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PROPERTIES OF CARROT, EXTRACTION METHODS AND ITS IMPACT ON SKIN: A NARRATIVE REVIEW

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ABSTRACT: Bioactive substances such as carotene and micronutrients are abundant in carrots. They also include a number of other functional compounds with significant health-promoting qualities. The following search phrases were entered into Google Scholar to find relevant articles for this literature review: Health effects of carrot phenolics, carotenoids, polyacetylenes and ascorbic acid/vitamin C on the skin following intake of carrots, which include carotenoids, polyacetylenes and vitamin C. Studies have illustrated that carrots have anti-aging properties, as well as an anti-oxidant effect and protect against ultraviolet rays. Consumption on a regular basis results in red-orange pigmentation. It increases the production of collagen and elastin in the skin, which results in increased density, elasticity, and firmness.

KEYWORDS: Carrot, Carotenoids, Dietary fiber, Antioxidants, Human health, Skin.

1. INTRODUCTION

Carrots are a nutritional powerhouse for beautiful skin because they contain a high concentration of beta carotene, which helps to prevent cell degeneration, slow ageing, and make your skin glow. The vitamin A unearthed in carrot juice also helps preserve the health of body tissue, eyes, bone, and teeth. Carrots are one of the most often consumed root vegetables, and they are high in bioactive compounds such as carotene and micronutrients, as well as considerable levels of various other functional components that have important health-promoting properties. The usage of carrots and carrot products is increasing steadily as it is becoming increasingly recognised as a key source of antioxidants with anticancer properties[1]. Using carrot pomace, which contains around 50% -carotene, to enrich items such as cake, bread, and biscuits, as well as to manufacture a variety of beneficial products, might be a profitable venture.

Daucuscarota, the edible carrot, is the most extensively grown root vegetable in the world. Members of the Apiaceae family include this plant. Two primary parts of the carrot are the stem and root, which are essentially constituted of the peel (periderm), a pulpy outer cortex (phloem), and an inner core (xylem)[3]. In this examination, we will concentrate on the root of the carrot plant, but we will also discuss the stems and leaves because they are also edible[4,5]. Carrot's nutritional value, health-promoting phytonutrients, and potential usage in skin care are discussed in this review.

2. MATERIALS AND METHODS

The literature for this review paper was retrieved from Google Scholar by using the following significant key words: Vitamin C in carrot; nutritional importance of carrot or nutritional benefits of carotenoids, polyacetylenes; health benefits of carrot, impact of phenolics, carotenoids and polyacetylenes on skin.

3. PROPERTIES OF CARROT

Carrots have a moisture content ranging from 86 to 89 percent. Carrots are a good source of carbohydrates and minerals such as calcium, phosphorus, iron, and magnesium. Carrot chemical constituents include moisture (86%), protein (0.9%), fat (0.2%), carbohydrate (10.6%), crude fibre (1.2%), total ash (1.1%), calcium (80 mg/100 g), iron (2.2 mg/100 g), and phosphorus (53 mg/100 g) [6], whereas Holland et al[7]. reported values for the majority of these parameters as moisture (88.8%), protein (0.7%), fat (0.5%), carbohydrate.

The caretonoids are two major types; Hydro carbon caretonoids are referred to as carotins such as alpha carotin , beta carotin , lycopene. Secondly; Oxygenated derivatives of hydro carboncarotenoids are known as xanthophylls. Carotenoids can be further classified into pro vitamin A- carotenoids, non- pro vitamin A-carotenoid. Carotenoids contains 18.27 and 36.88 mg /100gm(FW) of beta catotein and lutein[8].

4. EXTRACTION PROCEDURE OF CAROTENOIDS

Acetone, chloroform, isoproponol, methanol and methylene chloride are among the organic solvents used to extract carotenoids. Solvents are used at boiling temperatures under low pressure in a process known as soxhlet extraction. This e xtraction method is a traditional method that yields the most carotenoids after 6 hours of

extraction and yields the greatest concentrations of carotenoids when used. It is safer for the environment and may be used in food and pharmaceutical applications than traditional solvent extraction, which is why it is becoming increasingly popular[9].

Due to the widespread use of acetone in carotenoid extraction, the initial extraction solvent, THF (solvents: THF-MeOH1:1v/v and MeOH-ethyl acetate 6:4v/v), was chosen. Carotenoids may serve as a visible indicator of health because they give the skin an attractive yellow-orange hue by enhancing carotenoid pigmentation and skin yellowness. In order to extract carotenoid pigments from food matrices, the solvents acetone and hexane are the most frequently used. Detecting carotenoids in food samples has become increasingly popular, with techniques ranging from thin layer to high pressure liquid chromatography (HPLC) as well as the combination of HPLC and mass spectrometry, such as MALDI-TOF (matrix-assisted laser desorption/ionization-time of flight) becoming increasingly popular.

