JPharmSci
Journal of Pharmaceutical Sciences
Open access peer-reviewed Journal
www.jpsjournal.com [ISSN: 1520-601x]
JPHARMSCI

# Antihyperlipidemic Effect of Ethanolic extract of *Curculigo orchioides* Gaertn. on Progesterone induced obese mice

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## ABSTRACT

**Background:**
A serious global public health issue, chronic obstructive pulmonary disease (COPD) is a progressive respiratory condition. Despite the fact that smoking cigarettes is the most well-known risk factor, biomass fuel smoke exposure, indoor air pollution, and occupational risks account for a significant portion of COPD cases among non-smokers in India. Improving clinical management and preventive initiatives, especially in areas like Karnataka, requires an understanding of the variations in disease development and treatment response between smoking and non-smoking COPD patients.

**Aim:**
To compare disease progression and treatment response among smoking and non-smoking COPD patients in Karnataka.**Methods:**A cross-sectional observational study was conducted among diagnosed COPD patients attending selected healthcare facilities in Karnataka. Participants were classified into two groups based on smoking status: smokers and non-smokers. Data were collected using clinical history, exposure assessment, and pulmonary function tests. Key variables included severity of airflow limitation, frequency of exacerbations, symptom burden, and response to standard COPD pharmacological therapy. Statistical analysis was performed to identify differences between the two groups.**Results:**Smoking COPD patients demonstrated more severe airflow limitation, higher exacerbation rates, and faster disease progression compared to non-smoking patients. Non-smokers with COPD were more frequently associated with long-term exposure to biomass fuel smoke and indoor air pollution. Treatment outcomes indicated that smokers showed relatively slower improvement in lung function and symptom control, whereas non-smokers demonstrated comparatively better response to therapy.**Conclusion:** Both smoking and non-smoking COPD represent significant health burdens in Karnataka, but they differ in risk factors, disease progression, and treatment response. Early detection, reduction of environmental exposures, and individualized treatment approaches are necessary to improve disease management and patient outcomes.

**Keywords**: Chronic Obstructive Pulmonary Disease, Smoking, Non-Smoking, Biomass Fuel Exposure, Disease Progression.

**Relevant conflicts of interest/financial disclosures**: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## INTRODUCTION

In various system of medicines in India, herbs has been used since long. [1] As the conduct of animals and birds in illness was noted by man, and also the therapeutic value of herbs as written in *Atharvaveda.*[2]. Complementary medicine was used by many people. During chronic problems man relies on complementary medicine including alternative system of medicine. [3] Documents of the western countries reveals usage of natural substances since 78 A.D. when Dioscorides, documented many herbs in "De Materia Medica" [4]. Extraction including modifying active constituents from herbs during nineteenth century was initiated. Plants provide about one fourth of medicinal drugs. Synthetic medicines produce more side effects, so majority of people prefer herbs as medicines, as documented by W.H.O.The rhizomes of *Curculigo orchioides (Musali* or *Talamuli)* reduces aches, inflammation, causes more sperm production, aphrodisiac, stimulates immune system, used in liver problems. The current work was done to evaluate the therapeutic uses of plant. In traditional medicine the medicinal uses are proved by pharmacological studies. This genus is used in strengthening the immune system, taste-altering, oxidation inhibitor, mast cell stabilization, histamine blocker, as hepatoprotective also protects nerve cells.[5] Screening of the Antihyperlipidemic activity of the above plant was performed for obese rodents.

## MATERIALS AND METHODS

### Preparation of Extract

The root of plant were sliced, after drying coarse powder (500g) was prepared. Ethanolic(90%) extract was prepared by Soxhlet extractor and it was mixed in aqueous solution containing 2% v/v Tween 80.

For calculating glucose (GOD-POD), triglycerides (GPO-POD), cholesterol (CHOD-POD), high density lipoprotein (PEG), biochemical kits were received through Crest Biosystems Kits (India) other chemicals were received through Qualigens, India. Progesterone also received through local market.

### Animals

Swiss albino mice (25-30g) were fed with normal diet, including water *ad libitum*. Animals were acclimated in laboratory conditions for week before experimentation. The Institutional Animal Ethics Committee gave its approval for animal studies.

