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Original Article

Preliminary Phytochemical Screening and Pharmacological Evaluation of *Mundulea sericea* for Antidiabetic Activity

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ABSTRACT

Background: *Mundulea sericea* is a lesser-studied medicinal plant with potential pharmacological applications. Despite its traditional use, limited scientific reports are available on its phytochemical constituents and antidiabetic activity. Objectives: To perform preliminary phytochemical profiling, assess acute toxicity, and evaluate the antidiabetic potential of bark extracts of *Mundulea sericea*. **Materials and Methods:** Bark extracts were prepared using Soxhlet extraction with ethanol, hydroalcoholic mixture, and petroleum ether as solvents. Standard phytochemical screening tests were conducted, and Thin-Layer Chromatography (TLC) has been utilized to confirm the existence of bioactive compounds. Acute oral toxicity was assessed in Wistar rats in keeping with OECD guideline 423 at doses reaching 2000 mg/kg. Glibenclamide was the standard reference drug used to study antidiabetic activity in Streptozotocin (STZ) or Alloxan-induced diabetic models. **Results:** Phytochemical analysis confirmed the existence of alkaloids, glycosides, carbohydrates, proteins, amino acids, flavonoids, steroids, or tannins, with the ethanolic extract showing the highest yield (16.7%). TLC analysis revealed distinct R_f values for different constituents. Acute toxicity studies demonstrated no mortality or pathological abnormalities up to 2000 mg/kg. In diabetic models, the ethanolic extract produced significant reduction in Blood Glucose Levels (BGL), comparable to Glibenclamide, while the hydroalcoholic and petroleum ether extracts showed moderate effects. **Conclusion:** The findings indicate that *Mundulea sericea* bark extracts, particularly the ethanolic fraction, are safe and exhibit promising antidiabetic activity, supporting their potential as candidates for plant-based antidiabetic drug development.

Keywords: Alloxan, Antidiabetic activity, *Mundulea sericea*, Phytochemical screening, Soxhlet extraction, Streptozotocin.

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INTRODUCTION

High blood sugar levels that result in ineffective insulin secretion or activity are a hallmark of Diabetes Mellitus (DM), a chronic metabolic condition. Long-term effects of DM include retinopathy, neuropathy, nephropathy, and cardiovascular disease (Lin *et al*., 2020). Globally, diabetes prevalence has doubled over the past three decades, reaching approximately 14% of adults, with over 200 million cases currently in India alone (Modak and Dixit, 2007). This escalating health burden has amplified interest in safer, cost-effective antidiabetic therapies, particularly those derived from medicinal plants, which are rich in bioactive compoundslike alkaloids, triterpenoids, flavonoids, and phenolics (Patel and Hemalatha, 2012).

Among well-studied botanicals, *Tinospora cordifolia* has shown efficacy in lowering fasting blood glucose and improving glycemic control in both diabetic animal models and human subjects (Stanely and Menon, 2000). However, scientific exploration of many traditional species remains limited. *Mundulea sericea* (Fabaceae), a shrub traditionally used for diverse medicinal purposes, including antimicrobial, analgesic, antioxidant, and insecticidal applications, has received attention for antidiabetic activity (Sharma and Prajapati, 2019).

To bridge this gap, the present study undertakes preliminary phytochemical screening of *Mundulea sericea* bark extracts, examines acute oral toxicity, and assesses antidiabetic potential using both Streptozotocin- and Alloxan-induced diabetic models in Wistar rats. This investigation aims to provide foundational data on safety and efficacy, laying the groundwork for further exploration of *Mundulea sericea* as a natural antidiabetic agent.

MATERIALS AND METHODS

Plant Material

Mundulea sericea bark is collected from Akole, District Ahilyanagar (Maharashtra). For *Mundulea sericea* authentication.

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The plant's herbarium was made and delivered to the Biological Survey of India in Pune. The plant botanical identification has been confirmed with no. BSI/WRC/Iden.Cer/2024/1107240007343 (Figure 1).

Ethical considerations

Ethical considerations Experimental protocol was presented in front of the members of Institutional Animal Ethics Committee (IAEC) of the SNDCOP Yeola, and was approved by all members.

Extraction

The root portion of *Mundulea sericea*, which had been dried and coarsely ground, was extracted using petroleum ether, water, ethanol, and ethanol in a Soxhlet extractor. The residue was then refluxed with water. Petroleum ether extract (6.28%), water-ethanol extract (1.88%), and ethanol extract (2.94%) were produced by vacuum-drying each extract (Mazimba and Muzila, 2012).

