AN INSIGHT INTO THE TRADITIONAL USES, PHYTOCHEMISTRY, AND PHARMACOLOGICAL PROPERTIES OF *PETROSELINUM CRISPUM* (MILL.) FUSS (PARSLEY)

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Abstract: *Petroselinum crispum (parsley), a widely cultivated herb, is recognized worldwide for both its culinary value and medicinal potential. Traditionally, parsley has been used in many cultures as a spice and as a herbal remedy for conditions such as hypertension, diabetes, inflammatory disorders, digestive problems, and urinary tract diseases. The plant contains a wide range of bioactive constituents, particularly flavonoids, phenolic acids, coumarins, terpenoids, and fatty acids, which contribute to its diverse biological activities. Experimental studies have demonstrated that parsley exhibits multiple pharmacological properties, including antioxidant, antimicrobial, anti-inflammatory, diuretic, antidiabetic, hepatoprotective, cardioprotective, and neuroprotective effects. Additional activities such as anti-fatigue, estrogenic, immunomodulatory, and anticancer effects have also been reported. These biological activities are largely attributed to its rich phytochemical composition, especially flavonoids and phenolic compounds. However, despite its promising therapeutic potential, most available evidence is derived from preclinical studies, and clinical data in humans remain limited. Furthermore, certain compounds such as apiole and myristicin may pose safety concerns when parsley is consumed in excessive amounts or as concentrated extracts. This review provides a comprehensive overview of the ethnobotanical uses, phytochemical constituents, pharmacological activities, and safety considerations of P. crispum, highlighting its potential as a functional food and medicinal plant. The findings suggest that parsley represents a promising natural source of bioactive compounds for the management of various health conditions, although further well-designed clinical studies are required to confirm its efficacy, clarify mechanisms of action, and ensure its safe therapeutic application.*

Keywords: *Parsley; Petroselinum crispum; Chemical constituent; Pharmacological effect.*

1. Introduction

Plants have long been used as both food and medicine in many cultures, providing valuable natural resources for health promotion and disease prevention (Witkamp, 2022). Among these plants, Petroselinum crispum (Mill.) Fuss (parsley) is widely cultivated and commonly used as a culinary herb around the world. In addition to its characteristic flavor, parsley has long been utilized in traditional medicine for the management of various health conditions.

Botanically, parsley occurs in several forms, including plain-leafed (ssp. neapolitanum), curly-leafed (ssp. crispum), and turnip-rooted (ssp. tuberosum) varieties, which may differ in their morphological characteristics and chemical composition (Liberal et al., 2020).

With increasing scientific interest in plant-derived bioactive compounds, parsley has attracted growing attention as a potential functional food and medicinal plant. Therefore, this review provides a comprehensive overview of the ethnobotanical uses, phytochemical constituents, pharmacological activities, and safety considerations of P. crispum.

2. Research overview

A growing number of studies have investigated the phytochemical composition and biological activities of Petroselinum crispum. Previous research has identified numerous bioactive constituents in parsley, including flavonoids, phenolic acids, coumarins, terpenoids, carotenoids, and essential oil components (Mahmood et al., 2014; Liberal et al., 2020). These compounds are considered important contributors to the biological activities associated with the plant.

Experimental and pharmacological studies have reported a variety of biological properties of parsley extracts and their constituents. In particular, antioxidant, antimicrobial, and anti-inflammatory activities have been widely documented, largely attributed to the presence of flavonoids and phenolic compounds (Tang et al., 2015; Slighoua et al., 2021; Liberal et al., 2020). Antimicrobial effects have also been observed against several pathogenic microorganisms, including Staphylococcus aureus and Candida albicans (Liberal et al., 2020).

Beyond these activities, research has suggested that parsley may exert protective effects on multiple physiological systems, including cardiovascular and nervous systems, mainly through mechanisms related to oxidative stress reduction and inflammatory regulation (Marín et al., 2016; El Rabey et al., 2017). Moreover, variations in extraction methods and preparation techniques may influence the concentration and bioavailability of active compounds, thereby affecting the biological activity of parsley extracts (Pápay et al., 2012). These findings highlight the increasing scientific interest in parsley as a plant with both nutritional and medicinal relevance.

3. Research methods

In addition to the primary database search conducted through SciFinder, Google Scholar, and PubMed, a structured search strategy was applied to ensure transparency and reproducibility. Literature published between 1976 and 2023 was screened using predefined keyword combinations involving P. crispum, parsley, and related botanical or pharmacological terms, using Boolean operators to refine query logic. All retrieved records were checked for duplication prior to analysis. Studies were then categorized according to thematic relevance, including phytochemical composition, biological activities, and pharmacological evidence. Only peer-reviewed articles written in English and directly addressing aspects of P. crispum were included, while non-scholarly reports or studies lacking methodological clarity were excluded. This systematic approach aimed to minimize selection bias and provide a coherent synthesis of the available evidence.