### Experimental protocol

Progesterone was provided s.c. (dissolve in arachis oil) to animals in dorsal neck area for 4 weeks. The extracts were given half an hour prior to progesterone. [6]

Group I was fed with normal diet. Group II was given progesterone (10 mg/kg) s.c. for 4 weeks. Group III, Progesterone(10 mg/kg s.c.) + Orlistat (50 mg/kg p.o. post 30 min. of progesterone ) for 4 weeks. Group IV, Progesterone (10 mg/kg) + Extract 500 mg/kg, p.o. post 30 min. of giving progesterone. Group V, Progesterone (10 mg/kg) + Extract 1000 mg/kg, p.o post 30 min. of giving progesterone. On last day, post 30 min of receiving of drug, ambulation, grooming, rearing was noted. Mice were placed in the centre during open field test, ambulations, rearing frequency and grooming were recorded for five minutes. After 28 days, anaesthesia was given to fasted mice, blood collected using retro-orbital method. Blood was Centrifuged (3000 rpm) for twenty minutes, serum used for determining biochemical estimations.

### Biochemical estimations

Biochemical parameters like Blood Glucose[7], triglyceride, HDL, LDL [8], total cholesterol level [9], ALT, AST [10] and ALP [11] were calculated by using standard available marketed kit.

### Statistical analysis

Results are depicted as mean ± S.E.M. Analysis were performed using one way analysis of variance (ANOVA), followed by Dunnett's test and $p<0.05$ was considered statistically significant.

## RESULTS

### Body weight

At day1 and day 29, weight of animals were observed for all groups. Standard and extract treated

animals showed maintained weight, during experiment, as compared to Negative controlled (Figure 1).

**Effect on exploratory behaviour**

As shown in Figure 2, on 28th day, after half an hour of drug administration, ambulations were significantly minimized ($p < 0.05$) and increased grooming were observed in Group II in comparison to normal. Animals on treating with drug with both doses (500mg/kg and 1000mg/kg), displayed maximum ambulation, rearing and fewer grooming ($p < 0.05$) when compared to control.

**Effect on blood glucose level**

On day 29th day, in the treated group, there was gradual reduction in blood glucose. Level of Blood glucose was reduced significantly($p<0.05$) in standard group in contrast to control group (Figure 3).

**Effect on Cholesterol concentration**

As shown in Figure 4, extract at both doses and Orlistat treated group, the cholesterol level was reduced significantly ($p < 0.05$) in comparison to progesterone control group.

**Effect on Triglycerides level**

In Group IV and Group V, Triglyceride levels was lowered significantly. In Orlistat (50mg/kg) treatment group there was significant reduction in triglyceride level ($p < 0.05$) as compared to Group II (Figure 5).

**Effect on LDL level**

As shown in Figure 6, in Group IV and V there was significant lowering of LDL level ($p<0.01$). In Orlistat treated group (Group III) there was significant decrease in LDL level ($p<0.001$) as compared to control group.

**Effect on HDL level**

As shown in Figure 7, in groups treated with extract, amount of HDLwere elevated significantly ($p< 0.001$). In Group III, HDL amount elevated significantly ($p<0.001$), in comparison with Group II.

**Effect on Liver Enzymes**

As shown in Figure 8 and 9, there was significant elevation of serum transaminase like ALT and AST concentration ($p < 0.001$) in 2nd Group. In remaining Groups, the ALT and AST levels was reduced significantly ($p < 0.05$) in comparison to Progesterone control.

In Figure 10, the SALP level in Group III, IV and V lowered significantly ($p < 0.05$) as compared to Group II (progesterone control group).

## DISCUSSION AND CONCLUSION

In this study, at both doses of plant extract, Antihyperlipidemic activity was assessed using progesterone induced model. Progesterone a female steroidal sex hormone, plays a significant role in menstruation and pregnancy. It slows metabolism of fatty substance and causing overweight issues by accumulating fat.[12] Obesity caused by progesterone is a very well model for testing drugs anti-hyperlipidemic effects. More food intake including weight is connected to progesterone administration.[13] At both doses, mice on treating with *C. orchioides* had comparatively less food consumption and reduction in weight. The effect on food intake is due to important ingredients of this herb, that were connected to a many medicinal effects including lowering of lipid concentration in blood, heat production and preventing formation of gas in gastrointestinal effect.[14] Hypertrophy or hyperplasia of the liver is indicated by an increase in liver weight.[15] Antiobesity effect of crude drug may be attributed to the saponin content of the extract. Inhibition of pancreatic lipase activity is shown by saponin constituent according to the reports. Since Synthetic drugs have several side effects so many varities of natural materials have been explored for their obesity treatment potential. These are mainly complex products having several components with different chemical and pharmacological features. These are mainly complex products having several components with different chemical and pharmacological features.[16] This progesterone action can be due to increase in body weight. In animals, providing progesterone decreases ambulation, rearing but there was more grooming levels seen. The administration of herbal extract

