



# Evaluation of Antidiabetic Potential of *Lagerstroemia speciosa* Ethanolic Green and Red Leaf Extracts in Comparison with Glibenclamide in Diabetic Mice

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**Abstract:** Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by elevated blood glucose levels (hyperglycemia) either from inadequate insulin synthesis or impaired insulin sensitivity. Diabetes mellitus ranks among the top ten major causes of mortality in the 21st century. By 2045, the International Diabetes Federation (IDF) estimates that almost 783 million persons, or 1 in 8, would have diabetes, representing a 46% rise. Hematological markers, including total white blood cell (WBC) counts, lymphocytes, and neutrophils, have been associated with the onset of type-2 diabetes. Increased white blood cell counts correlate with insulin resistance and pancreatic beta-cell impairment. *Lagerstroemia speciosa*, a tropical and subtropical species indigenous to Asia, is a viable contender for the Western Ghats, a biodiversity hotspot in India, especially around Coimbatore. The experimental animals were divided into six groups with n=6 animals. The groups III, IV, V, and VI are the experimental groups, orally fed with LELE Low Dose and High Dose (250 and 500 mg/kg body weight), and the II the standard groups treated with glibenclamide. The after 21<sup>st</sup> day evaluated for the estimation of biochemical parameters and haematological parameters. A histopathological evaluation was also performed. The results show that the treated groups showed a significant (\*\*\*) $P < 0.001$ , (\*\*) $P < 0.01$ , (\*) $P < 0.05$ ) elevation compared to the control group. Effective diabetes management frequently necessitates regular complete blood counts, illustrating the need of early identification and management of anemia and obesity in diabetic patients in primary care environments. Plants provide an appropriate substitute to manufactured pharmaceuticals, acting as possible sources of hypoglycemic drugs. Conventional medicinal systems extensively utilize these botanicals for diabetes prevention. Herbs, such as the decorative and medicinal herb *L. speciosa*, have demonstrated potential antidiabetic properties. Furthermore, anthocyanins, which are polyphenolic substances present in food, may significantly contribute to the prevention of type-2 diabetes.

**Index Terms** – Anthocyanin, *Lagerstroemia speciosa*, Herbs, Glibenclamide, Diabetes Mellitus, hypoglycaemic, Pancreatic beta cells.

## I. INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic condition that leads to high blood glucose levels (Hyperglycemia) due to either insufficient insulin production or poor insulin responsiveness (Kerner and Bruckel, 2014). As a global disease, diabetes mellitus is increasingly prevalent each year and continues to be a significant epidemic with severe health and socioeconomic impacts. It is now one of the top 10 leading causes of death in the 21<sup>st</sup> century (Saeedi *et al.*, 2019). By 2045, projections from the International Diabetes Federation (IDF) suggest that approximately 783 million adults, or 1 in 8, will be living with diabetes, marking a 46% increase. Diabetes is a chronic metabolic disorder characterized by elevated blood sugar levels, necessitating long term management to prevent complications and maintain glucose balance (Elangovan *et al.*, 2019). Hematological parameters such as total white blood cell (WBC) counts, lymphocytes, and neutrophils have been linked to the development of type-2 diabetes. Elevated WBC counts are associated with insulin resistance and pancreatic beta-cell dysfunction (Twig *et al.*, 2013). This association suggests the importance of routine full blood counts in managing diabetes (Al Salhen and Mahmoud, 2017).

Several medications are available for managing treating diabetes, but none have yet achieved a complete cure for the disease (Camille *et al.*, 2024). Plants have long been used in traditional medicine to prevent diabetes and may offer a potential source of hypoglycemic agents as alternative to synthetic drugs (Willcox *et al.*, 2021). Herbal therapies have shown promise in diabetes management due to their ability to influence various metabolic pathways involved in glucose regulation (Choudhury *et al.*, 2023). These plants contain bioactive compounds with proven antidiabetic effects, which can help control blood sugar levels and reduce the risk of diabetes related complications. Traditional medicine has utilized herbal plants for centuries for their antidiabetic properties (Abu and Talib, 2021).

