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Phytochemical Analysis and Cardiovascular Potential of Coriandrum sativum: A Review

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Abstract: *The objective of this study was to conduct a phytochemical investigation of various phenols, alkaloids, terpenoids, and glycosides present in solvent extracts of Coriandrum sativum from exiting literature. Plant belonging to the Umbelliferae family, Coriandrum sativum, commonly known as Dhanyaka, is a highly esteemed Ayurvedic medicinal plant. It is a small-sized tree found abundantly in India and Italy. Different parts of this plant, including seeds, leaves, flowers, and fruits, exhibit diuretic, antioxidant, antimicrobial, and anti-mutagenic properties. Despite its recognized benefits, the cardiovascular advantages of C. sativum have not been comprehensively summarized in previous literature. Therefore, this review aims to explore and discuss its effectiveness in managing cardiovascular diseases based on recent research findings. Various phytochemical evaluations have been documented, highlighting the significant potential of Coriandrum sativum. A systematic electronic search of literature was conducted using databases such as Google Scholar, encompassing articles published until January 2015. Additionally, traditional uses and phytochemistry of coriander were investigated in original sources and synthesized.*

Keywords: Coriandrum sativum, Cardiovascular, Phytochemical and Antimicrobial.

I. INTRODUCTION

Coriander (*Coriandrum sativum* L.), a member of the Umbelliferae/Apiaceae family, is a versatile herbaceous plant renowned for its culinary and medicinal significance. Originating from the European-Mediterranean region, coriander has traversed through centuries of human civilization, deeply embedded in various cultural practices and cuisines worldwide. Its distinct aroma and flavor have made it a staple ingredient in culinary traditions across the globe.

In recent decades, *Coriandrum sativum* L. has garnered increased attention from the scientific community due to its rich phytochemical composition and diverse biological activities (Matasyoh et al., 2009). Researchers have delved into unraveling the chemical constituents present in different parts of the coriander plant, ranging from leaves and stems to seeds and roots. Moreover, numerous studies have explored the potential therapeutic applications of coriander in traditional and modern medicine (Singhet al., 2006).

This comprehensive review seeks to provide a detailed examination of the phytochemistry and various health-promoting properties of Coriandrum sativum L. By synthesizing existing literature and research findings, we aim to shed light on the multifaceted nature of this remarkable plant and its potential implications for human health and well-being.

Throughout history, coriander has been revered not only for its culinary versatility but also for its purported medicinal properties. Ancient civilizations, including the Egyptians, Greeks, and Romans, valued coriander for its aromatic qualities and believed in its therapeutic benefits for digestion, circulation, and overall vitality. Today, coriander continues to hold a significant place in traditional medicine systems such as Ayurveda and Traditional Chinese Medicine (TCM), where it is prescribed for various ailments ranging from gastrointestinal disorders to inflammatory conditions (Grosso et al., 2008).

The growing body of scientific evidence supporting the medicinal properties of Coriandrum sativum L. has sparked interest in understanding its underlying mechanisms of action. Researchers have identified a plethora of bioactive compounds present in coriander, including phenols, alkaloids, terpenoids, glycosides, and carotenoids, each contributing to its diverse range of biological activities. These compounds exhibit antioxidant, antimicrobial, anti-

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inflammatory, cardioprotective, and neuroprotective properties, among others, making coriander a promising candidate for therapeutic interventions.

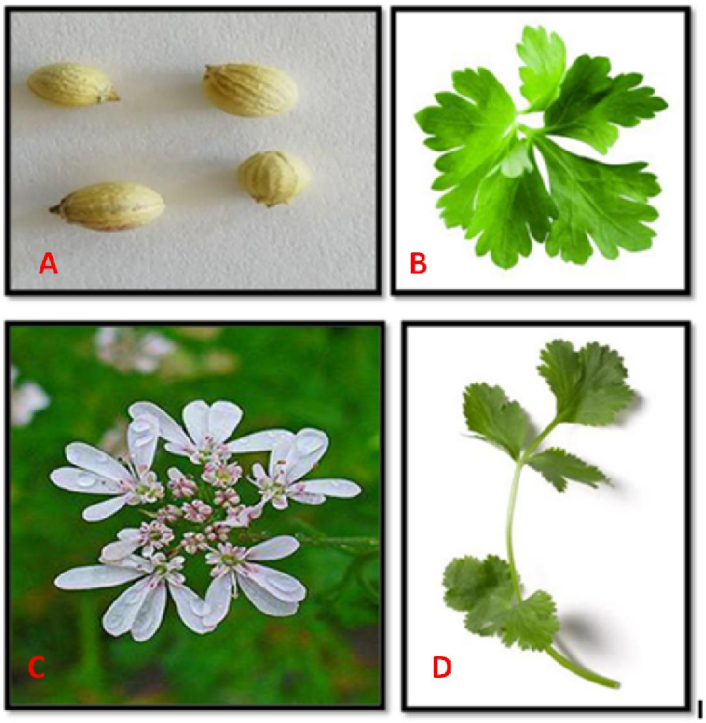

Figure A= Seeds, **B**= Leaf, **C**= Flower and **D** = Stem of Coriander.

Furthermore, the essential oil extracted from coriander has garnered attention for its potent antimicrobial effects against a wide spectrum of pathogenic microorganisms. Studies have demonstrated the inhibitory and germicidal actions of coriander essential oil against bacteria, fungi, and even certain viruses, highlighting its potential as a natural alternative to conventional antimicrobial agents (Delaquis et al., 2002).