4. Research results

4.1. Ethnobotany

Parsley originated in the Mediterranean region, where it grows wild and has been cultivated for hundreds of years (Mahmood et al., 2014). P. crispum has since spread worldwide and is now widely cultivated. The plant is a glabrous biennial herb reaching 60–100 cm in height, producing multiple stems from a single root system. The root ranges from slender to thick and fusiform. Leaves are tripinnate and ovate, while inflorescences form yellow umbels on elongated peduncles; the fruit is ovoid and grayish-green (Farzaei et al., 2013).

In Persian traditional medicine, parsley is known as “Hazaa” and “Jafary” and is considered to have “hot and dry” properties (Bahramsoltani et al., 2024). In the Mediterranean region, it is commonly used to treat hypertension and is also part of the daily diet (Ajebli & Eddouks, 2019). In Morocco, it has been used to treat conditions such as hypertension and diabetes (Mahmood et al., 2014). Parsley leaves are applied topically for hemorrhoids, inflammation, wound scars, and insect bites. In some traditional medical practices, parsley is used as a diuretic for urinary tract disorders and as a stomach tonic to support liver and intestinal health (Bahramsoltani et al., 2024). In addition to medicinal uses, parsley is widely used as a culinary herb and flavoring ingredient (Sarwar et al., 2016), and its seed-derived essential oil is used in perfumes, soaps, and creams (Agyare et al., 2017). This demonstrates how cultures around the world exploit the beneficial properties of parsley for health purposes (Table 1).

4.2. Phytochemistry

4.2.1. Flavonoids

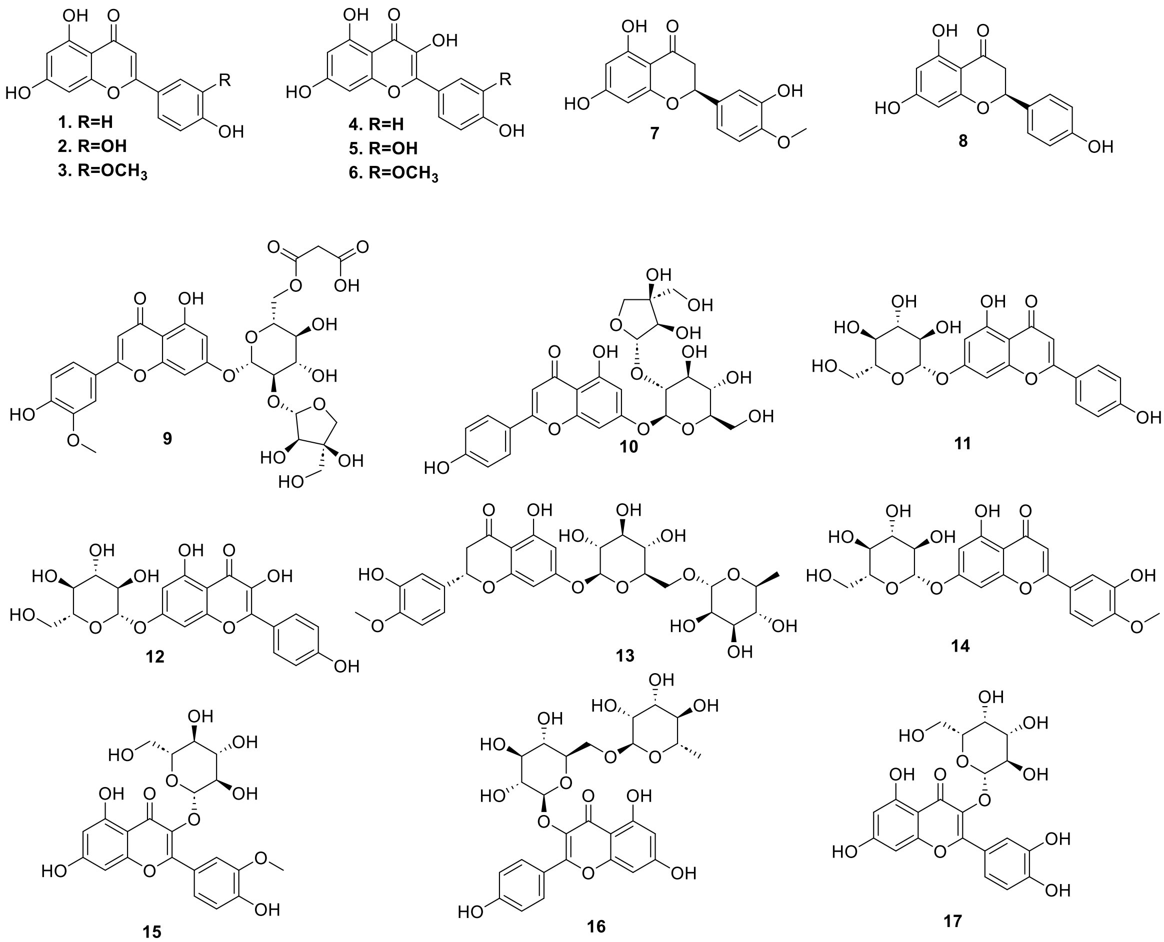
Parsley is a rich source of flavonoids with diverse chemical structures (Bahramsoltani et al., 2024). These compounds commonly possess a flavone backbone linked to sugar moieties, mainly glucose and apiose, through oxygen bonds at positions C-3, C-5, or C-7. Apigenin (1) is a major flavone skeleton found in parsley, frequently occurring in glycosylated forms. Apiin (10), a glycoside of apigenin from parsley, possesses a sugar chain consisting of apiose and glucose at the position C-7. Similarly, cosmosiin (11) is a glycoside of apigenin from parsley that also connects to a glucose moiety at the position C-7. Some flavonoids may contain sugar parts that link to malonyl groups, as seen in chrysoeriol-7-O-6"malonylapiosylglucoside (9). Variations in the positions of sugar moieties, as well as the presence of other substituent groups, contribute to the structural diversity of flavonoids from P. crispum. Different studies have also reported many forms of glycoside derivatives, with some reporting 7-O-glycoside analogs (9-14) while others found 3-O-glycosides (15-17) (Epifanio et al., 2020; Liberal et al., 2020). Other flavonoid skeletons can also be found in P. crispum including: luteolin (2), chrysoeriol (3), kaempferol (4), quercetin (5), isoharmentin (6), hesperetin (7), and naringenin (8) (Epifanio et al., 2020). The flavonoid content in P. crispum varies widely, depending mainly on the variety and extraction method, followed by environmental factors such as temperature and light (Bahramsoltani et al., 2024; Epifanio et al., 2020).

