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Comprehensive Review on Therapeutic Properties of Carrot

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ABSTRACT

Carrot is a root vegetable present with Carotenoids, flavonoids, polyacetylenes, vitamins, and minerals are all present in that has several nutritional and physiological advantages. The presence of carotenoids, polyphenols, and vitamins in carrots supports the old wives' tale that they are healthy for the eyes as well as acting as antioxidants, anticarcinogens, and immune boosters. Carrots have also been shown to offer anti-diabetic, cholesterol and cardiovascular disease reducing, anti-hypertensive, hepatoprotective, renoprotective, and wound healing effects. Even at low extract concentrations, the antioxidant activities were strong, and with time in the order, their activity increased. Amazonia is superior to Kuroda and Pamela. Amazonia was the most famous type since it had the largest amounts of fibre, protein, and carbohydrates and the least amount of moisture. Additionally noteworthy are the antibacterial, antifungal, anti-inflammatory, and analgesic properties of carrot seed extracts. Due to its recognised as a significant source of naturally occurring antioxidants with anticancer potential, the consumption of carrots and the products derived from them continues to increase.

Keywords : Carrot, Antioxidents, Therapeutic, Vitamin A, Carotenoids.

I. INTRODUCTION

(B. Cotes, B. Rämert, & U. Nilsson et al.,2018) The natural carrot, Daucus carota, which grows wild throughout Europe and southern Asia, is the source of the domesticated carrot. It is believed that this plant originated in Persia where it was first cultivated for its leaves and seeds. Typically, carrots are eaten fresh, made into juice, used in salads, cooked as vegetables, and in sweet recipes. Due to an excessive increase in the use of natural juices in recent years, fruit and vegetable juices have become increasingly important

as an alternative to traditional beverages that include caffeine such coffee, tea, or carbonated water. **(kaur S., Sarkar B. C., Sharma H. K., & Singh C et al., 2006)** The colour of carrot root flesh can range from white to very dark purple or yellow to orange to red. Orange carrots have quickly gained popularity once it was discovered that they contain a high provitamin A content. Carotenoids and anthocyanins are the two main antioxidant pigments found in carrots. Based on the pigments present, carrot cultivar variances exist. Phytochemicals are carotenoids they primarily come in yellow & orange fleshed kinds and are yellow, orange, or red in colour **(S. Varanasi, L. Henzel,2017).** The ordinary orange carrot contains a lot of provitamin A as well as - & carotene. Lutein, a substance that protects against macular degeneration, is responsible for the yellow colour of carrots. Certain cultivars' roots contain red water-soluble anthocyanin and red water-insoluble lycopene pigments, but they do not increase provitamin A levels. The red colour of carrots comes from their high lycopene content. On or h& carrots that are high in anthocyanins are purple. A large amount of numerous additional functional components with significant health-promoting effects are present in carrots, making them one of the important root vegetables that are rich in bioactive compounds like carotenoids and dietary fibres. The distinctive carrot roots are loaded with carotenoids and have a distinct flavour because terpenoids and polyacetylenes are present. The predominant terpenes are mono- and sesquiterpenoids, and polyacetylenes are made up of falcarinol molecules. The late development of sugars in the root during growth masks the bitter carrot flavour to an acceptable extent. **(Haq and Prasas, 2014)** When carrots are stored, the bitter chemical coumarin is created. Of the 39 fruits and vegetables ranked for nutritional value, carrots came in at number 10. The trace mineral molybdenum, which is uncommon in vegetables, and dietary fibre are both abundant in carrots. Molybdenum aids in the metabolism of fats and carbohydrates and is essential for the absorption of iron. This fruit contains large amounts of magnesium and manganese. Magnesium is necessary for energy production, bone development, protein synthesis, B vitamin activation, nerve and muscle relaxation, and blood clotting. Magnesium is necessary for the secretion and action of insulin. Manganese helps the body's enzymes process glucose by collaborating with them. Superoxide dismutase, an antioxidant enzyme, requires manganese as a cofactor. Magnesium and potassium, which are found in carrots, support muscle function. Lack of vitamin A may lead to the degeneration of photoreceptors in the eyes, impairing vision. Carotene, the carotenoid in carrots with the highest provitamin A activity, helps to maintain vision, especially at night, and helps prevent macular degeneration. One of the best sources of provitamin A is carrots, and eating a lot of carotenoids has been linked to a lower risk of postmenopausal breast cancer. A variety of skin conditions can be prevented and treated with carrots.

