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PHYTOCHEMICAL SCREENING AND ANTIHYPERLIPIDEMIC ACTIVITY OF *TALINUM PORTULACEFOLIUM* STEM IN HIGH FAT DIET INDUCED HYPERLIPIDEMIC RATS

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ABSTRACT

The aim of the present study was to carry out the antihyperlipidemic effect of stem of *Talinum portulacefolium* (Forssk.) Asch. ex Schweinf in high fat diet induced hyperlipidemia rats**.** The Antihyperlipidemic effect of hexane, ethyl acetate, ethanol and aqueous extracts was evaluated on the adult male albino rats at the selected doses of 100, 200 and 400 mg/kg body weight administered orally. The serum total cholesterol (TC), triglycerides (TG), low density lipoprotein-cholesterol (LDL) and extremely density lipoprotein-cholesterol (VLDL) were considerably diminished in the hyperlipidemia induced animals treated with ethanol extract at the both the doses of 200 and 400 mg/kg body weight when compared to that of normal rats. It could be said that the stem extract of *T.portulacefolium* exhibited a significant antihyperlipidemic effect.

INTRODUCTION

Life style changes have a significant impact on health of human beings. The modernization of society leads to change in dietry pattern of people with diet- high saturated fats, redefined sugars and low in fibre content [1]. This type of diet leads to many problems in human beings after some years [2]. One of the major problems among those is Hyperlipidemia. Hyperlipidemia is a heterogeneous group of disorders characterized by an excess level of serum total cholesterol (TC), triglycerides (TG), low level of high density lipoproteins (HDL), excess level of low density lipoproteins (LDL) and cholesterol [3].

Hyperlipidemia has been ranked one of the greatest factors contributing to coronary heart disease, atherosclerosis [1]. The World Health Organization (WHO) reported that the high blood cholesterol contributes to approximately 64% of cardiovascular diseases worldwide and caused 4.4 million deaths [2021]. Hyperlipidemia is classified into primary and secondary type that clearly indicates complexities associated with disease. The primary hyperlipidemia disease may be treated by baker's yeast anti-lipidemic drugs. Secondary type originating from diabetes, hypothyroidism and renal lipid nephritis and demands the original disease treatment rather than

hyperlipidemia. The main aim of treating hyperlipidemia patients is to reduce the risk of developing ischemia heart disease or cerebrovascular disease [2]. Currently available drugs have more number of side effects. Consumption of synthetic drugs leads to diarrhoea, nausea, myositis, gastric irritation, flushing, dry skin, and abnormal liver function and hyperuricemia. Medicinal plants play a major role in traditional system of medicine like Ayurveda ,Unani and Chinese system of medicine for the treatment of hyperlipedemia disorders [1]. *Talinum portulacifolium* (Talinaceae) is commonly known as "Flame Flower" [4]. It is also called Basalacheera (or) sambarcheera in Malayalam. In telugu it is called 'sizabhacchali'. It grows like a weed in nooks & cornes in kerala [5]. It is a tuberous geophyte and grows primarily in the seasonally tropical biomes. They are also available in tropical africa, arabia & eastwards of india [4]. Stems contain different type of chemical constituents like mixture of steroids, allantoin, N-acryloyl,malic acid , mixture of glucopyranosyl steroids and asparagines [7]. WHO estimated that 80% of people worldwide rely on herbal medicines partially for this primary health care [3]. The *Talinum portulacifolium* stem has toxic properties and used in the treatments of cough, pulmonary tuberculosis and gastritis [6].

2. MATERIALS AND METHODS

2.1. Plant materials

The Stems of *Talinum portulacefolium* were collected from local areas of Acharya Nagarjuna University, India. The plant was botanically identified and authenticated by Dr. P. Satyanarayana Raju, Department of Botany, University College of sciences, Acharya Nagarjuna University, Guntur, India.

2.2. Preparation of extract: The shade dried stems were powdered in an electric blender and was extracted separately in a soxhlet apparatus using ethanol, ethyl acetate, hexane and aqueous solvent system. Stem extract was filtered through a cotton plug followed by Whatman filter paper no.1 and then concentrated by using a rotary evaporator at low temperature 40 - 50 ºC. The yield of the hexane (AEHE), ethyl acetate (AEEA), ethanol (AEEE) and aqueous (AEAE) extracts were 3.4 g, 6.8 g, 9.4 g and 7.5 g respectively. All the extracts were preserved in air tight container until further use. Preliminary phytochemical screening tests were performed for all the extracts.