Table 1. Comparative summary of ethnomedicinal uses of P. crispum across cultural regions

Region / Cultural Tradition	Traditional Medicinal Uses	Plant Parts Used	Common Preparation Methods	Modern Pharmacological Evidence (Linking Ethnobotany & Science)
Mediterranean (Southern Europe)	Digestive aid; diuretic; breath freshener; treatment of menstrual discomfort	Leaves, seeds, roots	Infusion, decoction, fresh poultice	Diuretic activity supported by studies on apiol & flavonoids; antispasmodic effects correlate with menstrual use
Middle East & North Africa (MENA)	Anti-inflammatory; urinary tract cleanser; relief of flatulence; management of hypertension	Leaves, seeds	Herbal tea, maceration in water, culinary medicinal use	Antioxidant & anti-inflammatory activity validated; mild ACE-inhibitory effects reported, aligning with hypertension use
Central & Eastern Europe	Kidney stone prevention; edema reduction; antimicrobial for minor infections	Leaves, roots, seeds	Decoction, tincture	Diuretic and antimicrobial properties documented; evidence consistent with urinary uses
South Asia (Traditional Unani & Folk Medicine)	Enhancing digestion, treating intestinal worms, regulating menstruation	Seeds, leaves	Decoction, seed powder	Anthelmintic and carminative effects partly supported by essential oil composition (apiol, myristicin)
Latin America	Anti-inflammatory; postpartum recovery; detoxifying remedy; treatment of bruises	Leaves, roots	Poultice, infusion	Wound-healing and anti-inflammatory effects align with flavonoid and phenolic content

Region / Cultural Tradition	Traditional Medicinal Uses	Plant Parts Used	Common Preparation Methods	Modern Pharmacological Evidence (Linking Ethnobotany & Science)
North America (Folk Herbalism)	General tonic herb; management of urinary discomfort; breath and digestion aid	Leaves	Infusion, fresh consumption	Evidence supports antimicrobial, digestive-enhancing, and diuretic activities

Figure 1. **Flavonoids from P. crispum**



4.2.2. Phenolics

Phenolic acids derived from shikimic acid (18) via the phenylpropanoid pathway represent an important group of phenolics in parsley. Several phenolic acids have been identified in both the seeds and stems of parsley, including benzoic acid (19) and its derivatives (20-24) (Abu-Serie et al., 2019), cinnamic acid (25), coumaric acid (27), caffeic acid (28) and ferulic acid (29) (Slighoua et al., 2021; Aissani et al., 2021). Additionally, quinic acid (31), a derivative of shikimic acid with a bitter and astringent taste, is found in methanolic extracts of the aerial parts of P. crispum (Aissani et al., 2021).

Coumarins are another class of phenolic compounds found in P. crispum. Specific coumarins that have been reported in parsley include psoralen (32), 8-methoxpsoralen (33), 5-methoxpsoralen (bergapten) (34), oxypeucedanin (35) and isopimpinellin (36) (Farzaei et al., 2013). Oxypeucedanin (35) has been identified as a major furanocoumarin in parsley. Other furanocoumarins, such as imperatorin (37), have also been reported (Helmy et al., 2020).

