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EVALUATING NORMAL GLYCEMIC EFFECT OF STEM EXTRACTS OF *ABRUS PRECATORIUS* IN STZ-INDUCED DIABETIC WISTAR RATS

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ABSTRACT

Diabetes mellitus (DM) is a widespread metabolic disorder, particularly in developing regions where access to effective and affordable treatment remains a challenge. This study evaluated the antidiabetic efficacy, safety, and biochemical impacts of aqueous (AE) and methanolic (ME) extracts of *Abrus precatorius* stem in streptozotocin (STZ)-induced diabetic Wistar rats. Phytochemical screening revealed the presence of key bioactive compounds, including flavonoids, alkaloids, saponins, tannins, and glycosides. Acute toxicity tests confirmed a high safety margin for both extracts. Diabetic rats treated orally with AE and ME at doses of 100, 200, and 400 mg/kg over 14 days showed significant, dose-dependent reductions in fasting blood glucose levels. The highest doses (400 mg/kg) of both extracts nearly restored glucose levels to those of normal controls, comparable to the standard drug glibenclamide. Additionally, treatment improved lipid profiles by lowering total cholesterol, triglycerides, and low density lipoprotein (LDL) levels while increasing high density lipoprotein (HDL), with the ME-400 group showing slightly superior effects. Liver enzyme analysis revealed that diabetes-induced elevations in ALT and reductions in AST were modulated by the extracts, indicating hepatoprotective potential. The methanolic extract, likely due to better extraction of nonpolar bioactives, demonstrated slightly more pronounced therapeutic effects across biochemical parameters. These findings suggest that *Abrus precatorius* stem extracts, particularly at higher doses, exhibit potent antihyperglycemic, lipid-lowering, and hepatoprotective properties. Therefore, this result supports their potential use as safe, effective, natural and accessible therapeutic agents in the management of diabetes mellitus especially in low-resource healthcare settings.

Keywords: Diabetes mellitus, *Abrus precatorius*, Streptozotocin, Phytochemicals, Aqueous and methanolic extracts

INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycaemia, resulting from defects in insulin secretion, insulin action, or both (Ottah et al., 2012). It is a major cause of disability and hospitalization, which results in a significant financial burden (Bommer et al., 2017; American Diabetes Association (ADA), 2018). Complications that result from the disease could be acute, sub-acute, or chronic, resulting from defects in metabolism of carbohydrates, fats, proteins, and electrolytes in the body (Ojezele and Abatan, 2011). It is now recognized as one of the leading causes of death in the developing countries where the high prevalence of the disease is attributed to increase in sedentary lifestyle coupled with a gross lack of modern facilities for the early diagnosis of the disease.

Characteristically, the symptoms include polyuria, polydipsia, polyphagia, pruritus, and unexpected weight loss. Hypoglycaemia, diabetic ketoacidosis, hyperosmolar, and hyperglycaemic nonketotic syndromes are amongst the acute complications, while sub-acute complications include thirst, lack of energy, polyuria, visual blurriness, and weight loss (Kumar and Clark, 2002). Globally in 2017, an estimated 8.8 percent of the adult population worldwide had diabetes and this figure is projected to rise to 9.9 percent by the year 2045 (Elflein, 2019). About 90 % of this population are affected with T2DM. According to the International Diabetes Federation (IDF), an estimated 15.5 million and 19 million adults aged 20-79 years were living with diabetes in African Region in 2017 and 2019 respectively; this is projected to increase by 143 % by 2045 (IDF, 2020).

Abrus precatorius (L.) is a popular plant belonging to the family of fabaceae (Leguminosae)- pea family (Prabha et al., 2015). It is native to India widespread in tropical and subtropical areas, at altitudes up to 1200 m on the outer Himalayas of India. It is a beautiful, much-branched, slender, perennial, deciduous, woody, prickly twining or climbing herb. Stem cylindrical, wrinkled, bark smooth-textured, brown. The leaves are pinnate and glabrous, with many leaflets (12 or more) arranged in pairs. The leaflets are oblong, measuring 2.5-cm long and 1.5-cm wide (Bhatia et al., 2013). Flowers are numerous and appear in the leaf axils along the stems, shorter than leaves, fascicled on the swollen nodes and occur in clusters 1 to 3 inches long, usually red to purple, or occasionally white. The plant produces stout and short brownish pods, which curl back on opening to reveal pendulous red and black seeds, 4 to 6 peas in a pod (Chaudhari et al., 2012). The fruit is a legume (pea shaped pod) about 3 cm long containing hard ovoid seeds about 1 cm long.