Preliminary Phytochemical Screening

Preliminary phytochemical analysis of several extracts was conducted utilizing standard methods.

Test for Carbohydrates

Molish test: The extract solution was subjected to the addition of several drops of 15% ethanolic α-naphthol solution in a test tube. Next, the tube wall was carefully coated with 2 mL of pure sulfuric acid. Carbohydrates are indicated as a reddish-violet ring at the junction of two layers.

Fehling's test: A 1:1 mixture of Fehling's solutions A and B, consisting of 5 mL of extract solution and 5 mL of Fehling's solution, has been heated to boiling. There are reducing sugars present when a brick-red precipitate forms.

Test for Proteins

Biuret test: After being treated with 1 mL of 10% sodium hydroxide solution, the extract was boiled. The previously described mixture was mixed with a 0.7% copper sulfate solution. Proteins are present when a purple-violet color forms.

Millon's test: The sample has been tested with 2 mL of Millon's reagent. The emergence of a white precipitate signifies the existence of proteins or amino acids.

Test for Amino acids

Ninhydrin test: After treating the extract with the Ninhydrin reagent at a pH between 4 or 8, it was boiled. The color of purple suggests the presence of an amino acid.

Test for Steroids

Salkowski test: 10 mL of extract in 1 mL of chloroform contained 1 mL of pure sulfuric acid. Steroids are shown by the chloroform layer's reddish-brown color or acid layer's green fluorescence (Gangadevi and Chinnadurai, 2021).

Liebermann-Buchard test: After dissolving 10 mg of extract in 1 mL of chloroform, 2 mL of strong sulfuric acid has been added from the test tube's side, and then 1 mL of acetic anhydride. The junction becomes reddish violet when steroids are present.

Liebermann's test: The liquid was heated gently after adding a few mL of acetic anhydride and 2 mL of residual. 2 mL of concentrated sulfuric acid was introduced from the side of the test tube after the contents had cooled. Steroids were represented by the color blue.

Test for Glycosides

Anthraquinone glycosides

Borntrager's test: After adding diluted sulfuric acid to 33 mL of extract, it was boiled and filtered. The cooled filtrate has been mixed with an equal amount of benzene and thoroughly shaken. Following the separation of the organic layer, ammonia solution has been added. It becomes pink or red in the ammoniacal layer.

Cardiac glycoside

Keller-Killani test: A drop of concentrated sulfuric acid or 5% ferric chloride has been added to 2 mL of extract and glacial acetic acid. The intersection of the 2 liquid layers becomes reddish-brown while the upper layer becomes bluish green, signifying cardiac glycosides (Khyade and Waman, 2017).

Test for Saponins

Foam formation test: Saponins create stable foam when 1 mL of the extract solution is diluted with 20 mL of distilled water and stirred in a graduated cylinder for 15 min.

Test for Alkaloids

Dragendroff's test: 2 mL extract, 0.1 mL diluted hydrochloric acid, and 0.1 mL Dragendroff's reagent were combined in a test tube. Alkaloids are present when an orange-brown precipitate forms (Harborne, 1988).

Mayer's test: 0.2 mL of diluted hydrochloric acid, 0.1 mL of Mayer's reagent, and 2 mL of extracts have been added. When a yellowish buff precipitate appears, alkaloids are present.

Hager's test: 0.1 mL of Hager's reagent and 0.2 mL of diluted hydrochloric acid were added to two milliliters of extract and left to react. Alkaloids are indicated via the formation of a yellowish precipitate.

Test for Tannins and Phenolic Compounds

Ferric chloride test: 1 mL of a solution containing 5% ferric chloride was mixed with 5 mL of extract solution. Tannins are indicated by a greenish-black color.

Dilute nitric acid test: There were 2 mL of extract solution and a few drops of diluted HNO_3 solution, and the mixture was allowed to react. When a reddish-yellow color forms, tannins are present (Sasidharan and Lata, 2011).

Test for Flavonoids

Shinoda test: 5 mL (95%) ethanol, 0.5 g of magnesium turnings, and a few drops of strong hydrochloric acid were added to the extract to give it a pink color.

Lead acetate test: A few drops of 10% lead acetate have been added to the extract. When flavonoids are present, a yellow precipitate will occur.

