**BENEFITS OF CORIANDER - AN OVERVIEW**

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**Abstract**

Coriander (Botanical Name: Coriandrum sativum Linn), is a herbal plant referred as store house for bioactive compounds, belongs to the family Apiceae or umbelliferae. All the parts of this herb are valued for its culinary and medicinal uses such as anti-microbial, anti-oxidant, anti-diabetic, anti-epileptic, anti-depressant, anti-mutagenic, anti-inflammatory, anti-dyslipidemic, anti-hypertensive, neuroprotective and diuretic. Coriander possesses both nutritional as well as therapeutic properties. It is used in the preparation of many household medicines to cure bad cold, seasonal fever, nausea, vomiting, stomach disorders and also used as a drug for indigestion, against worms, rheumatism and pain in the joints. The aim of present paper was to highlight the nutritional and functional aspects of coriander.

**Key words** - Coriander, Antioxidant.

**Introduction**

Herbs and spices have been used by indigenous communities for culinary and medicinal purposes (Sharma et al., 2011). The use of diet as nutraceuticals is acknowledged as an important factor in the prevention and management of many diseases. The presence of a number of biologically active phytochemicals has been ascribed to the ability of most plant-based foods and medicines to prevent and manage disease progression. One such plant that has been identified and is currently being used as a spice for cooking and as an herb in ethnomedicine is Coriandrum sativum L. Coriander (Botanical Name :Coriandrum sativum Linn.) also called cilantro, are dried fruits of plant coriandrum sativum , belonging to family Apiceae or Umbelliferae. All the parts of coriander such as leaf, seed and fruits have culinary as well as medicinal use. Coriander (Coriandrum sativum L.) which belongs to the family Apiaceae (Umbelliferae) is mainly cultivated from its seeds throughout the year (Mhemdi et al., 2011). India is the biggest producer, consumer and exporter of coriander in the world with an annual production of around three lakh tonnes. It is an annual, herbaceous plant which originated from the Mediterranean and Middle Eastern regions and known as medicinal plants which contains essential oil (0.03 to 2.6%) (Nadeem et al., 2013). The green, young coriander leaves are also known as cilantro and are used as a herbal flavoring in the preparation of salads, sauces, Mexican salsas, and chilies, poultry and seafood dishes, and a variety of ethnic foods. The aromatic coriander fruit or seed, either whole or ground, finds use in curry meat dishes, puddings, breads, soups, and stews (Keith Singletary, 2016).

All parts of this herb are used as flavoring agent and/or as traditional remedies for the treatment of different disorders in the folk medicine systems of different civilizations (Sahib et al., 2012). It is indigenous to the Middle East and Mediterranean region, although it has been cultivated in China for millennia. The essential oil constitutes approximately 1% of the coriander fruit and is among the world’s top 20 essential oils. It finds uses in perfumes, cosmetics, herbal medicines, and alcoholic liquor flavorings. In traditional remedies, coriander was used for relief of gastrointestinal maladies, although other historical uses included as an aphrodisiac, antibiotic, a remedy for respiratory ailments and pain, and a treatment for loss of appetite and memory (Knaapila, 2012).

The coriander have nutritional constituents like water, protein, fat, carbohydrates, calcium, phosphorus, sodium, potassium, iron, Vit –A, foodenergy & ash. It contains various phytochemical constituents like flavanoids, alkaloids, tannins, saponin, terpenoids, sterol, carbohydrate (Krutika Patel, 2016). India has rich in medicinal plants flora of more than 7500 species. Of these, 4635 species are used commercially on large scale. Over 50% of all modern clinical drugs are of natural product origin and plays an important role for the drug development in the pharmaceutical industry. Phytochemical compounds are found in plants that are not required for normal functioning of the body, but it has a beneficial effect on health and plays an active role in amelioration of diseases (Ramesh Kumar, 2018).

Coriander seeds, leaves, flowers and fruit exhibit a wide range of pharmacological activities such as: antibiotic (Silva et al., 2011) anti-oxidant, anti-diabetic, anti-cholinesterase, anti-helminthic, sedative-hypnotic, anti- convulsant, cholesterol lowering (Wangensteen et al., 2004), anti-cancer, and hepatoprotective activity (Samojlik et al., 2010) among other functions. Coriander has been traditionally used and advocated as a remedy for diabetes and lowering cholesterol due to its hypoglycaemic and hypolipidaemic effect in animals (Aissaoui et al., 2011).