caused substantial increase in ambulation including rearing, but low grooming level was seen. Blood sugar levels and lipid levels like Triglycerides and Total cholesterol were increased and High Density Lipoprotein levels were decreased by Progesterone. Levels of Triglycerides and Total cholesterol in extract treated mice were significantly less.[17] The extract of plant on oral administration at given doses resulted in increased HDL levels. After 4 weeks, in treatment groups there was reduced ALT and AST concentration, as compared to untreated group [18]. After 4 weeks of receiving the extract, body weight, explorations and biochemical changes were observed. Maximum activity was seen at dose of 1000mg/kg of extract. The extract of *C. orchioides* root maintains body weight, tendency to explore or investigate a novel environment and biochemical changes. As it is useful in cutting down the lipids, the herb could be useful as Antihyperlipidemic drug. The authors are grateful to School of Medical and Allied Sciences, K. R. Mangalam University, Gurugram, Haryana.

As depicted in Figure 1, after 28$^{th}$ day, the weight of rodents was noted for all grouped animals. The weight was significantly ($p<0.05$) maintained in animals, which were treated with Orlistat, herb extract (both doses), as compared to negative control group.

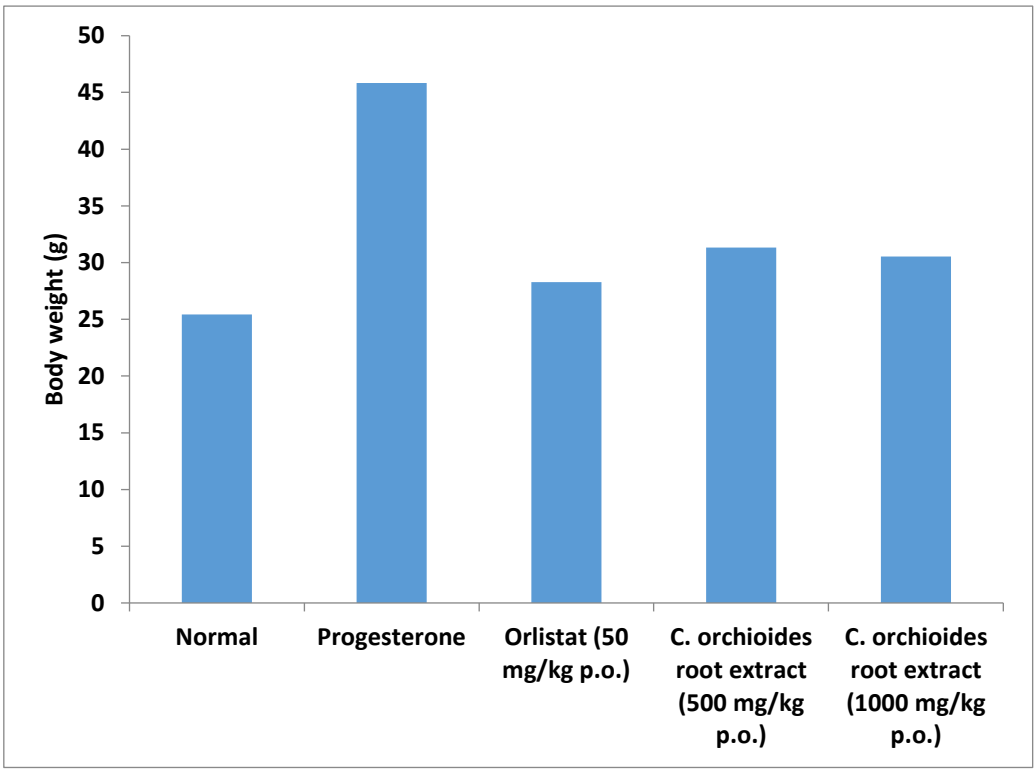


**Figure 1: Body Weight**

As depicted in Figure 2, a significant ($p < 0.05$) decrease in the amount of ambulation and rearing also grooming was more in progesterone control as compared to normal. Animals with extract groups, at both different doses, there was significant increase in ambulation, rearing and reduced grooming ($p <0.05$) was noticed as compared to control group.

