BilkarMD+

Aronia melanocarpa

Taxonomic Hierarchy [1]: Kingdom Plantae, Subkingdom Viridiplantae, Infrakingdom Streptophyta, Superdivision Embryophyta, Division Tracheophyta, Subdivision Spermatophytina, Class Magnoliopsida, Superorder Rosanae, **Order Rosales**, **Family Rosaceae**, Genus Aronia Medik. - chokeberry, **Species Aronia melanocarpa (Michx.) Elliot - black chokeberry**. *Syn.: Sorbus melanocarpa, Photinia melanocarpa, Mespilus arbutifolia var. melanocarpa.*

*Black chokeberry is valuable **natural antioxidant source** with strong **radical-scavenging activity**. These properties of the plant, are believed to be responsible for the protective effect of A. melanocarpa on different body systems and organs (gastrointestinal tract, cardiovascular system, liver, etc.).*

INDICATIONS

Prediabetes. **Diabetes mellitus type 2**. **Metabolic syndrome** (hypercholesterolemia, hypertension, obesity, hyperglycemia). Prevention of neurodegenerative (e.g. Alzheimer's disease) and bone-destructive diseases (e.g. osteoporosis), gastric injury/ulcer, hepatic injury (non-alcoholic fatty liver disease), cardiovascular diseases.

08.10.2018, **Ruth Busari**

Abbreviations: AM - Aronia melanocarpa. LDL-cholesterol - low-density lipoprotein cholesterol. TC - total cholesterol. NO - nitric oxide. *Cursive – in-vivo (in animals) or in-vitro studies.* **Bold – clinical trials.**

The main goal of this brief review is to inform the reader about possible health benefits from the consumption of Aronia melanocarpa. The presented information is based on open-source scientific publications, listed in the PubMed database and is not to be viewed as medical advice. **It cannot replace the consultation with physician in case of serious health disorder.**

DESCRIPTION

Aronia melanocarpa (AM), a.k.a. black chokeberry, is a deciduous shrub native to North America. Nowadays it can be found also in plantations in Europe and Asia. The black chokeberry plant can get about 1.5 m in height and about 3 m in width. The flowers are white or pale pink. The black berries ripen at the end of the summer. They are about 6–10 mm in diameter and have unique bitter-sweet taste. [2] The naturally ripened fruits of the black chokeberry plant can be consumed fresh or dried. Popular products of Aronia melanocarpa are the chokeberry juice and powder.

The chokeberry fruit is rich in vitamin C, polyphenols and anthocyanins. Preparations from the fruits are used as functional food in the prevention and (co-)treatment of various chronic diseases [3], in the food industry as natural color pigment [4] or as osmotic solution in the process of osmotic dehydration [5].

HEALTH BENEFITS

Improvement of cardiovascular parameters.

AM consumption **decreases the systolic blood pressure** in patients, suffering from metabolic syndrome [6, 14], and **lowers their LDL and total cholesterol levels** [6-8].

Black chokeberry *suppresses the visceral and hepatic fat accumulation and body weight gain* in high-fat diet-fed rats [9, 10]. It *exerts antiatherogenic activity* (inhibition of the building of atherosclerotic plaques in the arteries) and *ameliorates the age-related pathological changes in the aortic wall* [11, 15] in rats. The herb *can cause vasorelaxation* in coronary arteries [16] and *elevates the NO level and the activity of endothelial NO synthase* in coronary endothelial cells [13]. (Nitric oxide (NO) is an important mediator of arterial vasodilation.)

Improvement of hemostasis.

AM supplementation **increases membrane fluidity of erythrocytes, fibrinogen level and thrombin generation time**, and **affects the overall potential for clot formation and lysis** [7, 8, 17]. It *improves the antioxidative protection of platelets*, *reduces the platelet aggregation and the amidolytic activity of plasmin and thrombin* [17-19].

Improvement of glucose metabolism.

AM is suggested to be promising *therapeutic option for people, suffering from diabetes mellitus type 2*. It has the potential to *combat hyperglycemia-related oxidative stress and its consequences*

(macrovascular complications) in diabetic patients [23]. Aronia supplementation *can cause significant reduction in fasting blood glucose levels* in high-fat diet-fed rats [10].

Protection of the gastrointestinal tract.

AM pretreatment *ameliorates ethanol-induced gastric damage* [24] and *improves the colonic environment* (gut microbiota) in rats [25].

Protection of the liver.

AM *inhibits hepatic lipid accumulation and hepatocellular injury* in high-fat diet-fed mice [9]. Furthermore, two different models of hepatotoxicity in mice confirmed the *hepatoprotective activity* of AM [26].

Protection of the nervous system.

AM may have *protective effect against the development of Alzheimer's disease* (AD). Different in-vivo and in-vitro models of artificially induced AD confirmed this hypothesis [27, 28]. Black chokeberry was found to *improve scopolamine-induced memory impairment* in mice, possibly because of its ability to inhibit acetylcholinesterase [29]. Low doses of AM concentrate were able to *ameliorate paraquat-mediated neurotoxicity*, in-vitro [30].

Protection of the bone tissue.

AM *inhibits RANKL-induced osteoclastic differentiation*, in-vitro [31]. It also *improves bone collagen biosynthesis and femur biomechanical properties* in Cd-exposed rats [32].

Antioxidant [9, 14, 15, 18-20, 24, 26, 28, 30, 33], **anti-inflammatory** [3, 15, 27], **antineoplastic** [20-22] **activities**.

CAUTION

- *Extremely high doses of AM concentrate or high doses of purified polyphenols, extracted from AM, may have adverse (negative) effect on cell viability.* This effect was discovered in neuronal cell culture model (NG108-15) of paraquat-induced neurotoxicity and in HepG2 cell line, in-vitro [20, 30].
- *Cotreatment with naloxone, L-NAME, capsazepine and indomethacin may inhibit the gastroprotective effect of AM.* Information derived from rat model of ethanol-induced gastric damage, in-vivo [24].

PHARMACOLOGICAL EFFECT OF AM

- **acts as acetylcholinesterase inhibitor**, like *donepezil* (mouse model of scopolamine-induced memory impairment) [29];
- **ameliorates liver injury**, like *silymarin* (rat model of liver toxicity) [26].
- **inhibits inflammation**, like *ibuprofen*, *dexamethasone*, *PDTC* (model of artificially induced inflammation in human aortic endothelial cells, in-vitro) [15].
- **reduces gastric damage**, like *omeprazole* (rat model of ethanol-induced gastric ulcer) [24].

CONCLUSION

Aronia melanocarpa is natural source of antioxidants and colour pigments. **The herb is used mainly as alternative therapy for diabetes mellitus type 2, prediabetes and metabolic syndrome.** Its consumption may also have positive effect on the gastrointestinal tract, the liver, the nervous system and the bone tissue.

Further studies are needed to determine the role of Aronia melanocarpa in the modern healthcare system.

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