Sodium Hydroxide test: Increasing amounts of sodium hydroxide have been applied to the extract. A yellow color was created, but it was removed when acid was added.

Test for Steroids

Salkowski test: After dissolving 10 mg of extract in 1 mL of chloroform, 1 mL of strong sulfuric acid was added. Steroids are shown by a reddish-brown color displayed through the chloroform layer or green fluorescence via acid layer (Tiwari and Kaur, 2011).

Thin Layer Chromatography (TLC)

The stationary phase in TLC was silica gel-G. A slurry of silica gel was coated on glass plates and activated by heating at 105°C for 30 min. Samples were applied with a capillary tube about 2 cm above the baseline and air-dried. To make sure the solvent did not cover the spots, the spotted plate was placed inside the chamber after it had been saturated with mobile phase for 30 min. After allowing solvent to rise by 10 to 15 cm, the plate has been taken out, dried, studied under a UV, or R_f values were computed (Agrawal and Soni, 2015).

$$Rf = \frac{\text{Distance traveled via solute from origin line}}{\text{Distance traveled via solvent from origin line}}$$

Pharmacological Activity

Animals

Standard laboratory conditions (temperature: 22°C, humidity: 50±10%, 12hr light/dark cycle) were used to maintain healthy male and female rats (180-210 g) in polypropylene cages (3 cages per group with 2 animals in each). The animals were provided unrestricted access to rat food pellets or tap water *ad libitum*. Before trial, the animals have been acclimatized for 10 days. Before experiment, animals were given free water and fasted for 12 hr.

Pharmacological Activity

Animals

Healthy Male and female rats, 8-10 weeks, weighing among 150-180 g, were acclimatized for 10 days under standard laboratory conditions (22 ± 3°C temperature, 50-60% humidity, and a 12 hr light/dark cycle). The animals have been fasted overnight before to treatment but had free access to water.

Acute Toxicity Study

An acute oral toxicity study has been conducted on ethanolic, petroleum ether, and water-ethanol bark extracts of *Mundulea sericea* in Wistar albino female rats following the OECD Guideline 423 (Acute Toxic Class Method). Ethanolic, Petroleum ether, and Water-Ethanol extracts of *Mundulea sericea* were administered orally at 2000 mg/kg by gavage, while controls received distilled water. Each group had three rats. Observations were made for 30 min post-dosing, then at 4 hr, 24 hr, and daily for 14 days. Body weight has been recorded on Days 0, 7, and 14. On Day 15, necropsy of liver, kidney, and stomach was performed (Gothe and Anjankar, 2023).

Induction of diabetes in Wister albino rats

Male Wistar albino rats, 180-250 g, 6-8 weeks age, have been fasted for 12 hr before being given diabetes. Alloxan (150 mg/kg) dissolved in 0.1M cold citrate buffer (pH 4.5) and Streptozotocin (60 mg/kg) diluted in normal saline were injected intraperitoneally to induce diabetes. After injection, a 5% glucose solution was administered for 24 hr to avoid hypoglycemia. Rats exhibiting fasting BGL exceeding 250 mg/dL after 72 hr have been classified as diabetic or included in study (Algul and Ozcelik, 2025).

Animal Experimental Design for Alloxan and Streptozotocin induced model

The animals have been categorized into six groups, each including 6 rats, for both the Alloxan and Streptozotocin-induced diabetic models. Group I: Saline solution. Group II: The diabetic control group was administered distilled water. Group III: Glibenclamide (5 mg/kg) was given orally to diabetic animals. The oral dose for Groups IV, V, and VI was 200 mg/kg. *Mundulea sericea* bark extracts in ethanol, petroleum ether, and water-ethanol. For 21 days in a row, each treatment was given orally once daily. On Days 0, 7, 14, and 21, fasting BGL were recorded in every group for the diabetes animals induced by Streptozotocin and Alloxan (Martín *et al*., 2023).

Histopathological Study

At the end of the 21-day treatment, rats from both Alloxan- and Streptozotocin-induced diabetic groups were sacrificed. Surgery removed pancreatic tissues, washed them in saline, and stored them in 10% neutral buffered formalin. After dehydration with graded alcohols, tissues were washed in xylene, fixed in paraffin, and sectioned at 7µm using a microtome. H&E-stained sections were examined microscopically to determine pancreatic tissue structural integrity (Radenkovic and Prostran, 2016).

