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(REVIEW ARTICLE)

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An overview of *Portulaca oleracea*

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Abstract

The plant Portulaca oleracea L., commonly referred to as purslane, can be found worldwide and thrives in a variety of soil types and climate conditions(1). It has been used traditionally around the world as a nutritious and medicinal food. Numerous studies indicate that the plant possesses a rich array of essential phytochemicals, including flavonoids, alkaloids, terpenoids, proteins, carbohydrates, as well as vitamins A, C, E, and B, carotenoids, and minerals like phosphorus, calcium, magnesium, and zinc(1,2). Its significance is heightened by the exceptionally high levels of omega-3 fatty acids, particularly α-linolenic acid, gamma-linolenic acid, and linoleic acid, which are typically not produced by terrestrial plants. Because of their anti-inflammatory, antidiabetic, skeletal muscle relaxant, antitumor, hepatoprotective, anticancer, antioxidant, anti-insomnia, analgesic, gastroprotective, neuroprotective, wound healing, and antiseptic effects, various purslane constituents are known for their ethnomedical and pharmacological uses(3,4). Because of its many benefits, purslane has become known as a major wonder crop and has sparked a lot of interest from experts worldwide as a potential future health food(3). An update on purslane's phytochemical and nutritional profile is provided in this paper, along with information on its use as a plant for nutrition and ethnomedicine around the world(5).

Keywords: Purslane; Chemical Constituents; Ethnomedical; Antiseptic; Alkaloids; Flavonoids

1. Introduction

One important member of the Portulacaceae Juss family is purslane, or Portulaca oleracea L. Its origins are in Africa and South America, but it grows primarily in tropical and subtropical climates worldwide. The term "Portulaca" is derived from two Latin words: "lac" means "milk," and "porto" means "to carry." It describes the plant's milky juice(6,7). Because of its nutritional, medicinal, phytoremediation, and aesthetic properties, purslane has been shown in numerous studies to be significant(8). Purslane has been used as a folk remedy and traditional food in many parts of the world since ancient times. Indigenous cultures consider it an important cure for a number of ailments, such as diabetes, urinary tract infections, kidney and cardiovascular disorders, diarrhoea, migraines, ulcers, and snake and bug stings, according to numerous ethnobotanical research studies(9). Nearly every continent has documented its use as an ethnomedicinal plant, underscoring its significant contribution to indigenous societies' health care(10). The identification of several hundred metabolites in various purslane components is the consequence of recent advancements in quantitative analysis techniques for phytochemicals. Following ethnobotanical guidance, scientists have conducted in vitro and in vivo studies to investigate purslane's effectiveness as a medicinal plant, yielding significant results about its pharmacological characteristics(11,12). Modern scientific research has validated purslane's therapeutic uses against illnesses, which lends credence to its ethnomedical qualities(13). Phytochemical studies show that purslane is one of the richest terrestrial sources of ω-3 and ω-6 fatty acids, ascorbic acid, tocopherols, glutathione, and β-carotene, suggesting that it may be used as a nutraceutical. For every 100 g of fresh weight, its leaves contain approximately 300–400 mg of alpha-linolenic acid, 12.2 mg of α-tocopherol, 26.6 mg of ascorbic acid, 1.9 mg of β-carotene, and 14.8 mg of glutathione. Purslane is also rich in specialized metabolites, including phenolic acids, alkaloids, catecholamines, lignans,

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terpenoids, anthocyanins, flavonoids, and betalains. It has been demonstrated that several of these metabolites have positive effects on human health.

2. Origin

In Massachusetts, it was discovered for the first time in the United States in 1672. Given that the plant has a milky liquid, the name Portulaca is believed to be derived from the Latin words "porto," which means "to carry," and "lac," which means "milk." The Latin word "oleracea," which means "pertaining to kitchen gardens," alludes to the plant's use as a vegetable. This plant has been used as a vegetable, spice, and medicinal since the ancient Egyptians, and it was widely used in medieval England(1,3,5).

Figure 1 Purslane plant

Classification:

- Kingdom - Plantae
- Subkingdom - Tracheobionta
- Superdivision - Spermatophyta
- Division - Magnoliophyta
- Class - Magnoliopsida
- Subclass - Caryophyllidae
- Order - Caryophyllales
- Family - Portulacaceae
- Genus - Portulacae L.
- Species - Portulacae oleracea L(1).