The high water content of fruits and algal cells is often seen as detrimental to successful carotenoids extraction. To minimize carotenoids degradation during extraction, the following five points should be considered: During the extraction, a neutralizer such as calcium carbonate, sodium bicarbonate, or magnesium carbonate should be added to neutralise the acids released from the plant materials. Samples are shielded from direct UV light exposure. During extractions, sample tubes are filled with N2 to remove oxygen and create an internal environment. Occasionally, pretreatment treatments are used to assist in the breakdown of cell walls and other physical barriers present in the sample.

5. IMPACT ON SKIN

An enzyme called pectolytic enzyme is used to break down the pectin in carrot juice. Depectinized juice is ultra-filtered to recover retentate rich in carotene from the depectinized juice. For skin discoloration to appear, you must take between 20 and 50 milligrammes of beta-carotene every day over a period of many months. Beta-carotene content of a medium carrot is roughly 4 milligrammes per medium carrot[10]. We can develop it if we drink ten carrots daily for a period of several weeks, according to this method.

As a group of carotenoids, they include lycopene, alpha beta carotene (beta carotene), alpha alpha beta carotene (beta carotene), lutein, and zeaxanthin. Adipose tissue, blood, and lymph flow, as well as sebaceous glands release and subsequent penetration into the skin's surface are the key routes via which carotenoids accumulate in the epidermis and protect it against sunlight-induced oxidative effects. Carrots' TEAC antioxidant activity ranged from 25.9 to 86.6 mol TE/100g FW, according to the results[11].

Carrot root periderm cells are rich in phenolic compounds. The hydroxycinnamic acids and related metabolites are abundant in carrot roots. Among the hydroxycinnamic acids discovered in different carrot tissues, chlorogenic acid was the most prevalent, accounting for 42.2% –61.8 percent of the total phenolics. In carrot root tissues, the concentration of phenolic compounds decreases from the peel (periderm) to the xylem[12]. The peel comprises 54.1 percent of the total phenolic compounds in the carrot, preceded by the phloem (39.5 percent) and xylem (39.5 percent) in terms of fresh weight (6.4 percent). When it comes to potency, however, the cultivar, extraction method, presentation of data and post-harvest circumstances all have a role[13].

There was a wide variety of antioxidant activity in carrots of different colours. Because of their higher phenolic component content, purple carrots were shown to have the greatest antioxidant potential among all carrot colours. The antioxidant, anti-inflammatory, and antineoplastic properties of phenolic substances have been related to better health. In addition to helping to keep blood sugar and cholesterol levels in the normal range, these chemicals also support healthy nervous system activity. As free radical scavengers, polyphenols offer anti-aging and anti-cancer capabilities. Vitamin C can help prevent scurvy, which is marked by symptoms linked to connective tissue abnormalities. Maintaining clear skin, gums, and vasculature is dependent on vitamin C. Plasma cholesterol levels are reduced and the immune system's strength is increased, as is reactive oxygen species removal[14].

6. DISCUSSION

Findings reveal that carrots have anti-aging properties, as well as an anti-oxidant effect and the ability to protect against ultraviolet rays. Consumption on a regular basis results in red-orange pigmentation. It increases the production of collagen and elastin in the skin, which results in increased density, elasticity, and firmness. Repairs and regenerates protein fibres that have been damaged by ultraviolet radiation. Stimulates epidermal renewal and aids in the production of smooth, velvety skin. It functions as a photoprotective agent, protecting the skin from being damaged by the detrimental photodynamic reaction.

Dehydration of carrots throughout the major growth season is one of the most critical choices for preservation. Carrots are processed into various products to assure year-round availability. In order to fully benefit from the antioxidant capabilities and dietary fibres found in carrot pomace, it is necessary to produce products that have the highest possible phytochemical concentration without losing taste or convenience.

Variables such as carrot genotype (colour variations), environmental parameters, and processing and storage of carrot products affect phytochemical content and shape. These studies are critical to improving carrot

quality and generating genotypes rich in valuable phytochemicals. Massive quantities of carrots are frequently abandoned due to market failure. Carrot peel, for example, may be recovered and utilised as a source of bioactive chemicals. Thus, food industry wastes and discarded carrots can yield valuable by-products such carotenoids, phenolic compounds, dietary fibre fractions, and bioethanol. Carrots may also be processed to provide anthocyanin-rich concentrate for the pigment industry, and the pomace can be used to produce high-value phenolic chemicals for use as functional food additives[15].

CONFLICT OF INTEREST
None declared.

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