*Lagerstroemia speciosa*, a tropical and subtropical plant native to Asia, is a promising candidate for the Western Ghats, one of India's biodiversity hotspots, particularly around Coimbatore, Tamil Nadu. Known as the Pride of India and Poomaruthu in Tamil (Ganesan and Sujatha, 2024). This plant's leaves are rich in corosolic acid, which has demonstrated antidiabetic properties, and also contain significant amounts of tannins (Hayashi *et al.*, 2002). Its pharmacological benefits include antidiabetic, antiobesity, antimicrobial, hypolipidemic, antioxidant, and anticancer effects (Al-Snafi, 2019). This study aims to evaluate the antidiabetic potential of ethanolic extracts of *L. speciosa* leaves, both green (LEGLE) and red (LERLE), in alloxan monohydrate induced diabetic female albino rats.

## II. MATERIALS AND METHODS

### 2.1 Collection and Authentication of Plant Samples

The green and red leaves of *L. speciosa* were collected from PG Girls Hostel, at Government Arts College (Autonomous), Coimbatore District, Tamil Nadu, India. The identification and authentication of the plant were conducted by the Botanical Survey of India, Coimbatore, and voucher specimens numbered BSI/SRC/5/23/2020/Tech/50 were deposited in the Department of Zoology at Government Arts College (Autonomous), Coimbatore. The collected leaves were washed, shade dried for two weeks, and then ground into a powder (100g). This powder was soaked in ethanol (1000 ml) and stirred intermittently for four days to ensure thorough solubilization. The resulting extract was then filtered through Whatman No.1 filter paper and left to dry in a plastic tray at room temperature (Kongathip, 1994).

### 2.2 Experimental Animals

Thirty-six female Wistar albino rats, aged 10 to 14 weeks and weighing between 150 to 250 grams, were obtained from KMCH College of Pharmacy, Coimbatore. These rats were divided into six groups, with six rats in each group. All animals were housed in the departmental animal facility at Kovai Medical College Hospital (KMCH) under controlled conditions (21-24°C, with a 12-hour light and 12-hour dark cycle). They had free access to standard rat chow and reverse osmosis water throughout the study, except as noted otherwise. Approval for the study was granted by the Institutional Animal Ethics Committee of KMCH College of Pharmacy, Coimbatore (Approval No: KMCRET/ReRc/Ph. D/24/2021). The animal experiments and procedure adhered to the guidelines set by the Institutional Animal Ethical Committee (IAEC) and standard regulations.

### 2.3 Acute Toxicity Studies

The toxicological properties of *L. speciosa* leaf extracts were assessed following OECD Guidelines No. 425 in a single-dose, 14-day acute oral toxicity study. Six female albino rats were fasted overnight before receiving a single oral dose of 2000 mg/kg of the *L. speciosa* leaf extract. The rats were closely monitored for changes in general behaviour, adverse clinical signs, and mortality. Observations were made during the first hour and then at regular intervals for 48 hours. No significant changes were noticed in their movement patterns, physical or behavioural parameters, general appearance, salivation, or lacrimation (Alkahtani *et al.*, 2022).

### 2.4 Experimental induction of diabetes in rats

In this study, albino female rats were treated intraperitoneally with alloxan monohydrate (125 mg/kg) dissolved in 0.9% saline after a 15-hour fast. The normal control rats received an intraperitoneal injection of 0.9% saline. To prevent hypoglycemia, the rats were provided with a 5% glucose solution for the following 24 hours. After 72 hours, rats with fasting blood glucose levels exceeding 250 mg/dl were classified as diabetic and included in the study (Preetha *et al.*, 2013).

The 36 female Wistar albino rats, each weighing 100-150 g, were sourced from KMCH College of Pharmacy, Coimbatore, and divided into six groups, with six rats per group. They were housed in standard polypropylene cages in the animal facility of KMCH College of Pharmacy. The rats were fed a formulated pellet diet and had access to water ad libitum. After 21 days, all the animals were euthanized using mild ether anesthesia.

Group I	:	Control animals (Normal saline 1 ml/200g BW for 21 days)
Group II	:	Positive Control (Diabetes + Glibenclamide)
Group III	:	Diabetic + LEGLE (Low dose: 250 mg/ 1 ml BW for 21 days)
Group IV	:	Diabetic + LEGLE (High dose: 500 mg/ 1 ml BW for 21 days)
Group V	:	Diabetic + LERLE (Low dose: 250 mg/ 1 ml BW for 21 days)
Group VI	:	Diabetic + LERLE (High dose: 500 mg/ 1 ml BW for 21 days)

### 2.5 Collection of Blood

Blood was collected from the retro-orbital plexus of rats under mild ether anaesthesia at the end of the experimental period. The collected blood was then centrifuged to separate the serum for biochemical analysis (Onyemelukwe *et al.*, 2020).