Herbs and marine sources have been considered the best option. The use of herbs and natural product drugs from various plant sources is now of great interest in the management of diabetes mellitus. Several herbs have been reported in folk medicine to be successfully employed in the management of diabetes and have shown effectiveness in non-insulin dependent diabetes (Rastigo, 1977).

Plants are endowed with various phytochemical molecules such as vitamins, terpenoids, phenolics, lignins, stilbenes, tannins, flavonoids, quinones, coumarins, alkaloids, amines, betalains and other metabolites which are rich source of free radical scavengers (Gracelin et al., 2012). From ancient period, people have been using medicinal plants for the treatment of diabetes and WHO estimates that 80 % of the populations presently use herbal medicine for primary health care (Atmakuri and Dathi, 2010). Anti-diabetic plants have

the ability of inhibiting the intestinal absorption of glucose and also restore the function of damaged pancreatic tissue brought about oxidative damage, thereby increasing the secretion of insulin (Malviya et al., 2010). Many studies have confirmed the benefits of medicinal plants with hypoglycaemic effects in the management of diabetes mellitus.

With the increasing incidence of diabetes in rural populations throughout the world, coupled with the inability of current therapies to control the metabolic defects of the disease and their pathological consequences, as well as the great expense of modern therapy, the demand by patients to use natural products with antidiabetic activity is increasing, since access to traditional medicines is less constraining and more affordable (Kamgang et al., 2008; Afolayan and Sunmonu (2010); Ocho-Anin et al., 2010). Therefore, the objective of this study was to evaluate normal glycemic properties of Aqueous and Methanol extracts of *Abrus Precatorius* stem in Stz-induced diabetic Wistar rats.

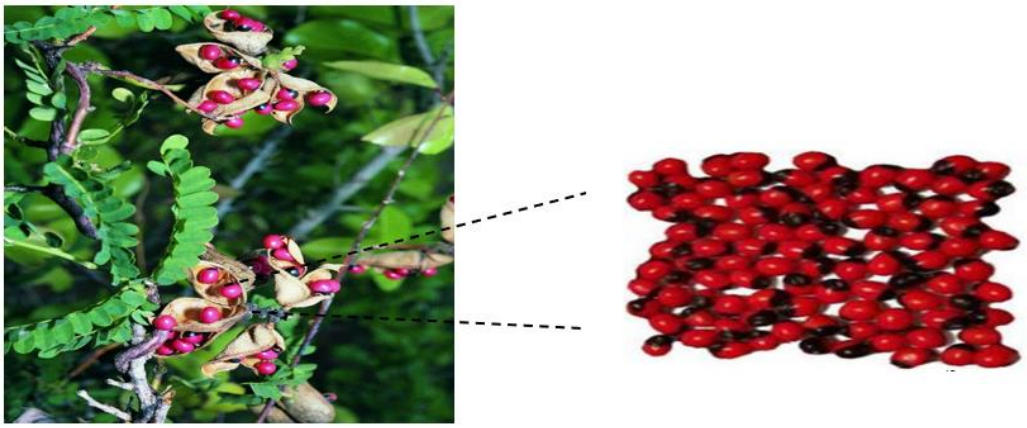

Figure 1: Showing Plant of *Abrus precatorius* in its natural habitat, showing its red seeds (Bhatia et al., 2013)

MATERIALS AND METHODS

Chemicals and Reagents

Streptozotocin was purchased from Ibadan**.** All chemicals and reagents used in this study were of analytical grade.

Collection of Plant Material and Identification

Abrus Precatorious Stem was picked from a field at Kpandaragi village Via Badeggi, Katcha Local Government, Niger State, Nigeria in the Month of August 2024. The specimen was identified and authenticated at the herbarium of the Department of Biological Sciences, Ibrahim Badamasi Babangida University, Lapai - Nigeria and a voucher specimen number, 401 was deposited.

Animals

Fifty Five (55) apparently healthy Albino Wistar rats of both sexes weighing between I50-200g were obtained from the Animal house, Faculty of Life Science, Federal University of Technology, Minna, Niger State. Male and female rats were housed separately in standard cages to avoid complications of pregnancy. They were acclimatized for 2 weeks under laboratory conditions maintained at a temperature of 25^{o}C and humidity of 50%. The animals were maintained on standard pellets, grower‘s mash (Vital feed, Lapai, Niger State) and water ad libitum.

Extract Preparation

Abrus Precatorious Stem was air dried and then reduced to coarse powder using wooden mortar and pestle. Then 150grams of coarsely powdered stem was extracted with 1000mls of both 70% (v/v) ethanol and distilled water independently using cold maceration for 24hours. The extracts were filtered through cheese cloth with fine pore, and filtrates were evaporated to dryness on a hot water bath at 100°C. The extracts were kept in suitable amber coloured containers until needed (Aliyu et.al., 2008).