2.1. Characteristics

2.1.1. Macroscopy

It has a spherical, smooth, procumbent, succulent stem that reaches about 6 inches in height, and small, rectangular, wedge-shaped, dark-green leaves that are thick and stalked, grouped together, and devoid of the bristles in their axils(14).
Above the last leaves on the branches are the small, yellow blooms, which can be solitary or clustered and have no stalk. They only open for a short time at noon and bloom in June and July(1,15). The deep red stems of this plant, which grows somewhat like samphire, are very striking and highly decorative in herb borders.

Like the spokes of a wheel, the reddish stems radiate out from a central rooting point. The stems range in length, usually reaching up to 12 inches(1). When crushed, the succulent, widely branched stem felt extremely slick because of the mucilage(16). The internodes are 1.5–3.5 cm long and have a diameter of roughly 2 mm. Compared to Portulaca quadrifida, which is small and frightening, nodel appendages are less in number(17).

The leaves range in length from 0.5 to 2 inches and are round, smooth, succulent, glossy, and stalkless (sessile). Although they are typically arranged opposite, the leaves can also occur alternately along the stem, especially close to the base. They are very short, petiolated, have stipular appendages that are either minute or absent, taste sour without any smell, and have a greenish upper surface and a reddish lower(4,10,18). The tiny (2.67 inch), yellow, five-petaled flowers open solely in sunlight and are borne singly in the leaf axils. The tiny pod in which seeds are born has a top that detaches like a cookie jar lid. It has been observed that a single plant's seeds can yield both green and golden-leafed plants(19).

The oval, reddish-brown to black seeds have a diameter of 0.02-0.03 inches. The common purslane spreads widely. 240,000 seeds may be produced by a single plant, and they may still sprout five to forty years later. When flat mats of adult purslane are flipped over in late summer, thousands of seeds are visible on the soil's surface(20,21).

2.1.2. Microscopy

The microscopic structure of Portulaca oleracea's lamina in the transverse section is similar to that of Portulaca quadrifida in many ways. As in P. quadrifida, the vascular bundles are encased in a sheath of green palisade cells, and the entire mesophyll is composed almost entirely of aqueous tissue(22). of both species, the eragstic material takes the form of prismatic and rossets (drugs) of calcium oxalate crystals of varying sizes. Unlike P. quaudrifida, which has epistomatic leaves, plants have amphistomatic leaves. The adaxial surface has more stomata. The petiole's transverse section shows that the top surface is slightly depressed and the lower surface is relatively greatly bulged. Tangentially elongated tubular parenchymatous cells make up the uniseriate epidermis(23,24). Lower epidermal cells have a bent anticlinal wall and some dark pigmentation. Ground tissue is made up of four to six layers of spherical, thin|-walled parenchymatous cells with distinct intercellular gaps(1,9). The 2-4 vascular bundles are closed, collateral, positioned roughly in the center, and organized in an arch that opens toward the adaxial side. Simple holes are visible in vesicles with helical and scaliferous thickenings, and fibers frequently proliferate intrusively(25).

3. Health benefits of purslane

It's essential to remember that purslane has been proved to provide health benefits.

3.1. Anti-oxidant

The human body contains unstable chemicals called free radicals that harm cells. Special substances called antioxidants are present in plants and plant-based diets and help fight them. Purslane is rich in antioxidants, including:

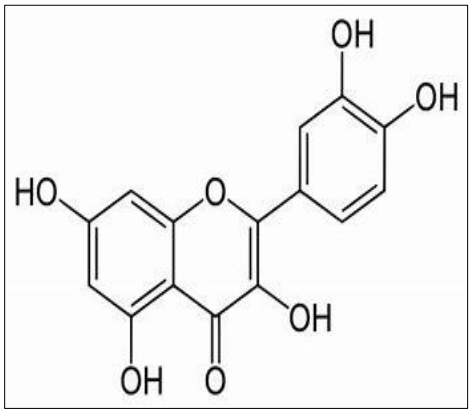
- Vitamin A: It strengthens your immune system and protects your eyes. Because it promotes healthy cell division, it is also essential for the well-being of your organs.
- Beta-carotene: The human body converts beta-carotene to vitamin A. It can lower your risk of cancer by lowering the quantity of free radicals in the body.
- Vitamin C: It aids in the healing of wounds and maintains the health of the blood vessels and collagen.
- Glutathione: It possesses anti-cancer qualities. Glutathione levels in purslane leaves are higher than those in spinach.
- Melatonin: In addition to helping people sleep better, it also lowers inflammation, supports immune system function, and lowers blood pressure.
- Betalain: The natural compound that gives purslane stems their scarlet hue seems to have antiviral, antibacterial, and antifungal properties, though further research is necessary(26,27).

