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Emerging Pharmacological Effects and Evidence of Health Benefits of Coriander

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Abstract: ***Coriander, the most popular garnishing herb on dishes worldwide, has several health benefits. Traditionally used in herbal remedies for treating diseases in different countries and regions across Europe, the Mediterranean belts, the Middle East, Chinese medicine, and in Indian ayurveda and Umami practices. The plant is entirely edible and has a safe profile granted by USDA. The seeds are used as condiments, and even the roots are used in different cuisines. Extracts from leaves, seeds, and oils derived from seeds (seed oils) and the volatile essential oils from seeds and leaves derived from steam distillation of plant parts, where linalool is the major constituent have numerous traditional medicinal uses. A plant with good nutrient qualities can deliver the needs of Vitamins and minerals. The extracts having vital phytochemicals like quercetin and isocoumarin have antioxidant, antidiabetic, cardio-protective, hepatoprotective, antidiabetic, and derma-protective, neuroprotective properties as established through in-vivo animal studies. Vital enzyme inhibitions of pathological importance like HMG reductase, LCAT, Glucosidase, and other hormonal (insulin) and neurotransmitter (Glutamate, GABA Acetylcholine) sensitivity alterations are noted in in-vitro studies as well. Essential oils are used in aromatherapy as an anxiolytic and muscle-relaxant and found to have sedative effects in animal studies. Cosmetic uses of its essential oil in dermatological and skin care products are increasing. It is one of the most potent herbs as a cardio-protectant to counter metabolic syndrome and warrants clinical trials on applying its phytochemicals in treating diseases.***

Keywords: Coriander, Essential oil, Linalool, Coriander seed

1. Introduction

Coriander has been used for centuries in various cuisines around the world but, recent scientific research has shed light on the emerging pharmacological effects and evidence of the health benefits of coriander beyond its culinary applications. This versatile herb possesses a rich array of bioactive compounds, including antioxidants, essential oils, phenolic acids, and flavonoids, which contribute to its medicinal properties. In traditional medicine, coriander has been utilized for its digestive, anti-inflammatory, and analgesic properties. However, with advancements in scientific techniques and a growing interest in natural remedies, researchers have begun to unravel the pharmacological effects and potential health benefits of coriander in more depth. Studies have revealed that coriander exhibits potent antioxidant properties, protecting against oxidative stress and reducing the risk of chronic diseases such as cardiovascular diseases, neurodegenerative disorders, and certain types of cancer. The high concentration of phenolic compounds and flavonoids in coriander contributes to its antioxidant potential by scavenging free radicals and inhibiting oxidative damage to cells and tissues. It has shown antimicrobial activity against a wide range of pathogens, including bacteria, fungi, and parasites. This antimicrobial effect is attributed to the presence of essential oils like linalool, which has been found to possess significant antibacterial and antifungal properties. Such findings suggest that coriander may have potential applications in the development of natural antimicrobial agents or as a food preservative. Coriander has been studied for its anti-inflammatory properties, which may be attributed to its bioactive components like quercetin and kaempferol. These compounds have demonstrated inhibitory effects on pro-inflammatory enzymes and cytokines, thereby potentially reducing inflammation and associated symptoms. Emerging evidence suggests that coriander may have lipid-lowering effects, contributing to the management of hyperlipidemia and the prevention of cardiovascular diseases. Studies have shown that coriander extracts can reduce total cholesterol (TC), ycerides (TG), and low-density lipoprotein (LDL) cholesterol levels while increasing high-density lipoprotein (HDL) cholesterol levels, thus improving the lipid profile.