Acute Toxicity Studies of *Abrus Precatorious* Stem Extracts on Wistar rats

The median lethal dose (LD50) of the plant extracts was carried out in order to select a suitable dose for the evaluation of antidiabetic activity. This was done using the method described by Lorke (1983.) Using 9 rats. In the initial phase, rats was divided into 3 groups of 3 rats each and treated orally with 10mg, 100mg and 1000 mg of the extract per kg body weight.

The rats were observed for 48 hours for signs of toxicity including death. Based on the results of phase one, three fresh rats were divided into 3 groups of one rat each, and were treated with 1900mg, 2500mg and 5000mg per kg body weight of the extracts. The rats were also observed for 48 hours for signs of toxicity including death.

Experimental Design

In the experiment, a total of fourty five (45) rats were used. They were randomly divided into 9 groups of 5 rats each which received varying doses of methanol, aqueous extracts and standard antidiabetic drug daily for four (4) weeks, orally. The blood glucose level was monitored weekly.

Group 1: Normal Control (NC) - not induced with diabetes.
Group 2: Diabetic Control (DC) - Induced rats and treats with distilled water orally (Diabetic Control).
Group 3: Diabetic with known drug (DD) – induced and treats with diabetic drug glibenclamide at 10mg/kg body weight orally on daily basis.
Group 4: Diabetic rats treated with 100mg/kg body weight of aqueous extract orally.
Group 5: Diabetic rats treated with 200mg/kg body weight of aqueous extract orally.
Group 6: Diabetic rats treated with 400mg/kg body weight of aqueous extract orally.
Group 7: Diabetic rats treated with 100mg/kg body weight of methanolic extract orally.

Group 8: Diabetic rats treated with 200mg/kg body weight of methanolic extract orally.
Group 9: Diabetic rats treated with 400mg/kg body weight of methanolic extract orally.

Biochemical Assays

Induction of diabetes

Diabetes was induced in rats by a single intraperitoneal injection of Streptozotocin (STZ) at a dose of 65 mg/kg body weight. STZ was freshly dissolved in an acidified (4.5pH citrate buffer) in ice and administered to rats that had been fasted for 12–14 hours within 5 minutes (Katsumata et al., 1999). Due to the risk of fatal hypoglycemia caused by the sudden release of insulin from the pancreas following STZ administration, the rats were immediately given a 20% glucose solution orally. To further prevent hypoglycemia, they were maintained on 5% glucose solution in their cages for the following 24 hours. After three days of STZ administration, blood samples were collected from the tail vein using Acu-check (Burcelin et al., 1995). Rats with fasting blood glucose levels exceeding 200 mg/dL were considered diabetic and where used for this study. After diabetes was established, treatment of rats commenced and last for 14days (Igbashio et al., 2025).

Collection and Preparation of Sera Samples

The study period lasted four (4) weeks after which the rats were fasted for 12hrs then rats were sacrificed by exposing them to an over dose of chloroform soaked in cotton wool placed in anesthetic box covered with lid. The rats were dissected laterally and blood sample were collected using sterile needle from the heart while its beats and pumps blood and store in plain sample bottles and allowed to clot and the serum separated by centrifugation using Denley BS400 centrifuge at 2556 g for 10minutes. The samples collected were then subjected to various biochemical analyses such as estimation of Serum Lipid Profile and Estimation of Liver Enzymes.

Statistical Analysis

Data obtained was expressed as mean ± SD and statistically analyzed using one-way analysis of variance (ANOVA) with Turkey‘s multiple comparison post hoc tests to compare the level of significance between the test groups. The values of $p<0.05$ were considered as significant.

RESULTS AND DISCUSSION

Phytochemical analysis

Phytochemical Analysis of Abrus Precatorious Stem Aqueous and Methanolic Extract

The phytochemical screening revealed that the aqueous and methanolic extracts of *Abrus precatorius* stems contain a variety of bioactive compounds. Alkaloids, glycosides, tannins, flavonoids, phenols and steroids were present in both extracts. Interestingly, the aqueous extract showed a more diverse phytochemical profile, containing saponins and terpenoids, which were absent in the methanolic extract. This variation highlights the solvent-dependent nature of phytochemical extraction, as water appears to be more effective in extracting polar compounds like saponins and terpenoids.

Table 1: Qualitative phytochemical Analysis of Abrus Precatorious Stem Aqueous and Methanolic Extract

Phytochemicals	Aqueous Extract	Methanol Extract
Alkaloids	+	+
Glycosides	+	+
Tannins	+	+
Saponins	+	-
Flavonoids	+	+
Phenols	+	+
Steroids	+	+
Terpinoids	+	-

Note: + Present - Absent

Toxicological Studies

Acute toxicity test of aqueous and Methanolic extract of Abrus Precatorious Stem on wistar rats.