2.3 Phytochemical Screening: Standard screening tests [8] were employed in screening the extracts for identifying different constituents. Conventional for detecting the presence of alkaloids, tannins, flavonoids and steroids, etc. were utilized.

2.4. Animals

The animals weighing from 220-240 g were maintained under standard husbandry conditions in the animal house of the University College of Pharmaceutical Sciences, Acharya Nagarjuna University, A.P, India. The animals were kept at controlled temperature (25 ± 2 °C) in the natural light-dark cycle and had free access to feed and water. The study was approved by the Institutional animal ethical committee of Ministry Of Culture, Govt of India (ANUCPS/IAEC/AH/P/13/2020).

2.5. Development of high fat diet rats Rats were fed with two dietary regimes such as Normal pellet Diet (NPD) and High fat Diet (HFD). The rats were feeding either NPD or HFD (58% fat, 25% protein and 17% carbohydrates, as a percentage of total kcal) ad libitum, respectively, for the initial period of 2 weeks. The composition and preparation of HFD as were described elsewhere [9].

2.6. Experimental design: The animals were divided into control, toxic, standard and test groups each of which comprised of 6 animals. The test group animals were treated with the TPHE, TPEA, TPEE and TPAE extracts each with the doses of 100 mg/kg, 200 mg/kg and 400 mg/kg b.w p.o, suspended in 5% gum acacia solution, daily once. Animals in the normal control group received normal saline orally. Except

control group rest other groups were fed with rich cholesterol diet pellets. Standard group received atorvastatin 10 mg/kg orally. The details of different doses of extracts and standard drug were shown in table 1.

Table 1: Animals of different groups were administered with different doses of extracts and standard drug.

Group	Treatment (20)days
Group I	Normal saline
Group II	Cholesterol diet
Group III	Cholesterol diet + Atorvastatin (10 mg/kg b.w) suspended in 5% gum acacia solution
Group IV	Cholesterol diet + TPHE (100 mg/kg b.w) suspended in5% gum acacia solution
Group V	Cholesterol diet + TPHE (200 mg/kg b.w) suspended in5% gum acacia solution
Group VI	Cholesterol diet + TPHE (400 mg/kg b.w) suspended in5% gum acacia solution
Group VII	Cholesterol diet + TPEA (100mg/kg b.w) suspended in 5% gum acacia solution
Group VIII	Cholesterol diet + TPEA (200mg/kg b.w) suspended in 5% gum acacia solution
Group IX	Cholesterol diet + TPEA (400mg/kg b.w) suspended in 5% gum acacia solution
Group X	Cholesterol diet + TPEE (100mg/kg b.w) suspended in 5% gum acacia solution
Group XI	Cholesterol diet + TPEE (200mg/kg b.w) suspended in 5% gum acacia solution
Group XII	Cholesterol diet + TPEE (400mg/kg b.w) suspended in 5% gum acacia solution
Group XIII	Cholesterol diet + AEAE (100mg/kg b.w) suspended in 5% gum acacia solution
Group XIV	Cholesterol diet + AEAE (200mg/kg b.w) suspended in 5% gum acacia solution
Group XV	Cholesterol diet + AEAE (400mg/kg b.w) suspended in 5% gum acacia solution

The treatment was given for 20 days. On 21st day the blood samples were withdrawn from the arterial damage and serum total cholesterol (TC), triglycerides (TG), high density lipoproteins (HDL), low density lipoproteins (LDL) and), very low density lipoproteins (VLDL) wereanalyzed from it.

2.7. Preparation of serum sample: After the experimental period, blood was Collected from the animals and centrifuged to collect the serum. Then the serum Samples were collected in separate containers for biochemical estimations.

2.8. Estimation of biochemical analysis The biochemical estimation was carried out in our lab by using the following methods. Serum total cholesterol [10], triglycerides [11], serum high density lipoprotein, s erum low density lipoprotein, serum very low density lipoprotein [12].