Figure 2. Phenolics and shikimic acid derivatives from P. crispum

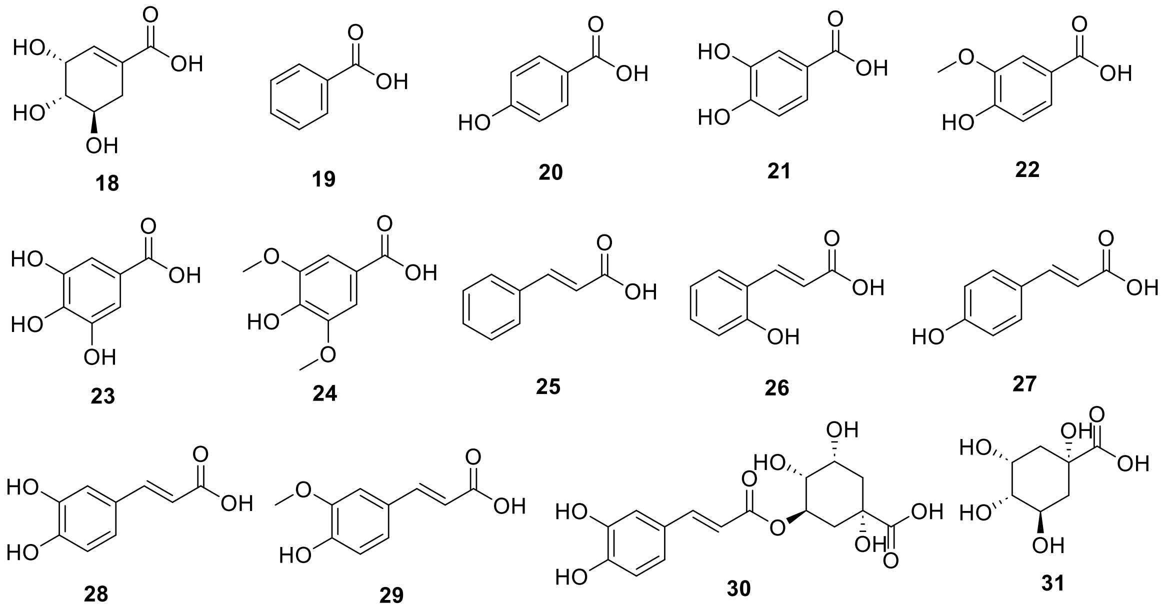
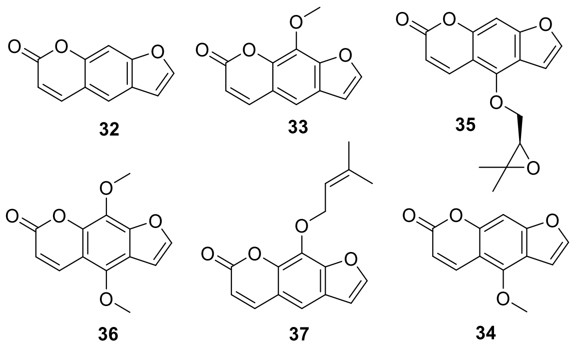


Figure 3. Coumarins from P. crispum



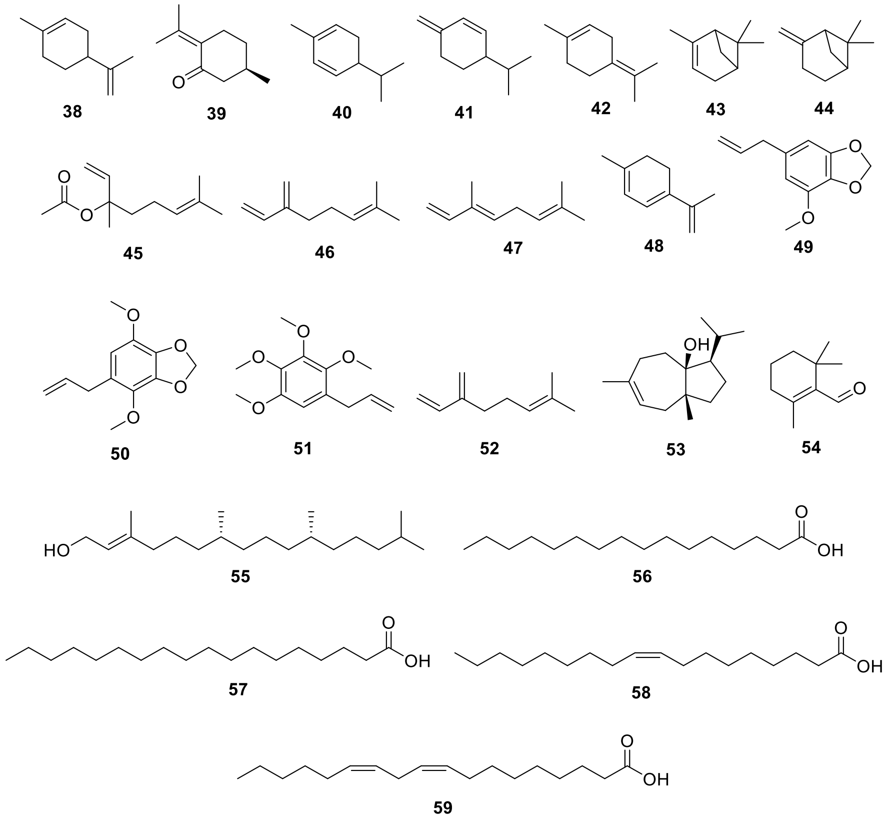
The detection of these molecules highlights the complexity of the phenolic composition of *P. crispum*, and the chemical structures and contents of these compounds may vary depending on the extraction method, the plant part analyzed and the specific variety of parsley (Liberal et al., 2020).

