

Study of Effect of Ocimum Sanctum on Hyper Lipidemic Rabbit Biomodel

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Abstract— Plants are an important source of medicines. Present study was conducted with Ocimum sanctum leaf extract administered to hyper lipidemic male albino rabbits for 6 months. Significant reduction in Total cholesterol(t.c), Low density lipoprotein (LDLcholesterol), Triglycerides(TG) and Very low density lipoproteins(VLDL) were achieved with Ocimum treatment. High density lipoprotein elevation was not achieved in our study. Lipid lowering diet produced HDL elevation. Lowering of TG and VLDL was significant with lipid lowering diet than ocimum treatment. More studies are needed to explore the medicinal effects of this sacred plant.

Index Terms— LDLcholesterol, Ocimum sanctum, TC, TG, VLDL

I. INTRODUCTION

Plants are one of the most important sources of medicines¹. Among them Ocimum species is very important for their therapeutic potentials². Known important species are Ocimum sanctum (Tulsi), O. gratissimum (Ram Tulsi), O. canum sims (Dulal Tulsi) O. basilicum (Ban Tulsi) O. kilimandscharicum Guerke (Camphor Tulsi) O. americanum Linn (Hoary Basil) O. Micranthum Wild. Medicinal Properties of Ocimum Sanctum are Hypoglycemic⁴ & Hypolipidemic⁵, Antioxidant⁶, Anti inflammatory⁷, & Antimicrobial. Anti Ulcer activity, Anti Cataract effect, Analgesic effect¹⁰, Antistress activity, Anti Tumor activity¹² & Radio protective effect¹³ of Ocimum sanctum has been revealed by many studies. This study aimed at exploring the role of Ocimum sanctum on its hypolipidemic effect. Male Albino rabbits were used as hypolipidemic study models³.

Aim : To study the effect of Ocimum sanctum on lipid profile of hyperlipidemic rabbits.



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II. MATERIALS & METHODS:

Ocimum sanctum was administered as capsules containing dried leaf extract prepared by Himalaya Drug Company (Trade name: Tulsi Capsules – 250mg).

Male Albino rabbits weighing above 2kg were selected for the experiment. Rabbits were divided in three groups



Group1 (Ocimum treated gp) (n=4)

Group2 Control gp (without Ocimum) (n=4)

Group 3 Normal Control gp (Normal diet & without Ocimum) (n=3)

Atherogenic diet was prepared by mixing normal rabbit chow with 0.3% cholesterol and 4.7% coconut oil. Base line values of total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides & VLDL was estimated by collecting blood from earlobe marginal vein from all 3 gps.

Atherogenic diet was introduced to animals of Group 1 & Group 2 for 18 months to induce hyperlipidemia. After 18 months blood was collected from all rabbits and lipid profile was estimated. To the gp1 Ocimum (Tulsi capsules one per day) was administered by mixing the drug in grated carrots. Six months after Tulsi treatment blood was withdrawn for lipid profile estimation. Six months after administration of atherogenic diet, Gp2 rabbits were switched on to normal diet for six months. No Tulsi treatment was given. After six months blood was withdrawn for lipid profile estimation. Normal rabbits were fed with normal rabbit chow throughout the experiment period.

III. RESULTS

Statistical analysis of the data was done using SPSS version 5 by applying non-parametric test. Percentage difference of the 6th month value from the zero month value was taken and Kruskal Walli's Test was applied to find out statistical significance among the groups. Variables with P < 0.05 was considered significant. Wilcoxon Mann Whitney Test was applied to find out the statically significant group.

Figure I- 1

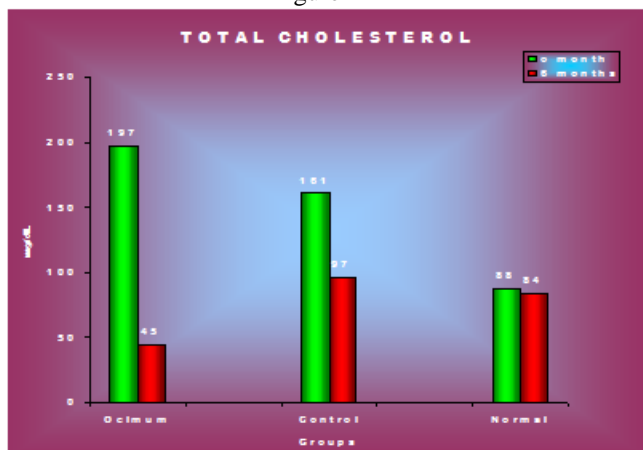


Table I-1

Kruskal Walli's Test – TC p= 0.016	
TOTAL CHOLESTEROL - Wilcoxonman Whitney Test	
Group	P Value
1 & 2	0.043
1 & 3	0.034
2 & 3	0.034

