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Review Article

Therapeutic Potential and Nutraceuticals Aspects of Lepidium Sativum

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ABSTRACT

With the rising trend toward the use of natural substances in medicines, the utilization of cress seed mucilage (*Lepidium sativum* L.) has gained significant importance.Since the Vedic period, the subcontinent has employed garden cress (*Lepidium sativum*) for medical reasons. There are several ecological and industrial uses of garden cress that are summarized in this paper. The emerging evidence revealed that in the Unani school of medicine, the seeds and leaves of this plant might be used to treat inflammation, bronchitis, rheumatoid arthritis, and muscle discomfort. Asthma, cough, and peptic ulcers are also said to benefit from their usage. Anti-hemagglutinating, hypoglycemic, antihypertensive, diuretic, and fracture-healing qualities are also attributed to the plant. A special emphasis was placed in the study on the nutritional content of the leaves, which revealed that they are an excellent source of macroelements such as potassium and sodium, but also of calcium and trace minerals such as iron, magnesium and zinc. **Conclusion:** The current study also discusses the culinary items that have been created by combining garden cress seed powder with other ingredients. As an underused oilseed crop, garden cress seeds should be promoted for their production and consumption.

INTRODUCTION

Brassicaceae family member *Lepidium sativum*, also known as Garden cress. North America, Europe, and Asia have all farmed this fast-growing edible herb as a culinary vegetable. Several sections of Saudi Arabia cultivate *L. sativum*, which is known as rashad or thufa [1]. It is an annual plant that grows between 15 and 45 centimeters tall. White flowers cover the long racemes of *L. sativum*, which produces wide or obovate pods that are emarginated and winged at the tip [2]. Diabetes, arthritis, and hepatitis are among the inflammatory disorders treated with *L. sativum* in traditional medicine. Several investigations have shown that *L. sativum* extracts have antioxidant, antidiarrheal, antispasmodic, antibacterial, anti-inflammatory and hepatoprotective properties against oxidative damage [3]. Sativum seeds contain 24% oil that is mostly constituted of the omega-3 and omega-6 fatty acids, ALA and LA, respectively (12%). Because of the high concentration of antioxidants and phytosterols in this oil, it is very reactively stable [2].Wistar rats' spleens and lungs showed synergistic effects of *L. sativum* oil (LSO) suppression of platelet aggregation and thromboxane B2 levels. Lymphocyte proliferation and generation of inflammatory mediators from macrophages were reported to be reduced by LSO in another investigation in rats. Another study

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demonstrated that feeding Wistar rats a diet containing LSO for 60 days boosted tocopherol levels and the activity of antioxidant enzymes [4]. The seeds of *L. sativum* were mainly used to treat hypertension and renal illness. It is used as a laxative for gastrointestinal disorders, as a cancer preventative because it contains essential fatty acids like arachidic and linoleic acids, as a memory booster because it contains essential fatty acids like arachidic and linoleic acids, and as a mild blood sugar controller in diabetic patients because it contains the phytochemical lepidimoide, which prevents the return of glucose from the kidneys back into the bloodstream. Phosphorus, of course, is essential for the body's normal metabolic functions. The seed of *L. sativum* has also been claimed to aid speed up bone healing, minimize hair loss, and prevent premature greying of the hair [5]. When it comes to the germination of *L. sativum* seeds, selenium is a vital ingredient that must be given. However, as time went on, it became clear that this technique was not financially viable. Seed powder has been shown to aid in the growth of lean muscle mass, which was a big draw for those looking to gain muscle without adding fat. It is widely accepted that whey proteins, rather than milk, are the best approach to achieve this goal. It was chosen to use *L. sativum* seed powder as a complement to whey protein concentrates. In spite of this, such a concept was only of academic curiosity because of the lack of commercial acceptance [6].

Nutritional composition

Chemical composition: Oilseeds include cress seed, which falls under this category. Macro and micronutrients are found in abundance in the seeds (see Table 1). (see Table 2) [7,8]. Bioactive composition: Sativum seeds contain 24% oil that is mostly constituted of the α-linolenic acid (ALA) (32%) and linolenic acid (LA) (12%). Due to its high level of antioxidants and phytosterols, this oil is redox-stable [2]. The diuretic lepidine is found in the seeds. Seeds contain antihypertensive Imidazole chemicals. The anti-asthmatic, antioxidant, and anticaricnogenic properties of glucosinolates, flavonoid compounds, and semilepidinoside (a and b) may be attributed to each of these substances [9-11]. Gc seeds have been found to include phenolic compounds, alkaloids, cardiac glycosides, anthroquinones glycosides, tannins, steroids, and flavonoids; phenolic compounds in Gc seeds have been identified using mass spectral lines [12].

