The Pharma Innovation Journal 2022; 11(7): 1017-1020

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(7): 1017-1020

www.thepharmajournal.com
Received: 08-03-2022
Accepted: 16-06-2022

Munna Muhammad Suhail N
Food Technology and Nutrition, School of Agriculture, Lovely Professional University, Phagwara, Punjab, India

Syed Dilshad
Food Technology and Nutrition, School of Agriculture, Lovely Professional University, Phagwara, Punjab, India

Corresponding Author:
Munna Muhammad Suhail N
Food Technology and Nutrition, School of Agriculture, Lovely Professional University, Phagwara, Punjab, India

Pharmacological activities and health benefits of different types of carrot: A review

Munna Muhammad Suhail N and Syed Dilshad

Abstract
Carrot (*Daucus carota*) is one of the most common vegetables used in households. It is abundant in its chemical compounds such as protein, crude fiber, carbohydrates, fats, carotene, and vitamins. The health benefits of carrots are due to the presence of rich bioactive compounds like dietary fibers and carotenoids in it. The consumption of its products is increasing steadily due to the presence of the important source of natural antioxidants having anticancer activity. In India, the roots of carrot have been used traditionally in the preparation of salads and curries and also these could be converted into nutritionally processed products like candy, juice, pickle and concentrate. About 50% of β-carotene present in carrot pomace is being utilized in supplementation of products like bread, biscuits, cakes, and different types of functional products. In this present review, the pharmacology and health benefits of different types of carrots have been described.

Keywords: Carrot, carotenoids, antioxidants, dietary fiber, pharmacology

Introduction
The carrot (*Daucus carota* Sativus) is one of the most important vegetables with high biological value and the most important carotenoid source in the human diet. It is one of the most important seasonal root vegetables belonging to the family Apiaceae (Umbelliferae) and is grown extensively during the winter season in India. It is considered to be native of Afghanistan. Although it has been widely cultivated in many countries the use of carrot as food dates only commenced in the twentieth century. The vegetable also contains a wide spectrum of other compounds like Vitamins, Carbohydrates, Minerals, Crude fiber, Antioxidants, and minerals like Fe, Mg Ca, and P (Sharma *et al*. 2012) [18] The intake of carrot root protects against high blood pressure, heart disease, cataracts and enhance the immune system. It is an important source of dietary fibers and phytonutrients (Arscott *et al*., 2010) [16]. The fresh root of a carrot contains 3% fibers, 7% carbohydrates, 0.25 fats, 1% proteins and 88% of water on a wet basis (Turturică and Bahirm, 2021) [4]. Although orange-colored carrots are more common, then also black carrots have attracted the attention of the scientific community due to the presence of phenolic compounds (Akhtar *et al*., 2017). For the development of longer shelf-life carrot is added to a different product. Besides fresh consumption carrots can also be consumed in dried and powdered forms to increase the nutrient content and color of different food products such as cakes, soups, sausages, jam, jellies confectionery baby foods, and fruit juices (Turturică and Bahirm, 2021) [4]. The total production of carrots was 44.76M tons in the world in 2019 (http://www.fao.org/faostat/en/#data). Uzbekistan, China and the USA were the top three producers of carrots with around 21.38 M tons, 2.26 M tons, and 8.53 M tons. Falcarinol is a major bioactive of polyacetylenes found in carrots This chemical is thought to activate cancer-fighting systems in the human body. Falcarinol content in fresh carrots is affected by carrot tissue cultivar & water stress. Apart from this, daucuside & daucuso are sesquiterpenoids that were recently extracted from carrot seeds & have a cytotoxic impact on human gastric cell lines (Soares *et al*., 2018) [2] Carrots were rated 10th in nutritional value out of 39 fruits & vegetables. Carrots are high in dietary fiber & trace mineral molybdenum, which is uncommon in vegetables. Magnesium & manganese are abundant in this fruit. Magnesium is required for bone formation, protein synthesis blood coagulation, vitamin activation, nerve & muscle relaxation, and energy generation. Manganese is a cofactor for antioxidant enzyme superoxide dismutase in the body and aids glucose metabolism by working in terms with enzymes in the body (Assous *et al*., 2014) [3] Carotene present in carrots protects eyesight and night vision & protects against macular degeneration.