### 2.6 Haematological studies

Haematological parameters such as total white blood cell (WBC) counts, lymphocytes, and neutrophils have been linked to the development of type-2 diabetes (Twig *et al.*, 2013). These parameters suggest the importance of routine full blood counts in diabetes management (Al Salhen and Mahmoud, 2017). Packed cell volume (PCV) was measured using a microhematocrit reader. The total hemoglobin concentration in the blood samples was determined using the cyanmethemoglobin method. Additionally, red blood cell (RBC) count, mean cell hemoglobin (MCH), mean cell volume (MCV), and mean cell hemoglobin concentration (MCHC) were also assessed (Adeyi *et al.*, 2012).

### 2.7 Biochemical parameters

#### Determination of Blood Glucose in Diabetic Rats

The blood glucose level was measured using the tail tipping method after 12-16 hour fast. A small amount of blood (2-3 drops) was obtained by gently squeezing the tail and placed on the test area of a glucose strip. The strip was then inserted into a digital glucometer to determine the blood glucose level. This measurement was taken on the 21st day (Suresha *et al.*, 2013).

## 2.8 Measurement of insulin and HbA1c

The serum samples were analysed for insulin levels using enzyme-linked immunosorbent assay (ELISA) kit (AccuBind ELISA Microwells, Monobind Inc, USA). Additionally, HbA1c levels were measured in the blood samples collected from the experimental animals (Al Jamal, 2019).

## 2.9 Histopathology

Kidney tissue sections were fixed in 4% buffered formalin, then dehydrated through a graded series of alcohol and embedded in paraffin. The samples were cut into 4 µm thick sections, which were subsequently stained with hematoxylin and eosin (H&E). The stained slides were examined and imaged using a light microscope (Lillie and Fulman, 1967).

## 2.10 Statistical Analysis

For each group (n=6), values are presented as Mean ± SEM. Statistical analysis was performed using one-way ANOVA followed by Dunnett's post-hoc test. The control group was compared with standard Group II (\*\*\*)  $P < 0.001$ . The treated groups (III, IV, V, VI, and VII) were compared with Group I, with significance levels denoted as \*\*\*  $P < 0.001$ , \*\*  $P < 0.01$ , \*  $P < 0.05$ .

## III. RESULTS

### 3.1 Result 1. Biochemical Examination

Diabetes was induced by administering an alloxan injection, and the study was conducted over 21 days, with medication beginning the day after diabetes confirmation. The body weight profile was monitored from day one thorough day 19, during which the experimental animals were fed a high-fat diet. Diabetes was induced over a three-day period with alloxan.

The control group was received saline treatment. The negative control group exhibited a 33% increase in body weight, while the positive control group showed a 7% decrease in body weight. Experimental groups treated with low concentrations of leaf extracts from LEGLE and LERLE (250 mg/ml/100 g BW) experienced body weight reductions of 12% and 11%, respectively. In contrast, high concentration of LEGLE and LERLE leaf extracts (500 mg/ml/100 g BW) resulted in body weight reduction of 8% and 18%, respectively.

**Table 1 Dose response study of *Lagerstroemia speciosa* in alloxan induced diabetic rats**

Groups	Blood Glucose Level (mg/dl)	HbA1C (%)
Group I Control	127.40±1.31	2.20
Group II D + Glibenclamide	125.27±1.09 <sup>ns</sup>	2.63
Group III D + LEGLE LD	139.96±1.45 <sup>ns</sup>	3.60
Group IV D + LEGLE HD	134.70±2.01 <sup>ns</sup>	2.81
Group V D + LERLE LD	136.07±1.96 <sup>ns</sup>	3.31
Group VI D + LERLE LD	128.30±1.25 <sup>ns</sup>	2.68

**Statistical comparison:** Each group (n=6), each value represents Mean  $\pm$  SEM. One way ANOVA, followed by Dunnett comparison was performed. (\*\*\*) $P<0.001$ ) control group was compared with std group-III. (\*\*\*) $P<0.001$ , \*\*) $P<0.01$ , \*) $P<0.05$ ) treated groups IV, V, VI and VII was compared With Group I.