Anti-Diabetic

Coriander extracts have been found to possess antidiabetic effects in several studies. It was observed that coriander aqueous extracts had a positive impact on reducing hyperglycaemia in diabetic mice induced by streptozotocin. These extracts showed similar effects to insulin by enhancing glucose transport, breakdown, and incorporation into glycogen. 80% ethanolic extracts of coriander leaves and stems were more effective in lowering blood sugar levels and providing antioxidant protection compared to glibenclamide in a model of alloxan-induced diabetes. Ethanolic extracts of coriander leaves exhibited potential in inhibiting α-glucosidase, surpassing the standard drug acarbose. These extracts also promoted the regeneration of pancreatic β-cells in alloxan-induced diabetic rats. Petroleum ether extracts of coriander seeds offered antioxidant protection against diabetic renal damage in streptozotocin-induced diabetes; the effect was attributed to the presence of quercetin, rutin, and kaempferol. Coriander essential oil (EO) showed superior antidiabetic actions compared to acarbose, with linalool, γ-terpinene, and α-pinene identified as major phytochemicals. Studies had shown that polyphenols present in coriander seeds were responsible for their antidiabetic effects. These polyphenolic fractions effectively controlled fasting blood glucose levels in alloxan-induced diabetic mice and had beneficial effects on fasting sugars. Coriander essential oil exhibited potential antidiabetic and antioxidant effects in insulin-resistant rats treated with dexamethasone. The oil reversed pancreatic weight loss, increased levels of reduced glutathione (GSH) and BCL2, and reduced malondialdehyde (MDA) levels in the pancreas. Additionally, it improved

serum HDL levels and corrected serum glucose, insulin, TG, and TC levels. Overall, coriander shows promise as a natural remedy for managing diabetes (Aligita et al. 2018, Sreelatha et al. 2012).

Cardio-Protective

Coriander extracts have shown promising cardioprotective effects in animal studies. These extracts have been observed to improve cardioprotective indices, lower the atherogenic index, and reduce cholesterol and TG levels in the blood. Seed extracts of coriander have demonstrated the ability to lower pulse rate, normalize ECG waves, and decrease levels of cardiac markers such as ALT, LDH, AST, and CK-MB fractions. This cardiovascular benefit may be attributed to the presence of polyphenolic compounds and flavonoids like quercetin, rutin, apigenin, and luteolin, which exhibit blood pressure-lowering effects, possibly through ACE inhibition. Furthermore, coriander extracts have been found to reduce blood pressure, provide antioxidant and anti-inflammatory protection to blood vessels, and lower the risk of cardiac and vascular damage. The modulation of lipid metabolism enzymes by coriander extracts results in decreased TG and cholesterol levels. The extracts also decrease the activity of HMG-CoA reductase while enhancing LCAT and tissue lipase activities, leading to increased lipid breakdown. In addition, coriander seed powder has been shown to reduce cholesterol concentration in the liver, intestine, and colon, as well as the cholesterol-to-phospholipid ratio. It has also demonstrated a protective effect against tumour formation in the intestine and colon of rats with colon cancer. Coriander extracts have been found to increase the excretion of cholesterol and phospholipids, reduce lipid peroxidation, and elevate GSH content and CAT activity, thereby promoting faecal cholesterol and phospholipid output. Overall, coriander exhibits potential as a cardioprotective agent with its various mechanisms of action (Hussain et al., 2018).