4.2.3. Terpenoids and Fatty acids

The terpenoid composition of *P. crispum* has been widely investigated and varies depending on plant part, geographic origin, and extraction method. Identified compounds include cyclic monoterpenes and monoterpenoids such as p-menthane-based monocyclic monoterpenes (limonene, pulegone), phellandrene isomers (α - and β - phellandrene), and terpinene derivatives, as well as bicyclic structures with a pinane backbone such as α-pinene and β-pinene, *β*-cyclocitral (Bahramsoltani et al., 2024; Snoussi et al., 2016). Acyclic monoterpenoids like linalyl acetate, myrcene and β-ocimene have also been detected (Marín et al., 2016). In Tunisian parsley, the major essential oil components were 1,3,8-p-menthatriene (24.2%), β-phellandrene (22.8%), apiol (13.2%), myristicin (12.6%), terpinolene (10.3%), and β-pinene (2.2%). Other studies reported myristicin (32.75%), apiol (17.54%), α-pinene (16.64%), β-pinene (11.54%), and 1-allyl-2,3,4,5-tetramethoxybenzene (10%) as major constituents (Snoussi et al., 2016). Additional analyses identified 1,3,8-p-menthatriene, myristicin, β-phellandrene, apiol, and myrcene as principal components in the essential oils of 104 parsley accessions. Other major compounds include α-pinene (up to 22.8%), β-pinene (up to 19.1%), apiol (up to 13.7%), myristicin (up to 41.45%), β-phellandrene (up to 32.4%), β-myrcene (up to 12.7%), limonene (up to 12.4%), terpinolene (up to 10.3%), and 1,3,8-p-menthatriene (up to 24.2%) (Bahramsoltani et al., 2024; Snoussi et al., 2016). (Terpenoids are presented in Figure 4, corresponding to compounds 38–54). Caratol has also been detected in Tunisian parsley leaves, while phytol represents the only diterpene identified in parsley essential oil (Snoussi et al., 2016).

Although fatty acid composition in parsley has been less extensively studied, several fatty acids including palmitic, stearic, oleic, and linoleic acids have been identified (55–58) (Daga et al., 2022).

Figure 4. **Terpenoids and fatty acids from P. crispum**



4.3. Pharmacological Activities

4.3.1. Antioxidant activities

P. crispum has been extensively studied for its antioxidant properties. Essential oils extracted from parsley flowers exhibited a dose-dependent antioxidant effect, suggesting that higher concentrations may provide stronger protection against oxidative stress (Marín et al., 2016). Parsley intake has also been reported to increase urinary excretion of apigenin, enhance antioxidant enzyme activity, and reduce oxidative stress biomarkers (Nielsen et al., 1999). Additional studies have confirmed the antioxidant potential of parsley, supporting its value as a functional food ingredient (Zhang et al., 2006).

Several studies have also focused on the protective effects of parsley against oxidative stress in vivo. Vora et al. (2009) reported that P. crispum leaf extract exhibited neuroprotective effects against D-galactose-induced oxidative stress in mouse brain (Vora, Patil, & Pillai, 2009). Similarly, Popović et al. (2007) observed that parsley extracts reduced oxidative stress markers in CCl_4-treated mice. Badr et al. (2021) demonstrated that parsley leaf essential oil alleviated hypothyroidism and testicular injury in CCl_4-treated rats by enhancing antioxidant enzyme activity and reducing lipid peroxidation. Tang et al. (2015) also reported that P. crispum protects against DNA damage and inhibits proliferation and migration of cancer cells. Overall, these findings highlight the diverse protective effects of parsley in oxidative stress-related conditions.

4.3.2. Antimicrobial activities

P. crispum has been investigated for its antimicrobial properties in several studies. Marín et al. (2016) reported that essential oils from parsley exhibited antimicrobial activity against Listeria innocua, supporting evidence of parsley's ability to inhibit microbial growth. Manderfield et al. (1997) identified antimicrobial furanocoumarins from parsley that exhibit antibacterial activities against both Gram-positive bacteria (Listeria and Micrococcus species) and Gram-negative bacteria (Escherichia and Erwinia species) by reacting with DNA and disrupting DNA replication. These findings suggest that specific compounds within parsley contribute to its broad-spectrum antimicrobial properties.