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No. BSI/WRC/Iden. Cer./2024/1107240007343 Date : 18.7.2024

CERTIFICATE

This is to certify that **Ms. Rupali Balasaheb Kote, Plant Researcher from Pravara Rural Education Societys, Institute of Pharmacy, Loni, Tal.Rahata, Dist-Ahmednagar-413713.** The plant specimen /~~specimens~~ brought by aforesaid is/ ~~are~~ identified and authenticated as :

Specimen No.	Plant Name	Family
RBKMS-1	**Mundulea sericea** (Willd.) A.Chev.	**Fabaceae**

* **Note** : 1. Avoid plastic wrappers for Herbarium sheets, to protect our environment.
2. Always send specimens in dry form.
3. Mission LiFE -- "Save Water - Save Life "
4. Mission LiFE -- "Conserve Plants - Conserve Biodiversity"
5. Certificate is issued to **Ms. Rupali Balasaheb Kote,** for her Research purpose.
6. Protect Biodiversity for our future.
7. Protect Environment to Protect our Life.

18/07/2024.
(D.L.Shirodkar)
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Figure 1: Authentication of of *Mundulea sericea*.

Statistical Analysis

One-way Analysis of Variance (ANOVA) has been conducted to estimate significant differences. Statistical significance has been established at $p<0.05$, with $p<0.01$ evaluated via "Dunnett's multiple comparison test" to evaluate treatment groups against the control.

RESULTS

Preliminary Phytochemical Screening

The initial phytochemical analysis of *Mundulea sericea* bark extracts verified the existence of carbohydrates, proteins, alkaloids, amino acids, steroids, terpenoids, glycosides, flavonoids, and tannins; however, saponins have not been detected, as indicated in Table 1. All three extracts (ethanol, hydro-alcoholic, and petroleum ether) demonstrated a wide range of phytoconstituents like tannins, flavonoids, alkaloids, or terpenoids are recognized for their glucose-lowering propertiesand therefore maycontribute significantly to antidiabetic effects of the extract

Acute Oral Toxicity Study

The acute oral toxicity research demonstrated that the ethanolic extract, petroleum ether extract, and water-ethanol extract of *Mundulea sericea* are non-toxic at a dosage of 2000 mg/kg. No fatalities or clinical indications of damage were noted. All animals exhibited normal weight gain, and no pathological alterations were observed in the major organs. According to OECD Guideline 423, the LD_{50} value is projected to exceed 2000 mg/kg for each extract, signifying a significant safety margin for oral administration.

Antidiabetic Activity

Alloxan (150 mg/kg, i.p.) or streptozotocin (60 mg/kg, i.p.) were used to develop diabetes in Wistar rats. After 72 hr, rats with fasting glucose levels >250 mg/dL have been included in the research. BGL were significantly reduced after 21 days of Glibenclamide (5 mg/kg) treatment when compared to diabetic controls. Among the extracts of *Mundulea sericea*, the ethanolic extract produced the strongest anti-hyperglycemic effect, nearly comparable to Glibenclamide, while the water-ethanol and petroleum ether extracts showed moderate activity in both models, as demonstrated in Tables 2 and 3, Figures 2 and 3, Graphs 1 and 2.

Table 1: Preliminary Phytochemical Screening of *Mundulea sericea* Bark Extracts.

Sl. No.	Chemical constituent	Chemical Tests	Observations		
			Ethanol extract	Hydro-Alcoholic Extract	Petroleum Ether extract
1.	Tests for carbohydrates	Molish Test	+	+	+
		Fehling Test	+	+	+
		Benedict Test	-	-	-
2.	Test for Proteins	Biuret test	+	+	+
		Millions test	+	-	-
3	Test for amino acid	Ninhydrin test	+	+	+
4.	Tests for Steroids	Salkowaski test	+	+	+
		Libermann Burchard test	+	-	-
		Libermann test	+	+	+
5.	Tests for Terpenoids	Salkowaski test	+	+	+
6.	Test for Glycosides	Borntrager's Test	+	+	+
		Killer- Killani Test	+	+	+
7.	Test for Saponin	Foam test	-	-	-
8.	Tests for Flavonoids	Shinoda test	-	+	+
		Lead acetate Test	+	+	+
		Sod-hydroxide Test	+	+	+
9.	Tests for Alkaloids	Mayers Test	+	+	+
		Hager's Test	+	+	-
		DragendorffTest	+	+	+
10.	Test for Tannins and Phenolic compounds	Ferric chloride Test	+	+	+
		Lead acetate	+	+	+