Dermato-Protective

Coriander extracts have demonstrated remarkable derma-protective properties, making them a promising option for addressing various skin conditions. When applied on the skin, aqueous extracts of coriander have shown the ability to hinder the growth of Propionibacterium acne and Staphylococcus epidermidis, two common bacteria associated with acne and other skin issues. This suggests that coriander extracts may have the potential in treating conditions such as acne, eczema, and psoriasis in humans. The essential oil (EO)derived from coriander possesses anti-inflammatory potential, which can be effective in treating UV-B-induced erythema, a type of skin inflammation caused by exposure to ultraviolet radiation. This anti-inflammatory property of coriander EO can help soothe and alleviate skin redness and irritation. Coriander extracts have also shown promise in treating skin lesions resembling contact dermatitis, a condition characterized by skin inflammation and irritation caused by exposure to allergens. The application of coriander leaf extract-coated silver nanoparticles has been found to be effective against skin diseases like acne and dandruff, offering a natural alternative for managing these conditions. In addition, coriander extracts have been evaluated for their efficacy in treating infant diaper dermatitis, a common skin condition that affects infants. The seed oil (SO) derived from coriander has been found to have a calming effect, making it a potential soothing agent for sensitized or irritated skin. Ethanol extracts from coriander leaves have been shown to increase collagen precursors and decrease MMP-1, an enzyme involved in collagen breakdown. This indicates that coriander extracts can contribute to the maintenance of healthy skin by promoting collagen production and reducing collagen degradation, thereby improving the overall health and appearance of the epidermis. The EO derived from coriander exhibits inhibitory effects on enzymes such as elastase, collagenase, hyaluronidase, and tyrosinase. These enzymes play roles in skin aging, degradation of skin proteins, and hyperpigmentation. By inhibiting these enzymes, coriander EO helps to preserve the integrity of the skin's structural components, prevents photoaging, and improves the appearance of the skin. Coriander essential oil has demonstrated anti-inflammatory and anti-melanogenic properties, making it effective in preventing skin aging and hyperpigmentation. It can be applied topically to treat skin infections caused by bacteria or fungi, including *Staphylococcus aureus* and *Candida albicans.* With its wide range of derma-protective properties, including antimicrobial, anti-inflammatory, soothing, collagen-promoting, and anti-aging effects, coriander proves to be a valuable natural ingredient for addressing various skin concerns and maintaining overall skin health (Park et al., 2012).

Anti-Inflammatory

Several studies have demonstrated the anti-inflammatory properties of coriander extracts. Hydroalcoholic extracts derived from coriander seeds have shown effectiveness in reducing edema and downregulating inflammatory cytokines and mediators. Additionally, ethanolic extracts of the aerial parts of the coriander plant have been found to significantly decrease the production of nitric oxide (NO) and prostaglandin (PG)-E2 induced by lipopolysaccharide (LPS), while also downregulating inflammatory regulators. The involvement of Toll-like receptor 4 (TLR4), MAPK pathways, and reactive oxygen species (ROS) generation in inflammatory responses has been confirmed, and targeting these pathways is considered a strategy to alleviate inflammatory diseases. Moreover, coriander extracts have been observed to possess a membrane stabilization effect. One particular compound, lacton C, isolated from coriander fruits, has demonstrated the ability to reduce levels of NO, ROS, and inflammatory cytokines while suppressing the expression of inflammatory mediators such as COX-2 and iNOS. Phenolic acids and caffeic acids present in coriander have been implicated in exerting anti-inflammatory effects in vitro on primary neutrophils. Anti-inflammatory effects on carrageenan-induced paw edema and their ability to modulate various inflammatory pathways and mediators are seen in numerous studies which collectively highlight the potential of coriander extracts as a natural approach to combat inflammation (Begnami et al. 2018).

Anti-Microbial

Spices offer a remarkable natural reservoir of antimicrobial compounds, presenting a viable alternative to synthetic preservatives such as BHA and BHT. Among the wide array of spices, coriander emerges as a promising source of antimicrobial activity through its EO and extracts. Coriander EO and extracts have demonstrated notable effectiveness against various bacteria and fungi, establishing their

antimicrobial potential. Notably, the primary contributors to this antimicrobial activity are linalool, α-pinene, and limonene, which have exhibited its efficacy against both gram-positive and gram-negative bacteria, including well-known pathogens like S. aureus, E. coli, P. aeruginosa, L. monocytogenes, and various Candida species. Interestingly, coriander EO has also shown synergistic effects when combined with conventional antibiotics such as chloramphenicol, ciprofloxacin, gentamicin, and tetracycline against specific bacterial strains. This suggests that coriander compounds may enhance the efficacy of antibiotics, potentially contributing to the development of more effective treatment strategies. The investigation has unveiled specific antimicrobial compounds present in coriander EO and extracts, such as (2E)-dodecanal, 1-decanol, E-2-dodecenal, and dodecanoic acid. These compounds add to the antimicrobial arsenal of coriander, expanding its range of activity and potential applications. In the case of Candida species, which are responsible for various infections, coriander EO has shown a fascinating mode of action. Monoterpenes and sesquiterpenes found in coriander EO bind to membrane ergosterol in *Candida* cells, leading to increased permeability to ions and causing significant damage to the cell membrane. This mode of action proves detrimental to the survival of Candida cells and highlights coriander EO's potential as an antifungal agent. Moreover, coriander extracts have exhibited inhibitory effects on Candida biofilm adherence, a crucial factor in the virulence and persistence of Candida infections. Additionally, coriander extracts have shown the ability to reduce the proteolytic activity of C. albicans, further attenuating its pathogenicity. These findings underscore the remarkable antimicrobial properties of coriander and its potential utility in combatting microbial infections. By harnessing the natural antimicrobial compounds present in coriander, researchers are paving the way for the development of novel antimicrobial strategies that can address the growing concerns of antimicrobial resistance and contribute to the advancement of more sustainable and effective approaches to microbial control (Silva et al. 2011).