In contrast, some studies have reported mixed results on the antimicrobial efficacy of parsley. For example, some studies using the disc diffusion method or a microtitre plate test have shown no antibacterial activity of parsley essential oils against several bacterial species including Listeria innocua, Serratia marcescens, Pseudomonas fluorescens, Enterobacter aerogenes, Enterobacter cloacae, Escherichia coli, Pseudomonas aeruginosa, Pseudomonas fluorescens, Pseudomonas putida, Salmonella enterica, Bacillus cereus, Lactobacillus brevis, Lactobacillus plantarum, and Staphylococcus aureus (Gutierrez et al., 2008; Teixeira et al., 2013). However, other studies have shown that ethanol extracts of parsley leaves and seeds were effective against Salmonella typhi, Staphylococcus aureus, Klebsiella pneumonia, Listeria monocytogenes, Escherichia coli, and Micrococcus luteus (Liberal et al., 2020; Snoussi et al., 2016). Additionally, ethanol-water extracts of parsley leaves showed antibacterial activity against S. aureus, B. cereus, L. monocytogenes, E. coli, and S. typhimurium and parsley has also demonstrated antifungal activity against Mucor species, Aspergillus flavus, and Candida albicans (Liberal et al., 2020).

Snoussi et al. (2016) further investigated the antibiofilm activity of Petroselinum crispum essential oil against Vibrio spp. strains and found that it could both inhibit and eradicate mature biofilms formed on polystyrene surfaces. These results highlight the potential application of parsley in controlling biofilm-forming bacteria, which is important in both food safety and medical contexts.

4.3.3. Anti-inflammatory activities

Several studies have investigated the anti-inflammatory effects of parsley extracts using different experimental models. Slighoua et al. (2021) evaluated the *in vivo* estrogenic and anti-inflammatory activities of hydro-ethanolic extracts and the polyphenolic fraction of parsley using a carrageenan-induced inflammation model. The results showed that parsley polyphenols at 220 mg/kg produced the most significant anti-inflammatory effect after 4 hours, followed by the hydro-ethanolic extract at 500 mg/kg and 1000 mg/kg.

Another study by Akinci et al. (2017) demonstrated that fresh parsley added to the diet of experimental animals reduced stress-induced gastric mucosal damage by supporting the cellular antioxidant enzyme system. Parsley also enhanced tissue glutathione (GSH) levels and catalase (CAT) activity, indicating its potential in mitigating gastric inflammation. In addition, parsley essential oil has been reported to suppress cellular and humoral immune responses, further suggesting its potential in the treatment of chronic inflammatory disorders (Mahmood et al., 2014).

4.3.4. Diuretic Activity

Parsley has long been used traditionally as a diuretic, and several studies have investigated its diuretic properties. Parsley exhibits diuretic effects mainly due to its constituents apiol and myristicin, which increase urine flow and volume (Kreydiyyeh & Usta, 2002).

Supporting these findings, Al-Yousofy et al. (2017) examined the antiurolithiatic effects of parsley and found that treatment with parsley significantly increased urine volume and pH in rats while decreasing urinary calcium excretion. The parsley may act as an antiurolithiatic agent partly through its diuretic activity.

4.3.5. Anti-diabetic activities

Several studies have investigated the anti-diabetic activities of parsley (*P. crispum*), particularly its effects on blood glucose levels and related metabolic parameters. Ozsoy-Sacan et al. (2006) reported that parsley extract improved liver function and significantly reduced blood glucose levels in streptozotocin-induced diabetic rats, showing effects comparable to the antidiabetic drug glibornuride. Similarly, Bolkent et al. (2004) observed that parsley reduced degenerative changes in hepatocytes and improved liver morphology in diabetic rats. Yanardağ et al. (2003) also found that parsley extract positively affected pancreatic β-cells, which are responsible for insulin production, and contributed to lowering blood glucose levels.

Further studies suggest that the anti-diabetic effects of parsley may be related to its bioactive compounds, including terpenoids, flavonoids, coumarins, and ascorbic acid. Overall, these findings support the anti-diabetic potential of parsley, indicating its ability to lower blood glucose levels, improve liver health, and protect pancreatic β-cells in diabetic animal models.

4.3.6. Hepatoprotective activities

Parsley (P. crispum) has demonstrated significant hepatoprotective activities in several studies, indicating its potential in preventing liver damage. Al-Oqail et al. (2020) reported that chloroform extract of parsley protected human liver (HepG2) cells from hydrogen peroxide-induced cytotoxicity by reducing lipid peroxidation (LPO) and reactive oxygen species (ROS) while increasing cell viability and glutathione (GSH) levels and mitochondrial membrane potential (MMP). Similarly, Popovic et al. (2007) found that parsley extracts improved oxidative stress parameters in mice treated with carbon tetrachloride (CCl_4).

In another study, Soliman et al. (2016) demonstrated that aqueous extract of parsley leaves restored elevated hepatic enzymes (AST, ALT, and LDH) to near-normal levels in rats with dexamethasone-induced hepatotoxicity. Additionally, Ede et al. (2023) showed that parsley leaf extract prevented liver fibrosis in rats with bile duct ligation-induced liver damage by reducing fibrosis-related biomarkers such as hydroxyproline, transforming growth factor (TGF)-β, 8-hydroxyguanosine, and caspase-3. Nair et al. (2015) also reported that ethanolic extract of parsley leaves significantly reduced hepatic inflammation and fibrosis in rats with high-fructose-induced hepatic steatosis. These findings indicate that parsley may protect the liver through antioxidant, anti-inflammatory, and antifibrotic mechanisms.