2.9. Statistical analysis: All the data expressed as mean ± S.E.M and analyzed statistically using ANOVA followed by

Dunnett's test and compare with respective control group. Values with of $p<0.05$ was considered significant and $p>0.05$ is ns= non significant.

3. RESULTS: The levels of serum total cholesterol (TC), triglycerides (TG), low density lipoprotein (LDL), Serum high density lipoprotein (HDL) and very low density lipoprotein-cholesterol (VLDL-C) were observed in normal and experimental animals. In the animals of group XI & XII treated with ethanol extract at both the doses of 200 and 400 mg/kg body weight, serum total cholesterol (TC), triglycerides (TG), low density lipoprotein (LDL) and very low density lipoprotein-cholesterol (VLDL) were significantly decreased when compared to that of normal rats. The results were shown in table 2 and represented graphically in figure 1.

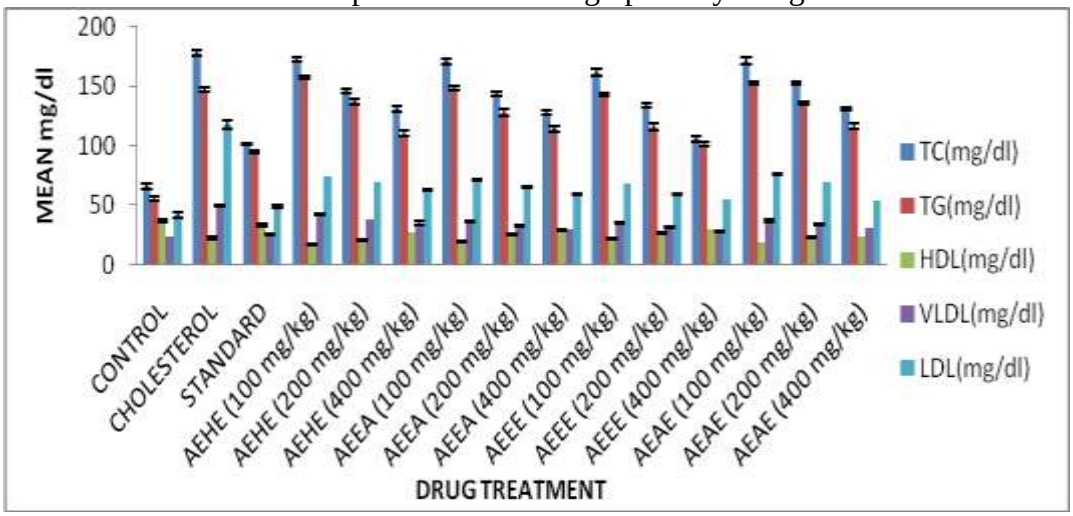

Figure 1: Graphical representation of Effect of Talinum portulacefolium Linn extracts on serum lipid profile levels (mg/dL) in HFD induced and NPD rats.

Table 2: Effect of *Talinum portulacefolium* linn extracts on serum lipid profile levels (mg/dL) in HFD induced and NPD rats

Plant extracts/Drug	Lipid Levels				
GROUPS	**TC(mg/dl)**	**TG(mg/dl)**	**HDL(mg/dl)**	**VLDL(mg/dl)**	**LDL(mg/dl)**
Control	65.89±2.28	55.90±1.67	37.15±1.13	23.76±0.33	42.00±2.65
Cholesterol (Toxic)	178.20±2.47**	147.13±2.45**	22.71±1.21**	49.65±0.75**	118.26±3.50**
Standard (10mg/kg)	101.63±0.14*	94.78±1.25*	33.54±0.87	25.59±0.65*	49.35±0.54*
TPHE (100 mg/kg)	169.54±1.74*	151.52±1.45*	21.22±0.41	37.52±0.64*	68.18±0.28*
TPHE (200 mg/kg)	141.65±1.63*	135.63±2.25*	24.32±0.63	34.53±0.14*	65.13±0.25*
TPHE (400 mg/kg)	122.74±2.36*	115.69±2.25*	27.34±0.36	30.39±2.25*	60.84±0.41*
TPEA (100 mg/kg)	165.44±2.41*	140.85±1.63*	23.93±0.72	33.52±0.58*	66.41±0.85*
TPEA (200 mg/kg)	136.78±1.85*	119.22±2.47*	28.38±0.94	31.63±0.28*	61.42±0.52*
TPEA (400 mg/kg)	115.55±2.41*	109.53±2.82*	30.39±0.33	29.96±0.17*	56.52±0.14*
TPEE (100 mg/kg)	151.41±2.39*	138.20±1.36*	25.37±0.63	31.52±0.58*	62.41±0.19*
TPEE (200 mg/kg)	125.85±1.88*	111.36±2.89*	31.99±0.53	28.41±0.82*	54.15±0.04*
TPEE (400 mg/kg)	98.25±2.17*	97.05±2.52*	34.42±0.58	25.67±0.41*	51.53±0.63*
TPAE (100 mg/kg)	168.22±2.77*	152.63±1.56*	21.97±0.98	35.36±0.82*	71.53±0.41*
TPAE (200 mg/kg)	144.82±1.96*	131.42±1.86*	26.63±0.52	32.05±0.85*	62.14±0.28*
TPAE (400 mg/kg)	126.98±1.40*	107.28±2.96*	24.41±0.05	30.17±0.17*	50.52±0.85*

