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RESEARCH ARTICLE
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VACCINIUM CYANOCOCCUS USES AND BENEFITS FOR HEALTH: A REVIEW

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Abstract:
Bioactive extracts from wild blueberries were isolated, fractionated, and analysed. Antioxidant activity, cardioprotective capacity, and ability to inhibit the initiation stage of chemically-induced carcinogenesis were evaluated Functional ingredients in blueberry have the best health benefits. To obtain a better understanding of the health role of blueberry in chronic disease. research involves the effects of blueberry on age-related mental decline, including cognitive and motor functions. Blueberries are known for their broad array of phytochemicals, especially flavonoids. Although attention has been focused on the anthocyanin pigments, the compounds responsible for the various medicinal activities have not been fully elucidated, and could include several different classes of polyphenolics. Blueberries are a popular fruit with an attractive flavour and colour, as well as health benefits. These health benefits have been attributed to the important number of bioactive compounds in blueberries with activities such as antioxidant, antitumor, antimutagenic, and antidiabetic effects. research has shown beneficial effects of polyphenol-rich diets in ameliorating cognitive decline in aging adults. Here, using a randomized, double blinded, placebo-controlled chronic intervention, we investigated the effect of two proprietary blueberry formulations on cognitive performance in older adults Background: Blueberries are rich in anthocyanins, which have been studied for many years. Interest in these compounds has grown attributing to their possible therapeutic and beneficial effects, among which are the reduction of coronary heart disease, anticancer/antitumor, anti-inflammatory, and antidiabetic effects, as well as the improvement of visual acuity and cognitive behaviour. However, the chemical instability of anthocyanins is one of the major limitations on their application. Anthocyanins are susceptible to degrade, leading to the loss of colour. Several environmental factors could significantly influence the stability of anthocyanins, including temperature, light, oxygen, enzymes, and pH. The instability of anthocyanins would likely result in their poor bioavailability. Blueberries are among the edible fruits that are recognized best for their potential health benefits. The crude extract from Vaccinium corymbosum was assessed in anti-inflammatory and antinociceptive models

Keywords: antioxidants, anthocyanins, chronic degenerative Diseases, free radical, pyruvic acid, portisin, liposome

INTRODUCTION:

Blueberry is a widely distributed and widespread group of perennial flowering plant with blue or purple berries.(1) They are classified in the section Cyanococcus within the genus Vaccinium. Vaccinium also includes cranberries, bilberries, huckleberries and Madeira blueberries Some foods, especially fruit berries provide plenty of antioxidants with their specific biochemical functions, and Are beneficial to health.(2)

Research in both in vitro and in vivo demonstrated that Foods of this nature, including blueberries, contained Antioxidants in their important bioactive composition Thus play roles to act as aids in reducing the risk of developing Certain diseases,(3), contributing to the health of the body Fruit-shaped berry, blue-black in color, originating from the found in Northern Europe and North America(4)

Blueberries are called “superfoods”, “functional foods”, “nutrient powerhouse” and “natural health package” due to their rich micronutrient content and health-promoting phytochemicals mainly (poly)phenols The (poly)phenols are secondary metabolites, which are produced by the plants as a defense mechanism to resist abiotic stress or non -conducive weather and repel predators(11) Blueberries are among the fruits that are best recognized for their potential health benefits. Many of the heath-promoting properties of blueberries are thought to be attributable to their bioactive compounds (proanthocyanidins and anthocyanins)(9)

Anxiety and depression are becoming increasingly prevalent in children and adolescents, and blueberries may also play a beneficial role here, as the executive function benefits of blueberries reported in children may also extend to cognitive control of mood(12) Blueberries are spherical or semispherical, small (0.7 to 1.5 cm in diameter), soft and sweet dark blue fruits, and these fruits can be consumed without peeling or cutting, containing mostly glucose and fructose (Brix range from 11◦ to 12.6◦) bluebarries are reach source of vitamins, anthocyanins, and other phenolic compounds such as flavonols, chlorogenic acid, and procyanidins, that have high antioxidant activity (Kalt et al., 2020). In addition, the Food and Agriculture Organization certified that blueberries are one of the five healthiest foods for humans (13)