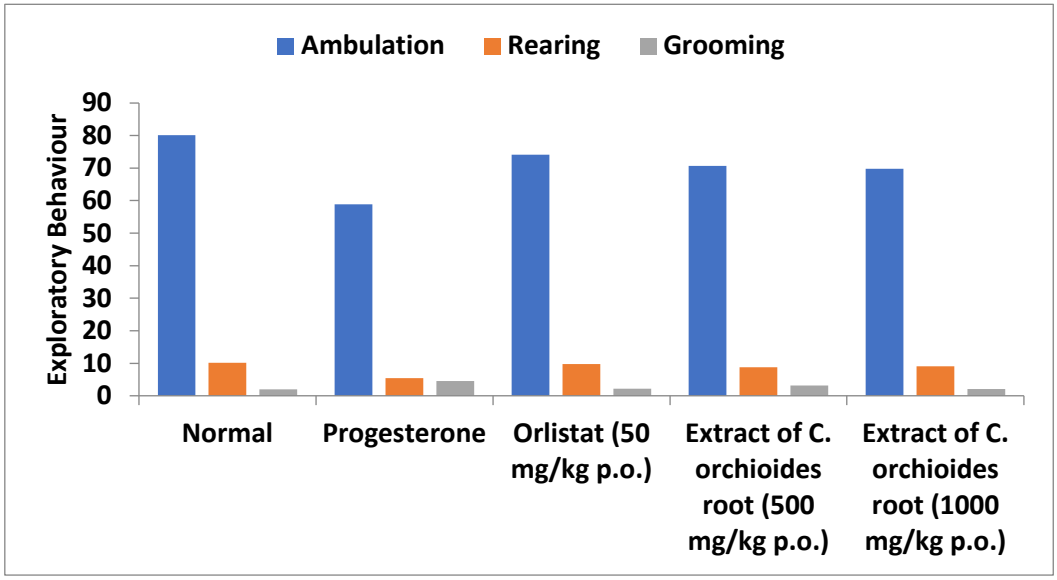


**Figure. 2: Effect of extract in number of explorations**

As shown in Figure 3, lowered blood sugar was noticed in treated group. At final stage, in Orlistat and treatment groups, blood sugar concentration was lowered in significant manner ($p<0.05$) when compared to Negative control.

