

A STUDY OF HYPOCHOLESTEREMIC EFFECTS OF *CHLOROPHYTUM BORIVILIANUM* TUBERS IN RATS

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Summary

Objective of present communication is to study the efficacy of *C. borivilianum* tuber extracts in reducing the cholesterol levels in hypercholesteremic rats.

The association of raised serum cholesterol with cardiovascular disease (CVD) is well known. Many plant extract containing saponins are claimed to have hypolipidemic activity and hence the present study was carried out to study the effect of alcoholic (AL) and aqueous extract (AQ) of *Chlorophytum borivilianum* tubers to investigate the possible hypolipidemic effects of extract on rats fed with a high-cholesterol diet. AL exhibited potential hypolipidemic activity when compared with AQ and a standard dose of lovastatin.

Keywords: *Chlorophytum borivilianum*, hypolipidemic, serum cholesterol

Introduction

Chlorophytum borivilianum belonging to family liliaceae is a well known plant for its aphrodisiac as well as immunomodulatory activity¹. Tubers of this plant used to treat oligospermia, pre and post natal symptoms, arthritis, diabetes and dysuria^{2, 3}. It is very good tonic to increase physical and mental health⁴. As there have been no reports on the hypocholesteremic effects of *Chlorophytum borivilianum*, the present study was undertaken to evaluate its ability to reduce the cholesterol.

Materials and Methods:

Plant Materials And Extraction:

Chlorophytum borivilianum roots were purchased from local cultivator in month of March-April 2007. Plant species is authenticated by Botanist Dr.Prabha Bhogaonkar, Vidarbha institute of science and humanities, (V.M.V), Amravati. A specimen sample is deposited at Dept. of Botany, Vidarbha institute of science and humanities, (V.M.V), Amravati.

The roots were dried, powdered and defatted by petroleum ether. Marc was then extracted with alcohol for 3 hour with mild heating. The aqueous extract was prepared by maceration process by treating 100g of fresh powder with 500ml of distilled water along with 10ml of chloroform as a preservative. The maceration process was carried for 7 days with intermittent stirring. Both the extracts were filtered and evaporated to dryness under vacuum. These Alcoholic (AL) and Aqueous (AQ) extracts were used for further study.

Animals

Albino rats of Wistar strain of either sex, weighing 150-200 gms. Obtained from animal house, A. I. S. S. M.S. College of pharmacy, Pune were used for the study. The animals were fed with standard rodent diet and water ad libitum throughout the study. The study was conducted in accordance with IAEC guidelines. (No.CPCSEA/IAEC/PC-01/04-2K8)

Materials

A. AQ: *Chlorophytum borivilianum* aqueous extract

B. AL: *Chlorophytum borivilianum* alcoholic extract

C. Cholesterol extra pure for feeding purpose was obtained from Loba Chem, Mumbai, India. Coconut oil was used as a vehicle for cholesterol feeding.

D. Tablet lovastatin was obtained as a gift sample from Cipla Pharmaceuticals, Mumbai, India.

Experimental Procedure^{5,6}:

All the animals were weighed, marked and divided into seven groups. Each group consisting of six animals. All experiments were carried out between 10 am and 2 pm.

Group I. Normal control.

Group II. Cholesterol control: Fed cholesterol at a dose of 400 mg/kg for the period of 30 days.

Group III. Fed cholesterol as in group II and AQ at a dose of 100 mg/kg for day 15 to 30.

Group IV. Fed cholesterol as in group II and AQ at a dose of 300 mg/kg for day 15 to 30.

Group V. Fed cholesterol as in group II and AL at a dose of 100 mg/kg for day 15 to 30.

Group VI. Fed cholesterol as in group II and AL at a dose of 300 mg/kg for day 15 to 30.

Group VII. Fed cholesterol as in group II and lovastatin 7.2 mg/kg for day 15 to 30.

Biochemical Parameters

Biochemical parameters measured in the study were serum cholesterol, triglycerides and HDL. The blood samples were collected from the orbital sinus of rats with the help of a capillary tube. Baseline investigations were done at the beginning of the study and then repeated at the end of 30 days for all the groups. The serum was stored in deep freezer and analyzed within 3 days.

Statistical Analysis

The data were analyzed by ANOVA followed by Dunnet test. P values <0.05 were considered significant. The serum cholesterol, triglycerides and HDL levels on day 30 was compared to values of cholesterol control group and the % fall was calculated⁶.

