

Comparing Effect of Hydroalcoholic Extract of Rosa Canina and Hydroalcoholic Extract of Dill on Lipoprotein in Alloxan-Induced Diabetic Rats

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Abstract: Background: diabetes is a metabolic disorder in which the body is not able to make full use of sugar and is associated with many complications. The most important of which dyslipidemia can be pointed out which is one of the most important signs of cardiovascular diseases. In general, in the world, especially in recent years, the general trend has been rising in the use of herbal medicines which are rich sources of natural antioxidants. The purpose of this study was to investigate the effects of hydroalcoholic extract of dill plant and Rosa Canina in reducing sugar and fat in diabetic patients's blood. Materials and methods: In this study, 40 adult male rats, weighing 200-250 g were divided into five groups of eight each: Group I served as control rats (non-diabetic group), and Group II (diabetic control) received alloxan monohydrate in a dose 120 mg / kg during six days on alternate days, and Groups III and IV, received alcoholic extract of dill and Rosa Canina as 300 mg / kg (by intraperitoneal injection) and Group VI received 150 mg / kg equally from each extract with overall volume 300 mg / kg for 10 days. At the end of treatment after blood sample collection, blood sugar content, cholesterol, triglycerides, LDL, HDL were measured. Results: The results showed that Rosa Canina Hydroalcoholic extract and dill hydroalcoholic extract significantly reduced ($p < 0.05$) glucose, cholesterol, triglycerides, LDL, and significantly increased HDL ($p < 0.05$). On the other hand, the effect of dill hydroalcoholic extract was more than that of Rosa Canina and combining the two extracts had a greater impact than individual extracts. Conclusions: It seems, combining the two extracts in diabetic patients, is a more effective procedure in controlling blood sugar and fat.

Keywords: Diabetes, Alloxan Monohydrate, Lipid Profile, Rosa Canina, Dill

Introduction

Diabetes is a disease associated with metabolic disorders and wide vascular and neuropathic complications characterized with changes in the metabolism of sugars, proteins glycosylation and lipids peroxidations, which are produced secondarily due to lower (or lack of) insulin activity (Dominguez et al., 1998). Impaired metabolism of carbohydrates appears in the form of less active tissues in the consumption of sugary foods and their reduced ability to store carbohydrates as glycogen. As a result, blood glucose free level goes beyond the normal range (Davidson, 1991). Insulin resistance is created by the loss of tissue sensitivity to insulin and leads to hyperglycemia, hypertriglyceridemia, and increased concentration of free fatty acids (Garg, 1996 and Reaven, 1988). In fact, despite the presence of hyperglycemia, the body is not able to use carbohydrates, and to meet its energy requirements, will be forced to use protein and fat, and as a result of the decomposition of protein, urinary nitrogen is increased. And due to altered metabolism of lipids, ketones are appeared in piss and metabolic acidosis state is created (Gyton, 1991). Use of medicinal plants for the treatment and prevention of many

diseases have long been popular. But the lack of scientific support led to a recession for their use. Renewed interest in these plants in this century, led to rigorous scientific studies and laboratory analyses, focused on the role of these plants, and their effective combinations. Dill with the scientific name of *Anethum graveolens* is a plant from the family of umbelliferae. Sex Anthum has a crop specimen in Iran planted in most parts of the world and is flavonoids compounds-rich. Nastaran with the scientific name of *Rosa canina* is a plant from Rosaceae family, native to Europe, western Asia and northeast Africa. Many species are found in Northern forests, Arasbaran region, and other upper areas of other areas of Iran in wild form. This plant is rich in terms of flavonoids compounds and vitamin C (Uggla and Werlemark, 2003). Kargari and Hatamian in 2012, in their study, under the title of combined effect of carnitine and dill extract, on serum lipids in male rats, has been done on 30 male rats with high-fat diet and in this study, dill hydroalcoholic extracts were injected intraperitoneally, and the results show that, hydro-alcoholic dill extracts, had a significant impact on the reduction in triglycerides, LDL and VLDL levels. Montazeri et al, in 2011, in a study on