### 3.2 Result II - Measurement of insulin and HbA1c

The blood sample from the positive control group II shows a glucose level of  $125.27\pm 1.09^{ns}$  and a significantly reduced HbA1C level of 2.63%. The experimental groups treated with green and red leaf extracts also showed reductions in HbA1c levels. Specifically, the red leaf extract demonstrated lower HbA1C level of 3.31% at a low concentration (Group V) and 2.68% at a high concentration (Group VI). Among the extracts, LERLE proved to be more effective than LEGLE in reducing HbA1C levels.

**Table 2 The haematological cell counts parameters in *Lagerstroemia speciosa* in alloxan induced diabetic rats**

Groups	Control	Diabetic + Glibenclamide	Diabetic + LEGLE L. D	Diabetic + LEGLE H. D	Diabetic + LERLE L. D	Diabetic + LERLE H. D
HB	13.23 $\pm$ 1.70 3	12.6 $\pm$ 0.5568 <sup>ns</sup>	13.23 $\pm$ 1.139 <sup>ns</sup>	13.1 $\pm$ 0.2646 <sup>ns</sup>	12.57 $\pm$ 0.393 <sup>ns</sup>	13.67 $\pm$ 0.393 <sup>ns</sup>
PCV	41.2 $\pm$ 4.735	38.17 $\pm$ 1.419 <sup>ns</sup>	40 $\pm$ 3.055 <sup>ns</sup>	40 $\pm$ 1.058 <sup>ns</sup>	38.27 $\pm$ 1.048 <sup>ns</sup>	42.33 $\pm$ 1.178 <sup>ns</sup>
WBC Count	9.5 $\pm$ 0.5568	13.03 $\pm$ 1.368 <sup>ns</sup>	10.83 $\pm$ 0.881 <sup>ns</sup>	11.57 $\pm$ 0.233 <sup>ns</sup>	13.5 $\pm$ 1.179*	11.6 $\pm$ 1.069 <sup>ns</sup>
Polymorphs	6.667 $\pm$ 1.76 4	4.333 $\pm$ 1.202 <sup>ns</sup>	8 $\pm$ 1.528*	5 $\pm$ 1.732 <sup>ns</sup>	7.667 $\pm$ 1.764 *	5.667 $\pm$ 0.881 <sup>ns</sup>
Lymphocytes	84.33 $\pm$ 2.40 4	90.33 $\pm$ 2.028 <sup>ns</sup>	84 $\pm$ 3.055 <sup>ns</sup>	87.33 $\pm$ 1.856 <sup>ns</sup>	83 $\pm$ 1.528 <sup>ns</sup>	87.33 $\pm$ 1.333 <sup>ns</sup>
Monocytes	6 $\pm$ 2.082	3.333 $\pm$ 1.333 <sup>ns</sup>	5 $\pm$ 1.155 <sup>ns</sup>	4 $\pm$ 1.528 <sup>ns</sup>	6.333 $\pm$ 0.333 <sup>ns</sup>	3.667 $\pm$ 1.667 <sup>ns</sup>
Eosinophils	3 $\pm$ 0.5774	2 $\pm$ 0.5774 <sup>ns</sup>	3 $\pm$ 1.528 <sup>ns</sup>	3.667 $\pm$ 0.881 <sup>ns</sup>	3.12 $\pm$ 1 <sup>ns</sup>	3.333 $\pm$ 0.881 <sup>ns</sup>
RBC Count	6.293 $\pm$ 0.97 5	5.03 $\pm$ 0.0953 <sup>ns</sup>	5.477 $\pm$ 0.348 <sup>ns</sup>	5.737 $\pm$ 0.184 <sup>ns</sup>	5.21 $\pm$ 0.1102 <sup>ns</sup>	5.26 $\pm$ 0.1358 <sup>ns</sup>
MCV	70.8 $\pm$ 5.351	75.77 $\pm$ 0.384 <sup>ns</sup>	74.27 $\pm$ 2.385 <sup>ns</sup>	76.2 $\pm$ 1.35 <sup>ns</sup>	73.43 $\pm$ 1.268 <sup>ns</sup>	74.97 $\pm$ 0.887 <sup>ns</sup>
MCH	24.23 $\pm$ 2.33 8	24.57 $\pm$ 0.290 <sup>ns</sup>	25.23 $\pm$ 0.240 <sup>ns</sup>	25.5 $\pm$ 0.9074 <sup>ns</sup>	24.57 $\pm$ 0.753 <sup>ns</sup>	24.43 $\pm$ 0.731 <sup>ns</sup>
MCHC	32.17 $\pm$ 0.21 8	32.4 $\pm$ 0.3512 <sup>ns</sup>	33.3 $\pm$ 0.5686 <sup>ns</sup>	31.47 $\pm$ 0.611 <sup>ns</sup>	31.77 $\pm$ 0.819 <sup>ns</sup>	32.67 $\pm$ 0.666 <sup>ns</sup>
Platelet Count	524.3 $\pm$ 37.6 4	580.7 $\pm$ 56.02 <sup>ns</sup>	617.3 $\pm$ 7.535 <sup>ns</sup>	611 $\pm$ 14.5 <sup>ns</sup>	667.3 $\pm$ 24.57 <sup>ns</sup>	700 $\pm$ 35.230 *