Results

Hypercholesterolemia was produced in rats by feeding a high cholesterol diet. From days 15 to 30, four groups (AL: Group III, IV and AQ: Group V, VI) of rats were administered

AQ and AL in two different doses (100 and 300 mg/kg). The results were compared with the group of animals treated with cholesterol control⁶. All the animals were in good health throughout the study period and average body weight of the animals did not change significantly during the study.

As phytosterols are known to inhibit cholesterol absorption from the intestine due to their greater hydrophobicity and greater affinity for micelles than cholesterol and displace intestinal cholesterol^{7, 8}. Conversely, saponins are capable of precipitating cholesterol from micelles and interfere with enterohepatic circulation of bile acids, making them unavailable for intestinal absorption, leading to a reduction in hepatic and plasma cholesterol levels^{8, 9}. Thus phytosterols and saponins of *C. borivilianum* root could be responsible for the cholesterol-lowering effect.

Serum Cholesterol

On day 30, normal rats had a mean \pm SEM serum cholesterol level of 194.34 mg. In the cholesterol control groups this value was increased in 127.50mg % (Table 1). AL has 73.06 mg % and AQ has 55.17 % fall in cholesterol at the dose of 300mg/ml while Lovastatin also produced significant reduction in cholesterol levels. The measured % fall in values showed that there was a significant fall in serum cholesterol in both AQ and AL treated groups.

Serum Triglycerides

On day 30, normal rats had a mean \pm SEM serum triglyceride level of 89.14mg. In the cholesterol control groups this value was increased by 168.48 mg % (Table 1). AL has 47.53 mg % and AQ has 36.9 % fall in triglycerides at 300mg/ml while Lovastatin also produced significant reduction in triglyceride levels.

Serum Hdl Level

On day 30, normal rats had mean \pm SEM serum HDL level of 12.53 mg%. In the cholesterol control rats this value was 24.28 % as shown in Table 1. There was no significant change in HDL values in any of the drug treated animals.

Table 1. Effect of CBEE on serum cholesterol, triglyceride and HDL levels in hypercholesterolemic rats.

Group	Cholesterol Mg/dl mean ± SEM	Triglyceride values Mg/dl mean ± SEM	H.D.L. values Mg/ dl mean ± SEM
CON	194.34 ±1.90	89.14±1.22	40.15±0.5
CHO-CON	442.13± 10.23 (+127.50)	168.34±2.48 (+88.84)	35.12±0.2 (-12.53)
AL-100	291.74±3.8** (-34.02)	124.98±2.12** (-25.76)	43.65±0.5** (+24.28)
AL-300	119.12±2.12** (-73.06)	88.33±1.23** (-47.53)	50.75±0.3** (+44.50)
AQ-100	309.52±1.42** (-30.01)	134.12±7.12** (-20.33)	48.34±1.2** (+37.64)
AQ-300	198.23±0.67** (-55.17)	106.23±1.23** (-36.9)	54.92±0.71** (+56.37)
LOVA	98.67±5.23** (-77.68)	62.12±3.52** (-57.16)	56.34±0.88** (+60.42)

Values are expressed as mean ± SEM; n=6; Group I. Normal control; Group II. Cholesterol control; Group III. AL at a dose of 100 mg/kg body weight; Group IV. AL at a dose of 300 mg/kg body weight; Group V. AQ at a dose of 100 mg/kg body weight; Group VI. AQ at a dose of 300 mg/kg body weight Group VII. Lovastatin, (Values in parenthesis indicates % falls). Negative (-) values indicate decrease and positive values (+) indicate increase in related parameters. The difference among the mean were analyzed by the ANOVA Dunnet test. *p<0.05.

Conclusion

Addition of *C. borivillianum* extract as at two doses, i.e.100 and 300 mg, resulted in a dose-dependent reduction in lipid profiles such as total cholesterol and triglycerides in plasma. However, HDL-cholesterol level increased in both extract treated groups significantly is indicative of unexplored hypocholesteremic and possible pharmacological properties of *C. borivilianum* root tubers. It is well known that increased HDL-cholesterol levels have a protective role in CVD. Thus the study represented that

alcoholic and aqueous extract of *C. borivillianum* possesses significant hypolipidemic activity. Overall Administration of alcoholic extract at 300 mg/kg significantly reduced hyperlipidemia as compared to aqueous extract. Chronic intake of both extract will surely decrease total cholesterol and triglyceride ratio. The further studies are recommended to reveal exact mechanism of action.

Acknowledgements

We thank Dr. Neeraj Vywhahare, A. I. S. S. M.S. College of pharmacy, Pune for providing continuous guidance.

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