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A Study on Anti-hyperlipidemicActivity of *Helianthus Annus* in Rats on High Fat Diet

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ABSTRACT

The aim of the present study was to evaluate the Antihyperlipidemic activity of petroleum ether extract of *Helianthus annus* seeds in reducing the cholesterol levels in experimentally induced hyperlipidemic rats. The elevated levels of total cholesterol, Triglycerides, low-density lipoprotein, and very low-density lipoprotein due to high fat diet (HFD). Administration of Petroleum ether extract of *Helianthus annus*(400mg/kg)was significantly (P<0.001)reduced the lipid profile and lipoprotein levels. A significant reduction in Total-cholesterol was noticed in HFD fed groups (III); however, decreased TC,TGs was produced by the administration of Petroleum ether extract of *Helianthus annus* (dose 400mg/kg). There was a noticed increase in the body weight in HFD fed group (III), which was reduced by the administration of Petroleum ether extract of *Helianthus annus* (dose 400mg/kg)..

Key words:*Helianthus annus*, hyperlipidemic effect, HFD.

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INTRODUCTION

Hyperlipidemia is an excess of fatty substances called lipids, largely cholesterol and triglycerides, in the blood. It is also called hyperlipoproteinemia because these fatty substances travel in the blood attached to proteins. This is the only way that these fatty substances can remain dissolved while in circulation.
Hyperlipidemia [1], in general, can be divided into two subcategories:

- Hypercholesterolemia, in which there is a high level of cholesterol.
- Hypertriglyceridemia, in which there is a high level of triglycerides, the most common form of fat.

Lipid is the scientific term for fats in the blood. At proper levels, lipids perform important functions in your body, but can cause health problems if one have too much. The term hyperlipidemia means high lipid levels or high cholesterol. Hyperlipidemia includes several conditions, but it usually means that you have high cholesterol and high triglyceride levels.

High lipid levels can speed up a process called atherosclerosis/arteriosclerosis or hardening of the arteries. Arteries are normally smooth and unobstructed on the inside but as age increases a sticky substance called plaque forms on the inner walls of your veins/arteries. Plaque is made of lipids and other materials circulating in your blood. As more plaque builds up then arteries get narrow and stiffen. Eventually enough plaque builds up to reduce blood flow through arteries [2].

Coronary heart disease is the most common cause of morbidity and mortality in the developing countries. More than 500,000 deaths a year are attributed to coronary heart disease [3]. At least a third of the individuals that die of coronary heart disease are younger than 55 years of age. This disease costs over 100 billion dollars per year in medical treatment [4].

MATERIAL AND METHODS

Collection of plant and extraction

Authentification

The seeds of *Helianthus annuslinn*. belonging to the family Asteraceae were collected from local area of Anantapur District (India) and was authentified by Dr. J. Ravindrareddy, M.Pharm, Ph.D. Department of Pharmacognosy, Raghavendra Institute Of Pharmaceutical Education & Research, Anantapur (specimen number**:** RIPER 16/11)**.**

The seeds were soaked in the petroleum ether which was used as solvent for one week then filtered and the extract was concentrated. (cold maceration) [5].

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Preliminary phytochemical screening

Phytochemical screening have been performed and it was found to be containing Alkaloids,Glycosides,Tannins,Carotenoids,saturated and unsaturated fatty acids [6].

Animals and treatment

Female rats of 16-19 weeks age, weighing 150-175g were procured from the animal house Bangalore. The animals kept in cages (6 per cage) with 12:12 hr light and dark cycle at 25±2°c. The animals were maintained on the standard diets with adequate supply of water. Animal Ethical committee's clearance was obtained for the study. Animals were divided into Three groups of 6 animals each.

Treatment

Group I (control)	:High fat diet
Group II (Standard)	: High fat diet + standard drug (Atoravastatin 1.2mg/kg B.wt)
Group III (Test)	: High fat diet + petroleum ether extract of *Helianthus annus administered 400mg/kg Body weight.*

Animal diet

The compositions of the two diets were as follows:

Control diet

Wheat flour 22.5%, roasted Bengal gram powder 60%, skimmed milk powder 5%, casein 4%, refined oil 4%, coconut oil 9%, salt mixture with starch 4%, and vitamin & choline mixture 5%.