Phytonutrients properties

Phytonutrients are essentially optional metabolites found in plants that have positive effects on health. As the trend of the future shifts towards functional food with specific health effects, scientists, food manufacturers, and consumers are becoming increasingly interested in the significance of antioxidant constituents in the maintenance of health and protection from coronary heart disease and cancer. **(Velioglu et al., 1998; Kahkonen et al., 1999; Robards et al., 1999)** Phytonutrients like carotenoids and phenolics may have a significant role, in addition to vitamins, in protecting natural frameworks from the effects of oxidative pressure, according to in vitro studies**. (Kalt 2005)** The phytonutrients phenolics and polyacetylenes, among others, are abundant in carrots**. (Babic et al., 1993; Hansen et al., 2003; Kidmose et al., 2004).** As a vitamin A rich food, carrots are high in - carotene, ascorbic acid, and tocopherol. **(Hashimoto and Nagayama 2004)** Carrots are regarded as a practical food with significant health-promoting

characteristics because of the clear degree of variety they exhibit.

Carotenoids

(Rock 1997and Krinsky el al., 1989) The important function of carotenoids in food extends beyond their role as natural colours; increasingly, these pigments are also thought to play a role in biological processes and actions. The presence of carotenoids intracellular affects cellular processes like platelet activation and the suppression of monocyte adhesion as well as the regulation of gene expression These biological effects have been linked to the antioxidant property of carotenoids, which deactivates free radicals and satisfies singlet oxygen. **(Krinsky 1989; Palozza and Krinsky 1992)** These biological benefits are independent of the pro-vitamin A activity. Foods that include carotenoids are often divided into carotenes and xanthophylls, which provide an appealing red or yellow colour and improve food quality. The carotenoids' structural options include being acyclic or having a ring with five or six carbons either at the molecule's ends or both. **(Carle and Schiber 2001)** In terms of micronutrients, carotenoids play an important role for human health. **(Castermiller and West 1998)** According to Simon and Wolff (1987), carrot roots' edible section contains somewhere between 6,000 and 54,800 g of total carotenoids per 100 g.

Dietary fibre

Lineback 1999 and Bao B, Chang KC et al., 1994) A complex carbohydrate that cannot be digested, dietary fibre is a component of plant tissues. They have no calorie content because they cannot be absorbed by the body, but eating a diet high in fibre has numerous health advantages, such as preventing constipation, controlling blood sugar, protecting against heart disease, lowering high levels, and preventing some types of cancer has studied that the carrot cell wall contain pectin (galacturonans, rhamnogalacturonans, arabinans, galactans and arabinogalactans-1), cellulose (β-4, D-glucan), lignin (trans-coniferyl alcohol, trans-sinapyl alcohol and trans-pcoumaryl alcohol) and hemi-cellulose (xylans, glucuronoxylans β-D-glucans and xyloglucans).**(Anderson & Bao and Chang et al. 1994)** Dietary fibres play a significant role in maintaining human health and are abundant in carrot. **(Anderson et al., 1994; Gorinstein et al., 2001; Villanueva-Suarez et al., 2003)** And dietary fiber-rich foods have been related to the avoidance, reduction, and treatment of various disorders, including diverticular and coronary heart disease

Health Benefits of Carrots

Antioxidant

(Dias JS. 2012 & Zhang D, Hamauzu Y. el al., 2014) Carrots are an excellent source of antioxidants, as are many other colorful vegetables. The biological and therapeutic effects of carrots can be attributed to the high concentration of antioxidant carotenoids, especially -carotene.The biological and therapeutic effects of carrots can be attributed to the high concentration of antioxidant carotenoids, especially carotene. **(Dias JS. 2012. Zhang D, Hamauzu Y. &. Gonçalves EM et al., 2014)** Carrots contain carotenoids, polyphenols and vitamins that act as antioxidants. Carotenoids, found in abundance in orange carrots, are powerful antioxidants that can counteract the effects of free radicals. Carrot roots contain flavonoids and phenol derivatives that are essential antioxidants. In addition, they reduce inflammation, modify the immune response and have anti-cancer properties.