**Statistical comparison:** Each group (n=6), each value represents Mean  $\pm$  SEM. One way ANOVA, followed by Dunnett comparison was performed. (\*\*\*) $P<0.001$ ) control group was compared with std group-III. (\*\*\*) $P<0.001$ , \*\*) $P<0.01$ , \*) $P<0.05$ ) treated groups IV, V, VI and VII was compared With Group I.

### 3.3 Result III - Haematological examination

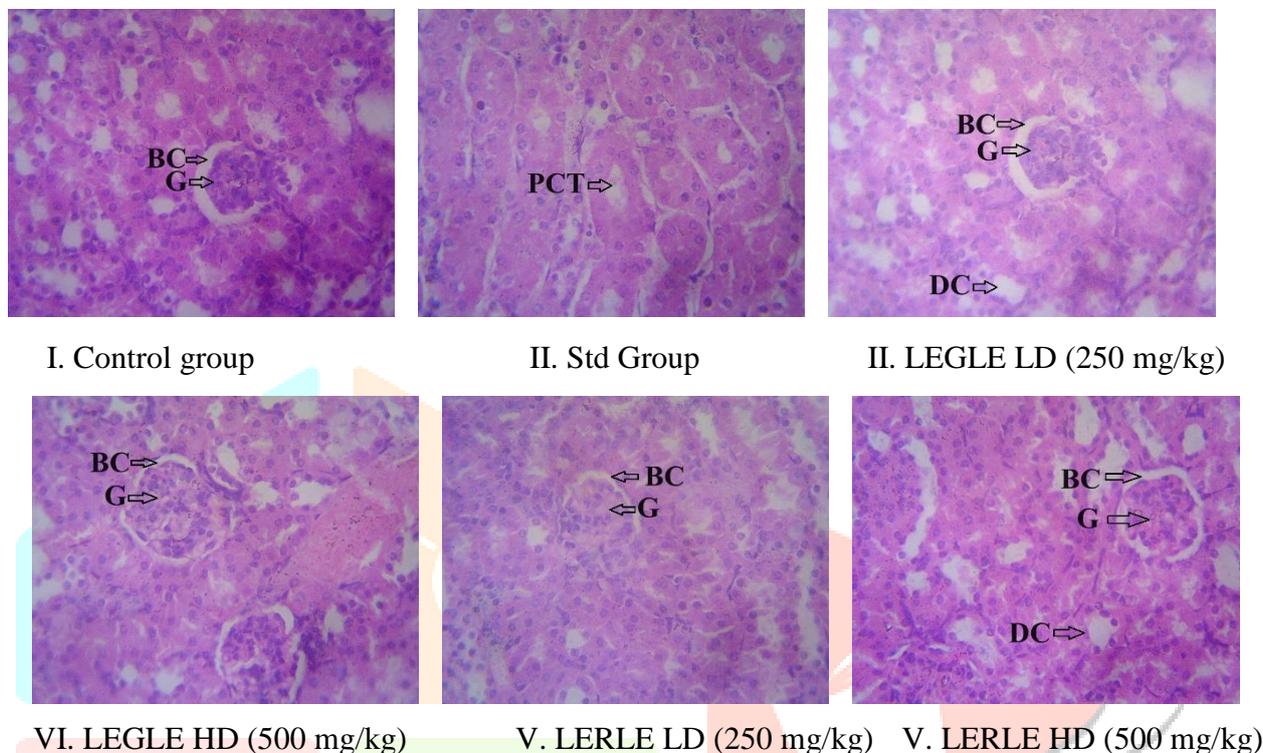
The blood glucose level was measured using serum samples. Additionally, the analysis included determining hemoglobin (Hb), packed cell volume (PCV), white blood cell (WBC) count, and differential leukocyte counts (Polymorphs, lymphocytes, monocytes, eosinophils). Red blood cell (RBC) count, mean cell