High fat diet

Wheat flour 20.5%, roasted Bengal gram powder 52.6%, skimmed milk powder 5%, casein 4%, refined oil 4%, coconut oil 9%, salt mixture with starch 4%, and vitamin & choline mixture 0.5%, cholesterol 0.4%[9].

Rats of group III were orally fed with the petroleum ether extract of *Helianthus annuus* (400mg/kg body weight) and rats of group II fed with standard drug atorvastatin (1.2mg/kg body weight). Both the petroleum ether extract of *Helianthus annuus* and atorvastatin were suspended in 2% tween 80 separately and fed to the respective rats by oral intubation [10]. Animals were given enough care as per the animal ethical committee's recommendations [8].

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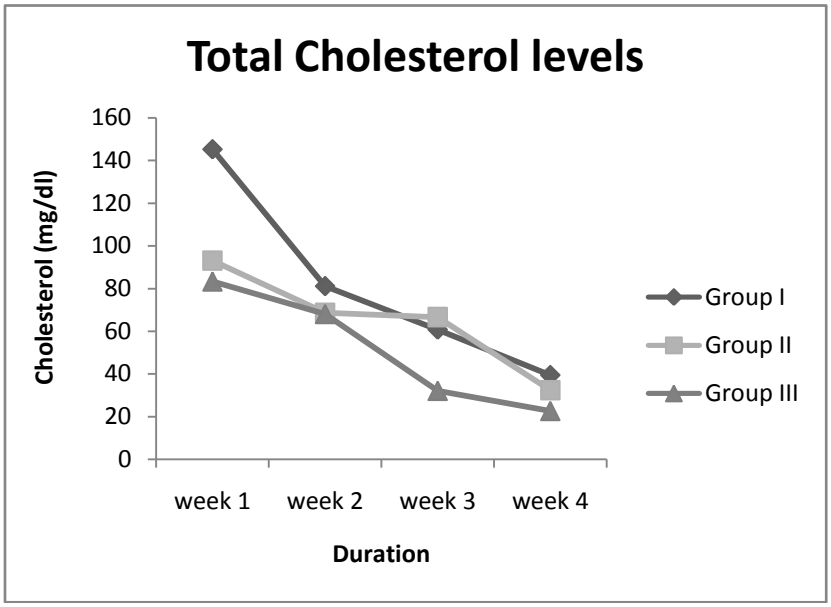
Biochemical estimation

On the 8th day, blood was collected by retro orbital sinus puncture under the mild ether anaesthesia. The collected samples were centrifuged for 10 min, the serum samples were collected and used for various biochemical experiments. Plasma samples were analysed for total cholesterol, triglycerides, S.G.O.T, S.G.P.T levels were estimated by using BoehringerMannaheim kits by Erba smart lab analyser [7].

RESULTS AND DISCUSSION

Table: I. Cholesterol estimation

	CONTROL	STANDARD	EXTRACT TREATED
Week 1	145.3±12.51	93.02±15.59	83.32±10.19
Week 2	81.18 ±8.825	68.64±7.523	68.07±13.47
Week 3	60.7±18.49	66.6±13.77	32.04±0.753
Week 4	39.35±4.647	32.4±2.094	22.59±8.004



Graph of total cholesterol levels for following four weeks

Table: II. Triglycerides estimation

	CONTROL	STANDARD	EXTRACT TREATED
Week 1	452.20±100.8	353.00±163	251.40±70.62
Week 2	153.10±26.03	150.60±77.29	80.30±28.87
Week 3	124.90±33.04	118.80±63.2	112.46±48.67
Week 4	75.54±28.82	71.61±15.24	67.27±41.20

