



Leaves of *Coriandrum sativum* as an Indigenous Medicinal Spice Herb of India: A Mini Review

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ABSTRACT

Coriandrum sativum is a popular spice herb and is widely used in various cooking around the world, primarily in the South East Asian Countries. *Coriandrum sativum* belongs to the family Apiaceae and is mostly grown in the Mediterranean countries annually. Though in India, we are used to find plenty of *Coriandrum* leaves in vegetable market in winter but hot and humid temperature favours the growth of the herb. The leaves are mostly referred to as "Cilantro". Leaves are used mainly for garnishing in cooking and they impart a delicious aroma to the food. The seeds are small, light brownish in colour and round in shape and are called coriander seeds. *Coriandrum* seeds are used widely in various cooking as spice and are also known to have various medicinal uses in folk medicine. The leaves of *Coriandrum sativum* also has medicinal properties and have use in Ayurveda and folk medicine for ages in India and other South East Asian countries. The leaves are rich in various potent phytochemicals with medicinal properties which actually impart the medicinal potency to the leaves of *Coriandrum sativum*.

Keywords: Ayurveda, *Coriandrum Sativum*, Cilantro, leaves, coriander seeds, folk medicine.

INTRODUCTION

Using a plant's seeds, berries, roots, leaves, bark, or flowers for medicinal purposes is termed as 'Herbal Medicine' or 'Botanical Medicine' or 'Phytomedicine'. Now a day, compounds isolated from medicinal herbs [phytochemicals or phytochemicals] constitute a big part of the pharmaceutical industry and Medicinal Science¹. In most of the studies, it is observed that some herbs when administered crude, work better than administration of the isolated bioactive compound alone. While in other instances, it is observed that the identified and isolated bioactive phytochemical when administered alone, works better to combat a particular pathogenic condition. Some experts are of the opinion that most phytochemicals work in combination with each other and hence, a crude plant or herb extract which is a mock tail of various potent bioactive compounds when administered together, act best by complementing each other's mode of action. Isolated compounds from herbs when administered alone may also act effectively to cure a pathogenic condition as the compound when isolated, gets concentrated and thus acts more effectively in some cases. Again, studies show that most phyto-compounds exhibit synergistic activity when combined with other compounds [herbal or conventional synthetic medicinal compounds]. This enhanced efficacy of combinatorial therapy further draws our attention to the 'mock tail' concept of potent bioactive compounds in a crude herbal extract.

The pharmaceutical industry is growing and is already in the shape of a global business giant who primarily aims at identifying and isolating various potent bioactive phyto

compounds from various traditionally well known medicinal herbs from different parts of the world. It will be unjust and wrong to speak that the only objective of the pharmaceutical industry in isolating the potent bioactive herbal constituents is their business goal. Rather myriads of studies reveal that some of the isolated compounds are exclusively potent and have been successfully used to cure several fatal diseases. Research are going on all around the world to get the true picture which will be overall beneficial for human race to sustain on this planet in a better disease free manner. Now, with the aid of science, technology and ages of research, we have in our hand several 'wonder drugs' which are composed of bioactive compounds from herbal sources or compounds derived from such natural phytochemicals or compounds synthesised in laboratory resembling some bioactive phytoconstituents of some popular medicinal herb.

India is a beautiful rich country with great biodiversity. There are lots of spice herbs in the Indian subcontinent which have traditional exclusive medicinal uses. Some such spice herbs are *Murraya koenigii*, *Coriandrum Sativum*, *Allium sativum*, etc., Leaves extract of *Murraya koenigii* has been found to be an excellent antioxidant and has cardioprotective, hepatoprotective and nephroprotective activities^{2,3,4}. *Murraya koenigii* leaves extract has also been found to exhibit more effective antioxidant activity when used in combination with other antioxidants like melatonin^{5,6}. Our earlier studies reveal that leaves extract of *Coriandrum Sativum* also is an excellent antioxidant and has capacity to protect heart



and liver tissues against oxidative stress induced damages^{7,8}.

In the present review we have tried to brief the diverse medicinal uses of *Coriandrum sativum* in a compact manner. *Coriandrum* is a popular spice herb, widely used in India and other South East Asian countries for culinary purposes. The leaves are also quite popular in other countries of the world including the Western countries. The spice herb has been in use in folk medicine for ages in India and is a rich source of various potent bioactive compounds.