Anti-Oxidative

Polyphenolic-rich fractions extracted from coriander seeds have shown remarkable protective effects against oxidative damage in human lymphocytes. These fractions effectively mitigated the detrimental effects induced by hydrogen peroxide, enhancing the activity of antioxidant enzymes and increasing the content of glutathione, a crucial antioxidant molecule. In a high-fat diet model in rats, the administration of coriander seed extracts led to reduced levels of lipid peroxides, free fatty acids, and increased levels of glutathione. These findings highlight the potential of coriander seeds as a natural dietary supplement to counteract oxidative stress and its associated health complications. When it comes to preserving the bioactive components of coriander foliage, microwave drying has emerged as a superior method compared to oven drying. Microwave drying not only preserved the pigments more effectively but also retained the bioactivities of the foliage to a greater extent. This preservation technique holds promise for maximizing the benefits of coriander foliage in various applications. One notable benefit of coriander is its potential as a source of pro-vitamin A. Pro-vitamin A compound is crucial for combating deficiencies in vitamin A, a vital nutrient for overall health. By incorporating coriander into the diet, individuals can increase their intake of pro-vitamin A, potentially addressing deficiencies and promoting better health outcomes. Coriander extracts have also demonstrated their role as natural antioxidants in protecting polyunsaturated fatty acids (PUFA) and phospholipids in emulsions. By fortifying oils with coriander extracts, a notable improvement in antioxidant activity has been observed. This finding suggests that coriander extracts can be used to enhance the stability and shelf life of lipid-based products, offering a natural alternative to synthetic antioxidants. The EO of coriander exhibits high levels of linalool and α-pinene, compounds that contribute to its potent antioxidant activity. These antioxidant properties make coriander EO a valuable ingredient in various applications, including cosmetics and food preservation. Furthermore, the combination of different herb essential oils, including coriander EO, has shown a synergistic effect, further enhancing antioxidant activity. This synergistic interaction expands the potential use of coriander EO in formulations seeking robust antioxidant protection (Wang et al., 2018; Kajal et al., 2019).

Neuro-Protective

The flavonoids quercetin and isoquercetin found in coriander seeds possess a wide range of beneficial properties, including sedative, anti-inflammatory, antioxidant, and analgesic effects. These compounds have been shown to activate α2 adrenergic receptors, leading to analgesic effects in mice. Their presence in coriander seeds highlights the potential of this spice as a natural source of therapeutic compounds for pain management and inflammation reduction. Furthermore, the methanolic extract derived from the aerial parts of coriander has been found to significantly stimulate the release of nerve growth factor (NGF) and exhibit anti-neuroinflammatory effects. This suggests that coriander extract may hold promise in the field of neurology for its potential to promote nerve growth and protect against neuroinflammation. In studies involving a rat model of Alzheimer's disease induced by Aβ plaques, coriander EO has demonstrated potent antioxidant, anxiolytic, and antidepressant effects. Additionally, the EO has shown the potential in reducing pain and inflammation associated with Alzheimer's disease. These findings suggest that coriander EO may hold therapeutic value in the management of symptoms related to neurodegenerative diseases. Coriander seed extracts have also exhibited anxiolytic and sedative effects in mice by acting on the GABA-A receptor complex, providing potential benefits for anxiety and sleep disorders. Linalool, the major monoterpenoid compound present in coriander essential oil, has been shown to increase sleep duration, reduce anxiety and stress in mice, and possesses anti-inflammatory, antioxidant, analgesic, anxiolytic, and antidepressant properties. Due to its diverse range of beneficial effects, linalool is utilized in the pharmaceutical industry as an active ingredient in topical creams and gels for the treatment of skin inflammation and pain. In the practice of aromatherapy, coriander essential oil can be diffused or added to a vaporizer to create a calming and relaxing atmosphere. The soothing properties of coriander EO make it a valuable tool for promoting relaxation and stress relief (Pathan et al., 2011).