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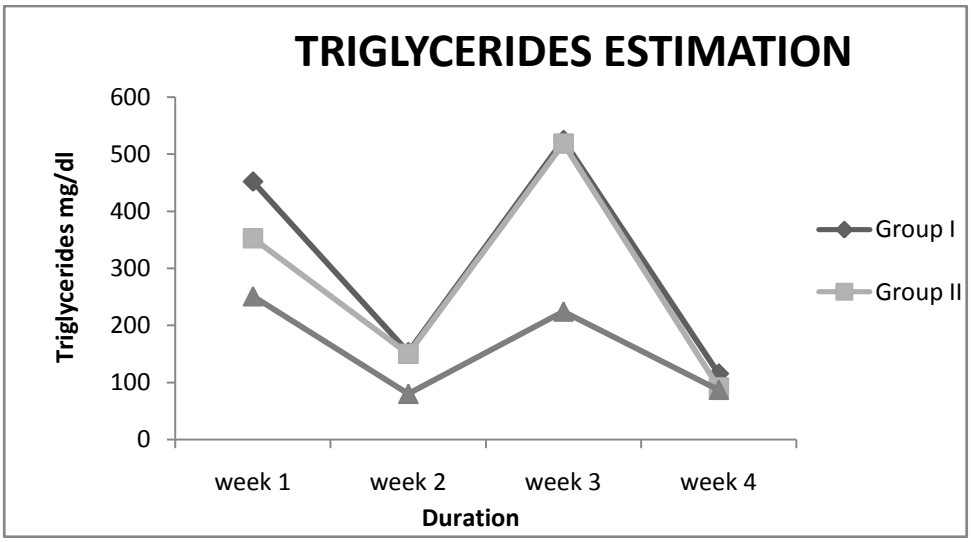
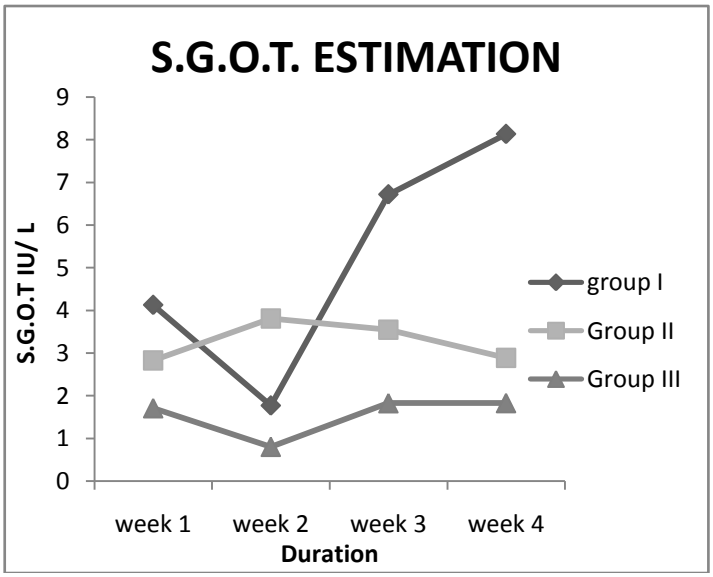


Graph of triglycerides levels for following Four weeks

Table: III. SGOT Estimation

	CONTROL	STANDARD	EXTRACT TREATED
Week 1	4.127±1.158	2.830±0.070	1.1900±1.246
Week 2	1.770±1.022	3.813±1.292	0.8067±0.4960
Week 3	6.771±1.813	3.553±0.4867	1.8270±0.0566*
Week 4	8.132±1.440	2.888±2.446	1.8300±0.9704

P*<0.05, significant when compared with control group.



Graph of SGOT levels for following Four weeks

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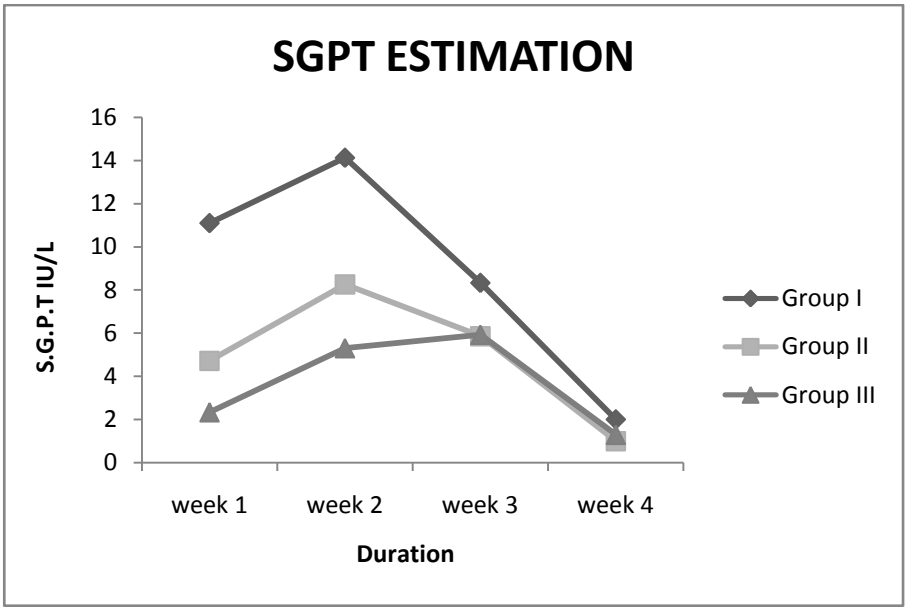
Table: IV. SGPT Estimation