1.0: General usages: The edible parts of coriander, including the leaves, seeds, and roots, are rich in fiber, vitamin B, vitamin C, carotene, and various minerals (Bhat, Kaushal, & Sharma, 2014). In Asian cuisine, the leaves and shoots are commonly utilized as a seasoning for soups and cold dishes, whereas the fruits or seeds and roots are typically employed in meat dishes. Furthermore, the dried seeds serve as a popular spice in both the Mediterranean region and India (Punetha, Tewari, & Pande, 2018).

2.0: Essential oil: Essential oil (EO) extraction from various parts of coriander, such as the seeds, pericarps, stems, leaves, roots, and flowers, is feasible (Sui et al., 2016; Chung et al., 2012). Notably, there are significant variations in the type of EO obtained from different parts of the coriander plant.

3.0: Antimicrobial activity: Coriander EO, along with specific coriander extracts, has demonstrated diverse degrees of inhibitory and germicidal effects against a range of pathogenic microorganisms (Furletti et al., 2011). Notably, volatile components extracted from coriander leaves (aerial parts) and seeds (fruits) exhibit stronger antimicrobial efficacy compared to other extracts. The antimicrobial activity of coriander EO and its extracts extends to both bacteria and fungi, attributed to the inhibitory and destructive properties of the active EO components.

4.0: Chemical constituents and their biological effects in coriander. Among these constituents, phenols, alkaloids, terpenoids, glycosides, and carotenoids play significant roles in imparting various biological activities to coriander. It's noteworthy that the composition of coriander can vary significantly depending on several factors, including the specific variety, growth stage, environmental conditions such as soil type and climate, and even the season of planting.One key aspect highlighted in this review is the ability to manipulate specific constituents of coriander through artificial

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measures(Potter, 1996). This suggests that certain compounds can be enhanced or modified to potentially optimize the plant's desired biological effects (Begnami et al., 2010). Coriander's essential oil and extracts have garnered attention for their antimicrobial properties. These components have been shown to damage microbial cell membranes, making coriander an effective agent against various pathogenic microorganisms. Another significant aspect explored in this review is the growth pattern and carotenoid accumulation in different coriander varieties. Studies have revealed substantial variations in growth patterns, biomass yield, and the accumulation of total carotenoids and β-carotene among different coriander varieties. These variations are attributed to inherent genetic differences among the varieties. Furthermore, the observation of distinct growth phases, including a short germination period, an initial growth phase, a lag phase, and a profuse growth phase before flowering, underscores the complexity of coriander's growth dynamics (Bhuiyan et al., 2009).

5.0: Measurements: The assessment of various plant growth traits was conducted throughout the growth period, including measurements taken at harvest or after plant harvesting (Anwar et al., 2011). Plant height was determined by using a scale, while the leaf SPAD value (Soil and Plant Analysis Development) was calculated by averaging five readings of plant leaves, specifically those from the middle of the plant, per pot. During harvest, the plants were carefully cut at the soil surface, and their roots were delicately washed to remove soil particles before being blotted dry against tissue paper. (Kałużewicz et al., 2018).

6.0: Phytochemistry of *Coriander:*

i. Antioxidant Capability of Bioactive Compounds: The antioxidant activity of coriander is attributed to the presence of various active compounds, including secondary metabolites and phenolic ingredients. These constituents exhibit multifaceted antioxidant actions, contributing to enhanced biological outcomes and promoting human health. Such naturally occurring antioxidants are abundant in a diverse range of vegetables, herbs, and fruits, which are commonly recognized as functional foods (McDonald et al., 2001).

ii. Cardioprotective Activity: Studies have demonstrated the cardioprotective activity of coriander fruits, particularly in hydro-methanolic extracts. This activity is primarily attributed to the high content of polyphenols present in the fruit. Methanolic extracts of coriander fruits have been shown to protect against myocardial damage in rats by preventing myofibrillar damage. Additionally, coriander extracts have been found to significantly reduce cholesterol-associated lipids and increase high-density lipoprotein (HDL) cholesterol levels, thereby mitigating dyslipidemia in rabbits. These findings underscore the valuable cardioprotective effects of coriander extracts (Patel et al., 2012; Abascal et al., 2012).

iii. Antibacterial Activity: The antimicrobial activity of Coriandrum sativum leaves against various microorganisms was assessed by evaluating the presence of inhibition zones, zone diameter, and minimum inhibitory concentration (MIC) values. The plant exhibited significant antimicrobial activity against a wide range of microbial strains. However, the ethanol extract of the plant demonstrated weak antimicrobial activity in both disc diffusion and MIC tests. These findings highlight the potential antibacterial properties of coriander, although further research is needed to elucidate its efficacy against specific microbial strains (Abascal et al., 2012).

II. CONCLUSION

Coriandrum sativum, commonly known as coriander, is a versatile herbaceous plant with significant phytochemical diversity and diverse biological activities. Through a comprehensive review of existing literature, this study has elucidated various aspects of coriander's phytochemistry and its potential health-promoting properties. Firstly, coriander is rich in bioactive compounds such as phenols, alkaloids, terpenoids, glycosides, and carotenoids, which contribute to its antioxidant, antimicrobial, and cardioprotective effects. These compounds exhibit multifaceted antioxidant actions, making coriander a valuable addition to functional foods. Secondly, coriander extracts, particularly those derived from its fruits, have shown promising cardioprotective activity. Studies have demonstrated their ability to protect against myocardial damage and dyslipidemia, highlighting their potential in cardiovascular health management. Furthermore, coriander exhibits significant antimicrobial activity against various microorganisms, although the efficacy of ethanol extracts may vary. This underscores the need for further research to elucidate its antibacterial properties against specific microbial strains.

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