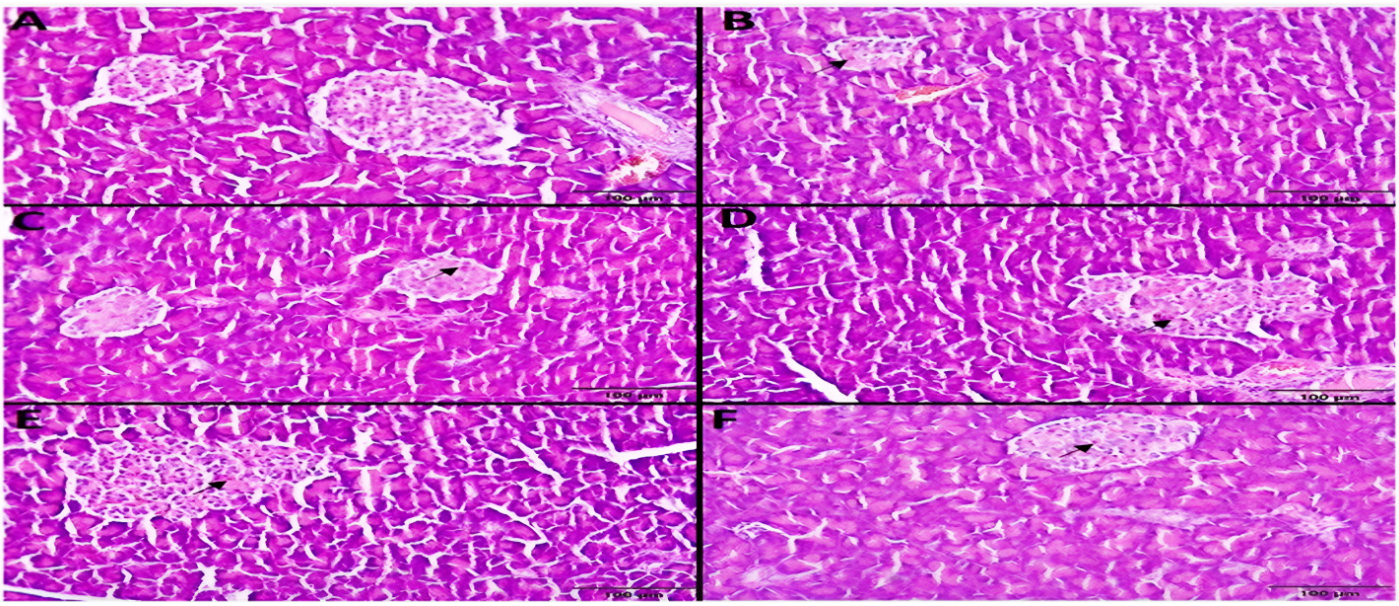


Figure 2: Microscopic image of STZ Induction pancreatic tissue A. Control Vehicle B. Diabetic Control C. Petroleum ether Extract. D. Water-Ethanol Extract E. Ethanol Extract F. Standard.