Nutrient	Nutrient value (per 100 g)	Nutrient value (per 100 g)
Moisture (g)	3.2	4.14 ± 0.05
Fat (g)	24.5	27.47 ± 0.14
Protein (g)	25.3	22.47 ± 0.78
Carbohydrate (g)	33	34.24 ± 0.92
Crude fiber (g)	7.6	7.01 ± 0.08
Total minerals (g)	6.4	4.65 ± 0.09
Calcium (mg)	377	296.60 ± 1.04
Iron (mg)	100	7.62 ± 0.04
Phosphorus (mg)	377	514.59 ± 10.67
Zinc (mg)	––	5.05 ± 0.07
Sodium (mg)	-	24.64 ± 0.02
Niacin (mg)	14.3	–-
Riboflavin (mg)	0.61	-
Copper (mg)	––	5.53 ± 0.09
Potassium	-	1193.95 ± 10.51
Energy (kcal)	454	474 ± 1.06

Table 1: Nutritive value of garden cress seeds [12].

Fatty acid	Mohammed Ali, (14)	Moser et al. (132)	Diwaker et al. (2)	Zia-Ul-Haq et al. (15)
Linolenic acid	26.42	29.3	34	32.18 ± 0.59
Oleic acid	26.42	30.6	22	30.50 ± 0.16
Arachidonic acid	3.57	2.3	3.4	2.10 ± 0.57
Palmitic acid	9.10	9.4	10.1	10.30 ± 0.12
Palmitoleic acid	0.16	0.3	–	0.70± 0.30
Stearic acid	4.40	2.8	2.9	1.90 ± 0.19
Eicosanoic acid	--	11.1	12	13.40 ± 0.66
Linoleic acid	8.64	7.6	11.8	8.60 ± 0.38

Table 2: Analysis of fatty acid composition of garden cress seed oil by different researchers

Amino acid	Quantity (g/100 g protein)
Essential amino acids	
Histidine	3.87 ± 0.14
Methionine	0.97 ± 0.02
Arginine	4.51 ± 0.03
Lysinelso	6.26 ± 0.39
leucine	5.11 ± 0.03
Phenyl alanine	5.65 ± 0.03
Valine	8.04 ± 0.03
Leucine	8.21 ± 0.01
Threonine	2.66 ± 0.09
Non-essential amino acids	
Aspartic acid	9.76 ± 0.03
Serine	4.96 ± 0.09
Glutamic acid	19.33 ± 0.19
Tyrosine	2.69 ± 0.09
Alanine	4.83 ± 0.02
Glycine	5.51 ± 0.07
Proline	5.84 ± 0.38

Table 3: Amino acid profile of garden cress seed [15].

Biological activities

For treatment of anemia: Garden cress seeds are rich in Folic acid and iron, which aids in the improvement of human blood haemoglobin levels. After almost two months of everyday consumption. Anemia, which is caused by an iron deficiency, may be treated with this [13]. In addition to