Hepato-protective
Coriander EO and extracts have been found to support digestive health through various mechanisms. They have shown efficacy in relieving symptoms such as gas, bloating, and indigestion. Additionally, coriander EO and extracts stimulate appetite and improve nutrient absorption, promoting overall digestive well-being. In terms of liver health, oral administration of ethanolic extracts derived from coriander leaves and stems has demonstrated the ability to reverse liver damage associated with necrosis, fatty changes in the liver, and clinical markers of hepatic injury. This suggests the potential hepatoprotective properties of coriander extracts. The hepatoprotective effects of coriander EO can be attributed to its components, including linalool, pinene, geraniol, geranyl acetate, camphor, and terpinene. These compounds exhibit both antioxidant and pro-oxidant activities, contributing to the overall hepatoprotective effects of coriander EO. Phenolic compounds play a crucial role in neutralizing harmful free radicals and protecting liver cells from oxidative damage. Scientific studies have provided evidence for the hepatoprotective effects of coriander extracts or EO. These effects include a reduction in hepatic injury, antioxidant protection, decreased lipid peroxidation, and histopathological confirmations. Collectively, these findings support the potential of coriander extracts and EO in promoting liver health and protecting against liver damage (Özbek et al., 2016).

2. Other Medicinal Activities

Analgesic Activity
Linalool, a major compound found in essential oils and known for its pleasant aroma, has been found to have multiple effects on analgesic activity. It has been shown to modify the nicotinic receptor-ion channels at neuro-muscular junctions, leading to an anaesthetic-like effect by altering the secretion of acetylcholine. Additionally, linalool has demonstrated analgesic properties in chronic pain states and inflammation by blocking NMDA and other ionotropic glutamate receptors, while also inhibiting the formation of nitric oxide. These effects, along with the presence of polyphenols, highlight the potential of linalool as a promising natural compound for pain management and neuroprotective interventions (Pathan et al., 2011).

Antiatherogenic activity
Various extracts derived from different parts of the plant, including the seed, leaf, and fruit, have been shown to exhibit antiatherogenic activity. The seed extract has been found to decrease the risk of cardiovascular diseases and reduce the atherosclerotic index. Additionally, the polyphenols present in the leaf extract have demonstrated the ability to prevent oxidative damage to myocardial tissues. Furthermore, the methanolic extract of seeds has shown promise in lowering damages caused by induced myocardial necrosis. Lastly, fruit extract has been observed to lower blood pressure, particularly in cases of high salt and fructose diet-induced hypertension. The seed extracts of the plant contain phytochemicals that exhibit antilipidemic activity by inhibiting the expression of scavenger receptor SRB1. This inhibition leads to a decrease in the number of foam cell formations, which are involved in the development of atherosclerotic plaques. Consequently, the reduction in foam cell formations helps to mitigate the formation of atherogenic plaques (Sreelatha & Inbavalli., 2012; Aissaoui et al., 2011).

Anticancer activity
The leaf, stem, and particularly the root of the plant contains phenolic compounds that exhibit antiproliferative activity by downregulating oxidative stress. These compounds also inhibit DNA damage, cancer cell migration, and metastasis. Additionally, the polyphenolic extract of the plant's seeds, specifically the flavonoids, catechins, and rutin, demonstrate antileukemic activity with a high binding affinity for their targeted receptors (Elmas et al., 2019).