4.3.7. Cardioprotective activities

Several studies have investigated the cardioprotective effects of parsley, highlighting its potential in preventing and mitigating cardiovascular damage. Abdellatief et al. (2017) reported that parsley oil alleviated cisplatin-induced cardiotoxicity in rats by improving cardiac injury biomarkers, antioxidant enzyme activity, and oxidative stress markers, indicating its therapeutic potential against drug-induced cardiac damage.

In addition, studies have shown that parsley can improve cardiovascular health through regulation of blood pressure and lipid profiles. Ajebli and Eddouks (2019) demonstrated that aqueous extract of parsley reduced systolic, diastolic, and mean arterial blood pressure in both normal and hypertensive rats. Similarly, El Rabey et al. (2017) reported that methanol extract of parsley seeds improved serum lipid profiles in hypercholesterolemic rats by decreasing total cholesterol, triglycerides, LDL-C, and VLDL-C while increasing HDL-C. These findings suggest that parsley may support cardiovascular health through antioxidant, hypotensive, and lipid-lowering effects.

4.3.8. Neuroprotective activities

P. crispum has shown neuroprotective effects in several studies, particularly against oxidative stress and heavy metal toxicity. Maodaa et al. (2016) reported that parsley leaf juice significantly improved behavioral changes and reduced oxidative stress and neuronal damage in mice exposed to cadmium-induced neurotoxicity. Parsley treatment also reduced cadmium accumulation in brain tissues, suggesting a protective role against heavy metal toxicity.

In addition, Vora et al. (2009) demonstrated that ethanolic extract of P. crispum protected the mouse brain from D-galactose-induced oxidative stress and mitochondrial damage. These neuroprotective effects are likely associated with the high flavonoid content of parsley, which acts as an effective free radical scavenger.

4.3.9. Miscellaneous activities

Several additional biological activities of P. crispum have been reported in the literature. Wang et al. (2022) showed that parsley flavonoids significantly improved fatigue-related physiological parameters and muscle morphology in mice with excessive fatigue. The anti-fatigue effect was associated with the regulation of oxidative stress through the Keap1/Nrf2 and AMPK/PGC-1α pathways.

Parsley has also demonstrated estrogenic activity. Methanolic extracts of the aerial parts exhibited estrogen-like effects comparable to isoflavone glycosides from soybeans, mainly attributed to flavone glycosides and related aglycones such as apigenin, diosmetin, and kaempferol (Farzaei et al., 2013). Additionally, hydro-ethanolic extracts of parsley aerial parts showed estrogenic effects in female rats (Slighoua et al., 2021; Bahramsoltani et al., 2024).

Parsley has also been reported to exhibit immunomodulatory activity. Evidence suggests that compounds present in parsley essential oil may influence immune cell responses, indicating its potential role in regulating immune function and alleviating conditions associated with immune dysfunction and chronic inflammation.

Finally, several studies have demonstrated anticancer properties of parsley extracts (Tang et al., 2015; Aissani et al., 2021). Methanolic extracts from parsley roots and aerial parts showed antiproliferative effects on cancer cells, inhibited DNA synthesis and cell migration, and induced apoptosis, indicating potential anticancer activity.

4.3.10. Toxicity and Safety

P. crispum is generally considered safe when consumed in normal dietary amounts; however, some studies have reported potential toxicity when taken at high doses or in concentrated extract forms. Most available evidence comes from preclinical studies, and clinical data on the safety of parsley in humans remain limited. Certain compounds found in parsley, including psoralen, apiole, and myristicin, have been associated with adverse effects when consumed in excessive amounts (Bahramsoltani et al., 2024). For example, apiole has been linked to hematological disorders such as hemolytic anemia and thrombocytosis purpura, while myristicin has been associated with hepatotoxicity, hypotension, and hallucinogenic effects.

Experimental studies have also evaluated the potential toxicity of parsley extracts on the liver and kidneys. Awe and Banjoko (2013) reported that a hydroethanolic extract of parsley administered at 1000 mg/kg induced hepatotoxicity and nephrotoxicity in rats after prolonged exposure, whereas lower doses did not produce toxic effects. Additionally, high doses of parsley have been reported to cause hypotension (Bahramsoltani et al., 2024). A clinical case report also indicated that daily consumption of parsley juice increased sirolimus blood concentration in a renal transplant patient, likely due to the inhibition of hepatic cytochrome P450 enzymes, suggesting possible interactions with certain medications (Kurtaran et al., 2021).

Overall, although parsley is generally well tolerated at dietary levels, further clinical studies are needed to better evaluate the safety and potential toxicity of its bioactive compounds.

5. Discussion

The findings summarized in this review indicate that Petroselinum crispum possesses a wide range of pharmacological properties closely related to its phytochemical composition. Compounds such as flavonoids, phenolic acids, coumarins, and terpenoids contribute to many of its reported biological activities. In particular, flavonoids and phenolic compounds are considered the main contributors to the antioxidant and anti-inflammatory properties of parsley.