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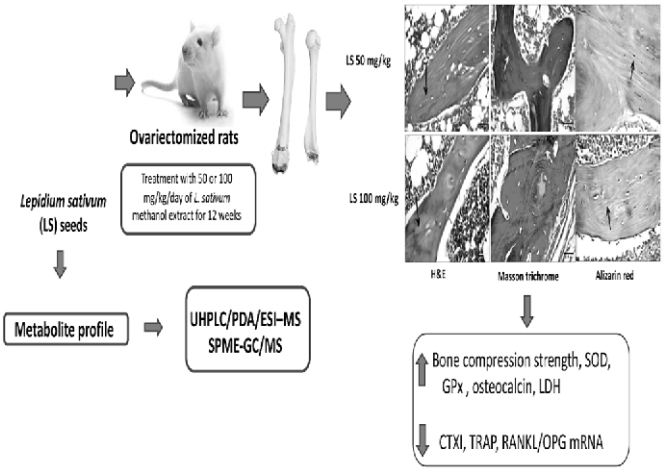
being a good source of iron, Garden cress seeds (GCS) also aid to raise blood haemoglobin levels. Every day, GCS may help those suffering with anaemia. It is possible to improve iron absorption by drinking vitamin C half an hour after eating these seeds [14]. Treatment of menstrual cycle disorders: Those who suffer from poor or irregular menstruation flow might benefit from this product. Garden cress seeds contain the hormone Estrogen, which acts as a "photochemical" to maintain the hormonal milieu necessary to initiate and sustain the menstrual cycle [15].Taking seeds of Garden Cress might help regularize an erratic menstrual cycle. When it comes to regulating the menstrual cycle, Garden Cress seeds contain phytochemicals that are highly similar to the oestrogen hormone in terms of activity and effectiveness [16]. For breast milk secretion: A significant role for *Lepidium sativum* seeds has been found in the development and enlargement of the mammary glands in female rats at three different physiological stages: virgins, pregnant women, and nursing mothers. The *Lepidium sativum* has a functional influence on the gland's tissue and hormone levels [17]. Antidiabetic activity: Vegetable gum secretes phytochemicals in Garden cress seeds. Phytochemicals have the ability to reduce blood sugar levels in diabetics because of their characteristics [18].The methanol extract of *L. sativum* possesses anti-diabetic and antioxidant properties, and it restored the normal state of all biochemical tests and pancreatic tissues [19]. Anticancer activity: *Ligusticum sativum* leaves and seeds contain high concentrations of glucosinolates, a type of thioglycosides that have been demonstrated to suppress carcinogenesis and have chemopreventive actions against the growth and proliferation of cancer cells [20]. Anti-inflammatory effect: Anti-inflammatory properties have been discovered in the leaves and seeds of the plant. As a result, flavonoids, alkaloid compounds, cyanogenic glycosides (traces), tannins, sterols, and triterpens are found in the plant. Inflammation and rheumatic discomfort might be alleviated by applying lime juice combined with bruised seeds [21].Healing properties of *Lepidium sativum* for bone fractures: To speed up the mending of broken bones, *Lepidium sativum* has long been used as a traditional remedy [22]. Anti-inflammatory activities have been claimed for *Lepidium sativum*. group. Folk medicine uses *Lepidium sativum* L. to treat bone fractures. Osteoarthritis-related discomfort, stiffness, edoema, soreness, and difficulties in mobility were reduced by the plant seeds at the conclusion of the study [23]. Anti-hypercholesterolemic effect: In hypercholesterolemic rats, Garden cress seed powder and extract showed a protective effect [24]. Alloxan-treated and hypercholesterolemic rats given 20 mg/kg of aqueous seed extract daily for four weeks showed substantial reductions in cholesterol, triglycerides, LDL, and HDL levels compared to the control groups [22]. Effect on bronchial asthma/digestive functions: The seeds of garden cress contain goitrogens, which are chemicals that interfere with the absorption of iodine by the thyroid gland [23]. Studies on normotensive and spontaneously hypertensive rats indicated that *L. sativum* aqueous extract has antihypertensive and diuretic effects.



Antibacterial activity

This research found that sativum extracts were efficient against a variety of microorganisms. *Staphylococcus aureus* (22 mm) and *Bacillus cereus* (16 mm) were found to have the largest zones of inhibition in terms of the antibacterial activity of the methanol extract [23].

CONCLUSION

Garden cress is a nutritional treasure trove, including high concentrations of macro- and micronutrients. Linolenic and arachidic acids, which are found in high concentrations in seeds and leaves, are excellent sources of high-quality protein and other important fatty acids. For therapeutic purposes, it is rich in several phytochemicals. Anticarcinogenic, antihypertensive, laxative, antidiabetic, and antioxidant activities have been found in the plant. Garden cress seeds have the highest chance of being used as both a medication and a food supplement. A number of studies have shown that garden cress seeds have a good effect on the development of youngsters and teenage females. Many sweet and salty home dishes like biscuits, ladoo, cookies, muffins and dhokla and dahiwalavada may be used to treat anaemia or malnutrition by simply adding it to the ingredients of these recipes. Because of its nutritious content and underused status, garden cress seeds should be widely promoted for their production and uses.

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REFERENCES

[1] Rahman MA, Mossa JS, Al-Said MS, Al-Yahya MA. Medicinal plant diversity in the flora of Saudi Arabia 1: a report on seven plant families. Fitoterapia. 2004 Mar; 75(2):149-61. doi: 10.1016/j.fitote.2003.12.012.

[2] Diwakar BT, Dutta PK, Lokesh BR, Naidu KA. Physicochemical properties of garden cress (Lepidium sativum L.) seed oil. Journal of the American Oil Chemists' Society. 2010 May; 87(5):539-48.

[3] Sakran M, Selim Y, Zidan N. A new isoflavonoid from seeds of Lepidium sativum L. and its protective effect on hepatotoxicity induced by paracetamol in male rats. Molecules. 2014 Sep; 19(10):15440-51. doi: 10.3390/molecules191015440.

[4] Raghavendra RH, Akhilender Naidu K. Eugenol and n-3 rich garden cress seed oil as modulators of platelet aggregation and eicosanoids in Wistar albino rats. The Open Nutraceuticals Journal. 2011 May; 4(1).