As a result, drinking carrot juice may benefit the human body by keeping human skin moisturized. Carrots are beneficial in the treatment & prevention of a diversity of skin conditions. Skin disorders like pimples & acne, rashes, dermatitis, & or skin issues caused by Vitamin A deficiency may be treated with antioxidants included in this vegetable.

Pharmacological activities of carrot

Cardioprotective activity

The Carrot seed extract, according to Muralidharan *et al.* (2008) [6] provides cardioprotection and muscle contraction regulation in rats with isoproterenol-induced myocardial infarction via preserving membrane-bound enzymes. The researchers concluded that carrot seed extract may have inotropic effects based on these findings the levels of aspartate transaminase, alanine transaminase, and lactate dehydrogenase in carrot seed extract-fed mice were much reduced.

Hypolipidemic activity

Carrot seeds were found to have hypolipidemic action in rats by Singh *et al.* (2010) [7] When rats fed carrot seeds were compared to rats fed a control group, total cholesterol, triglycerides HLD and VLDL levels were found to be reduced. The effect of carrot seed extracts on thioacetamide, a powerful hepatotoxic amide, was investigated by Aydin *et al.* (2010) [8] Normally, it promotes the synthesis of guanine and cytosine-rich RNA while lowering ribosomal RNA levels. The researchers discovered an inverse relationship between thioacetamide-induced increases in liver markers and carrot seed extract treatment.

Hepatoprotective activity

Singh *et al.* (2012) [9] investigated the antioxidant and hepatoprotective effects of carrot seed methanolic extracts in vitro. The antioxidant potential of carrot seed extract was found to be responsible for the hepatoprotective action of carrot seed extract in this study. Rezaei-Maghadam *et al.* 2012 [20] also discovered antioxidant and anti per oxidant activities in the liver. Based on investigations in rats' tissue of ethanolic carrot seed extracts research reveals usual consumption of ethanolic carrot seed extracts by rats improves antioxidant status and reduces per oxidant activity in liver tissue.

Antibacterial activity

According to (Rossi *et al*., 2007) [10] the essential oil extracted from the aerial sections of wild carrots has an inhibiting effect on the entomopathogen campylobacter jejune. Essential oil phenylpropanoids, such as methyl isoeugenol and elemicin, were also antibacterial against Campylobacter coli and campylobacter lari strains.

Cognitive dysfunction

Cognitive dysfunction includes aspects of perceiving, learning, thinking and remembering. Carrot seed extract according to (Vasudevan *et al*., 2006) [12] corrected memory loss by inducing scopolamine or diazepam-induced amnesia impairments in young mice these researchers discovered that giving mice carrot seed extract lowered acetylcholinesterase activity and cholesterol levels. Later they observed the ethanolic extract of carrot seeds improved the retention capacity of aged mice when orally administered for 7 days.

Antifungal effects

According to (Misiaka *et al*. 2004) [11] carrot, seed oil extracts exhibited moderate inhibitory effects on mycelia growth of Alternaria alternate (*Phytotoxic fungi*) Experiments carried out with carotol and β-caryophyllene and daucol chemical compounds has been observed that carotol significantly inhibited the growth of fungi and reduced colony radial size. The inhibitory effect produced by daucol was comparatively less than by carotol. No effect was exerted by β-caryophyllene. The research revealed that carotol is the main agent responsible for the anti-fungal activity of carrot seed oil extracts.

Anti-inflammatory effect

According to (Vasudevan *et al*., 2006) [12] Carrot seeds possess anti-inflammatory effect to have an anti-inflammatory effect. Research studies revealed that paw edema was induced in rats by using Carrageenan, histamine, and serotonin was induced using formaldehyde. Results showed the disease condition decreased in rats fed with a high dose of carrot seed extract.

Analgesic effect: To assess the carrot analgesic activity, the writhing effect was induced by intraperitoneal injection. Results revealed that there was a significant reduction in the writhing effect after the administration of carrot seed extract (Vasudevan *et al*., 2006) [12].