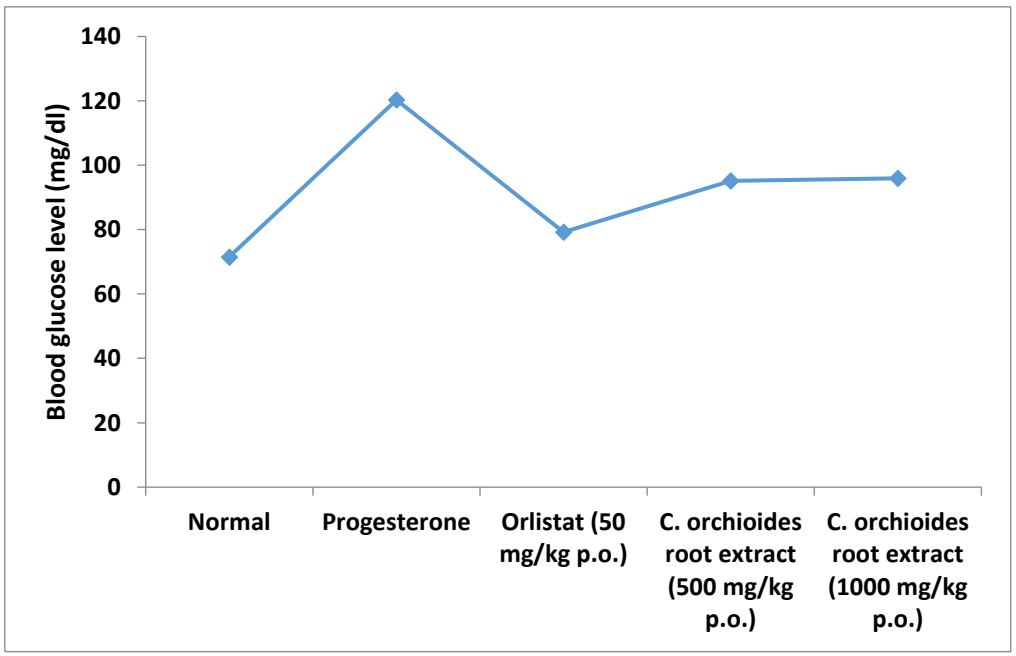


**Figure. 3: Effect of extract on glucose concentration**

As shown in Figure 4, at both doses of treatment groups, cholesterol amount was lowered significantly ($p < 0.05$). For standard drug treatment group cholesterol reduced significantly ($p < 0.05$), respectively as compared to progesterone control group. Values are expressed as mean ± S.E.M. (n=6).

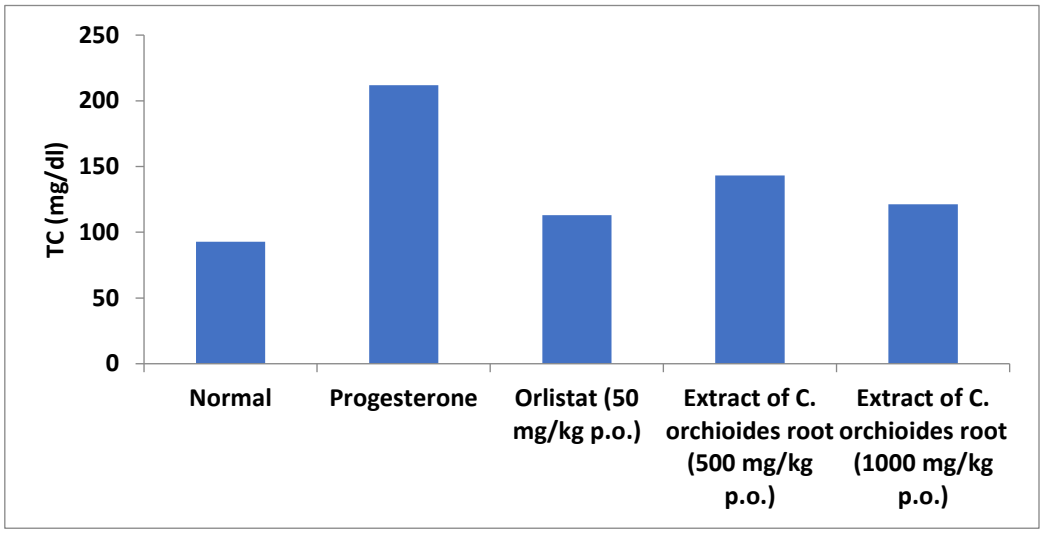


**Figure. 4: Effect of extract on cholesterol**

In extract treated groups, triglyceride lowered significantly ($p < 0.05$). For standard drug treatment group triglyceride reduced significantly ($p < 0.05$), respectively as compared to progesterone control group as given in Table 5 and Figure 5.