the methanol extract samples of the Mazandaran region showed that methanol extract of Rosa Canina has a high antioxidant activity and is containing polyphenolic compounds and flavonoids and rich in vitamin c, and has free radical scavenging properties and anti-bacterial properties as well. Roman et al in 2013 in study of biologically active compounds, the antioxidant activity of flavonoids and vitamin c in Rosa Canina in the region of Transylvania in Romania concluded that Rosa Canina is rich in vitamin c. And high levels of vitamin c is due to oxygen available in the environment and increases with increasing altitude, which is due to oxygen depletion, reduced oxidative stress, plant respiration reduction and reducing the destruction of this vitamin. The Genotype of plant and cultivation place, are effective in the amount of total phenols. And purging radicals is linked to phenol content and the amount of flavonoids is depending on fruit development and ripening and accumulation of anthocyanins, and flavonoids them. In Ardabil province, dill plant and Rosa Canina are experimentally used in reducing blood sugar and fat. And in this area Rosa Canina is used as tea and herbal tea, and dill is taken orally. In this study, the effect of Rosa Canina hydroalcoholic extract, and dill hydroalcoholic extract were investigated on the lipoprotein in alloxan-induced diabetic rats.

Materials and Methods
Extraction

Dill stems and leaves and Rosa Canina, are collected from gardens and natural areas around Ardebil. And after confirmation of Agriculture experts in Ardebil, away from sunlight, were dried at room temperature, and the dried plant by electric mill was brought into powder. 300 grams of powdered plant was used through Soxhlet method to produce methanol extract.

Treating mice

In this study, 40 adult male rats, weighing 200-250 g were divided into five groups of eight each: Group I served as control rats (non-diabetic group), and Group II (diabetic control) received alloxan monohydrate in a dose 120 mg / kg during six days on alternate days, and Groups III and IV, received dill and Rosa Canina alcoholic extracts as 300 mg / kg (by intraperitoneal injection) and Group VI received 150 mg / kg equally from each extract with overall volume 300 mg / kg for 10 days. At the end of treatment after **blood** sample collection, blood sugar content, cholesterol, triglycerides, LDL, HDL were measured.

Statistical analysis was conducted using SPSS computer program. In statistical analysis of results, Multivariate MANOVA was used.

Findings

The mean and standard deviation parameters studied can be seen in Table 1

Table 1. Mean ± SD of cholesterol, triglycerides, HDL, LDL and glucose levels in rats under study

Parameters	Non-diabetic control group	Diabetic control group	Group treated with hydroalcoholic extract of dill	Group treated with hydroalcoholic extract of Rosa Canina	Group treated with dill and Rosa Canina hydroalcoholic extracts
Cholesterol mg/dl	70.83 ± 6.27	*115.83± 19.19	**92.5 ± 15.87	**99.00±15.12	**91.00± 9.37
Triglycerides (mg / dl)	82.83 ± 9.02	*162.16± 21.07	**104.16 ± 20.56	**115.66±21.32	**105.16± 9.9
HDL (mg/d)	43.16 ± 4.30	*39.33 ± 2.40	**44.83 ± 4.02	**43.83 ± 2.85	**44.83± 2.61
LDL (mg/dl)	28.5 ± 5.31	*54.83 ± 10.16	**29.83 ± 8.97	**31.82 ± 4.79	**29.5 ± 3.08
Blood glucose (mg / dl)	88.33 ± 8.98	*72.26 ± 350.50	**133.66 ± 20.64	**147.16 ± 30.12	**117.16 ± 11.47

*: Significant difference between diabetic group and control group (P <0/05)

** : It shows significant difference between the treatment groups with extract compared to the diabetic group. P <0.05

As can be seen in Table, cholesterol level in nondiabetic control group (Group 1) is 70.83 mg / dl, in diabetic control group (Group 2), it is equal to 115.83 mg / dl and in diabetic group treated with dill hydroalcoholic extract (Group 3) it is equal to 92.5 mg / dl and in the group treated with Rosa Canina

hydroalcoholic extract (Group 4) it is equal to 99 mg / dl and in the group treated with a combination of both extracts (Group 5), it is equal to 91 mg / dl. Triglyceride level in non-diabetic control group is 82.83 mg / dl, in diabetic control group is equal to 162.16 mg / dl, in diabetic group treated with dill

hydroalcoholic extract is equal to 104.16 mg / dl, in the group treated with Rosa Canina hydroalcoholic extract is equal to 115.66 mg / dl and in the group treated with a combination of both extracts, it is equal to 105.16 mg / dl. The serum HDL levels in non-diabetic control group is 43.16 mg / dl, in diabetic control group is equal to 39.33 mg / dl, in diabetic group treated with dill hydroalcoholic extract is equal to 44.83 mg / dl, and in the group treated with Rosa Canina hydroalcoholic extract is equal to 43.83 mg / dl, and in the group treated with a combination of both extracts is equal to 44.83 mg / dl. The concentration of serum LDL in the non-diabetic control group is 28.50 mg/dl, in diabetic control group is equal to 54.83 mg / dl and in the diabetic group treated with dill hydroalcoholic extract is equal to 29.83 mg / dl and in the group treated with Canina L hydroalcoholic extract is equal to 31.82 mg / dl and in the group treated with a combination of both extracts is equal to 29.50 mg / dl.