	CONTROL	STANDARD	EXTRACT TREATED
Week 1	21.50±5.793	4.76±0.445	2.340±0.025
Week 2	14.12±2.569	8.20±3.256	5.300±2.621
Week 3	3.20±0.224	2.51±1.426	2.513±1.261
Week 4	2.03±1.134	1.30±0.060	1.260±0.3112



Graph of SGPT levels for following Four weeks

Table: V. Body weight estimation

	CONTROL	STANDARD	EXTRACT TREATED
Week 1	170.00±2.887	173.0±6.627	172.0±2.000
Week 2	175.00±2.887	180.0±7.638	171.7±1.667
Week 3	170.00±5.00	178.3±9.280	176.7±5.66
Week 4	170.00±5.00	180.0±10.00	175.0±2.887

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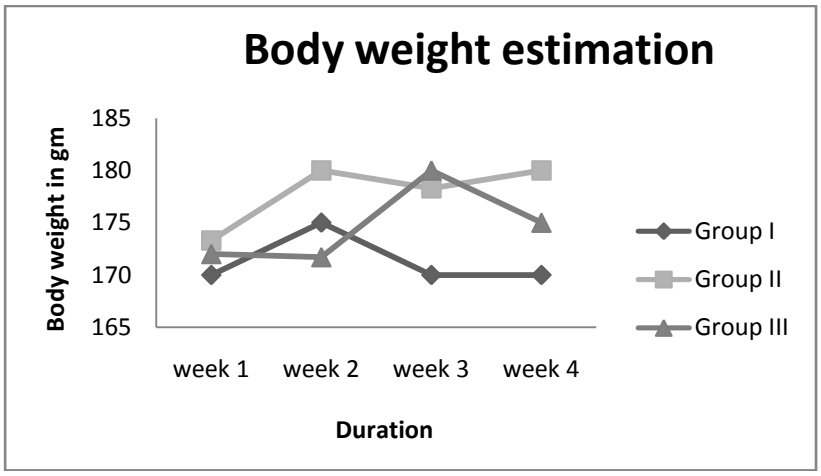

Graph of Body Weight Levels for Following Four Weeks

Cholesterol

Cholesterol levels were decreased from first week to fourth week .When compared to control and standard, the cholesterol levels of extract treated are gradually decreased. This was represented in table I.

Triglycerides

Triglycerides levels of treated extract were decreased when compared with control & standard groups from first week to fourth week. This is represented in table II.

SGOT

SGOT levels of treated extract were decreased when compared with control & standard groups from first week to fourth week. This is represented in table III.Only on third week significancy observed between control and treated group.

SGPT

SGPT levels of treated extract were decreased when compared with control & standard groups from first week to fourth week. This is represented in table IV.

Body weight

Body weight levels of treated extract were decreased when compared with control & standard groups from first week to fourth week.This is represented in table V.

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CONCLUSION

We concluded that it is quite evident from our result that petroleum ether extract of *Helianthus annuus*can be considered as a promising natural remedy for hyperlipidemia and these effects may contribute to its antihyperlipidemic activity.LD_{50} was calculated &it was found to be 2000 mg/kg bodywt. Antihyperlipidemic activity may be due to its antioxidant property (polyphenolic compounds). Further studies are recommended to trace out the single active principle of extract responsible for antihyperlipidemic activity.

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