[5] Eddouks M, Maghrani M. Effect of Lepidium sativum L. on renal glucose reabsorption and urinary TGF-beta 1 levels in diabetic rats. Phytotherapy Research 2008 Jan; 22(1):1-5. doi: 10.1002/ptr.2101.

[6] Tufail T, Saeed F, Ain HB, Niaz B, Afzaal M, Din A, Suleria HA. Cashew nut allergy; immune health challenge. Trends in Food Science & Technology. 2019 Apr; 86:209-16.

[7] Gokavi SS, Malleshi NG, Guo M. Chemical composition of garden cress (Lepidium sativum) seeds and its fractions and use of bran as a functional ingredient. Plant Foods for Human Nutrition. 2004 Summer; 59(3):105-11. doi: 10.1007/s11130-004-4308-4

[8] Jain T, Grover K, Grewal IS. Development and sensory evaluation of ready to eat supplementary food using garden cress (Lepidium sativum) seeds. Journal of Applied and Natural Science. 2016 Sep; 8(3):1501-6.

[9] Mali RG, Mahajan SG, Mehta AA. Studies on bronchodilatory effect of Lepidium sativum against allergen induced bronchospasm in guinea pigs. Pharmacognosy magazine 2008 Jul; 4(15):189.

[10] Falana H, Nofal W, Nakhleh H. A review article Lepidium sativum (Garden cress). Pharm-D Program, College of Nursing, Pharmacy and Health Professions. 2014: 1-8.

[11] Monsen ER. Iron nutrition and absorption: dietary factors which impact iron bioavailability. Journal of the American Dietetic Association 1988 Jul; 88(7):786-90.

[12] Brabin L, Brabin BJ. The cost of successful adolescent growth and development in girls in relation to iron and vitamin A status. American Journal of Clinical Nutrition 1992 May; 55(5):955-8. doi: 10.1093/ajcn/55.5.955.

[13] Obeid AK, Al-Bazii SJ, Al-masoudi FJ. Mammmagensis effect of lepidium sativum seeds (garden cress) in mammary gland growth and development during three physiological stage in female rats. EurAsian Journal of BioSciences. 2020; 14(1):2273-8.

[14] Attia ES, Amer AH, Hasanein MA. The hypoglycemic and antioxidant activities of garden cress (Lepidium sativum L.) seed on alloxan-induced diabetic male rats. Natural Product Research 2019 Mar; 33(6):901-905. doi: 10.1080/14786419.2017.1413564.

[15] Hazafa A, Iqbal MO, Javaid U, Tareen MBK, Amna D, Ramzan A, et al. Inhibitory effect of polyphenols (phenolic acids, lignans, and stilbenes) on cancer by regulating signal transduction pathways: a review. Clinical and Translational Oncology 2022 Mar; 24(3):432-445. doi: 10.1007/s12094-021-02709-3.

[16] Mahassni SH, Al-Reemi RM. Cytotoxic effect of an aqueous extract of Lepidium sativum L. seeds on human breast cancer cells.

[17] Alqahtani FY, Aleanizy FS, Mahmoud AZ, Farshori NN, Alfaraj R, Al-Sheddi ES, et al. Chemical composition and antimicrobial, antioxidant, and anti-inflammatory activities of Lepidium sativum seed oil. Saudi Journal of Biological Sciences 2019 Jul; 26(5):1089-1092. doi: 10.1016/j.sjbs.2018.05.007.

[18] Kessler CS, Pinders L, Michalsen A, Cramer H. Ayurvedic interventions for osteoarthritis: a systematic review and meta-analysis.Rheumatology international 2015 Feb; 35(2):211-32. doi: 10.1007/s00296-014-3095-y.

[19] Amawi K, Aljamal A. Effect of Lepidium sativum on lipid profiles and blood glucose in rats. Journal of Physiology and Pharmacology 2012 Aug; 2(8):277-81.

[20] Guedes MI, Alves CR, Vieira IG, de Almeida LM, Mendes FN, Duarte LS, et al. Processo de produçao, uso e composiçao farmacêutica compreendendo compostos obtidos a partir de cera de carnaúba. Patente BR. 2011: 1012429-2.

[21] Youssef GM, El-Ghamery HE, El-Sawy HA. Study the physico-chemical properties and antihyperlipidemic activities of garden cress seed oil. 2014.

[22] Doke S, Guha M. Garden cress (Lepidium sativum L.) seed-an important medicinal source: A. Cellulose. 2014; 9:0-3.

[23] Verma T, Sinha M, Bansal N, Yadav SR, Shah K, Chauhan NS. Plants Used as Antihypertensive. Natural Products and Bioprospecting 2021 Apr; 11(2):155-184. doi: 10.1007/s13659-020-00281-x