The acute toxicity test results indicate that both aqueous and methanolic extracts of *Abrus precatorius* stems are non-lethal at doses up to 5000 mg/kg body weight in Wistar rats. This is a crucial finding as it establishes a wide safety margin for the extracts, which is a prerequisite for their therapeutic application. The absence of mortality or adverse effects across both phases of the study underscores the extracts' high tolerability.

Table 2: Acute toxicity test of aqueous and Methanolic extract of Abrus Precatorious Stem on wistar rats

Dosage (mg/kg bw)	No. of animals	Mortality (Aqueous extract)	Mortality (Methanolic extract)
Phase 1			
10	3	Nil	Nil
100	3	Nil	Nil
1000	3	Nil	Nil
Phase 2			
1900	3	Nil	Nil
2500	3	Nil	Nil
5000	3	Nil	Nil

Glucose Levels of Wistar rats

The normal control group maintained consistent glucose levels throughout the trial (about 78–82 g), but the diabetes control group exhibited a substantial increase from roughly 80 g on Day 1 to over 231 g on Day 4, which remained high at 208 g by Day 14. In contrast, the glibenclamide-treated group

started with a similar baseline but exhibited a substantial increase on Day 4 (204 g) followed by a large decline to 80 g by Day 14, showing effective glycemic control. For the extract-treated groups, both aqueous and methanolic extracts produced an initial hyperglycemic response by Day 4, similar to the diabetic control. However, on Day 14, a dose-dependent improvement was seen. Lower doses (AE-100 mg/kg and ME-100 mg/kg) reduced glucose levels to roughly 145 g, whereas intermediate doses (AE-200 mg/kg and ME-200 mg/kg) further lowered them to around 124–131 g. The highest doses (AE-400 mg/kg and ME-400 mg/kg) were most beneficial, nearly restoring glucose levels (88.37 g and 84.22 g, respectively), demonstrating that both extracts, at optimal high doses, can significantly ameliorate hyperglycemia in diabetic rats.

Table 3: Glucose level of wistar rat administered aqueous and methanolic Extract of Abrus Precatorious Stem

Groups	Day 1(mg/dl)	Day 4(mg/dl)	Day 14(mg/dl)
NC	78.85±2.49^{a}	82.18±1.66^{a}	81.81±4.90^{a}
DC	79.70±0.82^{a}	231.43±22.26^{b}	208.10±4.50^{b}
GLB-5mg/kg bw	81.74±2.84^{a}	204.22±2.76^{b}	80.00±2.59^{a}
AE-100mg/kg bw	80.77±2.20^{a}	235.73±13.92^{b}	144.77±0.31^{c}
AE-200mg/kg bw	76.90±2.27^{a}	248.01±14.91^{b}	123.92±1.27^{b}
AE-400mg/kg bw	76.75±2.08^{a}	238.14±8.02^{b}	88.37±0.87^{a}
ME-100mg/kg bw	77.60±1.29^{a}	219.44±9.62^{b}	144.78±0.88^{c}
ME-200mg/kg bw	81.73±1.17^{a}	244.19±13.66^{b}	131.46±1.15^{b}
ME-400mg/kg bw	81.94±1.28^{a}	238.27±15.76^{b}	84.22±1.02^{a}

Values are expressed in mean ± standard error of triplicates Values with the same superscript down the Column have no significant difference at $p < 0.05$

NOTE: NC-Normal control, DC-Diabetic control, AE-aqueous extract of Abrus Precatorious Stem, ME-methanolic extract of Abrus Precatorious Stem, GLB-glibenclamide

