Research Article

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Antilipidemic activity of *Coriandrum Sativum*

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Myocardial infraction is a most common cause of death all over the world. The high level of blood cholesterol is a big risk for heart diseases. The basic purpose of this research work was to determine the antilipidemic activity of fresh leaves of *coriandrum sativum* against salbutamol induced cardiac injury in rabbits. Salbutamol administered rabbits (50mg/kg) showed elevated level of serum lipids (LDL-Cholesterol, Triglyceride) and decreased level of HDL-Cholesterol and antioxidant enzymes (SOD, CAT). Both the pre- and post treatment of plant extract (100mg/kg) for three weeks exert a significant antilipidemic effect against salbutamol-induced myocardial infraction by lowering the level of serum LDL-Cholesterol, Triglycerides and Peroxidase and increasing the level of HDL-Cholesterol and antioxidant enzymes. The results showed that *coriandrum sativum* possess antilipidemic activity.

Key words: *Coriandrum Sativum,* Coriander, Medicinal plants, Antilipidemic activity.

In this modern age, where science and technology has given too much comforts to mankind, but at the same time, it has suffered mankind into different diseases. Almighty Allah is the supreme curer Who furnished remedies for all maladies. The plants that are used for the treatment of different diseases are called “Medicinal plants” (Joshi 2000).

A medicinal plant is any plant which, in one or more of its organ, contains substance that can be used for therapeutic purpose or which is a precursor for synthesis of useful drugs.Myocardial infarction is a major public health problem which is the cause of high death rate (Sivakumar *et al*., 2007). The risk factors for cardiovascular heart disease and Myocardial Infarction are on the rise in Pakistan (Jafary *et al*., 2007).

In developing countries, the occurance of heart diseases increases rapidly (Jain *et al*., 2007).High level of blood cholesterol is responsible for circulatory system disorder. Increase level of low density lipoprotein (LDL) is alarming for cardiovascular diseases, and their risk is increased many times (Grundy *et al*., 2004).

A large number of synthetic hypolipidemic drugs are available in market. Long term use of these drugs cause serious side effects, and these are costly. Plant contains a large number of bioactive phytochemicals that are responsible for pharmacological action of plants and used for development of drugs. Many medicinal plants have shown their antilipidemic effect and proved their efficacy in cardiovascular diseases (Jain *et al*., 2007, Wang and Ng 1999))

Coriandrum sativum (Coriander) is an umbelliferous annual plant of the parsley family, native to the eastern Mediterranean region and southern Europe and is found in many other parts of the world. It is valued for the dry ripe fruits, called coriander seeds and also the fresh green leaves called cilantro. The genus *Coriandrum* includes the cultivated plant *C. sativum* and the wild species *C. tordylium*.

Coriander has been used in medicine for thousands of years (Mathias 1994). Ancient Egyptians reported the first medicinal uses of Coriander. As a medicinal plant, coriander has been used as carminative, diuretic, stimulant, stomachic and analgestic (Chaudhry & Tariq,

2006) anti-inflammatory (Chithra and Leelamma, 1997) and hypoglycemic (Waheed *et al*., 2006). The extracts and essential oil of coriander seeds also exhibited sedative-hypnotic activity (Emamghoreishi and Heidari-Hamedani 2006)

Coriander leaves showed stronger antioxidant activity. Being as a source of natural antioxidant coriander can reduce the cardiac diseases. The aim of this research work is to determine the Antilipidemic activity of *coriandrum sativum*.

MATERIALS AND METHODS

Plant Material: *Coriandrum sativum* (Fresh leaves)

Phytochemical analysis: Qualitative and quantitative phytochemical analysis of *Coriandrum sativum* was perform for the estimation of Alkaloids, Saponins, Steroids and Tannins by using standard methods of Adam (1970), Harbone (1973) and Brain and Turner (1975).

Extract Preparation: 150 gm of fresh leaves of *Coriandrum sativum* was weighted. Then grinded leaves were macerated in solvent methanol for three days. Then filtered the solution and solvent was evaporated. Then this extract was used for treatment.