Cholesterol-lowering benefits

According to (Vasudevan *et al*., 2006) [12] studies concluded that oral administration of carrot seed extract in mice reduced the brain acetylcholinesterase activity and cholesterol levels in mice acetylcholine synthesis is mediated by acetyl coenzyme and choline in the presence of enzyme choline acetyltransferase. (Gambhir *et al*. 1966) [13] showed that choline-rich quaternary base chlorides when separated from carrot seeds exhibit cholinergic activity. (Vasudevan *et al*., 2006) [12] in his studies concluded that enhanced cholinergic transmission resulted from increased acetylcholine synthesis in the brain ain due to abundant availability of choline and reduction of brain cholinesterase activity.

Table 1: Nutritional composition of carrot value per 100G. Total ORAC value 666UMOL TE/100G

Vitamins	Nutrient Value	Percentage of RDA
Folates	19µg	5%
Niacin	0.963mg	6%
Pantothenic acid	0.273mg	5.5%
Pyridoxine	0.138mg	10%
Riboflavin	0.058mg	4%
Thiamine	0.066mg	6%
Vitamin a	167.06IU	557%
Vitamin c	5.9mg	10%

Vitamin k	13.2µg	11%
Principle		
energy	4.1Kcal	2%
carbohydrates	9.58g	7%
protein	0.93g	1.5%
Total fat	0.24g	1%
cholesterol	0mg	0%
Dietary Fiber	2.8mg	7%
Electrolytes		
Sodium	69mg	4.5%
Potassium	320mg	6.5%
Phytonutrients		
Carotene-A	3427µg	-
Carotene-B	8285µg	-
Crypto-xanthin-B	0µg	-
Lutein-Zeaxanthin	256µg	-
Minerals		
Calcium	33mg	3%
Copper	0.045mg	5%
Iron	0.30mg	4%
Magnesium	12mg	3%
Manganese	0.143mg	6%
Phosphorous	35mg	5%
Selenium	0.1µg	≤1%
Zinc	0.24mg	2%

***Source*:** USDA National Nutrient database.

Table 2: Health Benefits of Different Types of Carrot

Varieties of carrot	Scientific name	Origin	Health benefits	Reference
Black carrot 	*Daucus carota* ssp. sativus var. atrorubens	Turkey	Reduction of different types of cancer breast and prostate cancer, treatment of human colon	Tanveer Ahmad *et al*., 2019
Yellow carrot 	*Daucus carota* subsp. Sativus	Pakistan or Afghanistan	Enhance Eyesight, Antioxidant for healthy eyes	Arscott *et al*., 2010 [16]
Purple carrot 	*Daucus carota* subsp. Sativus	Afghanistan	Improve heart health, encourage weight loss, reduce inflammation	Rasheed *et al*., 2022 [17]
Varieties of carrot	**Scientific name**	**Origin**	**Health benefits**	**Reference**
White carrot 	*Daucus carota* subsp. Sativus	Northern Iran	Reduce the risk of lung breast and colon cancer and helps in good digestion	Tanveer Ahmad (*et al*., 2019)

Red carrot 	Daucus carota subsp. Sativus	Pakistan	Helps to prevent heart disease, rich in vitamin C	Sakshi Sharma and KD Sharma (2020) [5]