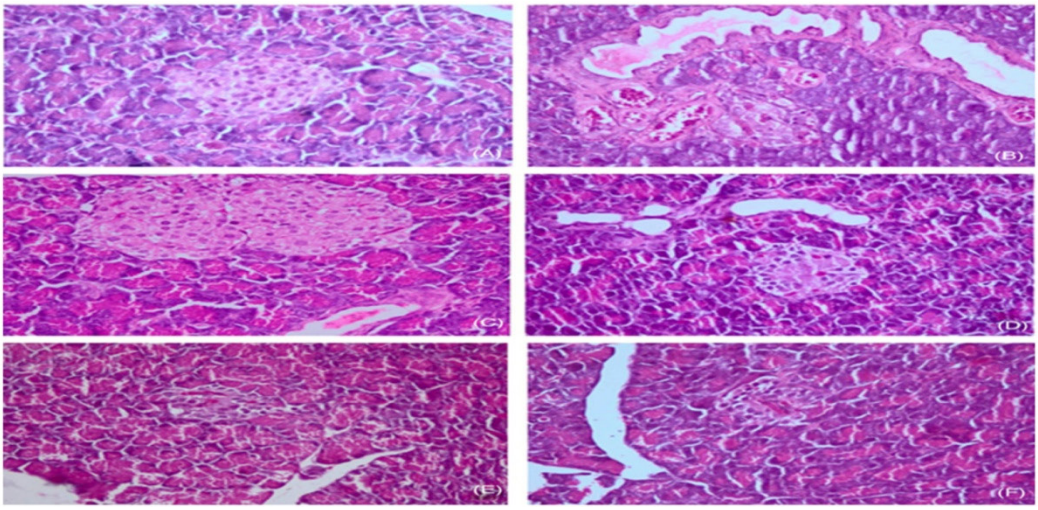


Figure 3: Microscopic image of AlloxanInduction pancreatic tissue A. Control Vehicle B. Diabetic Control C. Petroleum ether Extract. D. Water-Ethanol Extract E. Ethanol Extract F. Standard.

Table 2: Effect of *Mundulea sericea* Extracts on Blood Glucose in Diabetic Rats in Streptozotocin (STZ) Induced Diabetic Model.

Sl. No.	Group (*n*=6)	Day 0	Day 7	Day 14	Day21
1.	Normal Control (Vehicle)	88.16±0.4	86.8±0.4***	89±0.3***	90±0.44***
2.	Diabetic Control (STZ)	92.16± 0.3	322±0.4	360.66±0.4	395.5±0.22
3.	Standard (Glibenclamide)	90±0.25	189.3±0.4**	140.1±0.30***	110.33±0.42***
4.	Test 1: Ethanolic Extract	92.66±0.33	239.1±0.28**	175.5±0.22***	129.16±0.30***
5.	Test 2: Petroleum Ether Extract	88±0.3	260.3 ±0.3*	200.3±0.3*	149.5±0.22*
6.	Test 3: Water-Ethanol Extract	88.5±0.22	250.16±0.4**	190.5±0.42**	140.6±0.33***

ns- Nonsignificant, * p<0.05, **<0.01 Values are Mean±SEM, n=6, when compared with Control by using one way ANOVA followed by Dunnette's multiple comparison test.

Histopathological Study

Histopathological examination of pancreatic tissue revealed that the normal control group showed intact pancreatic structure with healthy islets and abundant β-cells. The diabetic control groups exhibited severe islet damage, including shrinkage, necrosis, and loss of β-cell integrity. Treatment with Glibenclamide resulted in partial recovery of islet morphology. Among the extracts, the ethanolic extract of *Mundulea sericea* showed the strongest restorative effect, subsequently, the water-ethanol extract, while the petroleum ether extract exhibited minimal recovery.

DISCUSSION

This study examined the phytochemical content, acute toxicity, and antidiabetic efficacy of *Mundulea sericea* bark extracts in diabetic mice produced through Streptozotocin and Alloxan. Bioactive substances such as flavonoids, alkaloids, tannins, terpenoids, and glycosides were found by phytochemical screening. These substances have been shown to improve glucose absorption, enhance insulin secretion, or protect pancreatic β-cells from oxidative damage.

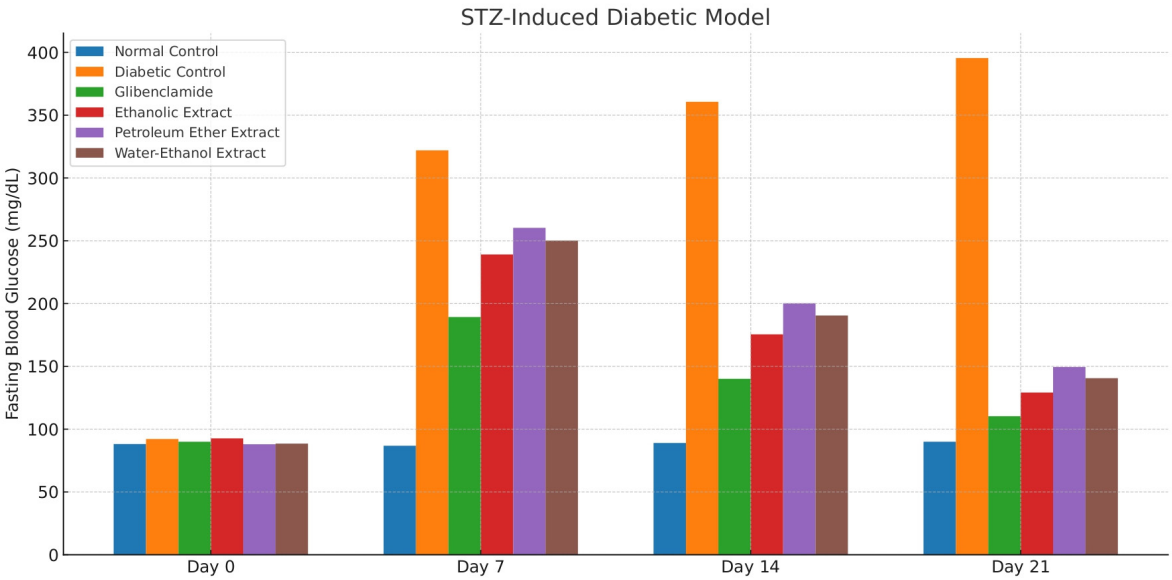
Ethanolic extract demonstrated most significant reduction in BGL in either diabetic models, suggesting higher concentration or better solubility of active phytochemicals in ethanol. The hydro-alcoholic extract showed a moderate effect, while the petroleum ether extract was least effective. These results are consistent with the polarity-dependent extraction of phenolic and flavonoid compounds, which possess antioxidant and insulinotropic properties.