Vitamins, minerals, polyphenols, and flavonoids from the diet have shown beneficial effects in improving endothelial function, blood pressure, blood lipid levels, and inflammatory markers However, from a comprehensive nutritional perspective, employing whole foods instead of single components as supplements in interventions is more reasonable. Well-accepted evidence from recent years indicates that normal cardiovascular health is associated with heart-healthy eating behaviours. Flavonoid- and polyphenol-rich fruits, such as cherries, berries, and orange juice, supplemented in interventions have been shown to benefit cardiovascular health and there is a growing interest in the impact of berry consumption on cardiovascular health.(14) studies showing that blueberries may be a contributing factor to reducing risk for these causes of death are promising forboth producers and sellers of berries, but also for people who may be at increased risk for these diseases. The antioxidants in blueberries may also protect eyes from aging caused by light-induced damage(15) Blueberries are commonly sold as fresh or frozen. Fresh blueberries have a very short shelf life making the supply chain management and marketing very challenging. Although not very common, dried and canned blueberry products are also available in grocery stores. Yogurts, beverages, jams, and jellies made with blueberries are some of the popular food items(16)

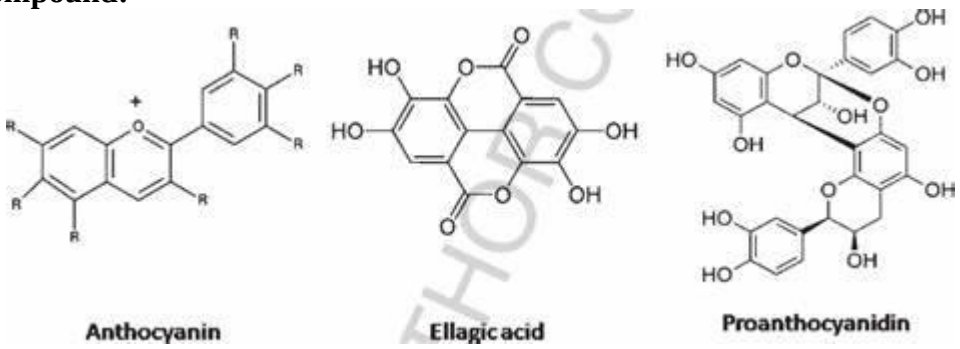
Berries have been hailed as excellent reserves of health-restoring phyto-chemicals. The popular berries are viz. strawberries, blueberries, blackberries, raspberries Dietary enrichment with the berries has emerged as an essential sector of nutritional improvement(17) In the past few decades, the scientific community has started to study and understand the impact of the Western diet on many non-communicable diseases and has demonstrated a clear beneficial relationship between healthy nutrition and cognitive aging. For example, deleterious dietary habits (overfeeding, high caloric/low dietary fiber diets or consumption of low antioxidant nutrients) and sedentary lifestyle, or emotional stress, have been reported as key environmental factors for brain disorders(18) Blueberries are a popular food enjoyed all over the world both for their delicious taste and high content of phenolic compounds,

including chlorogenic acids, flavonoids, and anthocyanins. Anthocyanins are compounds within the class of flavonoids, characterized by their red-blue color.(19) Anthocyanins are plant pigments responsible for the orange, red and blue colours of fruits, flowers, vegetables and other storage tissues in plants (Strack & Wray 1993). These compounds are involved in a wide range of biological activity(20)

Topical Application:
Rigorous research on topical application of natural bioactives suggests their ability to supplement depleted levels of skin micronutrients induced through environmental stressors. Application of compounds containing vitamin E and C successfully replenished the depleted cutaneous antioxidants stores due to O3 and UV exposure