3.2. Lower risk of Cancer

Purslane stands out as a prospective contender in anticancer research due to its distinctive qualities. A unique kind of mucilage, a gel-like material with possible medicinal uses, is found in its succulent leaves and stems(28). According to research, purslane mucilage may be involved in altering the tumor microenvironment, preventing angiogenesis—the growth of new blood vessels to supply tumors—and interfering with the exchange of information between cancer cells and the tissues around them(29,30).

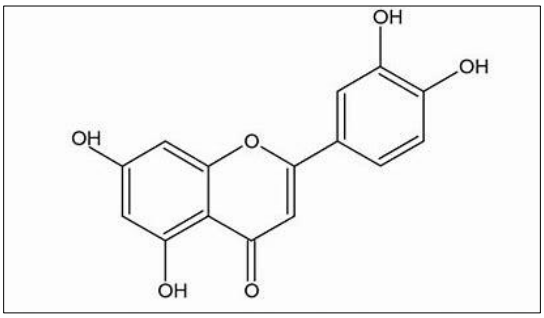
Purslane also has exceptional environmental adaptation, flourishing in nutrient-poor, arid soils and being resilient to environmental shocks. Purslane's innate resilience may result in increased effectiveness against cancer cells since it represents its ability to adjust and react to changes in the internal environment of the body(31). Purslane's special blend of phytochemicals and bioactive components may also work in concert to strengthen its anticancer properties, increasing its potential as a natural dietary supplement for cancer treatment and prevention(17).

The main active ingredient, including quercetin, kaempferol and luteolin are all flavonoids mainly used for anti-cervical cancer(12).



Quercetin

Kaempferol

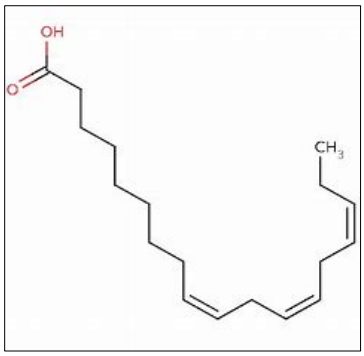


Luteolin

3.3. Heart Health

Fish, not often vegetables, contain omega-3 fatty acids. A notable exception is purslane. Actually, of all the land-based plants, it has the highest quantities of omega-3 fatty acids known to science. These vital fats can help keep your arteries healthy and guard against heart attacks, strokes, and other heart disease conditions. Additionally, omega-3 fatty acids may lower your risk of dementia and various cancers, such as breast cancer(32).

The main active constituent of purslane that is good for heart health is omega-3-fatty acids, especially alpha-linolenic acid.



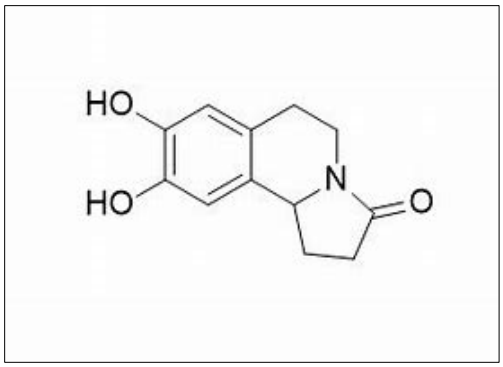
Alpha linolenic acid

3.4. Diabetes Management

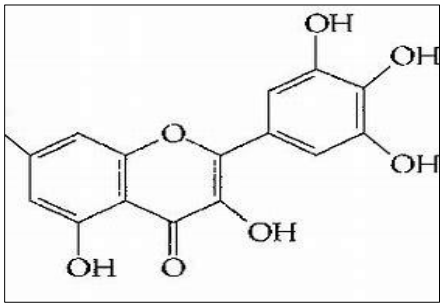
Purslane's special qualities make it a fascinating option for managing diabetes. Because purslane contains a high amount of soluble fiber, it can help reduce blood sugar increases after meals by slowing down the absorption of sugar. Purslane's anti-inflammatory properties may also be attributed to the presence of natural antioxidants including flavonoids and vitamin C, which can help reduce insulin resistance and enhance glycemic management in diabetics(7,33).

Moreover, purslane's capacity to alter important biochemical pathways involved in glucose metabolism suggests that it may be used as a natural supplement to diabetic treatment(2,4). Research has indicated that purslane's bioactive components, including as betacyanins and betaxanthins, may have protective effects on the beta cells of the pancreas, which are in charge of making insulin. Purslane may increase insulin secretion and the body's capacity to control blood sugar levels by maintaining beta cell viability and function. This would provide a comprehensive strategy for managing diabetes that goes beyond traditional treatments(34,35).