Table No 1: Coriander Description

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| Synonyms (Other names) | Coriander fruits, Cilantro, Dhania Chinese Parsley, Coriandre, Coriandri Fructus, Coriander Essential Oil, Dhanyaka, Koriander, Kustumburi, Persil Arabe, Persil Chinois |
| Botanical Name | Coriandrum sativum Linn. |
| Family | Apiaceae or Umbelliferae |
| Geographical Source | Holland , Russia, Hungary,Egypt, Morocco and India (Andhrapradesh , Maharashtra ,  West Bengal , Uttar Pradesh,Rajasthan) |
| Hazarads | Narcotic effect , Photosensitivity and Allergic reactions |

**Botanical Classification (**Shivkumar Yadav, 2021)

Family Apiaceae – Carrot family

Genus Coriandrum L. – coriander P

Species Coriandrum sativum L. – coriander P

Class Magnoliopsida – Dicotyledons

Subclass – Rosidae

Order- Apiales

Subkingdom Tracheobionta – Vascular plants

Superdivision Spermatophyta – Seed plants

Division Magnoliophyta – Flowering plants

Kingdom Plantae – Plants

**Cultivation**

Coriander a tropical crop can be grown in loamy or black soil. It is sown by drilling method, generally in the month of October – November. Irrigation of coriander depends on climate, soil and moisture. Harvesting is done after 100 days of growth when 50% of seeds turn yellow. It requires optimum temperature of 20 to 26°c for growth. 70% of global requirement of coriander is produced in India (Deeksha, 2015).

**Nutritional Aspects**

Nutrition in coriander is basically due to its green leaves and dried fruits. Like all other green leafy vegetables, its leaves are a rich source of vitamins, minerals and iron. Its leaves contain high amount of vitamin A (β-carotene) and vitamin C. It is very low in saturated fat and cholesterol and a very good source of thiamine, zinc and dietary fiber. Green coriander contains 84% water (Bhat, 2014). Coriander herb contains no cholesterol but is rich in anti-oxidants and dietary fiber which help to reduce Low Density Lipoprotein (LDL) while increasing the more acceptable High Density Lipoprotein (HDL) levels. The leaves and seeds contain many essential volatile oils such as borneol, linalool, cineole, cymene, terpineol, dipentene, phellandrene, pinene and terpinolene. The leaves and stem tips are also rich in numerous anti-oxidant polyphenolic flavonoids such as quercetin, kaempferol, rhamnetin and epigenin. The herb is a good source of minerals like potassium, calcium, manganese, iron and magnesium. Potassium is an important component of cell and body fluids that helps control heart rate and blood pressure. Iron is essential for red blood cell production. Manganese is used by the body as a co-factor for the antioxidant enzyme superoxide dismutase. Coriander is one of the richest herbal sources for vitamin K. Vitamin-K has potential role in bone mass building by promoting osteotrophic activity in the bones. (Sharangi, 2013). The coriander fresh leaves contain: moisture: 87.9 g/100 g; protein: 3.3 g/100 g; carbohydrates: 6.5 g/100 g; total ash: 1.7 g/100 g; calcium: 0.14 g/100 g; phosphorus: 0.06 g/100 g; iron: 0.01 g/100 g; vitamin B2 : 60 mg/100 g; niacin: 0.8 mg/100 g; vitamin C: 135 mg/100 g; vitamin A: 10,460 I.U. (International unit)/100 g. Coriander seeds contain nearly 11 g of starch, 20 g of fat, 11 g of protein, and nearly 30 g of crude fiber per 100 g (Peter, 2004)

**Functional Aspects**

The functional properties of coriander cannot be under estimated. Besides nutritional benefits, it is well known for its health or medicinal benefits as well as for additional benefits like it acts as antimicrobial agent. The type of meat and temperature did not influence the antimicrobial activity of the oil; indicating the potential of coriander oil to serve as a natural antimicrobial compound against Campylobacter jejuni in food (Rattanachaikunsopon and Phumkhachorn, 2010). The most important and well characterized functional aspect involves antioxidant activity.

**Antioxidant Activity**

Coriander is a good source of polyphenols and phyto chemicals due to its high antioxidant activity. Reactive species of oxygen can cause oxidative stress and consequently, the damage of tissues and biomolecules (Barros et al., 2012). The Antioxidant content of coriander is attributed to its high content of pigments particularly carotenoids. The carotenoids of its extract were found to show higher hydroxyl radicals scavenging potential thereby protecting cells from oxidative damage (Peethambaran et al., 2012). Coriander leaves showed stronger antioxidant activity than the seeds. A marked reduction in the induced free radical levels in the liver of pre feeded rats with coriander seed powder. In a study cryogenic grinding technology is helpful in retention of flavour and medicinal properties of coriander irrespective of genotypes from diverse origin showed significantly increase in oleoresin content, total phenollic contents, flavonoids and antioxidant properties. Antioxidant content is attributed to its high content of pigments particularly carotenoids. The carotenoids of its extract were found to show higher hydroxyl radicals scavenging potential thereby protecting cells from oxidative damage (Peethambaran et al., 2012). Coriander essential oils serve as potential antioxidants. Main components of its essential oil are: camphor (44.99%), cyclohexanol acetate (cis-2- tert.butyl-) (14.45%), limonene (7.17%), α-pinene (6.37%). This essential oil at percentage of 0.05, 0.10 and 0.15 is very much effective in inhabiting primary and secondary oxidation products. It was found that at the proportion of 0.02%, its effects were almost equal to BHA (butylated hydroxyanisole) (Darughe et al., 2012).