Materials and Chemicals: Salbutamol, methanol, Plant dose, Syringes, Cotton, Centrifuge tubes, Ephendroff tubes, Kits of LDL-Cholesterol, HDL-Cholesterol and Triglyceride.

Animals: Eighteen rabbits weighing about 1.00 to 1.25Kg were used as experimental animals. Throughout the investigation, animals were housed in a room at normal temperature with free access to food and water, and on standard conditions. Animals were weekly weighted.

Experimental Protocol

G1: Normal control group: Standard diet was provided to the normal control group.

G2: Salbutamol Treated group: Salbutamol 50 mg/kg was given for two days. After two days blood samples were collected.

G3: Inderoll treated group: Salbutamol was given for two days to induce myocardial injury. Then *inderoll* 100mg/kg was given for 5-7 days after 24 hours. Blood sample was taken daily. After experimental period rabbits were scarified.

G4: Base line group: Plant extract (100mg/kg) was given to rabbits for 3 weeks. At the end of experimental procedure blood samples were taken.

G5: Curative group: Salbutamol was given for two days to induce myocardial injury. Then plant extract 100mg/kg was given for 5-7 days after 24 hours. Blood sample was taken daily to check curative effect. After experimental period rabbits were scarified.

G6: Preventive group: In this plant extract 100 mg/kg was given to rabbits once a day at fixed time by oral gavage for 3 weeks at the end of experimental period rabbits were injected Salbutamol 50mg/kg to induce myocardial injury for two consecutive days. After 48 hours blood samples were taken to illustrate preventive effect of *Coriandrum sativum*. Heart beats of rabbits were also checked during this experimental period.

Collection of blood samples: Blood sample were collected from neck vein during experimental period. The blood sample were collected in glass centrifuge tubes, then centrifuged it and serum were separated and stored in deep freezer till further biochemical measurement.

Gross pathological studies: Immediately after the sacrifice of animals, there different body parts were removed and analyzed under instruction of vetinary doctor.

Biochemical Assay

The activity of lipidemic enzymes like LDL, HDL Triglycerides in serum was determined by Kit method using bioanalyzer.

Tissue homogenate preparation: Rabbits were sacrificed at the end of experimental period. Hearts of the all rabbits were minced and homogenized in 0.05M ice cold phosphate buffer of pH 7.4.Homogenate was mixed, centrifuged and supernant was used for estimation of catalase and peroxidase and Superoxide dismutase.

Quantitative estimation of Catalase :

Catalase level in the sample was estimated by following methods as described by Aebi and Berjmeyer, (1974).

Quantitative estimation of Peroxidase: Peroxidase (POD) activity is measured by using the method of Paglia and Valentine, (1967).

Quantitative estimation of Superoxide dismutase (SOD): SOD activity was assayed by using spectrophotometer NBT method as described by Kakkar *et al*., (1984).

Statistical analysis

All numerical data in text and figures showed as the ± SD (standard deviation), means, standard error, and significant ANOVA were performed.

RESULTS

The aim of this research work was to determine the Antilipidemic activity of fresh leaves of *coriandrum sativum* against salbutamol induced cardiac injury in rabbits. The results obtained are described here under:

Phytochemical analysis

The plant contains metabolities which are grouped as Alkaloids, Flavonoids, Steroids, Saponins, Glycosides, Tannins and Anthraquinones on the basis of their composition.

Anthraquinones and saponins were absent while Flavonoids were 5%, Glycosides were 16%, Alkaloid were 0.20 %, Steroids were 11.13% while Tannins were 3.4% *Coriandrum sativum* (Table:1).

Biochemical Assay

Curative effect: To determine the curative effect of plant salbutamol was given for two days to induce myocardial injury. Then plant extract (100mg/kg) was given for five days after 24 hours. Blood sample was taken daily to check curative effect of coriander.