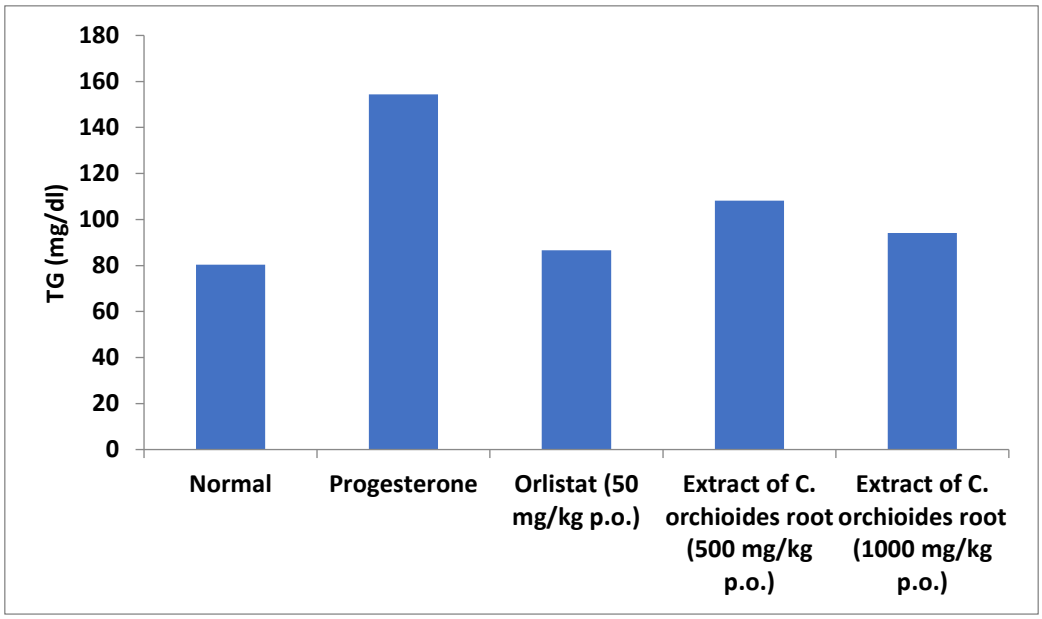


**Figure. 5: Effect of extract on triglycerides.**

As shown in Figure 6, in extract treated animals, bad cholesterol was low significantly ($p<0.01$). Whereas animals which were provided standard drug the Low density lipoprotein was significantly lowered ($p<0.001$), as compared with negative control group.

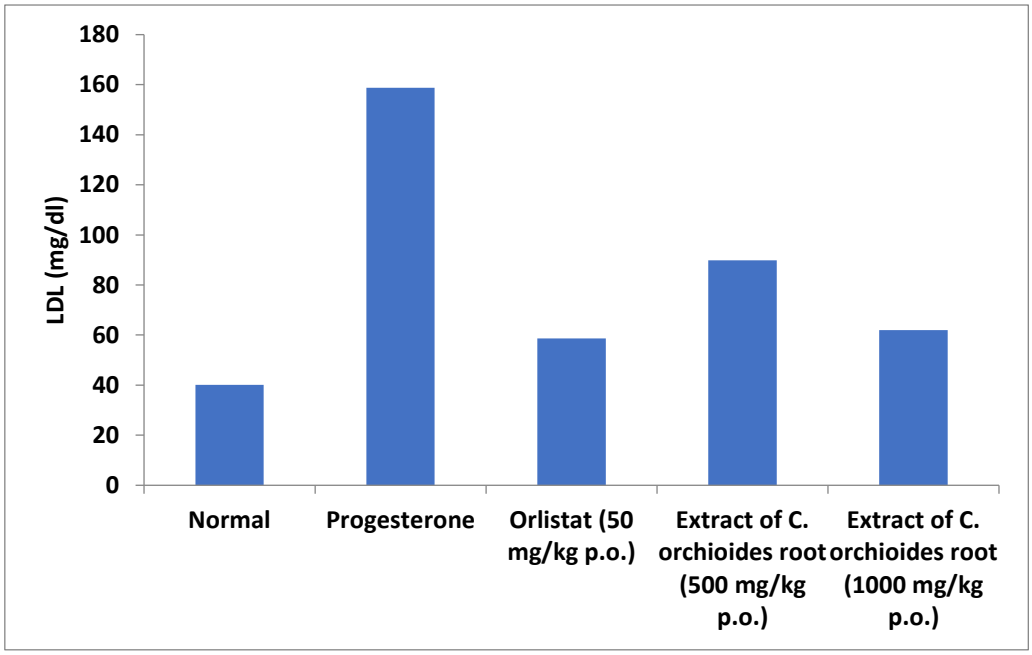


**Figure 6: Effect of extract on Low Density Lipoprotein in progesterone-induced obese mice**

As shown in Figure 7, in extract treated groups, H.D.L. was increased significantly ($p < 0.001$). In standard drug treated animals, good cholesterol was more ($p<0.001$), as compared to negative control group.