Values are mean±SEM, n=6 **p<0.01, when compared with control Group, * p<0.01, when compared with toxic group.

4. DISCUSSION

Medicinal plants have been source of drugs since decades. *T.portulacefolium* has been used conventionally to reduce serum lipid levels. It is not proved to treat *Diabetes millitus* and connected lipemia. Hipercholesterolemia, a high cholesterol diet and oxidative stress increase the risk of development of atherosclerosis [13]. Cholesterol is synthesized in animal liver and additionally it is a precursor for the synthesis of steroid hormones. Accumulated quantity of cholesterol leads to cardiovascular disease particularly coronary heart disease (CHD [14]. In the present study, feeding rats with diets resulted in augmented TC, TG, LDL and VLDL cholesterol levels. This model was not to study the potential of antihyperlipidemic result of supplementations of *T.portulacefolium* that contained important amounts of inhibitor properties. From this study, we have a tendency to found that daily oral administration of *T.portulacefolium* extracts shows a positive result on consequentially reduced total sterol levels in plasma after twenty days of administration. This result agrees with literature wherever depleted level of HFD fed hyperlipdemia. Alpha-lipoprotein is directly removes sterol from the blood. Lipoprotein may be a risk issue and plays a job in development of coronary artery disease. A decrease in oxidative stress and protection of lipoprotein from oxidization may thus be a technique with nice promise for bar of coronary artery disease related to disorder. VLDL particles are smaller than the chylomicrons and are made triglycerides tho' to a lesser extent very low density lipoprotein particles sizes vary wide, with a concomitant variation of the chemical composition; the larger particles are made in triglycerides and in apo-c and also the smaller particles depleted of TG and surface materials result from the reaction of conjugated protein [VLDL lipoprotein] by lipoprotein enzyme activity. In this study, blood serum, TG levels were considerably elevated in HFD rats. Those levels are the cause for hardening of arteries. In conclusion, it could be said that the stem extracts of *T.portulacefolium* exhibited a significant antihyperlipidemic activity. At the dose 100 mg/kg it has showed less antihyperlipidemic effect which is nonsignificant when compared to normal rats. All the extract treated groups were showed antihyperlipidemic activity at doses 200-400mg/kg. The levels of TC, TG, LDL & VLDL significantly decreased in ethanol extract treated group when compared to normal group at doses 200 & 400mg/kg. The ethanolic extract was proved to have shown the plnt as potent antihyperlipidemic agent. The HDL levels were enhanced in cholesterol treated nimals. But, the exact mechanism of action is unknown. The phytochemical screening of stem extracts showed that it contains Alkaloids, Flavanoids, Glycosides, Tannins and Triterpenoids. The antihyperlipidemic activity of *T.Portulacefolium* is due to presence of compounds case in point such as Alkaloids, Flavanoids, Glycosides, Tannins and Triterpenoids. Due to presence of Polyphenolic compounds hepatic LDL-C receptors were increased and decreased the availability of cholesterol. Thus Phenolic compounds may be responsible for the decrease of in lipid levels [15]. This might led to decreased in risk factors for development of atherosclerosis and other cardiovascular diseases. The present study has also opened chances for further research especially with reference to the development of highly potent phytomedicine for dyslipidemia from *T.Portulacefolium*.

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