The extracts' safety up to 2000 mg/kg was validated by the acute toxicity data, indicating a high therapeutic margin. Histopathological examination supported the biochemical findings, where the ethanolic extract showed nearly normal pancreatic morphology, comparable to the standard drug Glibenclamide. This suggests possible β-cell regeneration or protection against oxidative and inflammatory damage caused by diabetes.

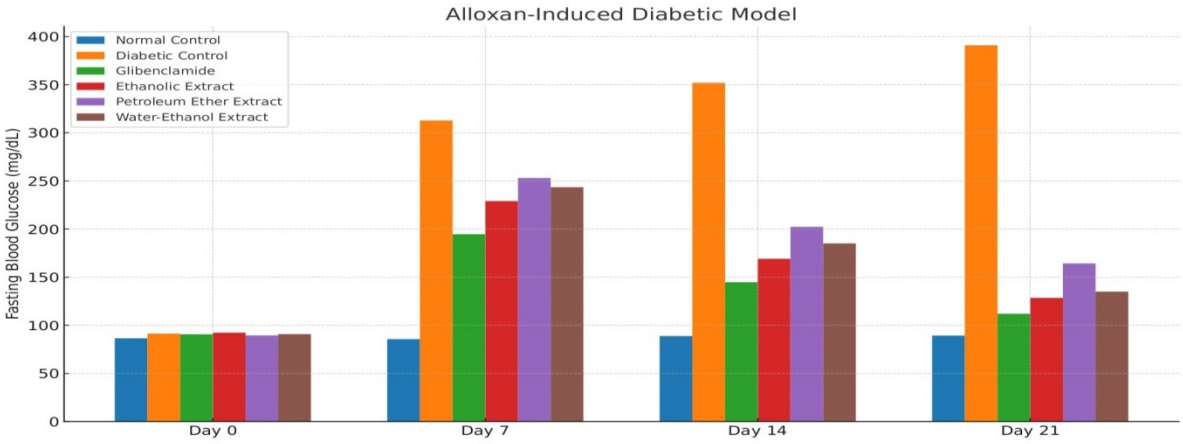
Table 3: Effect of *Mundulea sericea* Extracts on Blood Glucose in Diabetic Rats in Alloxan Induced Diabetic Model.

Sl. No.	Group (*n*=6)	Day 0	Day 7	Day 14	Day21
1.	NormalControl (Vehicle)	86.5±0.2	85.66±0.19***	88.83±0.3***	89.33±0.3***
2.	Diabetic Control (Alloxan)	91.33±0.2	312.83±0.4	352±1.94	391±1.01
3.	Standard (Glibenclamide)	90.66±0.91	194.66±0.6**	144.8±0.4***	112±0.5***
4.	Test 1: Ethanolic Extract	92.33±0.2	229.1±1.34**	169.1±0.60***	128.5±0.42***
5.	Test 2: Petroleum Ether Extract	89.5±0.34	253.1±0.8*	202.33±0.98*	164.3±1.4*
6.	Test 3: Water-Ethanol Extract	90.83±1.13	243.5±1.5**	185.1±0.47**	135±0.36***

ns- Nonsignificant, * $p<0.05$, ** $p<0.01$ Values are Mean±SEM, n=6, when compared with Control by using one way ANOVA followed by Dunnette's multiple comparison test.



