



## Is *Coriandrum sativum* Hypolipidemic in Alloxan Induced Diabetic Rats?

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### ABSTRACT

**Introduction:** Diabetes mellitus is a widely recognized metabolic condition. Due to various side effects of currently available medicines, studies have reported the use of many plants in various areas for the traditional management of diabetes.

**Aims & Objectives:** To determine the effects of *Coriandrum sativum* seeds on lipid profile in diabetic rats.

**Place and duration of study:** This experimental research was conducted at Physiology Department, Services Institute of Medical Sciences (SIMS), Lahore from August 2013 to January, 2014.

**Material & Methods:** Ninety rats were randomly distributed into three groups of (n=30) each. Group A was healthy control, group B was disease control and group C was diabetic experimental which was treated with *Coriandrum sativum* with a single dosage of 250 mg/kg of body weight/day through a gavage tube for 28 days. On next day, 4-5ml blood was collected through heart from each rat. The markers evaluated were high density lipoprotein (HDL), triglycerides, total cholesterol, low density lipoprotein (LDL) and very low density lipoprotein (VLDL). Data was analyzed by using SPSS version 16, p value <0.05 was considered significant.

**Results:** The experimental group showed highly significant (p=0.000) lower levels of serum LDL (25.47±3.90mg/dl), serum cholesterol (100.33±2.81 mg/dl), serum triglyceride (96.97±4.79 mg/dl) and serum VLDL (19.40±0.97 mg/dl) as compared to healthy control and disease control group. The level of serum high density lipoprotein revealed (55.27±3.69 mg/dl) highly significant rise (p=0.000).

**Conclusion:** Oral administration of *Coriandrum sativum* has revealed the lipid lowering impacts in alloxan induced diabetic rats.

**Key words:** *Coriandrum sativum*, diabetes mellitus, alloxan, serum triglycerides.

### INTRODUCTION

Diabetes mellitus is the most widely recognized metabolic condition which is linked with deranged lipid metabolism and lipoproteins. Over 90% of patients with type 2 DM had one or more types of dyslipidemia<sup>1</sup>. Type 2 diabetes (T2D) is an eminent element of danger for coronary artery disease. Prompt detection and treatment of hyperlipidemia in diabetic patients cuts the risk for cardiovascular and cerebrovascular diseases. Lifestyle modification such as diet and regular exercise are very significant in improving diabetic dyslipidemia.<sup>2</sup>

Due to various side effects of currently available medicines, the consumption of different herbs as medication has been reported in the traditional treatment of many disorders. World Health

Organization (WHO) revealed that 80% populace of underdeveloped nations such as Africa and Asia has been using herbal medicine for primary care.<sup>3</sup> Studies have reported the use of many plants in various areas of the world for the traditional management of diabetes.

*Coriandrum sativum* L. is probably originated from Eastern Mediterranean belongs to apiaceae, umbelliferae family, otherwise called coriander, cilantro, Arab parsley, Chinese parsley and dhanial. It is usually utilized in cooking.<sup>4</sup>

The phytochemical screening of different *Coriandrum sativum* components has revealed a substantial amount of phyto constituents, such as, essential oil, terpenoids, reducing sugar, alkaloids, flavonoids, fatty acids, and sterols. *Coriandrum sativum* is generally consumed as remedy, such as, in

the management of gut problems, respiratory diseases, anxiety, insomnia, headache and dizziness.<sup>5</sup> Its all extracts have high total phenolic contents like caffeic acid, glycitin and pyrogallol<sup>6</sup>. The hypolipidemic,<sup>7</sup> hypoglycemic,<sup>8</sup> antioxidant,<sup>6</sup> anti-anxiolytic<sup>9</sup> and analgesic effects of coriander seeds have been investigated.

This study was conducted in order to investigate the effects of *Coriandrum sativum* on lipid parameters in diabetic rats as varying data exists on this important subject.

## MATERIAL AND METHODS

An experimental research was done at Physiology Department, Services Institute of Medical Sciences (SIMS), Lahore from August 2013 to January, 2014. This research project was approved by Research Evaluation Unit (CPSP/PHY/2011/060/003-E, 14 November, 2012). Ninety male albino rats (150-200gm weight) were selected according to following criteria.

**Inclusion criteria:** Healthy male albino rats.

**Exclusion criteria:** Rats which did not become diabetic after administration of alloxan.

Out of ninety rats, sixty rats selected and were given intraperitoneal injection of alloxan monohydrate (120mg/kg) to make them diabetic. Rats with blood glucose > 200 mg /dl were considered as diabetic and included in the experiment.<sup>10</sup> After being diabetic, these 60 rats were indiscriminately distributed into two groups (Group=B & C) of 30 rats each and the remainder serving as non- diabetic healthy control rats.

Group A: Healthy control, on normal pellet diet

Group B: Disease control, on normal pellet diet

Group C: Diabetic rats, treated with ethanolic extracts of seeds of *Coriandrum sativum*.