LDL-Cholesterol: The results showed that induction of salbutamo*l* significantly ($p<0.05$) raised the LDL-Cholesterol level (32mg/dl) compared to the control normal group (16mg/dl). The *inderoll* group to which after giving salbutamol, *inderoll* was injected which is the standard drug that decreased LDL level, the LDL-Cholesterol level come closer to the normal LDL level in rabbit i.e. (16mg/dl). The LDL level (16mg/dl) in base line group to which only plant dose was given showed that *Coriandrum sativum* not increased LDL-Cholesterol concentration. Two doses of salbutamol significantly ($p<0.05$) increased the level of LDL-Cholesterol. Then five post treatment of plant dose (100mg/kg) significantly decreased (19mg/dl) the elevated level of LDL-Cholesterol. (Table: 2).

HDL-Cholesterol: There was a significant ($p<0.05$) increase noted in the level of HDL-Cholesterol in the serum of Curative group (15.0mg/dl) as compared to the Salbutamol group in which HDL-Cholesterol level decreased to (13.0mg/dl). The level of HDL-Cholesterol in *inderoll* group increased significantly ($p<0.05$) (15.33mg/dl). The level of HDL-Cholesterol (13mg/dl) in base line group showed that *Coriandrum sativum* itself has no effect on the HDL-Cholesterol level. The level of HDL-Cholesterol in normal control group was 15.3mg/dl (Table: 3).

Triglycerides: Results indicated that induction of salbutamol significantly ($p<0.05$) increased the triglyceride level (199.67mg/dl) in salbutamol group compared to control normal group (110mg/dl). In *inderoll* group the triglyceride level come closer to control normal group (125.3mg/dl). The value of triglyceride (110mg/dl) in base line group was close to control normal group (110mg/dl) showed that plant had no effect on triglyceride in serum of rabbit. In curative group the level of triglycerides comes closer to the control normal group (128mg/dl) after giving plant dose as compared to salbutamol group in which level of triglycerides increased (199.67mg/dl) (Table: 4).

Preventive effect: After three weeks of oral administration of plant dose, Salbutamol was given to induce myocardial injury for two consecutive days. After 48 hours blood samples were taken to illustrate preventive effect of *Coriandrum sativum*. The results showed that pretreatment of coriander lowered the LDL-Cholesterol level (20mg/dl) and Triglyceride level (130mg/dl) compared to salbutamol treated group in which LDL-Cholesterol level and Triglyceride level

Table 1: Qualitative and Quantitative analysis of phytoconstituents of *Coriandrum sativum*

S. No.	Constituents	Inference	%age
1	Alkaloids	+ve	0.20
2	Saponins	-ve	absent
3	Steroids	+ve	11.13
4	Flavonoids	+ve	5
5	Glycosides	+ve	16
6	Tannins	+ve	3.4
7	Anthraquinones	-ve	absent

Table 2: Curative effect of Coriander on Level of LDL-cholesterol in Serum of different experimental groups

Days	Control Group	Salbutamol Group	Inderoll Group	Base line Group	Curative Group
1	16.0±1.0	29.33±1.155	17.667±0.577	15.67±0.557	26.0±2.0
2	16.33±0.577	29.0±1.00	16.667±0.577	16.0±1.0	21.0±2.0
3	15.33±0.577	32.0±1.0	16.0±1.0	16.0±2.0	22.0±1.0
4	16.0±0.0	32.33±4.041	15.667±.577	16.3±1.15	19.0±1.0
5	16.0±1.732	32.67±2.309	16.0±1.0	16.3±0.57	19.0±1.732

Table 3: Curative effect of Coriander on Level of HDL-cholesterol in Serum of different experimental groups

Days	Control Group	Salbutamol Group	Inderoll Group	Base line Group	Curative Group
1	14.3±1.528	15.80±1.0	13.0±1.0	15.67±0.577	13.33±1.0
2	15.0±1.0	14.8±1.528	13.50±1.0	15.3±0.577	13.13.67±1.0
3	15.0±0.577	14.67±0.577	13.67±1.53	15.0±0.577	14.3±0.577
4	15.0±2.0	14.60±1.0	14.33±0.577	15.67±1.155	14.67±1.15
5	15.67±0.577	13±1.53	15.33±1.0	15.0±1.155	15.0±2.0