Literature Review:
Blue berry (*Vaccinium Cyanococcus*)
The blueberry is a member of the heath family (Ericaceae) and is native to North America and East Asia. There are three main types of blue-berries - Highbush, Vaccinium corymbosum; Lowbush, Vaaainium angustifoZium, V. myrtiZZoides, V. Zamarkii and V. vaaiZZans and Rabbiteye, Vaaainium ashei Reade. The health benefits of blueberries are of particular interest of late due to their high content of phytochemicals known as (poly)phenols Blueberry fruit contains several classes of bioactive phytochemicals including phenolic acids, anthocyanins, proanthocyanidins, stilbenes, and organic acids Blueberry is one of the highest sources for five major anthocyanidins, namely, cyanidin, delphinidin, malvidin, peonidin, and petunidin among vegetables and fruits

Chemical compound:



Kingdom: Plantae
Scientific name: Vaccinium Cyanococcus
Common name: Nilabadri, Tall Huckelberry
Family: Ericaceae
Biological source: Blueberries come from the genus Vaccinium of flowering plants, which also includes cranberries and bilberries. blueberries are found in North American native species of blueberries are grown commercially in the Southern Hemisphere in **Australia, New Zealand** and **South** American nations
Uses: Blueberries are packed with antioxidants, vitamins, and minerals, and may have many health benefits, including:
- Heart health: Blueberries may help improve heart health and lower cholesterol levels.
- Blood pressure: Blueberries may help lower blood pressure.
- Blood sugar: Blueberries may help regulate blood sugar.
- Digestion: Blueberries may help improve digestion.
- Skin and hair: Blueberries may improve skin texture, reduce dark circles, hydrate the skin, boost collagen production, and enhance skin radiance. They may also be good for hair health.
- Mental health: Blueberries may improve short-term memory and motor coordination, and may help reduce the risk of cognitive damage and slower cognitive decline in older women.

• Other health benefits: Blueberries may help protect against aging, cancer, and DNA damage. They may also help maintain eye health, support immunity, reduce gastrointestinal symptoms, ease urinary tract infection symptoms, and reduce muscle damage after exercise.

Chemical Composition:

Blueberries are rich in water and sugars, particularly glucose and fructose though other sugars such as galactose and rhamnose may be found, frequently as sugar moieties associated with phenolic compounds. Generally, blueberries in a fresh form consist of water (84%), carbohydrates (9.7%), proteins (0.6%) and fat (0.4%). A considerably high content of organic acids (e.g., citric and ascorbic acids), minerals (e.g., phosphorus, potassium, and magnesium) and fiber, particularly pectin are also found in blueberries 100 g of fresh fruit contains 83.4 g of water, 0.6 g of protein, 0.6 g of fat, 15.0 g of sugars, 0.3 g of ash Moreover, 0.02 mg of vitamin B1, 0.02 mg of vitamin B2, 0.3 mg of vitamin PP, 16 mg of vitamin C, 289 I.E. (International Equivalents) of vitamin A, 16.0 mg of calcium 13.0 mg of phosphorus and 0.8 mg of ferrum Blueberry extracts ameliorate age-related declines in neuronal and cognitive function, common in disorders such as Alzheimer disease

Water Content(Hydration):

The high water content in blueberries helps maintain hydration, especially when consumed raw or in juice

Vitamin C:

blueberries and vitamin C supplementation would attenuate elevations in both oxidative stress markers and plasma cytokines after exercise in the heat. study indicates that blueberry supplementation may be beneficial for athletes exercising in hot environment

Vitamin k:

blueberries are rich in vitamin K, which helps promote heart health. The vitamin is also important in bone health and blood clotting.