The Lipid Profile

The results indicate significant variations in lipid profiles across experimental groups. The disease control (DC) group showed elevated cholesterol (87.63 ± 9.22 mg/dl), triglycerides (66.67 ± 1.62 mg/dl), and LDL (52.7 ± 1.59 mg/dl) compared to the normal control (NC), alongside reduced HDL (39.3 ± 0.52 mg/dl), suggesting a dyslipidemic state. Treatment with BLG-5mg/kg (likely a standard drug) effectively reversed these trends, normalizing cholesterol (59.23 ± 0.95 mg/dl), triglycerides (52.43 ± 1.15 mg/dl), and LDL (41.2 ± 2.25 mg/dl) while increasing HDL (48.57 ± 0.71 mg/dl), demonstrating its efficacy. Both aqueous (AE) and methanolic (ME) extracts of *Abrus precatorius* at higher doses (400 mg/kg) exhibited dose-dependent improvements: AE-400 and ME-400 reduced cholesterol (62.43 ± 0.91 and 63.8 ± 1.53 mg/dl), triglycerides (~53 mg/dl), and LDL (~43–45 mg/dl) while moderately elevating HDL (43–44 mg/dl), though less effectively than BLG. Notably, ME-400 showed marginally better HDL enhancement (44.83 ± 1.91 mg/dl) compared to AE-400 (43.33 ± 1.2 mg/dl), possibly due to methanol's superior extraction of nonpolar bioactive compounds (e.g., flavonoids, steroids) that modulate lipid metabolism. Lower doses (100–200 mg/kg) of both extracts had inconsistent effects, suggesting a threshold for therapeutic activity. The absence of phenols but presence of alkaloids, flavonoids, and saponins in prior phytochemical analysis may explain these effects, as flavonoids and saponins are known to inhibit cholesterol synthesis and promote excretion. Overall, the findings highlight the potential of A. precatorius extracts, particularly at higher doses, as adjuvants for managing dyslipidemia, though further mechanistic and clinical studies are warranted.

Table 4: Lipid Profile of Wistar Rat Administered Aqueous and Methanolic Extract of Abrus Precatorious Stem

Groups	Cholesterol (mg/dl)	Triglyceride (mg/dl)	HDL (mg/dl)	LDL (mg/dl)
NC	65.4 ± 1.93^{a}	57.87 ± 1.29^{a}	43.2 ± 1.85^{ab}	46.9 ± 1.81^{ab}
DC	87.63 ± 9.22^{b}	66.67 ± 1.62^{b}	39.3 ± 0.52^{a}	52.7 ± 1.59^{b}
BLG-5mg/kg bw	59.23 ± 0.95^{a}	52.43 ± 1.15^{a}	48.57 ± 0.71^{b}	41.2 ± 2.25^{a}
AE-100mg/kg bw	74.63 ± 1.19^{ab}	53.17 ± 1.25^{a}	40.97 ± 1.21^{a}	51.73 ± 0.74^{b}
AE-200mg/kg bw	71.77 ± 2.11^{ab}	55.73 ± 2.49^{a}	42.17 ± 1.05^{ab}	46.27 ± 1.07^{ab}
AE-400mg/kg bw	62.43 ± 0.91^{a}	53.57 ± 2.09^{a}	43.33 ± 1.2^{ab}	45.1 ± 2.47^{ab}
ME-100mg/kg bw	73.73 ± 0.72^{ab}	54.83 ± 1.27^{a}	40.57 ± 1.22^{a}	49.83 ± 1.35^{ab}
ME-200mg/kg bw	66.47 ± 2.57^{a}	54.07 ± 0.99^{a}	43.8 ± 1.46^{ab}	46.8 ± 3.93^{ab}
ME-400mg/kg bw	63.8 ± 1.53^{a}	52.43 ± 2.9^{a}	44.83 ± 1.91^{ab}	43.53 ± 1.22^{ab}

Values are expressed in mean ± standard error of triplicates Values with the same superscript down the Column have no significant difference at $p < 0.05$

NOTE: NC-Normal control, DC-Diabetic control, AE-aqueous extract of Abrus Precatorious Stem, ME-methanolic extract of Abrus Precatorious Stem, GLB-glibenclamide

Liver Function Test

Direct and conjugated bilirubin, total protein, and albumin levels remained stable across all groups, showing that the liver's synthetic functions were not dramatically altered by diabetes or the therapies. However, diabetes triggered alterations in liver enzyme markers. The diabetic control (DC) group showed a substantial increase in ALT (32.72 U/L vs. 24.8 U/L in the normal control) and a drop in AST levels (50.23 U/L vs. 75.17 U/L in the normal control), with ALP marginally increased compared to the normal control. These variations show that diabetes may disturb hepatic enzyme balance, signifying liver stress or injury. Treatment with glibenclamide and the aqueous (AE) and methanolic (ME) extracts of *Abrus precatorius* stem appeared to regulate these enzyme levels toward normal. The glibenclamide group and larger doses of the extracts generally showed lower ALT levels, but AST and ALP values in these groups tended to line more closely with those of the normal control.