Figure I – 3

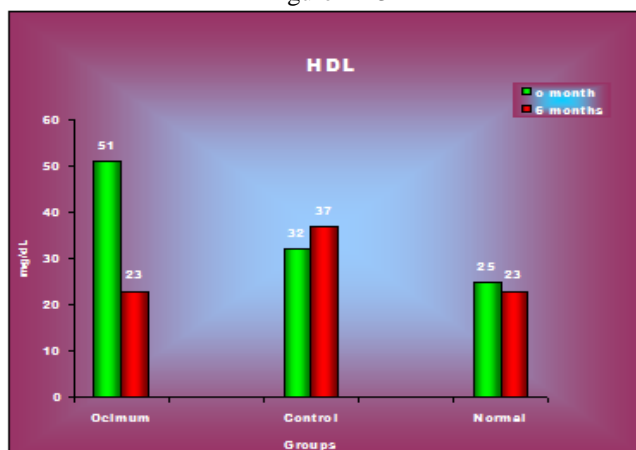


Table I-3

Kruskal Walli's Test – HDL p= 0.016	
HDL - Wilcoxonman Whitney Test	
Group	P Value
1 & 2	0.021
1 & 3	0.034
2 & 3	0.07

Figure I–2

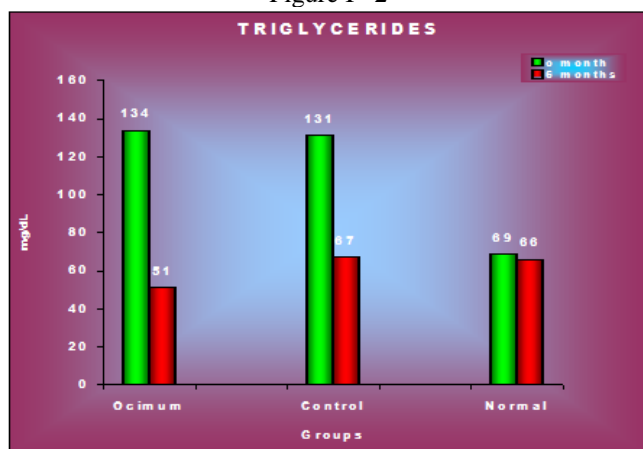


Table I-2

Kruskal Walli's Test – TG p= 0.035	
Tryglycerides - Wilcoxonman Whitney Test	
Group	P Value
1 & 2	0.24
1 & 3	0.034
2 & 3	0.034

Figure I – 4

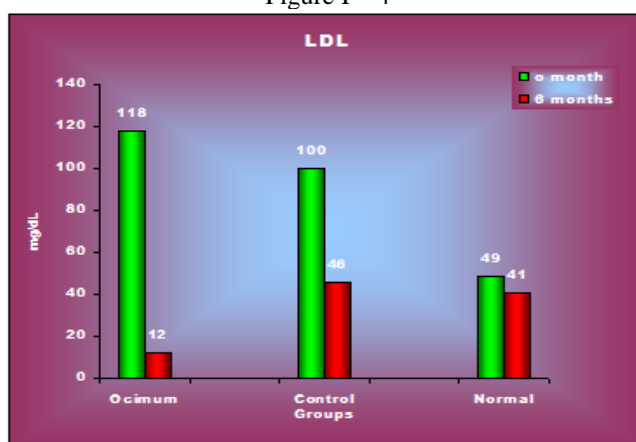


Table I-4

Kruskal Walli's Test – LDL p = 0.071	
LDL - Wilcoxonman Whitney Test	
Group	P Value
1 & 2	0.042
1 & 3	0.034
2 & 3	0.289

