Review Article

Nutritional and Medicinal uses of different types of Berries

Abstract

This abstract will provide an outline of the nutritional and therapeutic benefits of several berries. It will focus on the major vitamins, minerals, antioxidants, and phytochemicals found in berries, as well as how these compounds can benefit overall health and well-being. The study will also look into the possible therapeutic applications of berries in the prevention and treatment of several health disorders, including cardiovascular disease, diabetes, and cancer.It will discuss the differences in nutrient profiles and bioactive chemicals found in various berry species, as well as how these variances may influence their distinct health-promoting properties. Furthermore, the chapter also discuss any potential safety risks or contraindications related with berry eating, particularly for people who have certain medical problems or are taking specific drugs.

Introduction

The continuous search for agents that promote health and prevent disease in developed countries has altered our perception of food sources; the introduction of nutritious foods, vitamin, and mineral supplements, and nutraceuticals has improved the offerings of the food industry and contributed to its continued expansion. The incidence of heart disease and numerous malignancies is inversely correlated with the diet of fruits and vegetables. Nonetheless, a large portion of the population in northern latitude nations does not consume the suggested "5-a-day" of fruits and vegetables. Locally grown soft fruits, such as raspberries, blackberries, blueberries, and blackcurrants, may be a potentially significant supply of fruit for these communities.

The edible berries are classified into the following genera: Fragaria (strawberries), Aronia (chokeberries), Sambucus (elderberries), Rubus (raspberries, blackberries, and cloudberries), Ribes (gooseberries, black and red currants), and Vaccinium (blueberries, cranberries, bilberries, and lingonberries). They are all rich in phenolics, which play a major role in their organoleptic qualities and health advantages [10-12]. The phytochemicals like flavonoids, stilbenes, tannins, and phenolic acids are among the many different types of antioxidants and phenolics that can be found in berries.

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Berries are rich in phytochemicals such as anthocyanins, which are glycosidic-linked flavonoids that give berries their red, violet, purple, and blue colors. Studies conducted on rats show that anthocyanin absorption occurs in the stomach and the small intestine [13-15]. Their absorption from the stomach into the blood may explain their rapid but temporary increase in serum (Talavera*et al.*, 2004). These phytochemicals may have additional beneficial effects on health. Research conducted in vitro suggests that the polyphenols, specifically anthocyanins, present in berries may possess several anti-inflammatory, antioxidant, and cell-regulating characteristics that may help prevent cancer and heart disease [16-20].Berries are superfoods that are edible and may help prevent cancer, heart disease, and aging." However, it would seem that polyphenols like anthocyanins have a low bioavailability, which reduces their nutritional significance.

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Table 1. Berries with select nutrient and phytochemical profiles expressed in values per 100g of edible portion (Basu *et al.*, 2010) -

Fruit	Total anthocyanidin content (mg)*	Total flavan-3-ols (mg)†	Total flavonols (mg)‡	Calories (kcal)	Fiber (g)	Vitamin C (mg)	Vitamin E (mg)
Blackberry	90.46	42.5	2.49	43	5.3	21	1.17
Blueberry	163.52	51.71	9.72	57	2.4	9.7	0.57
Bilberry	430.91	4.13	NF	NF	NF	NF	NF
Chokeberry, raw	437.22	NF	8.90	NF	NF	NF	NF
Cranberry juice (unsweetened)	NF	0.92	20.82	46	0.1	9.3	1.20
Cranberry juice cocktail	0.46	0.19	1.79	54	NF	42.3	0.22
Cranberry (dried, sweetened)	0.72	NF	6.91	NF	NF	NF	NF
Cranberry	0.14	NF	5.11	151	1.0	2.0	0.83

Fruit	Total anthocyanidin content (mg)*	Total flavan-3-ols (mg)†	Total flavonols (mg)‡	Calories (kcal)	Fiber (g)	Vitamin C (mg)	Vitamin E (mg)
sauce (canned, sweetened)							
Currant, black, raw	272.44	1.17	12.69	63	NF	181	1.0
Mulberries, raw	NF	NF	2.47	43	1.7	36.4	0.87
Black raspberry	324.02	NF	NF	NF	NF	NF	NF
Red raspberry (raw)	38.68	6.63	1.32	52	6.5	26.2	0.87
Strawberry	33.63	4.51	1.6	32	2.0	58.5	0.29

*Total anthocyanidins (cyanidin, delphinidin, peonidin, petunidin).

†Total flavan-3-ols [(−)-epicatechin, (−)-epicatechin 3-gallate, (−)-epigallocatechin, (−)-epigallocatechin 3 gallate, (+)-catechin, (+)-gallocatechin].

‡Total flavonols (kaempferol, myricetin, quercetin).