Table 5: Liver Function Test of Wistar rat Administered Aqueous and Methanolic Extract of Abrus Precatorious Stem

Groups	Direct Bilirubin (mg/dl)	Conjugated Bilirubin (mg/dl)	Total Protein (g/dl)	Albumin (g/dl)	ALP (U/L)	ALT (U/L)	AST (U/L)
NC	1.89 ± 0.13^{a}	0.98 ± 0.04^{a}	7.7 ± 0.36^{a}	3.73 ± 0.13^{a}	41.83 ± 2.88^{ab}	24.8 ± 0.92^{ab}	75.17 ± 2.12^{c}
DC	1.82 ± 0.05^{a}	0.85 ± 0.03^{a}	8.33 ± 0.84^{a}	3.99 ± 0.44^{a}	47.7 ± 1.01^{b}	32.72 ± 0.78^{c}	50.23 ± 1.08^{a}
BLG-5mg/kg bw	1.84 ± 0.28^{a}	0.84 ± 0.06^{a}	8.37 ± 0.66^{a}	4.32 ± 0.29^{a}	35.93 ± 1.46^{a}	21.7 ± 0.9^{a}	82.7 ± 0.95^{c}
AE-100mg/kg bw	1.03 ± 0.03^{a}	0.9 ± 0.05^{a}	7.77 ± 0.19^{a}	3.75 ± 0.22^{a}	43.43 ± 0.9^{ab}	29.37 ± 2.69^{bc}	52 ± 1.24^{ab}
AE-200mg/kg bw	1.49 ± 0.23^{a}	0.84 ± 0.04^{a}	7.83 ± 0.48^{a}	3.51 ± 0.26^{a}	42.53 ± 0.87^{ab}	27.2 ± 0.67^{abc}	64.2 ± 1.29^{abc}
AE-400mg/kg bw	1.64 ± 0.27^{a}	0.83 ± 0.04^{a}	8.03 ± 0.15^{a}	3.60 ± 0.07^{a}	41.35 ± 1.27^{ab}	21.83 ± 0.8^{a}	69.37 ± 10.6^{bc}
ME-100mg/kg bw	1.44 ± 0.38^{a}	0.91 ± 0.04^{a}	8.3 ± 0.38^{a}	3.70 ± 0.19^{a}	43.53 ± 4.67^{ab}	31.23 ± 0.71^{bc}	53.97 ± 1.27^{ab}
ME-200mg/kg bw	1.12 ± 0.09^{a}	0.93 ± 0.03^{a}	7.47 ± 0.24^{a}	4.57 ± 0.12^{a}	42.3 ± 1.14^{ab}	24.9 ± 2.17^{ab}	62.53 ± 1.65^{ab}
ME-400mg/kg bw	0.91 ± 0.08^{a}	0.79 ± 0.06^{a}	9.1 ± 0.23^{a}	4.32 ± 0.12^{a}	40.17 ± 3.44^{ab}	20.77 ± 0.73^{a}	69.23 ± 0.61^{bc}

Values are Expressed in mean ± Standard Error of Triplicates Values With the same Superscript Down the Column have no Significant Difference at $p < 0.05$

Note: NC-Normal control, DC-Diabetic control, AE-aqueous extract of Abrus Precatorious Stem, ME-methanolic extract of Abrus Precatorious Stem, GLB-glibenclamide

Discussion

The both extracts reveals the presence of glycosides, tannins, flavonoids, steroids, and phenols. The aqueous extract showed a more diverse phytochemical profile, containing saponins and terpenoids, which were absent in the methanolic extract. Acute toxicity testing is a regulatory requirement to ensure the safety of substances before long-term use or administration. The acute toxicity test in this study showed no sign of toxicity or mortality at 5000 mg/kg bw, suggesting a wide safety margin for both extracts. These findings align with the studies of Anand et al. (2022) and Murtala et al., (2023), who reported no acute toxicity for *Abrus precatorius* extracts in rodent models. The absence of toxicity may reveals the potential of these extracts to be developed as safe, plant-based therapeutic agents.

The glucose-lowering effects were observed in *Abrus precatorius* extracts. The DC group exhibited high glucose levels, suggesting chronic hyperglycemia and impaired glucose regulation due to pancreatic beta-cell dysfunction. Treatment with AE and ME extracts significantly reduced glucose levels, in a dose dependent manner. The AE extract at 400 mg/kg restored glucose levels to near-normal, suggesting its potent hypoglycemic activity. These effects may be due to the phytochemicals (alkaloids, flavonoids, and glycosides) in the extracts, which have been reported to enhance insulin sensitivity, promote glucose uptake, and reduce intestinal glucose absorption (Singh et al., 2022). The glucose-lowering effects observed align with the findings of Vijayan and Thirumal (2024), who reported similar benefits of *Abrus precatorius* seed extracts in diabetic animals.