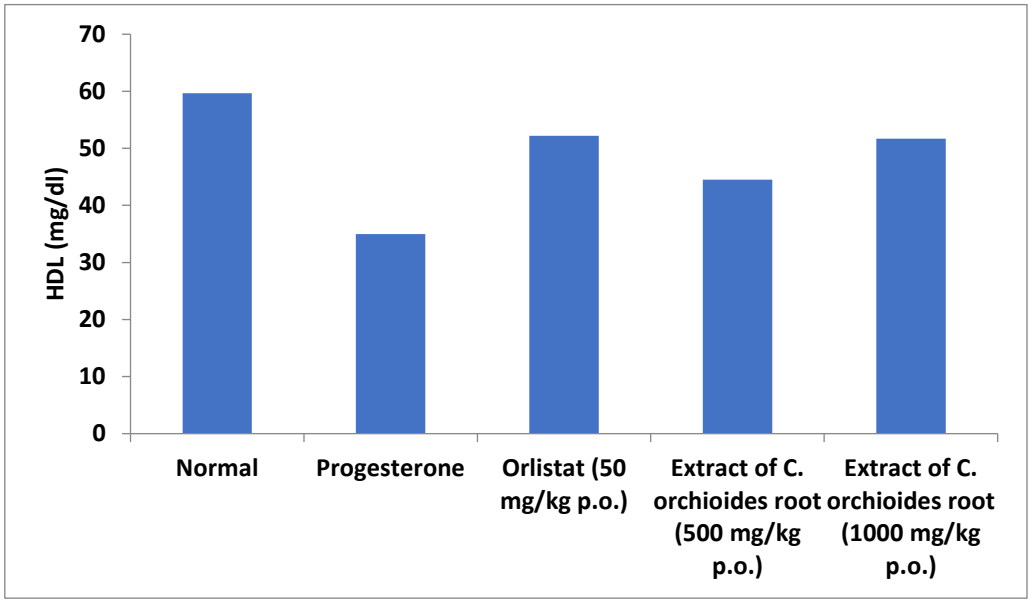


**Figure 7: Effect of extract in High Density Lipoprotein.**

In Figure 8, serum transaminase (ALT level) was significantly ($p < 0.001$) increased in negative control group. At both doses of Extract and standard treated groups ALT concentration were lowered significantly ($p < 0.05$) in comparison with negative control group.

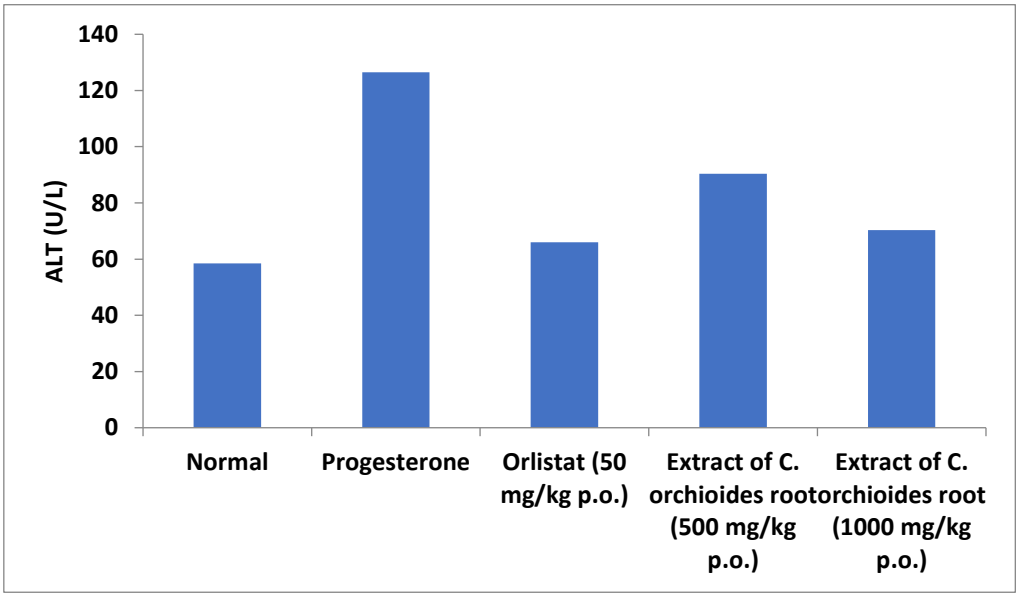


**Figure 8: Effect of extract on ALT**

In Figure 9, ethanol extracts and standard treated groups, AST concentration decreased significantly ($p < 0.05$) as compared to control group, respectively.