The main active constituents in purslane used for anti-diabetic activity are isoquinoline alkaloids, polysaccharides, and flavonoids which includes Oleracein E, Oleracein L and myricetin(1).



Oleracein E

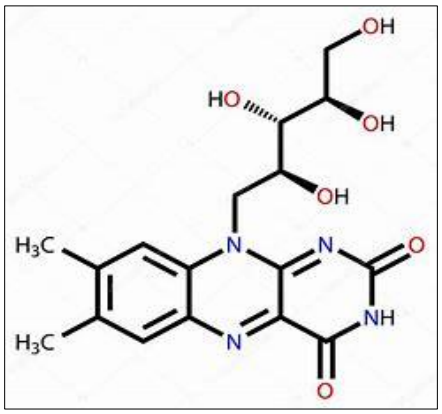


Myricetin

3.5. Bone health

Purslane has special qualities that make it very good for bone health, in addition to its high calcium, magnesium, and vitamin C concentration. Its high vitamin K content, a crucial ingredient involved in calcium control and bone metabolism, is one such quality(36). In order to improve bone mineralization and strength, vitamin K is essential for activating proteins that aid in the binding of calcium to the bone matrix. Purslane contributes to the overall density and integrity of bones by offering a substantial dosage of vitamin K, which lowers the risk of osteoporosis and fractures(37,38).

The main constituent of purslane that are important for bone health are Riboflavin, Calcium and Magnesium.

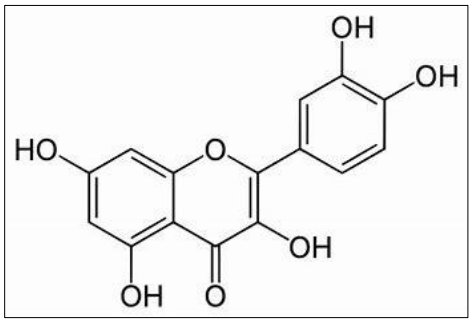


Riboflavin

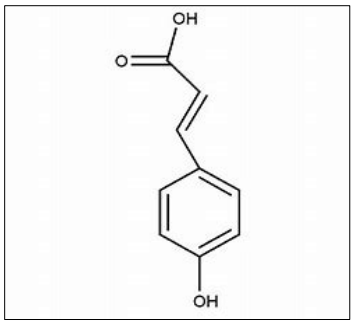
3.6. Anti-inflammatory

Purslane has high concentrations of omega-3 fatty acids, particularly alpha-linolenic acid (ALA), in addition to flavonoids and beta-carotene. Through the inhibition of pro-inflammatory chemicals like prostaglandins and cytokines, this important fatty acid plays a critical role in regulating the body's inflammatory response. Purslane's exceptional anti-inflammatory effectiveness is a result of the synergistic action of these bioactive components, which makes it a useful botanical ally in the fight against chronic inflammation and the illnesses that are linked to it(31,39,40).

The main active constituents of purslane (Portulaca oleracea) that helps in anti- inflammatory activity are flavonoids and phenolics i.e., quercetin, P-coumaric acid(1).



Quercetin structure



P- coumaric acid

3.7. Weight management

Purslane is a great supplement to a diet that aims to help people lose weight because it is high in fiber and low in calories. Alpha-linolenic acid (ALA), a unique kind of omega-3 fatty acid, is found in purslane, in contrast to many other leafy greens. According to study, this fatty acid may assist control metabolism and lessen body fat buildup, which is why it has been linked to weight management advantages. Purslane also has a relatively low carbohydrate content, especially simple sugars, which can help maintain stable blood sugar levels and avoid insulin spikes, which are linked to the promotion of fat accumulation(41,42).

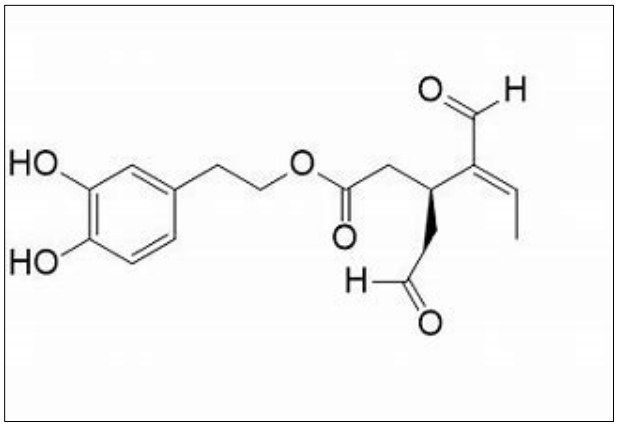
Additionally, betalains—compounds found in purslane—are responsible for the plant's vivid red and yellow pigments. Because they increase metabolism and encourage the body to break down fats, these betalains have been researched for their possible involvement in weight management. Purslane is a powerful ally in weight-loss efforts because of its high water content, which gives meals bulk without adding a lot of calories(43).

