



BILBERRY-A NUTRACEUTICAL AND ITS ROLE IN MAINTENANCE OF PERIODONTAL HEALTH

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ABSTRACT:

Bilberries, a rich dietary source of multiple phytonutrients, predominantly anthocyanins which are mainly responsible for their antioxidant and biomedical roles. Bilberries are proven to be protective against cardiovascular disorders, inflammatory responses, age induced oxidative stress and multiple degenerative diseases. These anthocyanins are indicted in protection against DNA genomic integrity. This review aims to summarize the main health effects of bilberry extract used as food supplements/pharmaceutical formulations thereby highlighting its role in maintenance of periodontal health.

KEYWORDS:

BILBERRY, ANTHOCYANINS, INFLAMMATORY CONDITION, PERIODONTAL DISEASE.

INTRODUCTION

Vaccinium myrtillus (L.) is a small wild shrub as a native of Europe. The fruit, a fleshy berry of blackish or bluish-purple color due to anthocyanin pigments. The fruits and leaves of bilberry contain active substances such as: anthocyanins, tannins, flavonoids, vitamins and organic acids. Due to its content especially the anthocyanins, bilberries are now recognized as major functional foods. The American Herbal Products Association has classified Bilberry as a Class 1 herb, indicating its consumption profile to be safe as no mutagenic effects or contraindications have been elicited. Bilberry is extensively used as an artificial coloring, as a phytocosmetic and in the pharmaceutical industry.(1)

MAIN CONSTITUENTS

Among the several active ingredients which have been isolated from the berries and leaves of the bilberry plant, anthocyanosides, flavonoids, vitamins, pectins and sugars are found in the berries. Leaves contain catechins, tannins, quercetin, phenolic acids and iridoids. These ingredients have led to a lot of research due to their proclaimed beneficial effects on health.(2)

Flavonoids derived from the large family of polyphenols, are useful for medicinal purposes and are involved in the phosphorus and nitrogen nutrition of plants (2). Flavonoids strongly absorb ultraviolet radiations. Thus DNA in cells are protected by flavonoids present in the epidermis of leaves. Flavonoids exhibits numerous biological roles like antibacterial activity, protection against capillary fragility and prevention of free radical formation which activate inflammatory processes, cellular aging, promotion of carcinogenic effects and

atherosclerosis (2).

The total content of anthocyanins in bilberries generally ranges between 300-700 mg/100 g in the fresh fruit. The recommended daily dietary intake of anthocyanins is approximately 200 mg (1,3,4,5). The most common anthocyanidins (anthocyanins bound to a glycosidic moiety) are cyanidin, petunidin, malvidin, peonidin, and delphinidin among which the most important are cyanidin and delphinidin (2,6,7).

HEALTH EFFECTS OF *Vaccinium myrtillus*

"Foods and food components that provide a health benefit beyond basic nutrition are referred to as a functional food" (8). These could either be present naturally or could be additive, they have the ability of bio-modulation i.e. modulation of physiological functions so could be effective in disease prevention and maintenance of health. The progressive aging of the population necessitates consumption of functional foods, also unhealthy lifestyles (such as sedentary habits and obesity), advances in agri-food technologies mandate that food products are not only used for caloric intake, however should have the ability to improve the quality of life of humans (9,10).

The bilberry has long been recognized as a medicinal plant with varied pharmacological actions.

Anthocyanin extracts have been shown to:

- a) have strong antioxidant properties (11),
- b) decrease capillary permeability and fragility (12), and
- c) inhibit platelet aggregation.

Pro-inflammatory compounds such as, prostaglandins, histamines and leukotrienes are prevented from being

released due to the anthocyanin constituents of bilberry leaves. It is also claimed Furthermore, the bilberry leaves oral administration reduces blood glucose levels (13). Bilberry is now emerging as a potent nutraceutical in management of vascular disorders diabetes mellitus and eye ailments. (14)

ANTI-INFLAMMATORY ACTION

- degradation of cellular proteins is inhibited due to arrest of proteasome activity; (15)
- NFκB-regulated proinflammatory chemokines were decreased substantially in healthy subjects(15,16, 17)

NEUROPROTECTIVE EFFECTS

- neuronal communication improvement enhanced dopamine release and neuro protective role have been allayed to bilberry intake ; (4, 18, 19)
- animal studies have proven promotion of sensory inputs enhanced triiodothyronine transport thus promoting vision and short term memory;(4, 20)

ANTIMICROBIAL EFFECTS

- Wide array of organisms such as *Staphylococcus aureus*, *Salmonella*, *H. pylori*, *Bacillus*, *Clostridium* are directly inhibited by the phenolic compounds of bilberry(21, 22).Also Methicillin resistant *S. aureus* (MRSA) is effected by bilberries antimicrobial action.(23)

ROLE IN PERIODONTAL DISEASES

Periodontal diseases are initiated by presence of subgingival biofilms which lead to a release of pro-inflammatory agents. The seemingly innocuous inflammation confined to the gingival crevice: termed as gingivitis, if left unchecked could pave the way for inflammation induced destruction of deeper periodontal structures such as the periodontal ligament and the alveolar bone. Therefore, it is necessary that this inflammation is corrected at the earliest. The mainstay of control of gingivitis has been mechanotherapy, however, adjunctive use of various pharmaceuticals, and now with the advent of nutraceuticals such as aloe vera, curcumin, guajava and green tea along with blueberries herald an exciting era.

ROLE IN GINGIVAL INFLAMMATION

The efficacy of bilberry as an anti-inflammatory agent was observed in a recent study by Widen et al(2015). They observed a dose dependent significant reduction in cytokine levels in the group that consumed 500 g of bilberries/day. IL-1β, IL-6 and VEGF (vascular endothelial growth factor)in gingival crevicular fluid were statistically reduced in the biochemical assay carried out based on the study and review of the other published data, it can be hypothesized that bilberry could have a promising adjunctive role in the maintenance of periodontal health. (24)

CONCLUSION

Due to antimicrobial and anti-inflammatory effects of bilberry, it is mandated that long term evaluation with bigger cohort size, longer follow up, microbiological and biochemical analysis are carried out to elucidate the potential role of bilberry in the maintenance of periodontal health and control of disease conditions.

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