The results demonstrate that *Abrus precatorius* extracts at higher doses, enhance dyslipidemia in a dose and solvent-dependent manner (Jyotsna et al., 2023). Compared to the normal control (NC), the diabetic control (DC) group exhibited elevated cholesterol (87.63 ± 9.22 vs. 65.4 ± 1.93 mg/dl), triglycerides (66.67 ± 1.62 vs. 57.87 ± 1.29 mg/dl), and LDL (52.7 ± 1.59 vs. 46.9 ± 1.81 mg/dl) alongside reduced HDL (39.3 ± 0.52 vs. 43.2 ± 1.85 mg/dl), confirming a pathological lipid profile. Treatment with the standard drug BLG-5mg/kg effectively normalized these parameters (e.g., cholesterol: 59.23 ± 0.95 mg/dl; HDL: 48.57 ± 0.71 mg/dl), NC likely due to its targeted pharmacological action. Both aqueous (AE) and methanolic (ME) extracts of A. precatorius at 400 mg/kg showed significant lipid-lowering effects, with AE-400 and ME-400 reducing cholesterol (62.43 ± 0.91 and 63.8 ± 1.53 mg/dl) and LDL (45.1 ± 2.47 and 43.53 ± 1.22 mg/dl) to near-NC levels, while moderately improving HDL (43.33 ± 1.2 and 44.83 ± 1.91 mg/dl). The methanolic extract's marginally superior HDL enhancement at 400 mg/kg may stem from its nonpolar phytoconstituents (e.g., flavonoids, steroids), which could enhance reverse cholesterol transport, whereas the aqueous extract's polar saponins and terpenoids might inhibit intestinal cholesterol absorption. Lower doses (100–200 mg/kg) of both extracts showed inconsistent efficacy, suggesting a threshold for bioactive compound concentrations to exert therapeutic effects. These outcomes align with prior phytochemical findings, where aqueous extracts contained saponins and terpenoids (polar compounds), while methanolic extracts harbored flavonoids and steroids (less polar), highlighting solvent-specific bioactivity. However, the absence of phenols implies other compounds (e.g., alkaloids, glycosides) drive lipid modulation. While promising, the study's qualitative phytochemical data and lack of compound quantification limit mechanistic clarity, necessitating future research to isolate active molecules, validate dose-response relationships, and explore clinical applicability for managing dyslipidemia ((Ding et al., 2022; Duan et al., 2023).).

The liver, which plays an important role in glucose and lipid metabolism, is often impaired in diabetes (Scoditti et al., 2024). In this study, the diabetic control (DC) group exhibited elevated levels of alkaline phosphatase (ALP), alanine

transaminase (ALT), and aspartate transaminase (AST), suggesting hepatic stress and injury. These observed elevations also suggest cellular leakage and compromised membrane integrity in hepatocytes which may be due to oxidative stress and inflammation. Alterations where also observed in bilirubin and protein levels in the DC group further suggesting impaired liver function. Treatment with aqueous (AE) and methanolic (ME) extracts of *Abrus precatorius* significantly improved liver function markers in a dose-dependent manner. Both extracts significantly reduced ALP, ALT, and AST levels, revealing there their hepatoprotective properties. These effects are likely due to the antioxidant and anti-inflammatory properties of the extracts, which may be responsible for shielding the hepatocytes from oxidative damage (Gupta et al., 2021). The normal bilirubin and protein levels observed also suggest that the extract *Abrus precatorius* may possess liver-protective effects. The presence of flavonoids, alkaloids, and glycosides in the extracts may be the contributor to these safety effects by scavenging free radicals and reducing inflammation (Nwozo et al., 2023). These findings are consistent with the studies of Ale et al. (2023), who reported on the hepatoprotective effects of plant extracts to their antioxidant and anti-inflammatory activities.

CONCLUSION

In summary, the research findings demonstrate that the Ethanol and Aqueous extracts of Abrus precatorious stem possesses anti-diabetic effects in STZ – induced diabetic rats. These result provide support for the traditional use of Abrus precatorious as an oral remedy for diabetes and suggest that it could be a promising source for the development of new drugs for the management of diabetes and its complications.

REFERENCES

Afolayan, A. J. and Sunmonu, T. O. (2010). In vivo studies on antidiabetic plants used in South African herbal medicines. Journal of Clinical Biochemistry and Nutrition, 47, 98-106.

American Diabetes Association (ADA) (2018). "10 Microvascular complications and foot care: standards of medical care in diabetes" Diabetes Care, 41 (Supplement 1), S105–S118.

Anand, U., Tudu, C. K., Nandy, S., Sunita, K., Tripathi, V., Loake, G. J. and Proćków, J. (2022). Ethnodermatological use of medicinal plants in India: From ayurvedic formulations to clinical perspectives–A review. Journal of ethnopharmacology, 284, 114744.

Atmakuri, L. R., and Dathi, S. (2010). Current trends in herbal medicines. Journal of Pharmaceutical Research, 3, 109-113.