3.8. Anti-microbial

Purslane's distinct biochemical makeup, which consists of a wide range of phytochemicals and bioactive substances, highlights its antibacterial qualities. These substances, which include phenolic acids, alkaloids, and flavonoids, have strong antibacterial properties against a variety of diseases, from common bacterial strains to hardy fungus species. Purslane's broad-spectrum antibacterial efficiency is demonstrated by its capacity to target a variety of pathogens, which makes it an effective natural treatment for infections and immune system support(44–46).

Purslane's antimicrobial action is further distinguished by its complex mechanism of action, which includes interfering with vital cellular functions and structures that are necessary for the survival and growth of microorganisms. Purslane extracts have been shown in studies to target important enzymes and metabolic pathways, which can impede bacterial development. This disrupts microbial replication and damages cells. The antibacterial potency and efficacy of purslane's bioactive components against resistant microbial strains are further enhanced by their synergistic interactions(47,48).

The main active constituents used for anti-microbial activity is oleraceins.

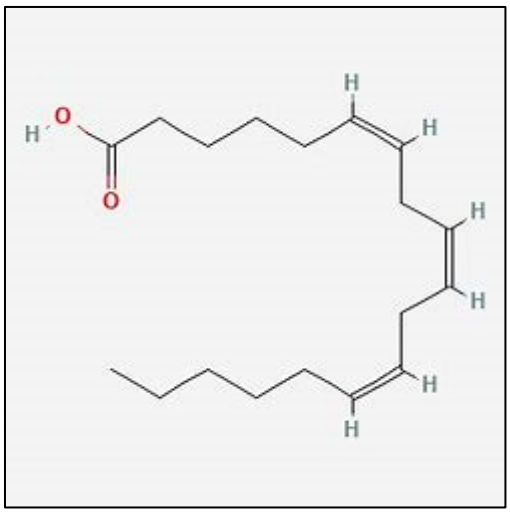


Oleracein structure

3.9. Skin health

In addition to its substantial nutrient content, purslane includes unique bioactive components that make it particularly good for skin health. One prominent chemical discovered in purslane is portulacan, a form of omega-3 fatty acid peculiar to this plant. Purslane's capacity to shield and nourish the skin is further enhanced by portulacan's strong anti-inflammatory and antioxidant qualities.

Purslane contains many active ingredients that helps with skin health including vitamins, minerals, fatty acids and anti-oxidants such gamma linolenic acid, kaempferol, ferulic acid, etc(49,50).,



Gamma linolenic acid

Ferulic acid

3.10. Cognitive function

Purslane's quantity of neuroprotective chemicals is one of its significant qualities in supporting cognitive function. In addition to its antioxidant qualities, purslane includes special phytochemicals including dopamine and betalains that have been connected to improved cognitive function and brain health. By scavenging free radicals and lowering inflammation in the brain, betalains in particular have demonstrated encouraging neuroprotective effects. Purslane's potential as a brain-boosting plant is further supported by the possibility that its high potassium content enhances neuronal signaling and synaptic transmission(30,48).

3.11. Gastro intestinal health

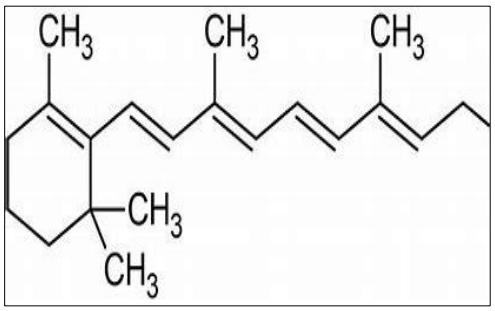
Certain substances called lignans, which are found in purslane, have been demonstrated to have antioxidant and anti-inflammatory effects in the digestive system(31). These lignans are essential for maintaining a healthy gut environment

because they lower inflammation and oxidative stress in the gastrointestinal tract. According to research, purslane's ability to effectively reduce gastrointestinal disorder symptoms including bloating, cramping, and pain may be attributed to the combination of its mucilage and lignans(22,23).

3.12. Eye health

Purslane's distinctive antioxidants, known as betalains—more especially, betacyanins and betaxanthins—give it its vivid hue and provide further resistance against oxidative stress in the eyes. Together with beta-carotene and vitamin A, these potent antioxidants neutralize free radicals and lower inflammation, improving the general health and robustness of the ocular tissues(4,5).