Benefits for Wound Healing

Carrots are a wonderful source of antioxidants, just like many other colourful vegetables. The biological and therapeutic effects of carrots may be attributed to their high concentration of antioxidant carotenoids, particularly –carotene. **(Dias JS. 2012. Zhang D, Hamauzu Y. & . Gonçalves EM et al., 2014)** Carrots include carotenoids, polyphenols, and vitamins that function as antioxidants. Strong antioxidants that can counteract the effects of free radicals are carotenoids, which are abundantly spread in orange carrots. Carrot roots contain flavonoids and phenolic derivatives,

which are essential antioxidants. Additionally, they diminish inflammatory insult, modify immunological response, and have anticarcinogenic effects

Fertility Benefits

(J. Ma, J. Li, Z. Xu, F. Wang, & A. Xiong, et al 2018) There is a gender-specific reproductive effect of carrot seed extract. Pharmacological studies have revealed that carrot seeds have anti-fertility effects in females. According to a study, carrot seed extract, on or h&, has been proven to promote spermatogenesis in male rats. Researchers found that rats administered carrot seed extract recovered from the reproductive toxicity caused by gentamicin and had enhanced spermatogenesis. As a result, the cauda epididymal region's spermatogenesis and sperm reserves were able to be stimulated by carrot seed extract. An rise in testosterone levels in male rats is thought to have an impact; this is a biological process. Antioxidant effects may have contributed to the increase in cauda epididymal sperm storage because carrot seed extracts are rich in antioxidants.

Anti-Bacterial and Anti-Fungal Benefits

(Rossi et al., 2007) The essential oil obtained from the aerial parts of the wild carrot is said to have an inhibitory effect on the enteropathogen Campylobacter jejuni. In addition, phenylpropanoids from essential oils such as methylisoeugenol and elemicin had antibacterial activity against Campylobacter coli and C. lari strains. According to these authors, the antimicrobial properties of methyl isoeugenol and elemicim could be due to the aromatic ring and the double bond on the side chains of both compounds. **(Misiaka, I.J., Lipoka, J., Nowakowska et al., 2004),** carrot seed oil extracts had a mild inhibitory effect on the mycelial growth of Alternaria alternati (one of the most commonly known phytotoxic fungi for carrots). However, Daucol showed a less pronounced inhibitory effect than carotene**. (Kumarasamy and Sarker, S.D. et al., 2005)**. There was no effect of caryophyllene. Research suggests that the main compound responsible for the antifungal properties of carrot seed extracts is carbotol. Another attempt was made to evaluate antibacterial activity using compounds prepared from the methanolic extract of wild carrot seeds. The main flavones recovered from the methanol extract are luteolin, luteolin-3'-OD-glucopyranoside and luteolin-4'-O-glucopyranoside. These researchers found that luteolin had an antibacterial effect on Citrobacterfreundii and Bacillus cereus. Meanwhile b.cereus and Lactobacillus plantarum were resistant to the antimicrobial activity of luteolin-3'-O-glucoside. Like luteolin, its 4'-O-glucoside also inhibited the growth of Staphylococcus aureus and Escherichia coli. In addition, 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay showed that luteolin has higher scavenging activity.

Anti-Diabetic

(Poudyal H, Panchal S, Brown L. et al., 2010) Carrots contain phytochemicals and antioxidants that may help control blood sugar. To help prevent high blood pressure and heart disease, the American Heart Association (AHA) recommends eating a high-fiber diet, increasing your potassium intake, and decreasing your sodium intake. Carrots provide a healthy balance of these nutrients**. (Chau CF, Chen CH, Lee MH. Et al., 2004)** People with lower levels of carotenoids had higher blood glucose levels and faster insulin responses. As the degree of glucose intolerance rose, carotenoids levels similarly fell. These results imply that carotenoids found in carrots and foods high in vitamin A maybe helping diabetics in controlling their condition.

Help *In Vision*

(Blaner WS. 2020 And Ross A. Vitamin A et al., 2014) Vitamin A is found in carrots and its deficiency can cause xerophthalmia, a chronic eye disease. Low sensitivity to light or night blindness can be caused by xerophthalmia. According to a reliable source from the Bureau of Dietary Supplements, one of the leading causes of childhood blindness that can be prevented with dietary supplements is a deficiency in vitamin A.

