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TO EVALUATE THE ANTIHYPERLIPIDEMIC ACTIVITY BY DETERMINING LIPID PROFILE PARAMETERS. ALANGIUM SALVIFOLIUM

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ABSTRACT

The seeds of Alangium salvifolium Linn. have been traditionally noted for their diverse biological activities, which include antidiabetic, anticancer, diuretic, anti-inflammatory, antimicrobial, laxative, and antiepileptic effects. This study aimed to validate these traditional claims and assess the seeds of Alangium salvifolium through various organic extracts to evaluate their antidiabetic, antiepileptic, analgesic, and anti-inflammatory properties. Extracts of Alangium salvifolium seeds were prepared using chloroform, ethanol, and water, followed by phytochemical screening and pharmacological evaluation. The acute toxicity assessment indicated that the chloroform, ethanol, and aqueous extracts of Alangium salvifolium seeds are non-toxic at a fixed dosage of 2000 mg/kg. Among the three extracts, the ethanol extract demonstrated significant ($p < 0.01$) antidiabetic, antiepileptic, analgesic, and anti-inflammatory effects. Phytochemical analysis confirmed the presence of alkaloids, glycosides, terpenoids, steroids, and tannins. The findings of this study support the traditional claims made by Ayurvedic practitioners. Nevertheless, the specific chemical constituents responsible for these pharmacological activities require further investigation.

INTRODUCTION

Herbal drugs refer to the utilization of therapeutic herbs for the prevention and treatment of diseases and ailments, as well as for the support of health and healing. These substances are derived from plants and are employed for such purposes. Herbal drugs represent the most ancient form of healthcare recognized by humanity. Nevertheless, herbal medicines face several limitations. These limitations encompass inadequate and unsatisfactory evidence regarding safety, efficacy, standardization, and inconsistent production practices. [1, 2, 3] Numerous Indian medicinal plants have been utilized in the management of hyperlipidemia, and they have been reported to exhibit no adverse effects. Hyperlipidemia is a secondary metabolic disorder linked to diabetes. In addition to its causal relationship with diabetes, elevated serum levels of triglycerides, cholesterol, and LDL are significant risk factors for the early onset of cardiovascular diseases such as atherosclerosis, hypertension, and coronary heart disease. Disorders of lipid metabolism are characterized by increased plasma concentrations of various lipid and lipoprotein fractions, including total and LDL cholesterol, VLDL, triglycerides, and chylomicrons. These conditions predominantly lead to cardiovascular diseases. The extract was administered to rectify abnormal lipid profiles and reduce vascular disease and its associated consequences. [4] A review of the literature indicates that different parts of Alangium salvifolium are reported to possess acrid astringent, emollient, anthelmintic, diuretic, and purgative properties. It is also applied externally in acute cases of rheumatism and leprosy. The juice from the leaves can be used both externally and internally in cases of rabid dog bites. The root bark serves as an antidote for various poisons. The fruits are sweet, cooling, and purgative, and are utilized as a poultice in the treatment of rheumatism. [5, 6, 7, 8] The total ash obtained was boiled with 25 ml of alcohol for a few minutes. The insoluble matter was collected on ashless filter paper, washed with hot water, and ignited for 15 minutes at a temperature not exceeding 450 °C. The weight difference represents the alcohol-soluble ash. The percentage of alcohol-soluble ash was calculated with reference to the air-dried drug.

Determination of extractive value:
Approximately 5 grams of air-dried, coarsely powdered roots of Alangium salvifolium were accurately weighed and separately macerated with 100 ml of alcohol in a stoppered flask for 24 hours, shaking frequently during the first 6 hours and allowing it to stand for 18 hours. It was then filtered, and 25 ml of the filtrate was evaporated to dryness in a tared flat-bottom shallow dish, dried at 105 °C, and weighed. The percentage of alcohol-soluble extracts was calculated with reference to the air-dried drug.

Determination of moisture content:
About 5 grams of powdered leaves of Alangium salvifolium were accurately weighed and placed separately in a china

dish. It was kept at 105–110 °C for 30 minutes in a hot air oven; the residue was then cooled and weighed. The percentage of moisture content was subsequently calculated with reference to the air-dried drug.

Photochemical Studies:
Preliminary phytochemical studies of the leaf extract were conducted following the standard procedure [9, 10, 11, 12, 13].

Animal Used:
Thirty male and female Wistar rats (5-9 weeks old and weighing 150-200 grams) bred in the Animal House of Gupta College of Technological Sciences, Asansol, were procured after prior approval from the Institutional Animal Ethics Committee. All animals were maintained under 12-hour light-dark cycles and at a room temperature of 22 °C (±3) with 30-70% relative humidity. Food (pellet) and water intake were measured and monitored. After 3-5 days of acclimatization in laboratory conditions, the rats were taken for experimental purposes. The current research focused on the assessment of Alangium salvifoliumleaves concerning pharmacognostic, pharmacological, and phytochemical aspects.