Purslane contains plenty of anti-oxidants such as Vitamin A which is used to protect eyes.

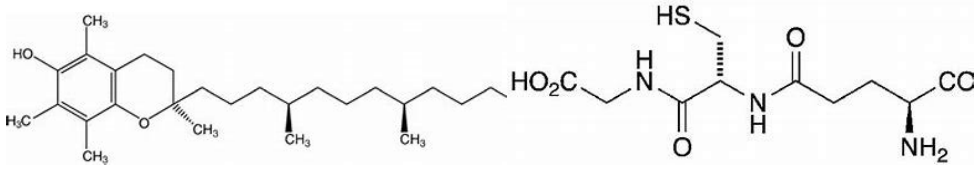


Vitamin A

3.13. Liver health

Purslane is known for having a distinct mix of bioactive substances that support its hepatoprotective properties. Certain phytochemicals included in purslane, like polysaccharides and betalains, have been found in studies to have strong anti-inflammatory and antioxidant effects. Together, these substances reduce oxidative stress and inflammation in the liver, preventing cellular damage and promoting liver health in general.

The main constituent of purslane used for liver health are Tocopherols, glutathione(49,50).



Tocopherol Glutathione

3.14. Immune system support

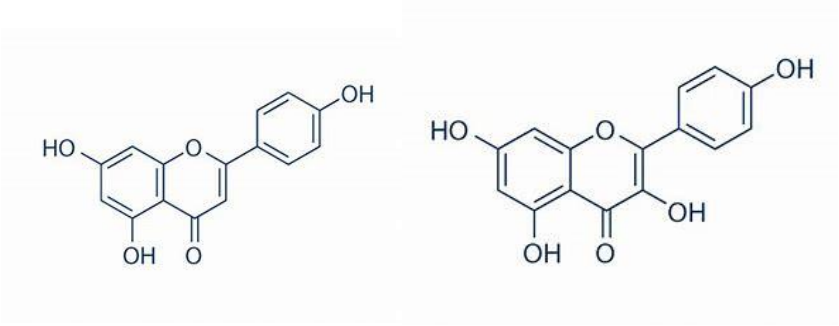
The antioxidants in purslane help lower oxidative stress in the body, which over time can weaken the immune system, and vitamin C, for instance, is known to increase the production of white blood cells, which are crucial for fending off infections. Purslane also contains a variety of nutrients and bioactive compounds that can support immune function and enhance the body's ability to defend against infections and diseases(46,49,50).

Also, purslane has a special high concentration of betalains, which are potent antioxidants with immune-stimulating qualities. By aiding in the body's defense against dangerous free radicals, betalains lower oxidative stress and boost immunity in general. Purslane is also a good source of minerals like magnesium, manganese, and zinc, all of which are important for immunological function. In particular, zinc has been demonstrated to shorten the length and lessen the severity of infections and is necessary for immune cells to operate properly(50).

Pectin, a soluble fiber with prebiotic properties, is another substance found in purslane. Pectin helps maintain a healthy balance of microflora in the digestive tract by providing food for good gut bacteria. Maintaining optimal gut health is crucial for supporting immune function since the gut contains a sizable percentage of the immune system. Purslane

indirectly strengthens the body's immunological response by promoting a healthy gut flora, offering a comprehensive strategy for immune system support(48,51,52).

The main active constituent of purslane for immune system support are apigenin and kaempferol.

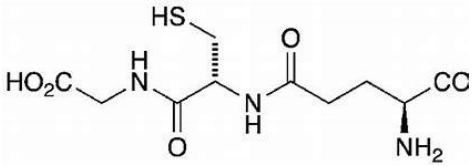


Apigenin Kaempferol

3.15. Anti-Aging effect

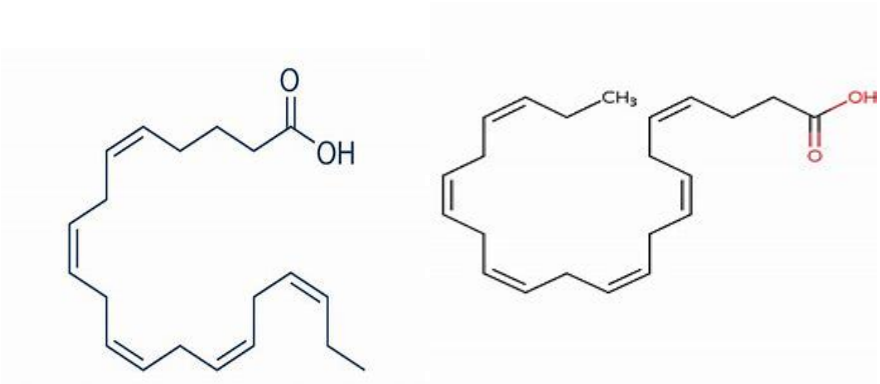
Purslane's antioxidants, which include beta-carotene, flavonoids, and vitamins A, C, and E, help shield cells from the harm that free radicals—molecules that cause aging and disease—can do. Purslane may slow down the aging process, lessen the visibility of fine lines and wrinkles, and enhance the general health and vitality of the skin by scavenging free radicals.

