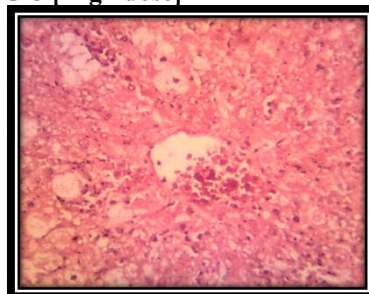


Figure 4: Histopathological examination

### Discussion

The results of the present study indicate that the methanolic extract of *Bignonia gracilis* possesses significant pharmacological potential. The extraction yield (6.47%) confirms methanol as an efficient solvent for isolating a wide range of bioactive compounds. Phytochemical screening revealed the presence of important secondary

metabolites such as flavonoids, phenolics, alkaloids, tannins, and saponins, which are known to contribute to therapeutic activities. Quantitative analysis further demonstrated appreciable levels of total phenolic (48.35 mg/g GAE) and flavonoid content (44.05 mg/g RE), supporting the strong antioxidant capacity of the extract, as confirmed by the DPPH assay with a notable IC<sub>50</sub> value.

In vivo evaluation in streptozotocin-induced diabetic rats showed that *Bignonia gracilis* extract exhibited a dose-dependent antidiabetic effect, significantly reducing blood glucose levels and preventing body weight loss, with the 500 mg/kg dose showing superior efficacy. The extract also improved lipid profile parameters by lowering TC, TG, VLDL, and LDL levels, indicating its hypolipidemic potential. Histopathological studies further supported these findings, showing restoration of pancreatic islet architecture and  $\beta$ -cell regeneration, particularly at higher doses. Overall, these results suggest that *Bignonia gracilis* exerts antidiabetic effects through antioxidant activity, improved glucose metabolism, and pancreatic protection, highlighting its potential as a natural therapeutic agent for diabetes management.

#### IV. CONCLUSION

The present investigation conclusively demonstrates that the methanolic extract of *Bignonia gracilis* possesses significant antidiabetic, antioxidant, and hypolipidemic activities. The high extraction yield, rich phytochemical profile, and substantial phenolic and flavonoid contents contribute to its biological efficacy. The extract exhibited strong free radical scavenging activity and effectively reduced hyperglycemia in streptozotocin-induced diabetic rats in a dose-dependent manner.

Furthermore, *Bignonia gracilis* at 500 mg/kg showed pronounced improvement in blood glucose levels, body weight maintenance, and lipid metabolism, comparable to the standard drug glibenclamide. The absence of acute toxicity confirms its safety at therapeutic doses. These findings suggest that *Bignonia gracilis* may serve as a promising natural antidiabetic agent. However, further studies are required to isolate the active constituents, elucidate the exact mechanism of action, and validate its clinical potential.

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