Endocrinological effects of *C.sativum*

Gray and Flatt, (1999)⁹ have reported the insulin mimicking activity of *Coriandrum sativum* in streptozocin-diabetic mice. Aqueous extract of coriander leads to 1.4 fold increase in deoxyglucose transport and glucose oxidation with 1.7 fold increase in conversion of glucose to glycogen in isolated murine abdominal muscle. Patients with uncontrolled NIDDM [Non Insulin Dependent Diabetes Mellitus] when treated with high dose of aqueous extract of the plant along with hypoglycemic drugs responded within 15 days to a hypoglycemic state with a fall in blood glucose level with disappearance with glycosuria¹⁰. Diabetes induced by alloxan treated rats could be impeded by supplementation of *Coriandrum sativum* extract¹¹.

Although the plant demonstrated efficient hyperlipidemic action, no morphological variation in the histoarchitecture of pancreas and testis was found without causing least alterations in testosterone levels¹². However controversial findings of Al-Rubaye,(2016)¹³ indicated that cholesterol lowering action of aqueous extract of *Coriandrum sativum*(dose 125 and 250 mg/kg body weight) dwindled testosterone level reflecting antifertility action of this plant. In female mouse, contraceptive action of this plant extract was revealed as evidenced by reduction in the number of ovarian follicles added to a decline in the levels of pituitary gonadotropins¹⁴.

Whether *Coriandrum* has growth hormone like effects is not clear but fowls fed with coriander seed extracts showed an increase in body growth and carcass quality¹⁵.

Effects on gastro-intestinal system

This culinary plant seeds are good sources of essential oils of terpenoid family and the leaves are rich in caffeic acid, ferulic acid, gallic acid and chlorogenic acid¹⁶. Thus it is a good traditional herb for treating various systemic dysfunctions¹⁷. It has good therapeutic repertoires for hepatic ailments. One such study on [Carbon tetrachloride] CCl₄ induced fibrotic hepatic insults showed that powdered dry plant of *Coriandrum sativum* reduced serum bilirubin, aspartate aminotransferase (AST) and alkaline phosphatase (ALP) levels, and increased hepatic proteins and reinstated the hepatobiliary pathological alterations to a recovery state¹⁸. Similar reports has also

been documented in lead nitrate induced hepatic toxicity¹⁹. The later group of workers has also sighted on the antioxidant defense activity of this plant in protecting oxidative stress induced hepatic cellular damage. Our recent findings on azodye- metanil yellow induced hepatotoxicity also reflected similar observations⁷. Further it has been reported that arsenite induced liver apoptotic DNA and RNA content was also alleviated by *Coriandrum* seed extracts probably for its antioxidant defense action²⁰. Continuous intake of *Coriandrum* seeds as spice in diet has shown to improve the activities of disaccharidases i.e. maltase, lactase and sucrase activities of intestinal mucosa²¹. Relaxation of gut muscles against potassium and calcium induced contractions of isolated rodent jejunum preparations may envisage the antispasmodic action of this herb²². On the whole, *Coriandrum* plant has carminative, antispasmodic and secretory effects on the GI tract over leading to medicinal effects against GI refluxes, vomiting, colic pains etc.

Effects on renal system

Renal ailments includes manifestations like alterations in serum urea creatinine ratio, serum electrolytes variations, changes in albumin, Immunoglobulin G [IgG], α 1 and α 2 microglobulin levels²³. Renal failure also affects the enzymes essential in hepatic heme biosynthesis. Chronic kidney disease is associated with hepatic overproduction of the porphyrin precursors aminolevulinic acid and porphobilinogen²⁴. Methanolic leaf extract of *Coriandrum sativum* acts as a chelator in preventing lead induced renal toxicity. This scientific work reported that the methanolic leaf extract of this plant decreased urinary excretion of delta-aminolevulinic acid (ALA) and an additional suppression of lead-induced inhibition of delta-aminolevulinic acid dehydratase (ALAD) activity *in vitro*²⁵. Kansal et al, 2011 reported that seed extract of this plant was effective in reducing AST, alanine aminotransferase (ALT), and ALP levels in renal tissue of lead exposed animals. Moreover diabetic rats showing free radical mediated renal oxidative stress was ameliorated by seed of coriander plant an indicative of oxidant and antioxidant balancing potential of this herb²⁶. Other important beneficiary effect of this plant is in protecting drug induced nephrotoxicity. Scientific report on gentamycin induced nephrotoxicity showed a consistent elevation of blood urinary nitrogen, urea and creatinine level that was reliably reduced by plant extract of *Coriandrum sativum*²⁷. Similarly, ibuprofen induced increase in renal alkaline phosphatase activity was shielded by *Coriandrum* oil in experimental animals²⁸. Healthy renal status and diuretic action of this plant has also been reported^{29, 30}. Thus it may be apparent that extract of this herb is a good medication of drug induced renal ailments or heavy metal induced kidney toxicity attributable to its chelator, antioxidant and diuretic action.