Bhatia M., NA S., Gupta S., *Abrus Precatorius* (L.): An Evaluation of Traditional Herb, Indo American Journal of Pharmaceutical Research, 2013 ISSN NO: 2231-6876.

Bommer, C., Heesemann, E. C. N. and Sagalova, V. (2017). The global economic burden of diabetes in adults aged 20-79 years: a cost-of-illiness study. Lancet Diabetes Endocrinology, 5 (6), 423-430.

Chaudhari S. K., Sharma, R., Pawar, S. P. and Kashikar A. V. (2012). Pharmacological activities of *Abrus precatorius* Linn. – A Review. International Journal of Ayurvedic and Herbal Medicine, 2(2), 336-348.

Ding, X., Giannenas, I., Skoufos, I., Wang, J. and Zhu, W. (2022). The effects of plant extracts on lipid metabolism of chickens—A review. Animal bioscience, 36(5), 679.

Duan, H., Song, P., Li, R., Su, H. and He, L. (2023). Attenuating lipid metabolism in atherosclerosis: The potential role of Anti-oxidative effects on low-density lipoprotein of herbal medicines. Frontiers in pharmacology, 14, 1161657.

Elflein, J. (2019). Diabetics worldwide 2017 and 2045. Statista Nigeria, Health & Pharmaceuticals.

Gracelin, D. H., Britto A.J. and Kumar, B. J. R. (2012). Qualitative and quantitative analysis of Phytochemicals in five Pteris species. International Journal of Pharmacy and Pharmaceutical Sciences, 5, 105-107.

Gupta, A., Kumar, R., Ganguly, R., Singh, A. K., Rana, H. K. and Pandey, A. K. (2021). Antioxidant, anti-inflammatory and hepatoprotective activities of Terminalia bellirica and its bioactive component ellagic acid against diclofenac induced oxidative stress and hepatotoxicity. Toxicology reports, 8, 44-52.

Igbashio, M. D., Eluehike, N and Oriakhi, K. (2025),Liver function and biomarkers of oxidative stress levels in streptozotocin-induced diabetic rats treated with leave extract of carica papaya. FUDMA journal of science (FJS) 5, 222-231

Jyotsna, F. N. U., Ahmed, A., Kumar, K., Kaur, P., Chaudhary, M. H., Kumar, S. and Kakadiya, K. A. (2023). Exploring the complex connection between diabetes and cardiovascular disease: analyzing approaches to mitigate cardiovascular risk in patients with diabetes. Cureus, 15(8).

Malviya, N., Jain, S. and Malviya, S. (2010). Antidiabetic potential of medicinal plants. Acta Poliniae Pharmaceutica-Drug Research, 67 (2), 113-118.

Murtala, A. A., Oladapo, O. E., Aderionla, A. A., Olooto, W. E., Soyinka, O. O., Folarin, R. O. and Abolarinwa, J. A. (2023). Sub-chronic (ninety days) toxicity study of hydroethanolic leaf extract of Datura stramonium L. in rodents. Clinical Complementary Medicine and Pharmacology, 3(3), 100090.

Nwozo, O. S., Effiong, E. M., Aja, P. M. and Awuchi, C. G. (2023). Antioxidant, phytochemical, and therapeutic properties of medicinal plants: A review. International Journal of Food Properties, 26(1), 359-388.

Ocho-Anin Atchibri, A. L., Brou, K. D., Kouakou, T. H., Kouadio, Y. J. and Gnakri, D. (2010). Screening for antidiabetic activity and phytochemical constituents of common bean (Phaseolus vulgaris L.) seeds. Journal of Medicinal Plants Research, 4 (17), 1757-1761.

Ojezele, M. O. and Abatan, O. M. (2011). Hypoglycaemic and coronary risk index lowering effects of Bauhinia thoningii in alloxan induced diabetic rats. African Health Science, 11 (1), 85-89.

Prabha P.M., Perumal P.C., Kumar M. P., S. and Sampath K. R. (2015). Pharmacological activities of *Abrus precatorius* (L.) seeds, International Journal of Pharmaceutical and Medicinal Research, 3(2), 195-200.

Rastigo AK, Chander R, and Srivastava KA (1977). Screening of natural products for hypolipidaernic and

hypoglycaemic activities. In: Proceedings in International workshop on Medicinal plants their bioactivity, screening and evaluation.

Scoditti, E., Sabatini, S., Carli, F. and Gastaldelli, A. (2024). Hepatic glucose metabolism in the steatotic liver. Nature Reviews Gastroenterology & Hepatology, 1-16.

Vijayan, S. and Thirumal, M. (2024). Systematic review on *Abrus precatorius* Linn. since 1871: ethnobotanical uses, phytochemistry and pharmacological properties. Phytochemistry Reviews, 1-30.