**Antidiabetic activity**

C. sativum showed significant hypoglycaemic action in rats fed with high cholesterol diet. The activity of glycogen phosphorylase and gluconeogenic enzymes revealed a decrease in the rate of glycogenolysis and glucogenesis. There was also an increased activity of glucose-6-phosphate dehydrogenase and glycolytic enzymes used glucose by the pentose phosphate pathway and glycolysis respectively [Chitra, 1999]. In an in-vitro study to assess the possible effects of aqueous coriander plant extract (50 g plant extract/L) on glucose diffusion across the gastrointestinal tract, it was found that the extract significantly decreased glucose diffusion compared to control with mean external glucose concentration of 6.4 ± 0.2 mmol/L at 26 h. Part of the antihyperglycemic action of C. sativum may be due to decreased glucose absorption in vivo. Pre-treatment with C. sativum protected Wistar albino rats against gastric mucosal damage induced by ethanol. The protective effect might be related to the free-radical scavenging property of the different antioxidant constituent present in C. sativum [Al-mofleh, 2006].

**Anti-Fungal Activity**

Moisture content and pH of the foodstuffs have been reported as the main biotic factors affecting the fungal deterioration especially in high moisture foods. Common moulds found in cakes and bakery products are Penicillium expansum, Penicillium stoloniferum, Rhizopus stolonifer, Aspergillus niger, Monilia sitophila and species of Mucor and Geotrichum (Darughe et al. 2012). Coriander extracts obtained above was also screened for their antifungal activity in comparison withstandard antibiotic Fluconazole (10mg/ml) in vitro bywell diffusion method. The lawn culture was preparedusing the test organism on Sabouraud’s Dextrose Agar (SDA) for well diffusion methods. The help of sterile cup borer wells were made in the inoculatedplates. The extract of Coriandrum sativum (500 µl) was added into the well and allowed to diffuse in the agar medium. The plates were incubated at roomtemperature for 48hrs. The activity of the extract was determined by measuring the diameter of zone oninhibition. For each fungal strains controls were maintained where pure solvents were used. (Rathabai and Kanimozhi., 2012).

**Hypolipidemic Effect**

Hyperlipidemia increases the risk for generation of lipid oxidation products, which accumulate in the sub-endothelial spaces of vasculature and bone. Atherogenic high-fat diets increase serum levels of oxidized lipids, which are known to attenuate osteogenesis in culture and to promote bone loss (Pirih et al., 2012). Lal et al. (2004) studied the hypolipidemic effect of coriander (Coriandrum sativum L.) where coriander was given at a dose of 1g/kg to triton induced hyperlipidemic rats. It was found that coriander decreases the uptake and enhances the breakdown of lipids.

**Anti - Diuretic Activity**

Jabeen et al. (2009) studied the diuretic activity of the plant extracts on wistar rats of either sex (200 to 250 g). Negative and positive control group comprising of five animals, each received saline and standard diuretic drug: furosemide (10 mg/kg), while rest of the groups with similar number of animals, were given different doses of the plant extracts dissolved in saline (50 ml/kg). The results concluded that the diuretic effect of coriander was confirmed due to significant increase in urine output (diuresis) in rats, similar to furosemide, a standard diuretic. Therefore, diuretic is considered as one of the best choices for the treatment and management of uncomplicated hypertension.

**Anti-carcinogenic effect**

Anticancer effects of various essential compounds in curry and coriander leaves are well studied. Chithra and Leelamma (2000] studied the effective role of the coriander crude extract on the antitumor effect of colon cancer and found to be highly efficient. Another potential compound such as pthalides found in coriander also showed potential anticancer effect.

**CONCLUSION**

The traditional medicines in different health care systems are precious natural gift to fight against various diseases. Coriander is one of miraculous herb that functions as both, spice as well as herbal medicine. The leaves and fruits are highly fragrant and contain nutrients like fat, proteins, vitamins minerals etc. Its health benefits activities ranging from antibacterial to anticancer activities. Most important and well characterized property of coriander is its use as antioxidant. Due to its multifunctional uses and protective and preventive action against various chronic diseases, this herb is righty called as “herb of happiness”.

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