Antidiuretic activity
The seed extract of coriander improves diuresis and urinary flow of sodium, potassium, chloride, and glomerular filtration rate in a dose-dependent way. Whereas, leaf extract increases sodium excretion in the urine more than potassium. This suggests that the leaf extract may have a specific influence on sodium handling and urinary sodium excretion (Aissaoui et al., 2011).

Anthelmintic activity
The seed extract of the plant has shown anthelmintic activity by destroying adult tapeworm Hymenolepis nana in a dose-dependent manner. Additionally, the EO derived from the plant exhibits nematicidal activity against the parasitic nematodes Bursaphelenchus xylophilus and Haemonchus contortus (Hosseinzadeh et al., 2016).

Antimigraine activity
Linalool, a compound known for its pleasant aroma, exhibits antimigraine activity through multiple mechanisms. It acts as an antagonist of the transient receptor potential M8 (TRPM8) channel, which is known to increase migraine and contribute to pain sensation. By antagonizing this channel, linalool helps alleviate migraine symptoms and reduce pain associated with migraines. Additionally, linalool possesses anti-inflammatory and analgesic effects, which further contribute to its potential in providing migraine relief (Delavar Kasmaei et al., 2016).

Antimutagenic activity
Both coriander juice and chlorophyllin, a surrogate molecule of chlorophyll, have been found to exhibit antimutagenic activity. There is a positive correlation between the concentration of these substances and their antimutagenic effect. Additionally, the extract of leaves derived from the plant has been found to possess antimutagenic properties. This extract has been observed to reduce abnormalities in the axial skeleton and impact the development of neural tube, cardiovascular structures, and the eye. These findings suggest that the extract of leaves may have potential therapeutic applications in preventing mutagenesis and promoting normal embryonic development (Reyes et al., 2010).

Anxiolytic activity
Linalool a component of EO enhance GABA like inhibitory effect in CNS and also exerts a antidepressant and muscle-relaxant properties. Seed extract reduces locomotor activity and helps in neuromuscular coordination. Seed extracts rich in linalool, ascorbyl palmitate, and petroselinic acid helps to protect against lipid peroxidation by reducing ROS production (Kajal et al., 2019; Pathan et al., 2011).

Hypocholesterolemic activity

Stigmasterol and β-sitosterol, present in the plant, are known to lower the absorption of dietary cholesterol, thereby reducing the amount of cholesterol entering the bloodstream. Additionally, the plant contains linoleic acid, oleic acid, palmitic acid, stearic acid, and ascorbic acid, which have been shown to contribute to reducing cholesterol levels in the blood and cholesterol deposition in blood vessels. The phytosterols, particularly stigmasterol, found in the plant, increase the activity of the enzyme HMG-CoA reductase, which plays a role in suppressing cholesterol absorption and enhancing the synthesis of hepatic bile acids. This, in turn, increases the degradation of cholesterol in the body. The seed extract of the plant, along with plant sterols and stanols, has been observed to increase the activity of HMG-CoA reductase and LCAT (plasma) activity, which enhances the degradation of cholesterol into faecal bile acids and neutral sterols. The combination of various compounds in the plant, such as stigmasterol, lanosterol, β-sitosterol, Δ5-avenasterol, sitostanol, Δ7-stigmastenol, Δ7-stigmastenol, Δ7-avenasterol, tocopherols, has been associated with a decrease in the levels of TC, TG, LDL, and very low-density lipoprotein (VLDL) cholesterol (bad) while increasing high-density lipoprotein (HDL- Good) cholesterol (Chithra et al., 1997; Sriti et al., 2010).

Hypolipidemic activity

The plant's flavonoids and polyphenols exhibit hypolipidemic activity by reducing fatty acid synthesis in the liver and preventing fat accumulation. These compounds play a role in regulating lipid metabolism and preventing the excessive synthesis and storage of fats in the body. The seed extraction of the plant, rich in linalool, ascorbyl palmitate, and petroselinic acid, has also demonstrated hypolipidemic activities. These specific components of the seed extract contribute to the reduction of lipid levels in the body (Kajal et al., 2019).