Treatment of rats of group C was started with ethanolic extract of seeds of *Coriandrum sativum* daily with single dosage of 250 mg/kg of body weight/day through a gavage tube for 28 days. On 29<sup>th</sup> day, a few ml of blood was collected through heart from each one. The Parameters measured were total cholesterol (through CHOD-PAP enzymatic colorimetric method), serum triglyceride (by GPO-PAP enzymatic colorimetric process), serum HDL-C (by Precipitation method) and serum LDL -C (by using Friedewald formula,  $LDL=TC-(HDL+TG/5)$ ).

### Statistical Analysis:

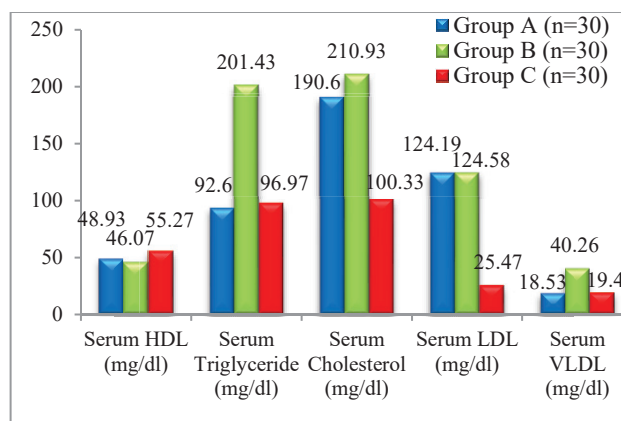
Data was analyzed by using SPSS version16. One way ANOVA test were used to determine the statistical significance of difference of different markers (Serum HDL, triglycerides, cholesterol,

LDL, VLDL) among the three groups. A p-value of  $\leq 0.5$  considered significant.

## RESULTS

The difference of serum lipid profile parameters between the Healthy control, disease control and experimental groups was highly significant ( $p=0.000$ ) (Fig-1).

By giving the 28 days supplementation of *Coriandrum sativum* to the rats of diabetic (experimental) group, all the lipid parameters including triglycerides, cholesterol, LDL and VLDL except serum HDL, showed highly significant lower levels ( $p=0.000$ ) in comparison to healthy and disease control. Whereas serum HDL had a highly significant ( $p=0.000$ ) higher levels in experimental group.



**Fig-1:** Comparison of serum lipid profile among healthy control, disease control and experimental groups (one way ANOVA)

Group A: Healthy control, on normal pellet diet

Group B: Disease control, on normal pellet diet

Group C: Diabetic rats, treated with ethanolic extracts of seeds of *Coriandrum sativum*

## DISCUSSION

In our study the consequence of ethanolic concentrate of *Coriandrum sativum* was measured on rat lipid profile. The lipid profile (serum triglycerides, cholesterol, LDL, and VLDL) of experimental group decreased highly significantly in comparison to health and disease control. Whereas serum HDL had a highly significant ( $p=0.000$ ) higher levels in experimental group. Our findings concurred with some researchers and contradicted others. Das et al conducted a study on Streptozotocin (STZ) induced diabetic rats. The hypolipidemic activity of *Coriandrum sativum* seed extract was compared to the standard drug metformin. They concluded that

oral administration of CS seed extracts significantly lowered total cholesterol (TC), LDL: HDL ratio, TC: HDL ratio, so, decreasing the cardiovascular risk.<sup>7</sup>

Our results were also similar to the findings of study of Vijaya Durga et al, who used a combination of aqueous extract of *Coriandrum sativum* and ginger to wister rats and reported a significant reduction in lipids parameters but rise in serum HDL<sup>11</sup>. Previously, hypolipidemic effects of methanolic, etheric,<sup>4</sup> aqueous,<sup>11</sup> ethanolic<sup>12</sup> extract of *Coriandrum sativum* fixed oils and essential oils have been reported.<sup>5</sup>

Contradictory results to our study were reported in a South Africa to investigate the effect of feeding dietary coriander seeds on growth performance, hepatic and visceral adipose tissue lipid storage and circulating metabolic substrates in healthy growing female rats. They divided the rats in two groups in which one group was fed with normal diet and the experimental group was supplemented with 500 mg kg<sup>-1</sup> day<sup>-1</sup> of whole, crushed coriander seeds for five weeks. They found no difference in the levels of blood triglycerides and plasma free fatty acids in both groups and concluded that dietary coriander seeds had no effect on growth performance, plasma lipids and blood glucose.<sup>13</sup>

A study was conducted in Iran to observe the lipid lowering effects of *Coriandrum sativum* extract and endurance training in diabetic rats. It concluded that endurance training increased the lipid lowering effects of *Coriandrum sativum* in diabetic rats.<sup>14</sup>

Zeb et al in 2018 concluded by comparing the effects of garlic and coriander that garlic has highest influenced on BMI, TC, LDL and HDL than coriander.<sup>15</sup>

## CONCLUSION

Oral administration of *Coriandrum sativum* has the lipid lowering effects in rats which were made diabetic with alloxan. *Coriandrum sativum* possibly have substantial beneficial effects as a hypolipidemic drugs and may be recommended as a significant ingredient in nutrition.

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