Antioxidants(anthocyanin):

Anti-inflammatory properties: May reduces inflammation and oxidative stress in body
Cardiovascular Health: Reduces blood pressure and oxidative stress
Health: The antioxidants in blueberries may also protect eyes from aging caused by light-induced damage

Minerals:

Phosphorus: Helps in balance electrolytes, which is essential for muscle contractions and nerve signalling
Potassium: It helps nerves function and muscle to contract, helping organ like heart in kidneys function normally
Magnesium: It plays a role in over 300 biochemical reactions in the body, including protein synthesis and muscle function

Proanthocyanidin:

Blueberry proanthocyanidins and anthocyanins improve metabolic health through a gut microbiota depended mechanism Anthocyanins's (one of the main classes of phenolic compounds present in blueberries) antioxidant activity has been associated not only with a direct quenching of reactive species but also with an upregulation of antioxidant and detoxifying enzymes (phase II enzymes that contribute to the reduction of oxidative stress such as gluthatione-S-transferase or quinone reductase)

Neuroprotection:
Several authors have hinted that the consumption of blueberries may aid in the reversal of some age-related and oxidative stress induced decline in brain function In fact, the neurotoxic effects of kainic acid, in rats, have been reported to be reduced after consumption of blueberry

Cardiovascular disease prevention:
Blueberries may be more effective in managing cardiovascular diseases, as flavonoids have been associated with improved blood flow and endothelial function blueberries contains polyphenol compound and also have anti-carcinogenic Properties

CONCLUSION:

bluebarries contributes to improved organoleptic quality, extended shelf-life, and enhanced health benefits the process of fermentation brings additional health benefits, mainly through the production of various microbial metabolites or postbiotics. The type of probiotics used in fermenting blueberries seems to be a critical factor in generating specific postbiotics. Recent investigations suggest that fermented blueberries have the potential to mitigate various non-communicable diseases including, but not limited to diabetes, cancer, cardiovascular diseases, cognitive mpairments (neurodegenerative disorders and neuropsychiatric diseases), and obesity. Flavonoids, including anthocyanins, are considered to be the most important family of phenolic compounds in fruits. A good correlation between the concentration of fruit phenolics and the total antioxidant capacity has been reported Such quantities are easily achievable within a normal diet, and it is likely that we would all benefit from consuming them regularly, while awaiting further research on the precise cognitive domains influenced, additional benefits of longer-term supplementation, detailed mechanisms of action responsible, and the real-world relevance of the cognitive benefits attained The concentration is a technological process widely used by the industry to easily transport, store, and preserve the valuable compounds of raw materials such as blueberry juice. In this context, blueberries are a stationary fruit with valuable micronutrients, including sugars, vitamins, minerals, and organic acids. Furthermore, blueberries are an important source of bioactive compounds such as anthocyanins with antioxidant properties and potential benefits for human health.

RESULT:

The study showed no effect of consuming either blueberry or blueberry powder daily, containing 220.48 mg and 288.43 mg of total polyphenol contents, respectively, for 1 week on blood pressure, pulse wave velocity, lipid profile, glucose control, and plasma nitrites levels health benefits which are attributed to the phytochemicals including phenolic compounds like anthocyanin and vitamins naturally present in the fruits. However, it is also evident that scientific studies on this topic are extremely limited. The review emphasizes the blueberry-based novel nutraceutical development. The plethora of health benefits suggest that research should be directed in understanding the bioactive components of blueberry and precise mechanisms mediating the disease remediation. Its ingestion must be encouraged for valorisation of immunity against nagging health threats The results indicate that 3 months intervention with facilitate better episodic memory performance and improve cardiovascular function over 6 months. The doses used in this study were comparatively small compared to previous research and it is therefore interesting to see an effect even at such low dose. Effects were not found, however, for the working memory, executive function, and mood tests, and further research investigating the efficacy of interventions on these domains with higher daily doses is currently in train The relevance of these findings in an in vivo setting remains to be determined. Currently, one of the main challenges is to convert applied research and technological innovations into safe products that provide health benefits for consumers. From the research considering that blueberries are edible fruits, their consumption may be helpful for the treatment of inflammatory disorders. In addition, this work has corroborated the traditional indication of different species of Vaccinium to treat inflammatory conditions, which may contribute to the understanding of the role of this edible fruit in promoting health.

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