Effects on cardiovascular system

It is well known that blood pressure, hyperlipidemia, diabetes etc. are important makers of cardiovascular ailments. As reviewed earlier, this plant is rich in polyphenols that may be effective as antioxidant, antiperoxidative, antilipidemic and hypoglycemic action. Cardiovascular effects are mediated by hastening the activities of hydroxy, -methyl glutaryl CoA reductase, plasma lecithin cholesterol acyl transferase activity leading to a fall in cholesterol and triglycerides in experimental animals. In addition, High-density lipoproteins (HDL) cholesterol level was elevated and bad cholesterol Low-density lipoproteins (LDL) was decreased in the animals³¹. Seeds of this herb also enhanced hepatic bile acid synthesis and increased degradation of cholesterol to fecal bile acids³². Further, *Coriandrum's* actions on human platelets *in vitro* indicated its anti-platelet aggregation action directing its thrombolytic action in vessels³³.

Effects on respiratory system

There are quite contradictory evidences related to respiratory effects of this *Coriandrum sativum*. Occupational allergy to coriander has been reported in a woman working in coriander factory who showed clinical manifestations of rhinitis and irritation of throat with a positive response to skin and serum specific Immunoglobulin E [IgE] test and nasal and bronchial challenge tests³⁴. Bakhru *et al.*, 2011 as well, reported that excessive use of *C.sativum* by patients of chronic asthma and bronchitis should be avoided³⁵.

However *Coriandrum* has been used to prevent sore throat³⁶. It can be used for 'pitta' type asthma in combination with 'anti pitta diet'³⁷. It helps clean mucus from the lungs due to its antispasmodic and expectorant properties³⁸.

Effects on nervous system

As a traditional folk medicine in South West Asia, essential oil (EO) of *Coriandrum* has been used to relieve nervousness, insomnia and anxiety related disorders³⁹. The anxiolytic effect is mediated at postsynaptic γ -aminobutyric acidreceptor [GABAAR] mediated increase in chloride conductance⁴⁰. Dobetsberger further reviewed that EO from this plant has a helpful action on memory⁴¹. Polyphenols including flavonoids, rutin, caffeic acid, and gallates isolated from *C. sativum* has sedative, analgesic action and is a good CNS depressant⁴². Bestowed on its antioxidant and metal chelating action, hydroalcoholic extract of this plant is quite good in defending brain lipid peroxidative damage and thiol restoration in pentylenetetrazole induced brain seizures plus oxidative and apoptotic neural damage⁴³. Similar reports has also been documented in aluminum chloride induced brain pyramidal cell damage assisted Alzheimer's disease in rats⁴⁴.

CONCLUSION

We may deduce that leaves of *Coriandrum sativum* have multipotential medicinal properties and can be explored for use in various health ailments. Our preliminary studies show that ethanolic and methanolic leaves extract of *Coirandrum sativum* contains various potent phtochemical compounds including polyphenols and flavonoids. Those compounds are known for their medicinal properties specially antioxidant and free radical scavenging properties^{7, 8}. Experimental evidences suggest that *Coriandrum sativum* leaves have wide application in treating pathological conditions of endocrinological system, renal system, cardiovascular system, respiratory system, nervous system etc. More studies and research are needed to evaluate the exact composition of the leaves of *Coriandrum sativum* and to identify the potent bioactive molecules present in the leaves extract. The findings will not only enrich the pharmaceutical industry but also may reward mankind with some potent and effective drug formulations against certain deadly diseases. As the herb is indigenous in India and is easily grown, it will be cost effective to extract medicinal compounds from the herb. Also we recommend regular use and consumption of *Coriandrum sativum* leaves in preparation of various dishes. The herb not only adds excellent flavour and aroma to the food it is used in and makes the dish more palatable, but also the leaves may add years to one's life by virtue of its rich medicinal compounds composition.

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