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STUDY OF HYPOLPIDEMIC ACTIVITY OF ALLI CHOORANAM (NYMPHEA NOUCHALI) BURM.F)

Internal Medicine

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ABSTRACT

Present study was undertaken to evaluate the hypolipidemic activity of hydroalcoholic extract of powder of rhizome & flower of the plant Alli chooranam (Nymphea nouchali burm.f.) in rats. Hyperlipidemia was induced by Atherogenic diet and animals are randomly divided in to five groups. Animals were treated with low (200mg\kg) & high dose (200mg\kg) of Ethanolic- water extract of powder of rhizome & flower of the plant Alli chooranam (Nymphea nouchali burm.f.) up to 28 days. Body weight, levels of total cholesterol, triglycerides, LDL, VLDL and HDL.were measured in weekly basis. After 28 days of treatment animals were sacrificed by mild ether anesthesia, blood & vital organ were collected to estimate biochemical parameters & to study histopathological changes. A regular rise in biochemical parameters were observed in toxic control groups when compared with the normal control. Daily oral administration of rats with extracts and standard drug (Atorvastatin 10 mg/kg), lowered body weight &elevated biochemical parameters significantly ($p < 0.00$). The extract treatment also improved the normal functioning of the liver and kidneys as confirmed by the restoration of the biochemical profile. The study revealed that Alli chooranam (Nymphea nouchali burm.f.) possesses promising hypolipidemic potential.

KEYWORDS

Alli, Nymphaea, Hypolipedemic, Siddha

1.INTRODUCTION

The increase in the prevalence of diabetes is parallel with an increase in associated risk factors such as being overweight or obese. [Bahare et al,2019]. In addition to hyperglycemia dyslipidemia is increasingly viewed as pathogenic factor for neuropathy, particularly for type II Diabetes. Invitro, in vivo and clinical studies are focused on uncovering the mechanisms by which altered lipids converge to affect peripheral nerve function and health to support the development of potential mechanism-based therapies. In addition to very high cost, most of the allopathic drugs causing very serious toxicities in the patients. Therefore, in this situation, use of herbal medicines is the best solution. Both cost and toxicity can be reduced up to large extent using the traditional medicinal plants [Mohd Nazam et al 2021]. It is proved that *N. nouchali* hydroalcoholic seed extract has DDPH scavenging activity nitric oxide scavenging activity & lipid peroxidation inhibitory activity.[Mable et al2014]

The Preparation and standardization of medicinal herbs are urgently need for future studies and therapies. The Alli (*Nymphea nouchali Bum,f*) large aquatic herb of the family Nymphaeaceae, commonly known as Water lily (Alli in Tamil).Aquatic perennial herb lactiferous rooted. Flowers bisexual floating & solitary. It is native to tempo rate & tropical Asia, Australia & tropical Africa. Siddha medicine recommended flower & rhizome of this plant has astringent & emollient action can be used in the treatment of Diabetes mellitus, urinary diseases, eye diseases & for healing ulcers. Although hypolipidemic activity of Alli (*Nymphea nouchali Bum,f*) have been reported, lack of sufficient literature on flower & rhizome. This study was focused on evaluating hypolipidemic activity of hydroethanolic extract (HEE) of powder of rhizome & flower of the plant

2. MATERIALS AND METHODS

2.1. Collection and Authentication of Plant

The flower & rhizome of Alli (*Nymphea nouchali Burm.f)* freshly collected from various places of Kerala. Identified and authenticated by the Medicinal Botanists at Government Siddha Medical College and Hospital, Palayamkottai. These herbal formulations purified according to the suitable procedure methods described in Siddha classical literature. The drug is dried and subjected to size reduction to get uniform coarse powder. The powdered material then subjected to excessive extraction using water & ethanol solvents in a Soxhlet extractor.

2.2. Selection and acclimatization of animals

Wistar strains of albino rats weighing between 180-200g are used for this study. The animals were housed in large spacious cages and they were fed with commercial pellets and access to water *ad libitum*. The animals were well acclimatized to the standard environmental condition of temperature (22 ± 5^0c) and humidity ($55 \pm 5\%$) and 12 hr light dark cycles throughout the experimental period.

2.3. Evaluation of hypolipidemic activity

2.3.1. Assessment of hypolipidemic activity against atherogenic diet-induced hyperlipidemia in experimental rats

Atherogenic diet and water *ad libitum* for 20 days were used to study the hypolipidemic effect of hydroethanolic extract (HEE) of powder of rhizome & flower of the plant against experimental hyperlipidemia. Hyperlipidemia was induced in Wister albino adult male rats weighing 150-200gm by experimental hyperlipidemic diet. The serum and liver were analyzed for serum total cholesterol, triglycerides, high-density lipoprotein (HDL), low-density lipoprotein (LDL), very low-density lipoprotein (VLDL) by standard enzymatic calorimetric methods.