Table 4: Curative effect of Coriander on Level of Triglyceride in Serum of different experimental groups

Days	Control Group	Salbutamol Group	Inderoll Group	Base line Group	Curative Group
1	110±4	130.3±4.041	190.0±2.65	109.67±0.57	150±5.196
2	110.67±6.1	147±2.52	176±1	110±2	146±11.53
3	111.3±5.03	166±2	146±1	112±2	142.3±1.53
4	110±3.464	180.3±4.51	139.3±0.57	110±1	135±6
5	110±4	199.67±4.73	125.3±2.309	110±2	128.3±3.51

increased significantly ($p<0.05$) to (29.3mg/dl) and (166 mg/dl) respectively. Whereas in case of HDL-Cholesterol there was a significant ($p<0.05$) increase noted in the level of HDL-Cholesterol (26mg/dl) in Preventive group as compared to the group to which only *Salbutamol* was given (23mg/dl) that show that *Coriandrum sativum* increased HDL-Cholesterol level in serum of rabbit. (Table: 5).

Antioxidant Enzyme Assay

Natural antioxidant enzymes manufactured in the body provide an important defense against free radicals. Glutathione peroxidase, glutathione reductase, catalase, thioredoxin reductase, superoxide dismutase, heme oxygenase and biliverdin reductase, are the most important antioxidant enzymes.

Catalase: In Salbutamol group the level of catalase (0.332 units/mg of protein) significantly ($p<0.05$) decreased as compared to control normal group (0.428 units/mg of protein). In both curative and preventive group the catalase level decreased (0.271 units/mg of protein), (0.277 units/mg of protein) when compared to salbutamol treated group (0.332 units/mg of protein). In Base line group the catalase level (0.450 units/mg of protein) close to control normal group (0.428units/mg of protein) (Table: 6).

Peroxidase (POD): Induction of salbutamol for two days significantly ($p<0.05$) increased the POD level (0.080 units/ mg of protein) as compared to control normal group (0.041 units/ mg of protein). Both pre- and post-treatment of *Coriandrum sativum* showed a significantl ($p<0.05$) decrease in the peroxidase level (0.0650 units/ mg of protein),

Table 5: Preventive antilipidemic effect of Coriander on different experimental groups

Enzymes	Control Group	Salbutamol Group	Inderoll Group	Base line Group	Curative Group	Preventive Group
LDL	16±1	29.3±1.15	15.667±0.57	16±2	19.0±1.0	20±1
HDL	12 ±2.0	25 ±1.0	18 ± 1.0	13.67±1.15	32.67±1.15	26 ±2.0
Triglycerides	110 ±3.46	166.67±2.5	130 ±1.0	110.3±0.57	128.3±6	130±1.0

Table 6: Effect of coriander on antioxidant enzyme (Catalase) on different experimental groups

Time/Min.	Control Group	Salbutamol Group	Inderoll Group	Base line Group	Curative Group	Preventive Group
3	0.428	0.332	0.338	0.450	0.271	0.277

(0.0523 units/ mg of protein) when compared to salbutamol treated group (0.080 units/ mg of protein). Base line group showed POD level (0.0047 units/ mg of protein) closer to control normal group (0.0040 units/ mg of protein) (Table: 7).

Superoxide dismutase (SOD): The results showed that the induction of salbutamol for two days significantly ($p<0.05$) decreased the % inhibition of SOD (19 %) as compared to control normal group (50 %). Pretreatment of plant showed significantly ($p<0.05$) higher (42 %) when compared to *inderoll* group (53 %) and salbutamol treated group. Post treatment of plant showed 14% inhibition close to salbutamol treated group (19 %). The Base line group showed significantly ($p<0.05$) higher inhibition (27%) as compared to salbutamol treated group (19 %) (Table: 8).

Gross Pathological Analysis

The results showed that in preventive group, the weight of its heart tissue was greater than control normal group. Whereas the curative group to which first two days *Salbutamol* and then plant dose was given showed that weights of its heart tissue was almost close to Control normal group. Whereas the Base line group shows that plant had not effect on the heart tissue of rabbit (Table: 9).