References

1. Varshney K, Mishra K. An Analysis of Health Benefits of Carrot, 2022. Doi: https://doi.org/10.55524/ijirem.2022.9.1.40.
2. Soares GR, De Moura CF, Silva MJ, Vilegas W, Santamarina AB, Pisani LP, *et al*. Protective effects of purple carrot extract (*Daucus carota*) against rat tongue carcinogenesis induced by 4-nitroquinoline 1-oxide. Medical Oncology. 2018 Apr;35(4):1-4.
3. Assous MT, Abdel-Hady MM, Medany GM. Evaluation of red pigment extracted from purple carrots and its utilization as antioxidant and natural food colorants. Annals of Agricultural Sciences. 2014 Jun;59(1):1-7.
4. Turturică M, Bahrim GE. Carrot-Application in food industry and health benefits-review. Innovative Romanian Food Biotechnology. 2021 Nov;16(21):1-21.
5. Sharma S, Sharma KD. Nutritional characteristics of different types of carrot. IJCS. 2020;8(6):2275-8.
6. Muralidharan P, Balamurugan G, Kumar P. Inotropic and cardioprotective effects of Daucus carota Linn. on isoproterenol-induced myocardial infarction. ||| Bangladesh Journal of Pharmacology|||. 2008 Jun;3(2):74-9.
7. Singh K, Dhongade H, Sing N, Kashyap P. Hypolipidemic activity of ethanolic extract of Daucus carota seeds in normal rats. International Journal of Biomedical and Advance Research, 2010, 1(3). Doi: http://dx.doi.org/10.3329/bjp.v3i2.849.
8. Aydin AF, Küskü-Kiraz Z, Doğru-Abbasoğlu S, Güllüoğlu M, Uysal M, Koçak-Toker N. Effect of carnosine against thioacetamide-induced liver cirrhosis in rat. Peptides. 2010 Jan;31(1):67-71.
9. Singh K, Singh N, Chandy A, Manigauha A. *In vivo* antioxidant and hepatoprotective activity of methanolic extracts of Daucus carota seeds in experimental animals. Asian Pacific Journal of Tropical Biomedicine. 2012 May 1;2(5):385-8. Doi: http://dx.doi.org/10.1016/S2221-1691(12)60061-6.
10. Rossi PG, Bao L, Luciani A, Panighi J, Desjobert JM, Costa J, *et al*. (E)-Methylisoeugenol and elemicin: antibacterial components of *Daucus carota* L. essential oil against Campylobacter jejuni. Journal of agricultural and food chemistry. 2007 Sep;55(18):7332-6.
11. Jasicka-Misiak I, Lipok J, Nowakowska EM, Wieczorek PP, Młynarz P, Kafarski P. Antifungal activity of the carrot seed oil and its major sesquiterpene compounds. Zeitschrift für Naturforschung C. 2004 Dec;59(11-12):791-6.
12. Vasudevan M, Gunnam KK, Parle M. Antinociceptive and anti-inflammatory properties of Daucus carota seeds extract. Journal of health science. 2006;52(5):598-606. Doi: http://dx.doi.org/10.1248/jhs.52.598.
13. Gambhir SS, Sanyal AK, Sen SP, Das PK. Studies on Daucus carota Linn. II. Cholinergic activity of the quaternary base isolated from water-soluble fraction of alcoholic extract of seeds. The Indian journal of medical research. 1966 Nov;54(11):1053-6.
14. Rudrappa U. Carrots nutrition facts, power your diet: Your guide to healthier nutrition, 2009.
15. Ahmad T, Cawood M, Iqbal Q, Ariño A, Batool A, Tariq RM, *et al*. Phytochemicals in Daucus carota and their health benefits. Foods. 2019 Sep;8(9):424.
16. Arscott SA, Tanumihardjo SA. Carrots of many colors provide basic nutrition and bioavailable phytochemicals acting as a functional food. Comprehensive reviews in food science and food safety. 2010 Mar;9(2):223-39.
17. Rasheed H, Shehzad M, Rabail R, Kowalczewski PŁ, Kidoń M, Jeżowski P, *et al*. Delving into the nutraceutical benefits of purple carrot against metabolic syndrome and cancer: A review. Applied Sciences. 2022 Mar;12(6):31-70.
18. Sharma KD, Karki S, Thakur NS, Attri S. Chemical composition, functional properties and processing of carrot-a review. Journal of food science and technology. 2012 Feb;49(1):22-32.
19. Akhtar S, Rauf A, Imran M, Qamar M, Riaz M, Mubarak MS. Black carrot (*Daucus carota* L.), dietary and health promoting perspectives of its polyphenols: A review. Trends in Food Science & Technology. 2017 Aug;66:36-47.
20. Rezaei-Moghadam A, Mohajeri D, Rafiei B, Dizaji R, Azhdari A, Yeganehzad M, *et al*. Effect of turmeric and carrot seed extracts on serum liver biomarkers and hepatic lipid peroxidation, antioxidant enzymes and total antioxidant status in rats. Bio Impacts: BI. 2012;2(3):151.