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A Review of Probable Effects of Cornelian Cherry Fruit

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Abstract

Cornelian cherry (cornus mass l.) is a fruit widely distributed in Europe, Turkey and some regions of Iran. Since this fruit is a main source of phytochemicals such as tannins, phenols, organic acids, anthocyanins, quercetin, kaempferol and aromadendrin, different studies focused on medicinal effect of the fruit on multiple disorders. This review accumulates some results from previous studies worked on this fruit. Cornelian mas extraction showed some anti cancer function in vitro due to its antioxidant capacity. Furthermore several studies observed beneficial effects of the fruit on dyslipidemia that result in lower total cholesterol, TG, LDL-cholesterol and some improvements in HDL cholesterol levels that could be related to its rich anthocyanins content by stimulation of PPARα expression. Another property of this fruit is its potential to modulate glycemic profile by increasing insulin secretion from B cell, improve glucose uptake by phosphorylation of insulin receptors, inhibition of α-glucosidase, postpone carbohydrate hydrolysis and activate G protein receptors due to high polyphenols content. Overall, different studies showed therapeutics effects of the fruit, so it can be used for further studies in future.

Key words: Cornelian cherry, Dyslipidemias, Hyperglycemia, Anthocyanins, Inflammation

Introduction

Cornelian cherry with the scientific name of Cornus mas is a species of the Cornaceae family. The tree with 3-6 meters height is locally from Europe and some parts of Asia (Deng et al., 2013). The Cornelian cherry fruits ripen in mid- to late summer and is dark ruby red. The taste of ripe fruit is a mixture of cranberry and sour cherry and it has acidic flavour but the unripe fruit has astringent taste. The fruit is used to make jam and as sauce. In Iran and Turkey the fruit is eaten as snack with salt (Nicholson & Anderson, 1963).

This fruit is a valuable fruit and medicinal plant with high antioxidant capacity. Previous investigations showed that this fruit has beneficial effects on different conditions such as urinary tract infections (UTIs), diarrhea, fever and vasomotor complications in menopause women (Deng et al., 2013; Dadkhah et al., 2016; Hassanpour et al., 2011).

The aim of our study was to summarize some therapeutic effects of Cornelian cherry on some aspects of health.

Methods

Our search was carried out in "Pubmed", "Google scholar", "Medline" and "ISI Web of Science" databases. The key words used for the search were: cornelian mas, lipid profile, glycemic inices and cancer. Following the search strategy, 34 ligible articles were identified and reviewed in this study.

Findings

Chemical properties

This fruit contain a wide range of phytochemicals including tannins, phenols, organic acids, anthocyanins and flavonoids. Some important flavonoids in this fruit are quercetin, kaempferol and aromadendrin (Deng et al., 2013; Pawlowska et al., 2010). Different

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studies analyzed the chemical composition and properties of cornelian cherry. Previous studies reported the acidity of the fruit that was 1.10% to 4.96%, while PH value was 2.50-3.14 (Tural & Koca, 2008; Güleryüz et al., 1998; Didin et al., 2000; Demir & Kalyoncu, 2003).. Based on Didin et al. study, sugar value was calculated 6.60–15.10 percent (Didin et al., 2000).Tural S Et al. measured the anthocyanin profiles, natural antioxidant content, antioxidant activity of cornelian cherry fruits and the results showed that ascorbic acid content was 0.16–0.88 mg per gram, total phenolics content 2.81–5.79 mg per gram, total anthocyanin include Cyanidin 3-glucoside, Cyanidin 3-rutinoside and Pelargonidin 3-glucoside 1.12–2.92 mg per gram (Tural & Koca, 2008).

Anti-Proliferative Properties of the cornelian cherry

Due to high content of antioxidants in cornelian cherry some studies had investigated its probable effect on different human cancer cells. In a study by Bahman Yousefi et al., after collection of cornus mas fruits from Kaleibar region, East Azerbaijan Province, Iran, the hydroalcoholic extract was carried out. The extract evaluated the high polyphenolic effect on SKOV3 (human ovarian carcinoma), MCF-7 (human breast adenocarcinoma), PC-3 (Human prostate adenocarcinima), A549 (lung non-small cell cancer cells) in vitro. The results showed that cornelian cherry extract have potential to inhibit cancer cells proliferation in dose dependent manner (Yousefi et al., 2015).

Lipid modifying effect of the fruit

Since Cornus mas L. is a rich source of anthocyanins such as malvidin, cyanidin, pelargonidin, peonidin, and petunidin, several studies showed enormous medicinal effects of it on inflammation, diabete, coagulantion, allergy and dyslipidemia. A study by Asgary et al. showed some improvements in lipid profile that includes LDL-C, HDL-C, TC, TG, apo A-I, and apo B after 6 weeks of consumption of Cornus mas in children and adolescents (Asgary et al., 2013).One suggested hypolipidemic mechanism of the fruit focuses on low secretion of apo B-100 and very-low-density lipoprotein (VLDL) packaging which result in reduction of LDL-C and TG levels due to its rich anthocyanins content (Zern et al., 2005).