The main chemical constituent of purslane used as anti-aging is glutathione(10).



Glutathione

3.16. Stress reduction



Eicosapentaenoic acid Docosahexaenoic acid

Purslane may have adaptogenic qualities, according to some research, which means it may improve the body's ability to adjust to and manage stress. Flavonoids and omega-3 fatty acids, two compounds included in purslane, have been associated with lower levels of stress hormones like cortisol and higher amounts of feel-good neurotransmitters like dopamine and serotonin. Thus, incorporating purslane into the diet may help lower stress levels and enhance mental health.

Eicosapentaenoic acid and Docosahexaenoic acid are mainly used for stress reduction(5,6).

4. Determination of DPPH radical scavenging activity

DPPH solution was prepared by dissolving 39 mg of DPPH in 100 mL ethyl alcohol. 10, 20, 30, and 40 μL of the sample extracts were mixed with 0.5 mL of DPPH solution and adjusted to a final volume 3 mL by ethyl alcohol. The mixture was vortexed and left for 30 min in the dark. After that, absorbance was measured at 517 nm. IC50 (concentration of the extract needed to cause a 50% decrease in DPPH radical inhibition) values were calculated from DPPH radical inhibition percentage versus concentration curve. % DPPH radical inhibition was calculated as follows

$$\% \text{ inhibition} = [(A\text{control} - A\text{sample}) / A\text{control}] \times 100$$

Acontrol: Absorbance value of DPPH solution without the sample (control)

Asample: Absorbance value of DPPH solution with the sample

Unsaponifiable Matter Analysis(53)

4.1. Identification of unsaponifiable fraction components

The method of Kolhe et al. (1982) was used with modifications for the isolation of the unsaponifiable fraction of purslane oil. Purslane oil was added with 40:8:1 ethanol-water-potassium hydroxide solution (1 g purslane oil: 40 mL solution) and subsequently refluxed for 2 h. The unsaponifiable fraction was extracted with petroleum ether and the ether was removed using a rotary evaporator. The thin layer chromatographic (TLC) method of Gut finger et al. (1972) was adapted to detect the components of the unsaponifiable fraction. The latter was dissolved in chloroform and applied on a silica gel plate (silica gel 60 F254, Merck). The following standards were also spotted to serve as reference: 2:1 stigmasterol- sitosterol isolate, α-tocopherol and squalene. The chromatogram was developed using 50:50:1 petroleum ether-diethyl ether-acetic acid solution. The spots were visualized using UV light (366 nm), iodine vapor and Liebermann-Burchard reagent.

4.2. Quantification of α-tocopherol, squalene and Phytosterols

Specific colour reactions coupled with spectrophotometric analysis were completed to quantify α-tocopherol, squalene and phytosterols. For each analysis, two trials with three replicates each were performed. α-tocopherol was quantified using the Emmerie-Engel reaction from the method of Wong et al. (1988) and the absorbance at 520 nm of the resulting solutions were determined using a Shimadzu Mini 1240 UV-Vis Spectrophotometer. The concentration of α-tocopherol was calculated as follows:

$$\text{Total } \alpha\text{-tocopherol (ppm)} = (A - B) / (M \cdot W)$$

Where ,
A is the absorption of the sample in 1 cm cell,
B is the absorption of blank in 1 cm cell, M is the 8.0 x 10-3 absorbance/μg α-tocopherol, and
W is the weight of the sample in grams.

Squalene was quantified using the sulfuric acid-formaldehyde reaction method of Rothblat et al. (1962). The absorbance of purslane samples and standards was determined at 400 nm and squalene content of the sample was estimated from the standard curve. Total phytosterol content was determined using the Liebermann-Burchard reagent. The absorbance of the solutions and cholesterol standards at 625 nm was determined and the total phytosterol content was interpolated from the standard curve(47,48).