Graph 1: Effect of *Mundulea sericea* Extracts onBlood Glucose in Diabetic Rats in Streptozotocin (STZ) Induced Diabetic Model.



Graph 2: Effect of *Mundulea sericea* Extracts on Blood Glucose in Diabetic Rats in Alloxan Induced Diabetic Model.

The overall findings indicate that the ethanolic extract of *Mundulea sericea* possesses potent antihyperglycemic activity, likely mediated through synergistic effects of its phytoconstituents. Further studies involving isolation and characterization of the active principles, along with elucidation of molecular mechanisms, are warranted to substantiate these results.

CONCLUSION

The bark extracts of *Mundulea sericea* were shown to have antidiabetic effects in both Streptozotocin-induced and Alloxan-induced diabetic models. The existence of bioactive substances known to have antioxidant and glucose-lowering properties, namely flavonoids, alkaloids, tannins, terpenoids, steroids, as well as glycosides, was confirmed by preliminary phytochemical analysis. Acute oral toxicity studies established the safety of the ethanolic, petroleum ether, and water-ethanol extracts, with LD_{50} values greater than 2000 mg/kg, demonstrating wide safety margin for oral administration.

In both diabetic models, the ethanolic extract exhibited the most potent antihyperglycemic effect, comparable to the standard drug Glibenclamide. The water-ethanol extract showed moderate efficacy, while the petroleum ether extract produced minimal effects. Histopathological evaluation further supported these findings, as the ethanolic extract offered the greatest protection and restoration of pancreatic islet architecture, highlighting its role in preserving β-cell integrity. These effects can be attributed to antioxidant activity, insulinotropic mechanisms, enhanced glucose utilization, and reduced hepatic glucose output mediated by the phytoconstituents.

Overall, the results suggest that *Mundulea sericea*, particularly its ethanolic extract, holds significant promise as a safe and effective natural antidiabetic agent. Future studies focusing on isolation of active compounds, mechanistic pathways, and clinical validation are warranted to establish its therapeutic relevance in diabetes management.

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ABBREVIATIONS

DM: Diabetes mellitus; **TLC:** Thin-layer chromatography; **OECD:** Organisation for Economic Co-operation and Development; **STZ:** Streptozotocin; **IAEC:** Institutional Animal Ethics Committee; **H&E:** Hematoxylin and eosin; **SEM:** Standard error of the mean; **ANOVA:** One-way analysis of variance; **ns:** Non-significant.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

FUNDING

This research, authorship, and publication received no financial assistance from any funding agency or organization.

ETHICAL STATEMENT

Ethical considerations Experimental protocol was presented and approved by Institutional Animal Ethics Committee (IAEC) of the SNDCOP Yeola.

AUTHOR CONTRIBUTIONS

Ms Kote: Planning, conceptualization, data Collection, and paper writing.

Dr. Dhananjay M. Patil: Supervision, Project administration.

SUMMARY

The study focuses on the identification of bioactive constituents and the evaluation of antidiabetic potential of bark extracts of *Mundulea sericea* (Fabaceae). The plant, traditionally used in folk medicine, was subjected to extraction using petroleum ether, hydroalcoholic mixture, and ethanol through Soxhlet apparatus. Carbohydrates, proteins, flavonoids, alkaloids, amino acids, steroids, terpenoids, glycosides, and tannins were found in preliminary phytochemical study, but saponins were not. The most varied profile of active ingredients was shown by the ethanolic extract. According to OECD Guideline 423, acute oral toxicity trials up to 2000 mg/kg demonstrated no mortality or behavioral abnormalities, indicating that the extracts are safe for further pharmacological evaluation. In STZ and Alloxan-induced diabetic rat models, the ethanolic extract markedly reduced BGL in comparison to diabetic control, yielding outcomes that were almost identical to those of the common drug Glibenclamide. The hydroalcoholic and petroleum ether extracts demonstrated moderate antidiabetic effects. Histopathological examination of pancreatic tissues revealed that the ethanolic extract showed marked protection and regeneration of β-cells, while the hydroalcoholic extract provided moderate improvement. The petroleum ether extract exhibited minimal restoration. The research concludes that the ethanolic extract of *Mundulea sericea* possesses potent antidiabetic activity and a high safety margin, likely due to its flavonoid and phenolic constituents with antioxidant and insulin-enhancing properties. Hence, *Mundulea sericea* can be considered a promising candidate for developing plant-based antidiabetic formulations.

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