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Table 2. Content of micronutrients in berry plant leaves (mg kg^{-1} DM) (Basu *et al.*, 2010)-

Specification	Fe	Zn	Cu	Co	Mn	Cr	Mo
Raspberry	64.1	30.2	3.54	0.42	64.2	0.98	21.2
Blackberry	61.6	20.1	5.23	0.62	52.9	0.91	20.3
Chokeberry	23.5	25.1	1.38	0.48	150.9	1.06	24.5
Sea buckthorn	177.8	20.8	5.07	0.68	39.9	1.47	23.0

A substantial amount of scientific research demonstrates how eating berries can help with the three goals of functional foods: (i) lowering the risk of obesity (ii) maintaining health (such as immune system function and mental health and (iii) lowering the risk of chronic diet-related diseases (such as metabolic syndrome, type 2 diabetes, and cardiovascular disease).

1. **Effects on diabetes, obesity, and metabolic syndrome**

Anthocyanins can reduce the risk of obesity, type 2 diabetes, and cardiovascular problems, according to in vitro studies. They do this by upregulating hormone-sensitive lipase and lipolysis, inhibiting COX-1 and COX-2 enzymes, and increasing the production of adiponectin and leptin.

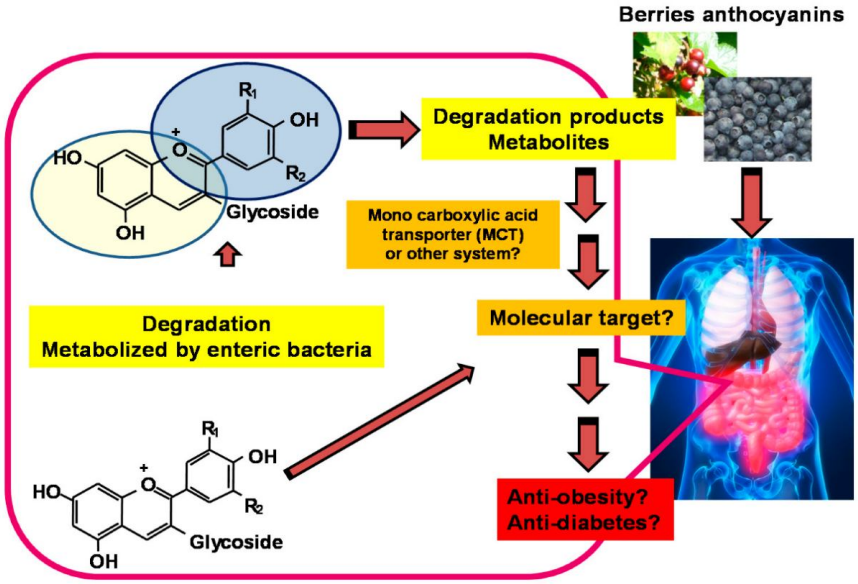

Figure 1. Degradation products or metabolites derived from berry anthocyanins can have an impact on health.

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2. **Effect on Neurological Disorders**

Age-related neurological disorders (ANDs) include neurodegenerative disorders, such as Parkinson's disease and Alzheimer's disease, which are the two most prevalent types of dementia in the elderly. It also addresses other ailments including epilepsy and migraines. There are other risk factors for ANDs besides age, which is one of the main ones. The three most common and significant pathogenic features of AND are oxidative stress, inflammation, and a build-up of misfolded proteins.

Berries contain quinic acid, catechol, catechin, gallic acid, ellagic acid, anthocyanins, minerals, and a small number of vitamins. These compounds exhibit a multitude of biological properties, including antioxidant and anti-inflammatory properties that may prevent cancer by reducing cell proliferation, inducing autophagy, and inducing apoptosis; they may also have anti-diabetic effects by inhibiting the expression of α-glucosidase, α-amylase, and dipeptidyl peptidase-4; and they may have anti-Alzheimer's disease effects by lowering the expression of Aβ, BChE, AChE, and BACE-1 as well as nitrate generation.

3. Effect of cardiovascular disease

The impact of blueberry consumption on clinically significant biomarkers of cardiovascular disease (CVD) risk, demonstrating that supplementing with blueberries can lower blood pressure, enhance endothelial function, and reduce arterial stiffness in individuals who are at risk of CVD, including those who are pre-hypertensive, overweight, obese, or have metabolic syndrome.It has also been demonstrated that berries reduce lipid peroxidation and boost plasma antioxidant capacity in smokers who are very susceptible to cardiovascular disease.

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4. Effect of cancerous diseases

Berry bioactive components impart anticancer effects through various complementary and overlapping mechanisms of action, including the induction of metabolizing enzymes, modulation of gene expression, and their effects on cell proliferation, apoptosis, and subcellular signaling pathways (Rice-Evans *et al.*, 1997).

Comment [13]: Too old

Conclusion

Berries and berry products have a beneficial effect on human inflammatory markers, antioxidative capacity, and postprandial glycemic response when included in meals. Berries and berry products have the potential to lower risk factors for metabolic syndrome and cardiovascular illnesses and enhance plasma lipid profile when consumed over time. The promise of a berry diet in reducing stress and promoting healthy aging will be the subject of more investigation. Berries are tasty and easy to eat, therefore researching their health benefits is crucial for health promotion and illness prevention.

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