Hypotensive activity

Several compounds found in the plant, including pinocembrin, apigenin, pseudobaptigenin, galangin-5-methyl ether, quercetin, baicalein, kaempferol, pinobanksin-glycosides, rutin, isorhamnetin, daidzein, luteolin, and pectolinarigenin, have been identified for their hypotensive properties. These compounds contribute to the regulation of blood pressure by various mechanisms, such as vasodilation and relaxation of blood vessels. The seed extract of the plant has been shown to possess antiarrhythmic activity, reducing pulse rate and normalizing ECG patterns. Additionally, it helps in maintaining cardiac biomarker levels, including LDH, CK-MB, AST, and ALT, within a normal range. The flavonoids- and isocoumarin glycosides-containing fractions, as well as the polyphenolic-rich extract derived from the plant, demonstrate ACE inhibition, which plays a fundamental role in regulating blood pressure. The seed extract has been found to improve cardiac hemodynamic parameters, including systolic blood pressure, diastolic blood pressure, heart rate, and mean arterial pressure. It also exhibits cardioprotective efficacy by addressing endothelin dysfunction and playing a preventive role against oxidative stress in heart failure (Jabeen et al., 2009).

Sedative-hypnotic activity

The extracts and EO derived from the seeds of the plant exhibit sedative-hypnotic activity by increasing sleeping time. This suggests their potential in promoting relaxation and sleep. Linalool acts on the central nervous system and contributes to its calming effects. In addition, the plant contains quercetin and isoquercetin glycosides, which have been shown to have a sedative effect on the central nervous system (in mice) (Pathan et al., 2011).

3. Conclusion

While the scientific exploration of coriander's pharmacological effects and health benefits is promising, further research is needed to fully understand the underlying mechanisms and optimize its therapeutic applications. The development of novel pharmaceuticals and functional foods derived from coriander holds great potential in providing natural remedies for various health conditions. In summary, coriander's emerging pharmacological effects and evidence of health benefits make it a fascinating herb for study. Its antioxidant, antimicrobial, anti-inflammatory, and lipid-lowering properties highlight its potential in promoting human health and combat diseases. Continued research efforts in the form of clinical trials in finding herbal remedies from this plant or plant derived major components may unlock further therapeutic applications of coriander, leading to the development of innovative treatments and preventive strategies in healthcare.

References

[1] Aissaoui, A., Zizi, S., Israili, Z. H., & Lyoussi, B. (2011). Hypoglycemic and hypolipidemic effects of Coriandrum sativum L. in Meriones shawi rats. Journal of Ethnopharmacology, 137(1), 652–661. https://doi.org/10.1016/j.jep.2011.06.019

[2] Aligita, W., Susilawati, E., Septiani, H., & Atsil, R. (2018). Antidiabetic activity of coriander (Coriandrum sativum L.) leaves' ethanolic extract. International Journal of Pharmaceutical and Phytopharmacological Research, 8(2), 59–63.

[3] Begnami, A. F., Spindola, H. M., Ruiz, A. L. T. G., de Carvalho, J. E., Groppo, F. C., & Rehder, V. L. G. (2018). Antinociceptive and anti-edema properties of the ethyl acetate fraction obtained from extracts of Coriandrum sativum Linn. leaves. Biomedicine & Pharmacotherapy, 103, 1617–1622. https://doi.org/10.1016/j.biopha.2018.04.196

[4] Chithra, V., & Leelamma, S. (1999). Coriandrum sativum changes the levels of lipid peroxides and activity of antioxidant enzymes in experimental animals. Indian Journal of Biochemistry & Biophysics, 36(1), 59–61.