Hypercholestromi in cooperation with inflammation play an important role in development of cardiovascular disease. Previous findings insisted on antioxidants as a major factor in improving hyperlipidemia and atherosclerosis features. As Rafieian-Kopaei et al. showed in their animal study that 1 gram per kilogram body weight Cornous mas could improve lipid profile (decreased atherosclerotic lesion and TG, TC and LDL levels), increased antioxidant capacity and decreased fibrinogen, AIP and MDA (Rafieian-Kopaei et al., 2011). Another study by Asgary et al. talked about therapeutic effects of Cornous mas supplementation on dyslipiemia and inflammation in diabetic rats due to its high content of cyanidin, malvidin, peonidin, pelargonidin, petunidin, bioflavonoids, ursolic acid and vitamin C (Asgary et al., 2014). T. Sozanski et al. showed that cornelian cherry have loganic acid as a main iridoid constituent that could have protective effects against hypertriglicerydemia and atherosclerosis by reducing oxidative stress and improving the expression of PPAR protein (Sozański et al., 2014). In contrary of previous results some studies didn't show significantly effective role of cornelian mas (Chamberlain & Bowen-Simpkins, 2000; Mashavi et al., 2008). A study performed by Abdullahi et al., different dosage (50, 200 and 400 mg per kg of body weight per day) of cornus mas extract was examined on 40 healthy male rats fed for 3 weeks. At the end of intervention time, there wasn't any significant change in mean serum levels of total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride (Abdollahi et al., 2014). Mirbeldzadeh et al. investigate the effect of the extract of Cornus mas fruit on lipid profile in diabetic rats. Based on the results of their study triglyceride and LDL cholesterol levels were significantly decreased in the serum of diabetic rats compared to those didn't receive the extract. On the other hand triglyceride level in the cornus mas group decreased more than the group receiving glibenclamide drug; in addition, the cornus mas showed potential to increase HDL cholesterol compared to the control group (Mirbadalzadeh & Shirdel , 2012). This effect of cornus mas could be due to improvement of plasma ApoA1 level and increase the expression of paraoxonase-1 due to high flavonoid content (Ruel et al., 2006; Gouédard et al., 2004). An intervention by Lee et al., on 30 diabetic people showed that 1500 mg of Cornus mas extract decreased LDL cholesterol and total cholesterol, however triglyceride and HDL cholesterol didn't change significantly in 12 weeks (Lee et al., 2008).

Some suggested mechanism of cornus mas is controlling the cholesteryl ester transferase (CETP) protein that results in LDL reduction. Additionally, anthocyanins can increase cholesterol excretion by stimulation the expression of LDL receptor-derived cholesterol. On the other hand anthocyanins can reduce LDL and decrease HDL levels by stimulation of PPARα expression (Liu et al., 2016; Du et al., 2015).

Glycemic control by the fruit

Another therapeutic effect of Cornelian mas discussed by Soltani et al. focuses on some antidiabetic effect of the extract. Different studies showed that anthocyanins content of the fruit can increase insulin secretion from B cell of pancreas which can result in less insulin resistance (Soltani et al., 215). On the other hand Cornelian mas can stimulate glucose uptake by phosphorylation of insulin receptors (Zhang et al., 2006). Study by JAYAPRAKASAM et al. showed that anthocyanins and ursolic cid in Cornelian cherry are capable of reducing hyperglycemia, obesity and related complications (Jayaprakasam et al., 2006). Another mechanism could be related to inhibitory effect of Cornelian mas on α-glucosidase which results in postponing carbohydrate hydrolysis. Asgary et al. showed in

their study that cornelian mas can modulate lipid profile and blood glucose in diabetic rats and its ability was equal with glibenclamide as a standard prescribed drug (Asgary et al., 2014). Some studies at the cellular level showed the capability of cranberry on blood glucose regulation. The suggested mechansim was inhibitory effect on alpha-amylase and alpha-glucosidase enzymes due to high polyphenols content of this fruit (Apostolidis et al., 2006; Pinto et al., 201). A study by Törrönen et al. have shown another property of phenolic acids that can inhibit SGLT1 and absorption of glucose in intestinal (Törrönen et al., 210) In the study by Teodoro et al. additional effect of cornus mas fruit was observed. Oleanolic acid has potential to activate G protein receptors, and improve insulin function through these receptors (Teodoro et al., 2008). Yamahara and colleagues observed an increase in the expression of GLUT4 mRNA in diabetic rats by using hydroalcoholic extract of cornus mas (Yamahara et al., 1981). Another investigation by Seymor et al on diabetic rats, showed significant decrease in fasting insulin level compare to control group after intervention with Tart Cherry in 12 weeks (Seymour et al., 2009). However a study by Lee et al. showed that 1500 mg of cornus mas intake over 12 weeks improve insulin level in insulin-dependent diabetic patients (Lee et al., 2008).

Conclusion

The purpose of the present research was to summing up the results of some previous studies on cornelian mas fruit and its beneficial effects on some aspects of lipid profile, glycemic indices and cancer. Further study of the issue would be of interest.

Conflict of interest: None.

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