The rats were divided into 5 groups after the induction of hyperlipidemia

1. Group-I: Normal control treated with of normal saline (10ml/Kg,PO)

2. Group-II: Hyperlipidemic control received Atherogenic diet (mixture of cholesterol 400 mg/kg, cholic acid 50 mg/kg, and coconut oil)

3. Group-III: Hyperlipidemic rat treated with Atorvastatin (10mg/Kg, PO)

4. Group-IV: Hyperlipidemic rat treated with low dose of HEE of Alli (*Nymphea nouchali Burm.f)* (200mg/Kg, PO)

5. Group-V: Hyperlipidemic rat treated with high dose of HEE of Alli (*Nymphea nouchali Burm.f)* (400mg/Kg, PO)

Hydro ethanolic extract of Alli (*Nymphea nouchali Burm.f)* flower and rhizome (200&400mg/Kg) was administered to normal and hyperlipidemic rats for 7 days. The next day after the completion of experimental study, the blood was taken from the rats under mild anesthetic state by retro orbital sinus puncture. The collected blood samples were centrifuged (2500 rpm) for 10 minutes. Then serum samples were separated and it was used for various biochemical analyses. Serum and liver tissue were analyzed at 5 different intervals for lipid profile, lipid peroxidation and the activity were compared to the cholesterol lowering drug Atorvastatin (10mg/kg/day) group. Then animals were sacrificed and the liver was taken for histopathological study. Liver lipid extraction the liver was homogenized in cold 0.15M KCl and extracted with CHCl3: CH3OH (2% *v/v*). This lipid extract was used for the estimation of lipid parameters.

2.4. Statistical Analysis

All the values were expressed as mean ± standard error of mean. The

data were statistically analyzed by one-way ANOVA followed by Dennett's t-test, and value P < 0.05 was considered to be significant. Statistical analysis was performed using INSTAT- V3 Software programme.

3. RESULTS

3.1. Evaluation of hypolipidemic activity

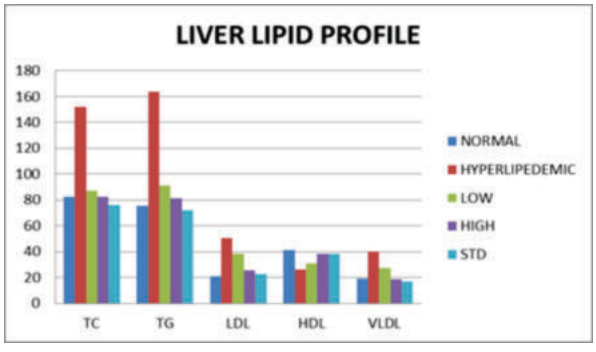
Table 3.1a Effect of HEE on Blood lipid profile of atherogenic - induced hyperlipidemic rats.

Groups	T.C.	T.G.	LDL	HDL	VLDL
G1	74.83±1.23	71.16±1.51	20.83±1.32	39.33±1.47	15.36±1.06
G2	140.17±1.39	148.17±1.53	57.17±1.29	28.17±1.12	30.83±1.55
G3	99.36±1.27	75.67±1.03	37.17±1.38	30.33±0.92	25.33±0.84
G4	81.35±1.49	72.83±0.94	31.33±1.06	35.25±1.18	18.17±1.29
G5	79.5±1.16	70.83±1.34	21.63±1.19	38.33±1.40	16.79±1.91

Table 3.1.b Effect of HEE on liver lipid profile of atherogenic - induced hyperlipidemic rats

Groups	TC	TG	LDL	HDL	VLDL
G1	82.16±0.71	75.75±1.67	21.17±1.64	41.17±0.85	19.19±1.28
G2	152.17±1.02	163.82±1.40	50.25±2.36	26.15±1.17	40.1±0.90
G3	87.15±0.86	91.15±1.17	38.12±1.15	30.9±0.70	27.22±0.19
G4	82.3±0.87	81.12±1.11	25.3±1.20	38.05±1.04	18.88±1.06
G5	76.05±1.11	72.25±1.09	22.93±1.45	38.1±1.04	17.1±0.85

Figure 3.1.a Effect of HEE on liver lipid profile of atherogenic - induced hyperlipidemic rats.