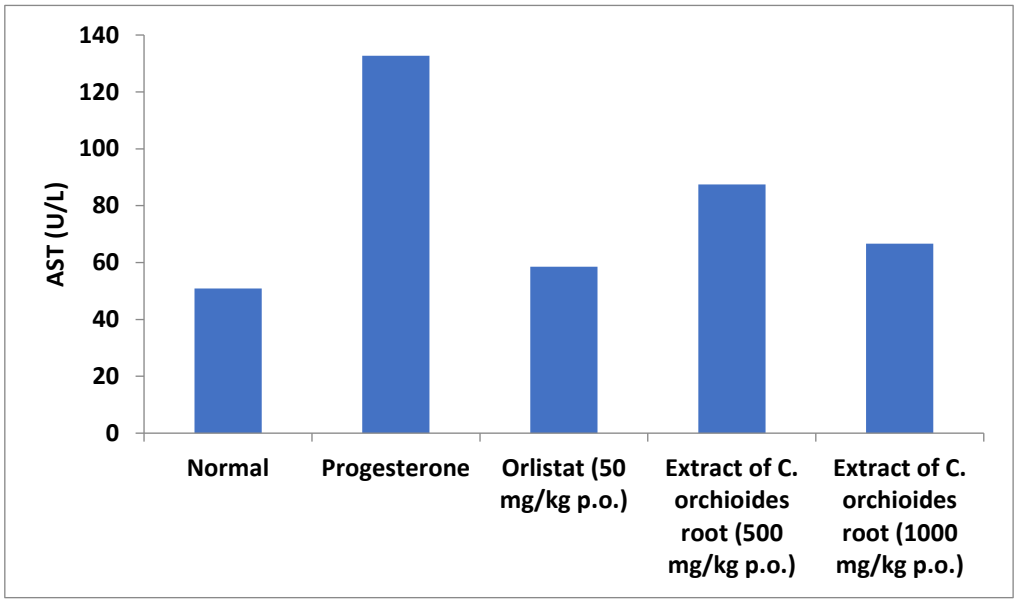


**Figure 9: Effect of extract on AST**

For 500 mg/kg including 1000 mg/kg of extract also 50 mg/kg Orlistat treated groups ALP concentration were reduced significantly ($p < 0.05$) as compared with progesterone control group, respectively, which is represented on Table 10 and Figure 10.

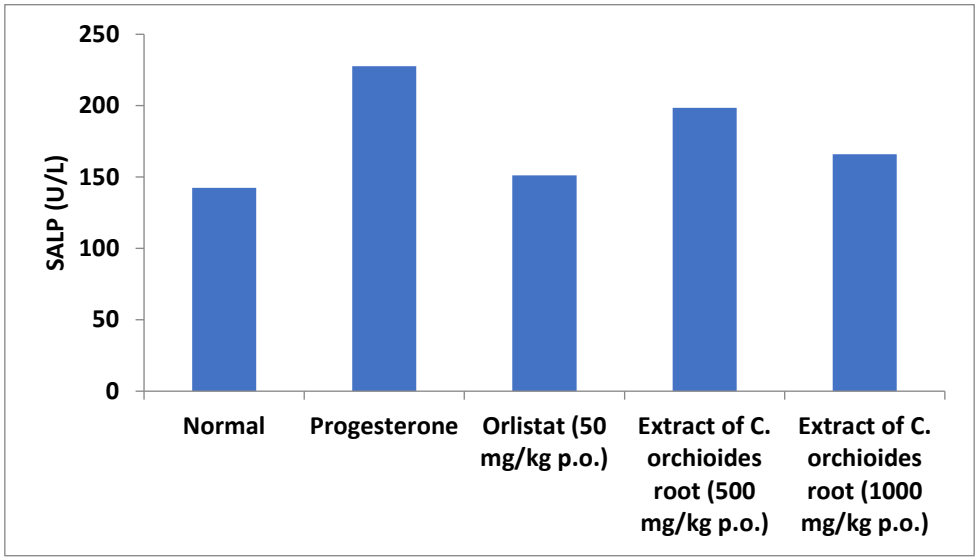


**Figure 10: Effect of extract on ALP**

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HOW TO CITE: Richa Tiwari, Pankaj Gupta, Mohd. Sabir Khan, Anmol Sharma, Manisha Kalra, Nitin Kumar, Antihyperlipidemic Éffect of Ethanolic extract of Curculigo orchioides Gaertn. on Progesterone induced obese mice, J. Pharm. Sci., 2026, 2 (4), 779-788. https://doi.org/10.5281/zenodo.19357957