volume (MCV), mean cell hemoglobin (MCH), mean cell hemoglobin concentration (MCHC), and platelet count were also assessed.

### 3.4 Result IV - Histological examination

Histological examination of the normal control kidney tissues revealed normal kidney morphology. In contrast, haematoxylin and eosin-stained sections of kidneys from diabetic rats, examined under light microscopy, showed multifocal areas of tubules with clear cytoplasm.

**Figure 1 Histology of kidney of rat stained with H&E (40x)**



**Std-** Standard, **A-** Adipocytes, **BC-** Bowman's Capsule, **G-** Glomerulus, **DC-** Distal Convoluted Tubule (Simple Cuboidal), **PCT-** Proximal Convoluted Tubule (Simple Cuboidal with microvilli), **LEGLE-** *L. speciosa* Ethanolic Green Leaf Extract, **LERLE-** *L. speciosa* Ethanolic Red Leaf Extract.

- I. The kidney sections examined show both the cortex and medulla, with no significant pathology observed in the glomeruli, tubules, or interstitial cells.
- II. The tubules and interstitium show no significant pathology.
- III. The glomeruli, tubules, and interstitium exhibit no significant pathology.
- IV. The kidney sections, including both cortex and medulla, show no significant pathology in the glomeruli, tubules, or interstitium, although blood vessels exhibit mild congestion.
- V. The glomeruli, tubules, and interstitium show no significant pathology.
- VI. The glomeruli and tubules show no significant pathology, and the interstitium is normal.

#### IV. DISCUSSION

The antidiabetic effect of the aqueous leaf extract of *L. speciosa* was investigated in streptozotocin-induced diabetic mice, and the extract effectively reduced blood glucose levels after the 15<sup>th</sup> day (Saumya *et al.*, 2011). The experimental groups treated with green and red leaf extracts also showed reduction in HbA1C levels. Haematological parameters such as total WBC counts, lymphocytes, and neutrophils have been linked to the development of type-2 diabetes (Twig *et al.*, 2013). The green leaves of *L. speciosa* contains glycoside triterpenoids, which contributes to reduced blood glucose levels. Flavonoids, which include anthocyanins and proanthocyanins (condensed tannins), are responsible for plant pigments. In the study, the red leaf extract exhibited HbA1C reductions of 3.31% at a low concentration (Group V) and 2.68% at a high concentration (Group VI). LERLE demonstrated a more pronounced antidiabetic effect compared to LEGLE.

Various studies have shown that anthocyanins can lower blood glucose levels through different mechanisms. Herbal plants play an important role in managing diseases such as diabetes, obesity, and hyperlipidemia due to their antioxidant properties. Phenolic compounds, such as quercetin, can reduce body weight, while decursin has been shown to improve glucose tolerance. For instance, saponin from *Tribulus terrestris* significantly reduced serum glucose levels by 26.5% in normal mice and 40.67% in diabetic mice (Xu *et al.*, 2000). Phytochemical analysis of *L. speciosa* ethanolic leaf extracts reveals the presence of saponins, which contribute to reduced serum glucose levels in high-dose experimental groups ( $134.70 \pm 2.01^{ns}$  and  $128.30 \pm 1.2^{ns}$ ). Anthocyanins, another important component, may lower blood glucose by enhancing insulin resistance, protecting  $\beta$  cells, increasing insulin secretion, and reducing sugar digestion in the small intestine (Renata and Krzysztof, 2012).