[5] Delavar Kasmaei, H., Ghorbanifar, Z., Zayeri, F., Minaei, B., Kamali, S. H., Rezaeizadeh, H., Amin, G., Ghobadi, A., & Mirzaei, Z. (2016). Effects of Coriandrum sativum syrup on migraine: A randomized, triple-blind, placebo-controlled trial. Iranian Red Crescent Medical Journal, 18, e20759. https://doi.org/10.5812/ircmj.20759

[6] Elmas, L., Secme, M., Mammadov, R., Fahrioglu, U., & Dodurga, Y. (2019). The determination of the potential

anticancer effects of Coriandrum sativum in PC-3 and LNCaP prostate cancer cell lines. Journal of Cellular Biochemistry, 120(3), 3506–3513. https://doi.org/10.1002/jcb.27625

[7] Hosseinzadeh, S., Ghalesefidi, M. J., Azami, M., Mohaghegh, M. A., Hejazi, S. H., & Ghomashlooyan, M. (2016). In vitro and in vivo anthelmintic activity of seed extract of Coriandrum sativum compared to niclosamide against Hymenolepis nana infection. Journal of Parasitic Diseases, 40(4), 1307–1310. https://doi.org/10.1007/s12639-015-0676-y

[8] Hussain, F., Jahan, N., Rahman, K. U., Sultana, B., & Jamil, S. (2018). Identification of hypotensive biofunctional compounds of Coriandrum sativum and evaluation of their angiotensin-converting enzyme (ACE) inhibition potential. Oxidative Medicine and Cellular Longevity, 2018, 4643736. https://doi.org/10.1155/2018/4643736

[9] Jabeen, Q., Bashir, S., Lyoussi, B., & Gilani, A. H. (2009). Coriander fruit exhibits gut modulatory, blood pressure lowering and diuretic activities. Journal of Ethnopharmacology, 122(1), 123–130. https://doi.org/10.1016/j.jep.2008.12.016

[10] Kajal, A., & Singh, R. (2019). Coriandrum sativum seeds extract mitigate progression of diabetic nephropathy in experimental rats via AGEs inhibition. PLOS ONE, 14(3), e0213147. https://doi.org/10.1371/journal.pone.0213147

[11] Özbek, H., Kırmızı, N. İ., Cengiz, N., & Erdoğan, E. (2016). Hepatoprotective effects of Coriandrum sativum essential oil against acute hepatotoxicity induced by carbon tetrachloride on rats. Acta Pharmaceutica Sciencia, 54, 35.

[12] Park, G., Kim, H. G., Kim, Y. O., Park, S. H., Kim, S. Y., & Oh, M. S. (2012). Coriandrum sativum L. protects human keratinocytes from oxidative stress by regulating oxidative defense systems. Skin Pharmacology and Physiology, 25(2), 93–99. https://doi.org/10.1159/000335257

[13] Pathan, A., Kothawade, K., & Logade, M. N. (2011). Anxiolytic and analgesic effect of seeds of Coriandrum sativum Linn. International Journal of Research in Pharmacy and Chemistry, 1, 1087–1099.

[14] Reyes, M. R., Reyes-Esparza, J., Angeles, O. T., & Rodríguez-Fragoso, L. (2010). Mutagenicity and safety evaluation of water extract of Coriandrum sativum leaves. Journal of Food Science, 75(1), T6–T12.

[15] Silva, F., Ferreira, S., Queiroz, J. A., & Domingues, F. C. (2011). Coriander (Coriandrum sativum L.) essential oil: Its antibacterial activity and mode of action evaluated by flow cytometry. Journal of Medical Microbiology, 60(10), 1479–1486. https://doi.org/10.1099/jmm.0.034157-0

[16] Sreelatha, S., & Inbavalli, R. (2012). Antioxidant, antihyperglycemic, and antihyperlipidemic effects of Coriandrum sativum leaf and stem in alloxan-induced diabetic rats. Journal of Food Science, 77(7), T119–T123. https://doi.org/10.1111/j.1750-3841.2012.02755.x

[17] Sriti, J., Wannes, W. A., Talou, T., Mhamdi, B., Handaoui, G., & Marzouk, B. (2010). Lipid, fatty acid and tocol distribution of coriander fruits' different parts. Industrial Crops and Products, 31, 294–300.

[18] Wang, X., Zhu, C., Peng, T., Zhang, W., Zhang, J., Liu, H., Wu, C., Pan, X., & Wu, C. (2018). Enhanced stability of an emulsion enriched in unsaturated fatty acids by dual natural antioxidants fortified in both the aqueous and oil phases. Food Hydrocolloids, 82, 322–328.