Experimental studies have shown that parsley extracts can protect biological systems against oxidative stress and inflammation. These mechanisms are associated with hepatoprotective, cardioprotective, and neuroprotective effects observed in experimental models. Parsley extracts have been reported to improve antioxidant enzyme activity, reduce lipid peroxidation, and alleviate tissue damage under various experimental conditions. These findings support the traditional use of parsley in managing disorders associated with oxidative stress and chronic inflammation.

In addition to these effects, parsley exhibits several other biological activities, including antimicrobial, diuretic, antidiabetic, and anti-fatigue properties. Estrogenic, immunomodulatory, and anticancer activities have also been reported for parsley extracts and their bioactive constituents, highlighting its potential as both a medicinal plant and a functional food.

Despite these promising findings, most available studies are based on in vitro experiments or animal models. Differences in experimental design, plant varieties, extraction methods, and dosage conditions make comparisons between studies difficult. Moreover, clinical evidence in humans remains limited.

Safety considerations should also be noted. Although parsley is generally safe when consumed as food, certain compounds such as apiole, psoralen, and myristicin may cause adverse effects at high doses or in concentrated extracts. Therefore, careful evaluation of dosage, preparation methods, and potential herb-drug interactions is necessary.

6. Conclusion

Petroselinum crispum represents a valuable medicinal and nutritional plant with diverse pharmacological activities. Its biological effects-including antioxidant, anti-inflammatory, antimicrobial, hepatoprotective, cardioprotective, neuroprotective, and antidiabetic activities-are largely attributed to its rich phytochemical composition.

However, current evidence is mainly derived from preclinical studies, and well-designed clinical trials in humans remain limited. Future research should therefore focus on clinical studies to confirm the efficacy and safety of parsley and its extracts.

Further investigations are also needed to identify key bioactive compounds and clarify their mechanisms of action. In addition, studies on optimized extraction methods, standardized dosing, and potential herb-drug interactions will be essential to maximize the therapeutic potential of parsley while ensuring safe use.

Overall, parsley represents a promising natural source of bioactive compounds with potential applications in functional foods and phytotherapeutic products. Continued research will be important to translate existing experimental findings into practical medical and nutritional applications.

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TỔNG QUAN VỀ CÔNG DỤNG TRONG Y HỌC CỔ TRUYỀN, THÀNH PHẦN HÓA HỌC VÀ TÁC DỤNG DƯỢC LÝ CỦA *PETROSELINUM CRISPUM* (MILL.) FUSS (MÙI TÂY)

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Tóm tắt: *Mùi tây (Petroselinum crispum), một loài thảo mộc được trồng phổ biến trên thế giới và được biết đến rộng rãi nhờ giá trị ẩm thực cũng như tiềm năng dược liệu. Trong y học cổ truyền của nhiều quốc gia, mùi tây được sử dụng như một gia vị đồng thời là vị thuốc hỗ trợ điều trị nhiều bệnh lý như tăng huyết áp, đái tháo đường, rối loạn tiêu hóa, các bệnh viêm và các vấn đề đường tiết niệu. Các nghiên cứu hóa học cho thấy mùi tây chứa nhiều hợp chất có hoạt tính sinh học như flavonoid, acid phenolic, coumarin, terpenoid và các acid béo. Những hợp chất này góp phần tạo nên phổ tác dụng dược lý đa dạng của dược liệu. Các nghiên cứu thực nghiệm đã chứng minh mùi tây có nhiều hoạt tính sinh học quan trọng như chống oxy hóa, kháng khuẩn, chống viêm, lợi niệu, chống đái tháo đường, bảo vệ gan, bảo vệ tim mạch và bảo vệ thần kinh. Ngoài ra, một số nghiên cứu còn ghi nhận các tác dụng khác như chống mệt mỏi, hoạt tính estrogen, điều hòa miễn dịch và tiềm năng chống ung thư. Tuy nhiên, phần lớn các bằng chứng hiện nay chủ yếu dựa trên các nghiên cứu tiền lâm sàng, trong khi dữ liệu lâm sàng trên người còn hạn chế. Bên cạnh đó, một số hợp chất như apiole và myristicin có thể gây tác dụng bất lợi khi sử dụng ở liều cao hoặc dưới dạng chiết xuất cô đặc. Bài tổng quan này trình bày một cách hệ thống về công dụng trong y học cổ truyền, thành phần hóa học, tác dụng dược lý và các vấn đề an toàn của P. crispum, qua đó cho thấy tiềm năng của mùi tây như một nguồn dược liệu và thực phẩm chức năng. Tuy nhiên, cần có thêm các nghiên cứu lâm sàng để xác nhận hiệu quả điều trị, làm rõ cơ chế tác dụng và đánh giá đầy đủ tính an toàn khi sử dụng.*

Từ khóa: *Mùi tây; Petroselinum crispum; Thành phần hóa học; Tác dụng dược lý.*