The experimental groups treated with *L. speciosa* ethanolic red leaf extracts (Group V and VI) exhibited notably reduced serum glucose levels, with values of  $136.07 \pm 1.96^{ns}$  and  $128.30 \pm 1.25^{ns}$ , respectively. Haematological parameters are closely associated with diabetes mellitus. Patients with type 2 diabetes mellitus (T2-DM) often exhibit lower hemoglobin concentrations, which can be linked to anaemia and obesity conditions that are relatively common among individuals with diabetes. Low hemoglobin levels may impact various clinical aspects of diabetes or its progression (Salhen *et al.*, 2022). In T2DM, the lifespan of red blood cells (RBCs) may be reduced due to disturbances in the hematopoietic environment, such as chronic hyperglycaemia and hyperosmolarity. Leukocytes can be activated by glycation end products, oxidative stress, and angiotensin II resulting from high blood sugar levels.

These activated leukocytes can produce inflammatory substances, such as tumor necrosis factor- $\alpha$  and interleukin- $1\beta$ , which contribute to the complications associated with diabetes (Holman *et al.*, 2008). An elevated leukocyte count, even if within the normal range, has been linked to chronic complications in type-2 diabetes. Recognizing this association can aid in identifying patients at higher risk for developing diabetic complications. Such patients can be advised to implement more stringent blood glucose control measures, which can help reduce inflammation and potentially prevent or mitigate complications (Naredi *et al.*, 2017). The results indicated that while haematological parameters remained normal, both LEGLE and LERLE effectively reduced blood glucose levels. Individuals with type-2 diabetes often show elevated levels of components associated with metabolic syndrome, including total white blood cell (WBC) count, neutrophils, lymphocytes, monocytes, and eosinophils.

There is a notable correlation between the overall white blood cell count and various components of metabolic syndrome. An increased WBC count, reflecting chronic inflammation, may be related to a higher prevalence of metabolic syndrome components among people with type-2 diabetes (Shim *et al.*, 2006). Although a high WBC count, even within normal ranges, is linked to metabolic syndrome features such as high triglycerides levels, hypertension, and obesity, it is not associated with insulin resistances (Mahdiani *et al.*, 2019). Renal morphological changes due to prolonged hyperglycaemia include the accumulation of glycogen granules in approximately half of the distal and thin segment tubules starting one month after diabetes induction with alloxan in experimental rats. This accumulation extended to about half of the proximal tubules after six months (Kang *et al.*, 2005). Histological analysis of kidney tissues from experimental groups treated with LEGLE and LERLE revealed normal kidney histology (Fig 1).

#### V. CONCLUSION

Diabetes management often requires routine full blood counts, highlighting the importance of early detection and management of anaemia and obesity in diabetic patients within primary care settings. Such measures can be cost-effective by reducing hospital admissions and promoting overall health. Although many chemical agents are available to control and treat diabetes, a complete cure has not yet been achieved. In

contrast, plants offer a promising alternative to synthetic medications, serving as potential sources of hypoglycaemic agents. Traditional medicine systems widely utilize these plants to prevent diabetes. Herbs, including the ornamental and medicinal plant *L. speciosa*, have shown potential antidiabetic effects. Additionally, anthocyanins-polyphenolic compounds found in food may play a significant role in the prevention of type-2 diabetes.

## VI. SUMMARY

Effective diabetes management often necessitates routine full blood counts, emphasizing the significance of early detection and management of anaemia and obesity within primary care settings. These interventions can reduce hospital admissions and enhance patient health, offering a cost-effective strategy for healthcare systems. Despite the availability of numerous chemical agents for controlling diabetes, a complete cure remains elusive. In this context, medicinal plants present a promising alternative, offering natural sources of hypoglycaemic agents. Traditional medicine systems have long utilized such plants to prevent and manage diabetes effectively. Among these, *Lagerstroemia speciosa*, an ornamental and medicinal herb, has demonstrated significant antidiabetic potential. Furthermore, anthocyanins and other polyphenolic compounds found in various foods may contribute to the prevention of type-2 diabetes, underscoring the importance of integrating plant-based remedies and dietary interventions in diabetes care.

## AUTHORS CONTRIBUTIONS

**Author 2\*** designed the study, wrote the protocol, and wrote the first draft of the manuscript, **Author 1** did the experimental work, performed the statistical analysis, managed the analyses of the study, managed the literature searches. All authors read and approved the final manuscript.

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