Administration of atherogenic diet significantly (P<0.001) increased the lipidemic parameters level compared to normal control rats. A significant reduction (P<0.001) of Total cholesterol, TG, LDL, VLDL level was noticed in hyperlipidemic rats after the oral administration of HEE (200 mg/kg) and (400 mg/kg) on 0^{th},14^{th}& 28^{th} day, compared to the control group. On the other hand, atorvastatin also has significantly reduced serum total cholesterol levels to ($P < 0.001$). HDL-cholesterol in atherogenic -induced group has significantly decreased compared to normal rats. A significant rise in HDL (P<0.001) in treated group was noted. (Table 3.2.a & b)

Table 3.1.c Effect of HEE on body weight of atherogenic -induced hyperlipidemic rats

GROUP	Body weight
G1	169.14±3.21
G2	252.30±1.13
G3	196.83±2.34
G4	184.83±0.91
G5	172.55±0.93

Administration of atherogenic diet significantly (P<0.001) increased the body weight compared to normal control rats. A significant reduction (P<0.001) was noticed in hyperlipidemic rats after the oral administration of HEE (200 mg/kg) and (400 mg/kg).

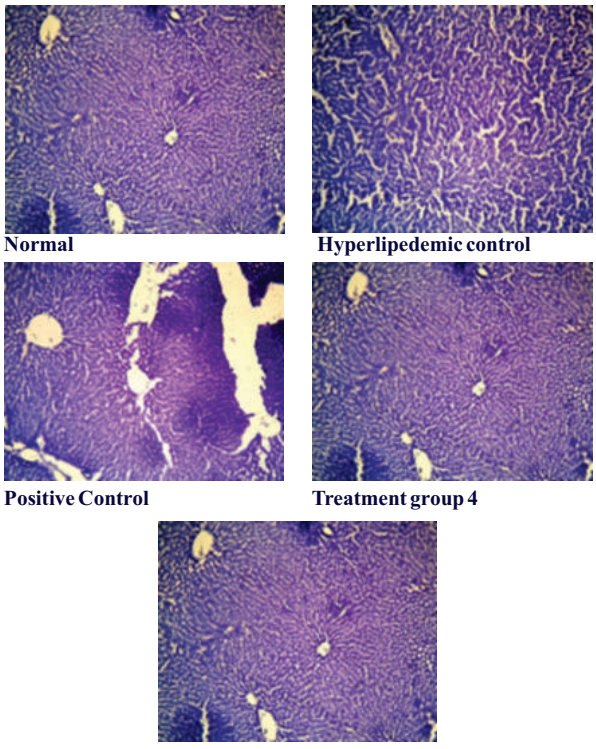


Figure 3.1.b Histopathological study of liver

Normal showed section of liver parenchyma with hepatocyte which appear normal, and central vein & portal tract are normal. Hyperlipidemic control showed liver parenchyma with scattered focal area of necrosis of hepatocyte. Treatment group (4) showed liver parenchyma with minimal necrosis, and minimal inflammation and Treatment group (5) showed liver parenchyma with hepatocyte which appear normal, and central vein & portal tract are normal.

4. DISCUSSION

Increase in TC, TG, LDL and VLDL cholesterol with decrease in HDL cholesterol, which contribute to coronary artery disease. The abnormal high concentration of serum lipids in the diabetic subject is mainly due to increase in the mobilization of free fatty acids from the peripheral fat depots, since insulin inhibits the hormone sensitive lipase [Rajagopal et al2008]). The reduction in cholesterol may indicate the increased oxidation of mobilized fatty acids by inhibition or lipolysis. The present investigation showed that all atherogenic induced rats displayed hyperlipidemia as shown by their elevated levels of serum and liver cholesterol, triglyceride, VLDL, LDL and also the reduction in the HDL level. The results showed that HEE produced a significant reduction in cholesterol level at a dose of 200 and 400mg/kg which significantly lowered both plasma triglycerides and cholesterol levels. The reduction of total cholesterol by the HEE at the dose level of 200 and 400 mg\ kg may be associated with a decrease of LDL, which is the ultimate aim of many hypolipidemic agents.This study suggests that cholesterol-lowering activity of the plant increase the fecal excretion of bile acids and neutral sterols with the consequent reduction of hepatic cholesterol because of its use in the biosynthesis of these bile acids. These fractions also slow down the rate of diffusion through the intestinal mucosa thereby reducing the absorption of cholesterol and triglycerides. HEE at high dose (400mg/kg) and low dose (200mg/kg) exhibited significant anti-hyperglycemic activity in normal and STZ-diabetic rats. This powder showed improvement in the parameters like body weight and carbohydrate metabolizing enzymes as well as regeneration of β-cells of pancreas.

5. CONCLUSION

The results of the study demonstrated study hydroethanolic extract of powder of rhizome & flower of the plant Alli (*Nymphea nouchali Burm.f*) possess anti hyperlipidemic effect.. These effects were statistically analyzed by ANNOVA & found to be significant. ($p < 0.05$)

Further studies are required to identify, isolate & characterize active principle responsible for the anti hyperlipidemic activity of the plant.

6. Acknowledgements
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7. Conflict of interest
The author declares no conflict of interest in the present work

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