The leaves of Alangium salvifoliumunderwent various standardization processes. This study aimed to investigate the anti-hyperlipidemic properties of Alangium salvifoliumleaves. The powdered leaves were analyzed for their alcohol soluble ash, alcohol soluble extractive value, moisture content, and phytochemical characteristics. Ash values play a crucial role in assessing the quality and purity of crude drugs, providing insights into the inorganic composition and other impurities associated with the drug. Extractive values are instrumental in evaluating crude drugs, offering information about the chemical constituents they contain. In certain instances, the solubility of the drug in a specific solvent serves as an indicator of its purity. Extractive values are particularly valuable for identifying exhausted or adulterated drugs. It is essential to control and minimize the moisture content of the drug to prevent its decomposition due to chemical changes or microbial contamination.

Phytochemical analysis of the methanolic extract from Alangium salvifolium leaves indicates the presence of alkaloids, glycosides, phenolic compounds, tannins, phytosterols, fixed oils, and fats.

Regarding anti-hyperlipidemic activity: Triton-induced hyperlipidemia in Wistar Albino rats was treated with various doses of the Alangium salvifoliumextract. This treatment significantly lowered plasma LDL and triglyceride levels while increasing plasma HDL levels. The methanolic extract at a dosage of 300 mg/kg proved to be the most effective compared to the control group. Therefore, it holds potential as an anti-hyperlipidemic therapeutic agent or as an adjunct in the current treatment strategies for hyperlipidemia.

Table 1. Effect of *Alangium salvifolium* seeds extracts on blood glucose level in oral glucose tolerance test (OGTT).

Treatment (mg/kg *p.o.*)	Blood glucose level (mg/dL)				
	0 min	30 min	60 min	120 min	180 min
Normal control	56.78 ± 0.04	150.43 ± 1.86	148.46 ± 2.2	157.67 ± 1.2	141.34 ± 0.9
Metformin (11.3)	58.78 ± 0.07	134.56 ± 1.45**	122.45 ± 1.5**	108.67 ± 0.9**	98.76 ± 0.8**
Chloroform extract (500)	60.46 ± 0.06	145.35 ± 1.51	141.98 ± 1.6*	123.98 ± 1.3**	107.67 ± 0.9
Ethanolic extract (500)	59.34 ± 1.15	142.76 ± 1.34*	127.84 ± 1.7**	118.6 ± 1.4**	102.34 ± 0.8**
Aqueous extract (500)	57.47 ± 0.06	148.67 ± 1.45	142.38 ± 1.8*	126.72 ± 0.6**	122.45 ± 1.1**

Data are the mean ± SD values for six mice in each group. *p < 0.05, **p < 0.01 as compared to the control.

Table 2. Effect of *Alangium salvifolium* seeds extracts on blood glucose level of alloxan-induced diabetes in rats.

Treatment (mg/kg *p.o.*)	Blood Glucose Level (mg/dl)			
	0 day	3rd day	5th day	7th day
Normal control	86.11 ± 1.27	85.67 ± 1.14	84.68 ± 0.88	86.23 ± 1.28
Diabetic control	192.34 ± 1.34	210.44 ± 1.45	232.42 ± 1.22	247.68 ± 1.10
Metformin (11.3)	188.45 ± 1.56	156.88 ± 0.96**	125.77 ± 1.34**	104.10 ± 1.32**
Chloroform extract (500)	191.18 ± 0.98	208.58 ± 1.76	198.57 ± 1.12*	178.45 ± 1.38**
Ethanol extract (500)	186.17 ± 1.08	198.23 ± 1.44**	162.47 ± 1.08**	109.45 ± 1.67**
Aqueous extract (500)	194.99 ± 1.43	207.45 ± 1.24*	189.64 ± 1.04**	172.38 ± 1.76**

Data are the mean ± SD values for six mice in each group. *p < 0.05, **p < 0.01 as compared to the control.

Treatment (mg/kg *p.o.*)	Serum			
	Cholesterol (mg/dL)	Triglycerides (mg/dL)	HDL (mg/dL)	LDL (mg/dL)
Normal control	111.72 ± 4.67	85.96 ± 6.85	33.22 ± 2.24	88.45 ± 11 22
Diabetic control	160.87 ± 6.78	160.67 ± 8.85	25.430 ± 4.56	198.56 ± 14.56
Metformin (11.3)	85.98 ± 6.24**	85.67 ± 7.56**	44.45 ± 2.24**	95.20 ± 11.45**
Chloroform extract (500)	107.87 ± 8.43*	102.23 ± 8.45*	41.23 ± 1.98*	158.78 ± 14.56*
Ethanolic extract (500)	98.78 ± 8.20**	91.23 ± 6.23**	47.34 ± 3.45**	116.0 ± 13.67**
Aqueous extract (500)	125.87 ± 6.43	112.32 ± 3.42	40.23 ± 3.65*	145.540 ± 11.26**

Data are the mean ± SD values for six mice in each group. *p < 0.05, *p < 0.01 as compared to the control. HDL = High density lipoprotein, LDL = Low density lipoprotein.

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