Figure I – 5

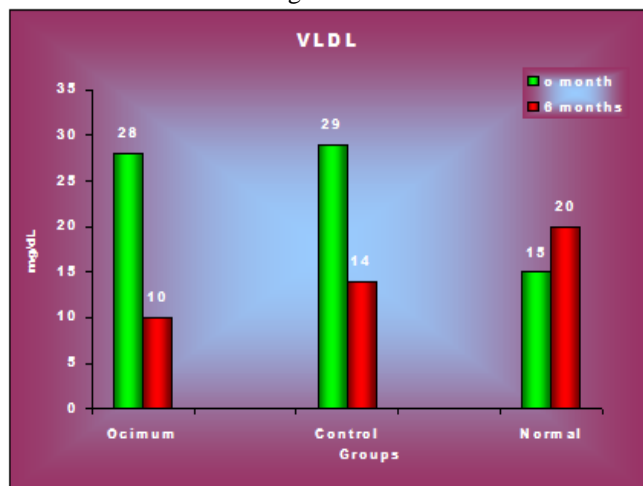


Table I-5

Kruskal Walli's Test - VLDL p = 0.043	
VLDL - Wilcoxonman Whitney Test	
Group	P Value
1 & 2	0.46
1 & 3	0.034
2 & 3	0.034

IV. DISCUSSION

1) Medicinal Properties of Ocimum Sanctum¹⁴

When diabetic rats were fed with *O. Sanctum* leaf powder for one month, it reduce the FBS and Total cholesterol levels. Hence proved to be hypoglycemic and hypolipidemic. Oral administration of aqueous extract also found to hypoglycemic⁴, hypolipidemic and anti oxidant booster in streptozotocin induced diabetic rats. Sarkar et al⁵ demonstrated that administration of fresh leaves of Tulsi mixed in diet resulted in significant lowering of serum cholesterol, TG, phospholipids and LDL cholesterol levels with a significant increase in HDL cholesterol. But our study could not demonstrate HDL elevation by Ocimum. Studies with volatile oil⁶ revealed that *O. Sanctum* can scavenge highly reactive free radical. Eugenol is major component of volatile oil. Gas liquid chromatographic analysis of fixed oil of *O. Sanctum* revealed the presence of five fatty acids (stearic, palmitic, oleic, linoleic, linolenic acid) Linoleic acid present in *O. Sanctum* fixed oil has the capacity to block both the cyclo oxygenase and lipoxigenase pathways of arachidonic metabolism^{7,15}. Aqueous extract of the plant shown growth inhibition for klebsiella, E.coli, proteous and staphylococcus aureus. Alcoholic extract shown growth inhibition for vibrio cholerae. The ethanolic extracts from the leaves showed better activity against β lactamase producing methicillin resistant staphylococcus aureus strain. Essential oil also showed potent antihelminthic activity⁹.

Sharma et al opined that ocimum can delay the process of cataract formation in galactosaemic cataract¹⁶. Ethanolic extracts of Ocimum had effect on plasma level of corticosterone induced by exposure to noise stress². Anti tumor activity of Ocimum is attributable to its antioxidant properties. Oral treatment with leaf extracts significantly elevated the activities of enzymes which are important in the detoxification of carcinogens and mutagens. Prakash and Gupta concluded that the potential chemo preventing activity of seed oil is attributable antioxidant properties of Ocimum¹². Radio protective effect is attributed to the antioxidant activity. Orientin (ot) and vicenin (vc) two water soluble flavanoids isolated from the leaves of *O. sanctum* have shown significant protection against radiation injury and chromosomal aberrations in vivo¹³.

Present study revealed reduction in Total cholesterol, TG, LDL & VLDL was achieved after 6 months treatment with Ocimum. & the difference was statistically significant amongst the 3 gps Figure I-2 and Table I-2 shows that Total Cholesterol was significantly lowered in Ocimum treated gp when compared to control gp (P = 0.043).

Figure I-2 and Table I-2 shows that after six-month treatment, there is no significant change in TG value among Ocimum treated group and control group (P = 0.24). But compared with normal group, Ocimum treatment and dietary reduction of lipid has similar significant hypo triglyceridemic effect. (P= 0.034) Figure I-3 and Table I-3 shows that after six month treatment, there is significant difference in HDL level among Ocimum group and control group. HDL elevation by dietary lowering lipid is more significant when compared with Ocimum treatment (P = 0.021). Figure I-4 and Table I-4 shows that after six months Ocimum treatment, there is significant change in LDL cholesterol value among Ocimum group and control group. LDL reduction by Ocimum is significant when compared with control group (P = 0.042). Figure I-5 and Table I-5 shows that after six months treatment, there is no significant change in VLDL values among Ocimum group and control group (P = 0.46). But compared with normal, Ocimum group and control group has significant VLDL lowering effect (P = 0.034). Dietary lipid lowering achieved the same effect as Ocimum treatment in VLDL lowering.