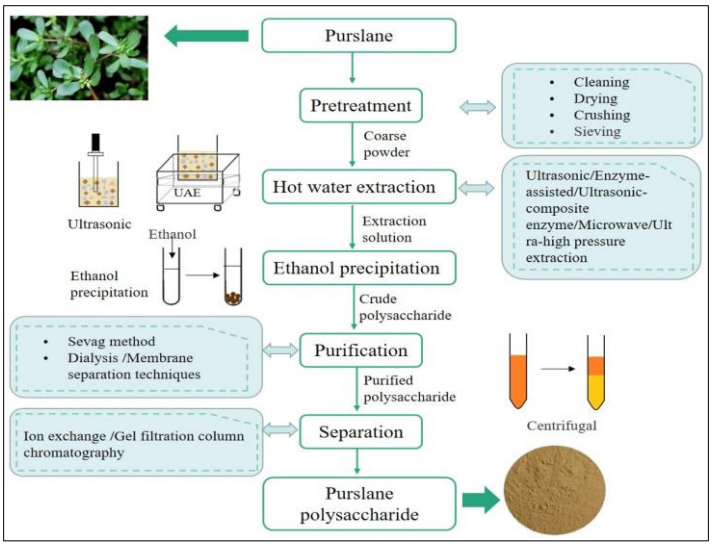


Figure 2 Extraction process

4.3. Depression

Depression is now proposed to be the second most common disorder after cardiovascular disease, causing significant socioeconomic distress. Several overlying physiological interconnections are responsible for the pathophysiology of depression . In earlier decades, the most common theories on the pathophysiology of depression focused on monoamine expression and receptor dysfunction, decreased monoamine synthesis, or failures of secondary messenger systems such as G proteins or cyclic adenosine monophosphate (cAMP). Cortisol augmentation and its detrimental effects on neurogenesis by lowering endogenous opioid function, decreasing brain- derived neurotropic factor (BDNF), changing gamma- aminobutyric acid (GABA)ergic or/and glutamatergic transmission, irregular circadian rhythm, and cytokine or steroidal changes have all received more attention in recent years . Moreover, some evidence has disclosed the contributions of the corticotropin-releasing hormone, adrenocorticotropic hormone (ACTH), and cortisol disturbances in the induction of postpartum depression. Because purslane is high in minerals including lithium, folate, calcium, potassium, and magnesium, this plant is supposed to possess antidepressant properties research in this field is limited, and more research is needed to confirm its anti-depressive properties and underlying mechanisms(52,53)

4.4. Angiogenic Activity of Purslane Oil Extract

Angiogenic activity was assessed based on the formation or suppression of blood capillaries under a filter paper disc where the sample was applied. The CAM assay takes advantage of the rapid formation of blood vessels in the CAM up to about day 11 of development (Ausprunk etal. 1974). The untreated and PBS-treated CAM did not show any abnormal growth of blood capillaries . Loss of blood capillaries under the filter paper discs applied with quercetin (anti-angiogenic compound) was evident and the degree of inhibition was dose-dependent. Conversely, heparin (pro-angiogenic compound) promoted angiogenesis, which was enhanced with increasing amount of test compound from 75 to 300µg. Purslane oil extract and its saponifiable and unsaponifiable fractions, as well as the standards (omega- 3 fatty acids, β-sitosterol, α-tocopherol and squalene) all exhibited dose-dependent anti-angiogenic activity. Angiogenesis was completely inhibited (score of -3) by omega-3 fatty acids and β-sitosterol at 300 µg, similar to that of quercetin. Purslane oil appeared to have lower anti -angiogenic activity, exhibiting scores of 0, -1.25 and - 2.30 when applied at 75, 150 and 300 µg, respectively. The unsaponifiable fraction was more inhibitory to angiogenesis than the saponifiable fraction. The angiogenic effect of the unsaponifiable fraction was comparable to that of quercetin. This result could mean that purslane oil may be used to modulate angiogenesis(22,23,52,53).

4.5. Side effects of purslane

- Contact dermatitis with the fresh plant, in individuals with hypersensitivity.
- Increased diuresis or urination, due to its alkaloid and potassium content.
- Slightly laxative effect, due to its fiber and malic acid content.
- High oxalate content, which may cause kidney stones or aggravate vulvodynia. Avoid consumption if you have stomach problems or are pregnant(1).

5. Conclusion

Portulaca oleracea L., or purslane, is a nutrient-dense plant with a rich phytochemical profile, offering numerous health benefits due to its high levels of omega-3 fatty acids, vitamins, minerals, and antioxidants. Its ethnomedical and pharmacological uses make it a valuable crop for potential future health food applications.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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