DISCUSSION

The significant ($p<0.05$) increase was observed in the level of LDL-Cholesterol and Triglyceride and decreased level of HDL-Cholesterol in salbutamol treated animals compared to control normal group which is in line with earlier report Sivakumar *et al*., (2007), and is an indication of myocardial injury. The level of LDL cholesterol was significantly ($P<0.05$) higher in salbutamol myocardial infarction induced rabbits, due to increased oxidative stress by catechol amines (salbutamol). Oxidative stress causes damage to myocardial membrane and lipids leak from damage tissue and their level increased Fravin *et al*., (2004), whereas HDL cholesterol levels were significantly lower compared to control normal group animals which might be due to the increased mobilization of LDL-cholesterol from the blood into the myocardial membranes, resulting in abnormal cholesterol deposition in the myocardium. These findings are in accordance with an earlier reported study Sangeetha and Quine (2006).

In present study, the, curative group of rabbits indicated that *Coriandrum sativum* decreased the level of LDL-Cholesterol, Triglycerides and increased HDL-Cholesterol level in serum of rabbit that was the indication of lowering cardiac disease by *Coriandrum sativum*. These results were confirmed by the results of Narayan (2005) who investigated effects of *psyllium* on cardiovascular disease. Coriander contain significant amount of polyphenols. Polyphenols are potent antioxidants and reduces the oxidative stress. Polyphenols have great importance in prevention of free radicals associated diseases like heart disease.

The result of Level of different enzymes in Preventive groups of rabbits showed that coriander in Preventive group decrease the LDL-Cholesterol level and triglycerides level but increase the HDL-Cholesterol level. These results were confirmed by Karthikeyan *et al*., (2007) who evaluate the preventive role of grape seed proanthocyanidins (GSPs) on serum and tissue lipid enzymes in isoproterenol (ISO)-induced myocardial injury in male Wistar albino rats.

The decreased level of catalase and SOD in Salbutamol treated group indicated increased oxidative stress which confirmed by

Table 7: Effect of coriander on antioxidant enzyme (Peroxidase) on different experimental groups

Time/Min.	Control Group	Salbutamol Group	Inderoll Group	Base line Group	Curative Group	Preventive Group
3	0.0041	0.080	0.0730	0.0047	0.0650	0.0523

Table 8: Effect of coriander on antioxidant enzyme (Superoxide Dismutase) on different experimental groups

Time/Min.	Control Group	Salbutamol Group	Inderoll Group	Base line Group	Curative Group	Preventive Group
15Min	50%	19%	53%	27%	20%	42%

Table 9: Weights (in grams) of organs of different experimental groups of rabbits

Organs	Control Group	SalbutamolGroup	Inderoll Group	Base Line Group	Curative Group	Preventive Group
Heart	2.13	2.633	2.33	2.16	3.04	2.22
Lungs	4.75	5.04	4.80	5.00	5.94	4.77
Kidney	7.85	7.9	7.87	7.85	7.83	6.19
Liver	26.17	29	27.30	26.0	29.1	28.49

the study of Gauthaman *et al*., (2006) that the decrease in catalase level and SOD during myocardial infarction indicating oxidative stress. However decrease in catalase and SOD level in both pre- and post-treatment showed that *Coriandrum sativum* decreased the catalase and SOD level. The Base line group showed catalase and SOD level close to control normal group which indicated that *Coriandrum sativum* alone not increase catalase level neither decrease. But the decrease in catalase level is not clearly understood. Whereas *Coriandrum sativum* in both pre- and post-treatment decreased the POD level which indicates antioxidant action against free radicals and confirmed by the previous study of Chithra and Leelammas (1999) that the formation of lipid peroxides declined whereas activities of antioxidant enzymes (catalase, glutathione peroxidase) increased in rats treated by *Coriander sativum*.

In conclusion, the results of the present study indicate that the *Coriandrum sativum* fresh leave extract after purification and suitable extraction method can become an agent for reducing heart diseases.

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