V. CONCLUSION

We conclude that *Ocimum sanctum* has got very good lipid lowering effect. Reduction in Total cholesterol and LDL cholesterol after Ocimum administration was highly significant. But the present study showed not much effect of *Ocimum sanctum* on TG & VLDL lowering. Even though Ocimum has hypotriglyceridemic effect, same effect was achieved with lipid lowering diet alone. Probably the study has to be conducted with more sample size to reach at a definite conclusion with strong evidence. *Ocimum sanctum* can be studied further on its effect on different HDL fractions. By virtue of its anti-inflammatory, antioxidant, & Hypolipidemic effect, *Ocimum sanctum* can have plaque-stabilizing property also. Studies, which established the scientific basis for various pharmacological effect of Tulsi, shows that it has great therapeutic potential against various ailments. Much more studies are still required to explore other potential activities of this sacred plant.

Conflict of interest

The authors declare no conflict of interest.

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REFERENCES

- [1] Herbal Care India – Herbal Monograph
- [2] Tulsi: The Indian Holy Power Plant - Subir Kumar Das & D.M. Vasudevan. Natural product radiance Vol.5(4) 2006. 279 – 283
- [3] Circulation 106, 1390 – 1396 (2002)/pubmed/ Aikawa – M et. al. lipid lowering reduces oxidative stress and endothelial cell activation in rabbit atheroma.
- [4] Effect of Tulsi on diabetes mellitus . Indian Journal of nutrition and dietetics 24(11) 337 – 341. Giri, J.B. Sugandhi et.al. (1994)
- [5] Changes in blood lipid profile after administration of Ocimum sanctum (Tulsi) leaves in normal albino rabbits. Indian journal of Physiology and Pharmacology 38(4) 311 – 312. Sarkar A, S .C Lavanya et.al 1994
- [6] Modulation of glutathione and antioxidant enzyme by ocimum sanctum and its role in protection against radiation injury. Devi P.U. Ganasoundari A. Indian Journal of EXP Biol. 1999 March 37(3) 262 – 268.
- [7] .Effect of ocimum sanctum Linn on changes in leucocytes of albino rats induced by acute noise stress. Sembulingam, K.P.sembulingam, et.al. (1999) Indian Journal of physiology and Pharmacology. 43(1) 137 – 140.
- [8] Evaluation of anti inflammatory potential of fixed oil of O.sanctum holy basil and its possible mechanism. Singh S, D.K. Majumdar et.al. (1996) Journal of Ethno pharmacology 54, 19-24.
- [9] Anti Bacterial activity of some selected medicinal plants. Rajendran M.J, M.A Mani et.al.(1998) Geobios Jodhpur 25(4).
- [10] Analgesic activity of O.Sanctum and its possible mechanism of action. Singh .S, D.K. majudar (1995) International Journal of Pharmacology 33(3) 188 – 192.
- [11] Effect of O.Sanctum linn on noise induced changes in plasma corticosteron level. Sembulingam, K.P.Sembulingam (1997) Indian Journal of Physiology and pharmacology 42(2) 139 – 141.
- [12] Banerjee.s, R Prashal et al (1996) Modulatory influence of alcoholic extract of Ocimum leaves on Carcinometabolising enzyme activities and reduced glutathione levels in mouse. Nutrition and cancer 25(2), 205 – 217.
- [13] Radioprotective effect of leaf extract of Indian medicinal plant O.Sanctum. Devi P.U & A. Gana Soundari (1995) Indian Journal of Experimental Biology 33(3) 205 – 208.
- [14] Australian New crops – listing of useful plants of the world.Dr. Rob Fletcher, School of Agriculture and Horticulture, University of Queens Land. Gatton. A. Devi P.U. Ganasoundari A. Indian Journal of EXP Biol. 1999 March 37(3) 262 – 268.
- [15] Evaluation of anti inflammatory potential of fixed oil of O.sanctum holy basil and its possible mechanism. Singh S, D.K. Majumdar et.al. (1996) Journal of Ethno pharmacology 54, 19-24.
- [16] Anticataract activity of O.sanctum on experimental cataract. Sharma P.S, Kulshreshtha et.al. (1998) Indian Journal of pharmacology 30(1) 16-20.