Lutein and zeaxanthin, two other antioxidants found in carrots, may work together to improve vision to prevent loss from age-related yellow macular degeneration. However, eating carrots is unlikely to improve vision for most people unless they are deficient in vitamin A.

Dental Care

(Gopalan C, Ramasastry BV, et al., 1991) Due to its ability to remove plaque and food particles, carrots are good for your teeth and mouth. The gums are stimulated by carrots, which also encourages the production of a lot of saliva. Because saliva is naturally alkaline, it keeps bacteria that cause cavities and produce acids in check. Carrots include nutrients that destroy harmful oral bacteria and guard against tooth decay.

Benefits of Anti-Inflammatory and Analgesic Drugs

(Vasudevan and Mornin, R.A et al., 2003) Experimental reports on the anti-inflammatory and analgesic properties of carrot seed extract exist. carrot seeds have anti-inflammatory properties. In their study, carrageenan, histamine, and serotonin were used to cause paw edoema in rats, and folmaldehyde was used to cause arthritis. Surprisingly, animals administered a high dose of carrot seed extract showed a decline in illness severity. Additionally, an intra-peritoneal injection was used to produce a writing effect in order to measure the carrot's analgesic effectiveness. After the injection of carrot seed extract, the writhing effect was significantly reduced. **(Mornin et al., 2003)** discovered that the anti-inflammatory activities of carrot seed extract components (2,4,5-trimethoxybenzaldehyde, oleic acid, trans-asarone, and geraniol) are caused by the inhibition of cyclooxygenase enzymes. It had significant anti-inflammatory advantages over anti-inflammatory medications such aspirin, ibuprofen, naproxen, and celebrex.

For Glowing Skin, Eat Carrots

(Patil MV, Kandhare AD,and . Muralidharan P, Balamurugan G et al., 2008) Because carrots are so high in vitamin C and antioxidants, eating them helps to keep your skin looking young and healthy. Additionally, carrots can be utilised to make a simple and affordable face mask. To obtain glowing skin, all you have to do is combine some grated carrot with some honey and use it as a face mask.

Anti-Aging Advantages

(Vasudevan M, Gunnam KK, Parle M. et al., 2015) Additionally, carrots contain vitamin C, which helps the body produce collagen. Proteins of the type collagen are essential for maintaining the suppleness of the skin. It slows down the ageing process and prevents wrinkles. As an antioxidant, vitamin A fights free radicals to stop the development of wrinkles, discoloration, and uneven skin tone.

Sun Defence

(M. R. Alam, J. G. Lyng, D. Frontuto, 2018) Beta-carotene, a substance that is good for the skin and is found in carrots, is transformed by the body into vitamin A. It provides protection from the sun's damaging rays and helps with skin tissue repair. Carotenoids and antioxidants condition and protect the skin, boosting its UV resistance and speeding up the recovery from sunburns. In fact, carrot juice acts as a natural sunscreen when consumed in the summer.

II. CONCLUSION

Carrots are full of nutrients and provide a number of health benefits. Carrots are rich in carotenoids, phenolic compounds, polyacetylenes, and vitamins, which may help lower the chance of contracting certain diseases. Studies have revealed that certain carrot compounds have antioxidative, anticarcinogenic, and immunoenhancer effects. The anti-diabetic, cholesterol- and cardiovascular disease-reducing, anti-hypertensive, hepatoprotective, renoprotective, and wound-healing effects of carrot have been demonstrated. It is difficult and

occasionally confusing how certain carrot compounds lower the risk of contracting particular diseases. Molybdenum helps in the metabolism of fats and carbohydrates and is essential for the absorption of iron. This fruit contains large amounts of magnesium and manganese. Magnesium is necessary for energy production, bone development, protein synthesis, B vitamin activation, nerve and muscle relaxation, and blood clotting. Magnesium is necessary for the secretion and action of insulin. By collaborating with bodily enzymes, manganese promotes glucose metabolism. Due to its growing recognition as a good source of natural antioxidants with anticancer effects, carrot consumption is rapidly increasing. Carrot roots, in addition to being used in salads and curries in India, can be professionally processed into highly nutritious processed goods such as juice, concentrate, dry powder, canned, preserve, c&y, pickle, and gazrailla. Carrot pomace, which contains about 50% -carotene, can be used to flavour foods like cake, bread, and cookies, as well as to manufacture a variety of helpful products.

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