Blood sugar levels in non-diabetic control group is 88.33 mg / dl, in diabetic control group is equal to 350.50 mg / dl and in diabetic group treated with dill hydroalcoholic extract is equal to 133.66 mg / dl and in the group treated with Rosa Canina hydroalcoholic extract is 147.16 mg / dl, and in the group treated with a combination of both extracts is equal to 117.16 mg / dl.

T-test for these variables suggests that cholesterol, triglycerides, LDL and serum blood sugar levels in patients treated with the dill extract and Rosa Canina extract and the combination of these two extracts decreased significantly ($P < 0.05$). This reduction in the group treated with dill extract compared to Rosa Canina extract is more, and the combination of both extracts makes more significant impact than each alone. **Serum HDL level** in patients treated with dill and Rosa Canina extracts and the combination of these extracts significantly increased ($P < 0.05$). This increase has been more in the group treated with dill extract and the combination of both extracts compared to Rosa Canina.

Discussion

Diabetes is a disorder of metabolism that occurs for various reasons and comes with different degrees of insulin deficiency or lack of response to insulin. According to this definition, the important role of insulin and significant changes caused in metabolism after its deficiency are better characterized.

Despite the recent medical progresses, this disease has become less deadly but is still the leading cause of blindness and kidney failure. Although there is still no way to cure diabetes, but it is possible to control it successfully. One of the goals for diabetes control is blood sugar and blood fat control. The use of a

balanced diet and taking medicinal herbs, weight control, and following a healthy way of life, may be of particular importance (Henzen, 2012).

Medicinal herbs being rich in natural antioxidant compounds are used in traditional medicine for the control and treatment of many diseases. It is estimated that more than 800 types of plants are used as a traditional local medicine to treat diabetes. According to the results of this study, dill and Rosa Canina hydroalcoholic extracts showed a significant effect in lowering blood glucose and lipid profile. But the impact of dill hydroalcoholic extract is much more than that of Rosa Canina and the combination of both extracts showed more significant impact of dill and Rosa Canina extracts (Wali, 2013).

hydroalcoholic extract of Rosa Canina, according to a study that was done in the case of biologically active compounds (Lattanzio et al., 2011 and Chrubasik et al., 2008) contain flavonoids, vitamin C and phenolic compounds. Studies have shown that oxidative stress is a pathogen factor for beta and endothelial cells dysfunction. Beta cells dysfunction results from long-term exposure to of glucose or free fatty acids. Beta cells are sensitive to Reactive Oxygen Species (ROS) because they are low in terms of secretion of antioxidant enzymes such as CAT, GPX, SOD. As a result, impaired insulin secretion is no surprise (Natheer, 2011). Accordingly, regarding the role of these compounds in the prevention of oxidative stress in diabetes, they may have been able to prevent beta-cell apoptosis and avoid oxidative damage caused by hyperglycemia and create adjustment and the reduction of blood glucose (Wali et al., 2013).

The effect of hypoglycemia of dill extract is probably related to (flavonoids) combination found in quercetin (Englisch, 2000; Vessal et al., 2003 and Nuraliev and Avezov, 1992). The possible mechanism of action of this plant to reduce blood sugar, is the effect on glucose absorption. Antioxidant plant compounds reduce glucose absorption in the intestine. On the other hand, herbal antioxidants have insulin-like effect and increase glucose uptake in peripheral tissues. Other possible action of this plant is to affect the beta cells and the repair and regeneration of damaged cells, and stimulation of the cells to insulin secretion (Ashok and Rao, 2002). Our studies are consistent with Nargol Ahmadi Mahmoodabadi in 2007, Hajhashemi and Abbasi in 2008, Kargari and Hatamian in 2012, Yazdanparast and Alavi in 2001 who tested the effect of dill hydroalcoholic extract in diabetic rats. We have obtained similar results which are based on reducing the amount of glucose, cholesterol, triglycerides, LDL and increasing HDL. Also, our study is consistent with Aslan et al in 2009 implying that investigating anti-diabetic properties

and antioxidant property of ethanol extract of Rosa Canina concluded that probably other biologically active constituents such as vitamins B and C, carotene,

tannins, carbohydrates, pectin and Flavonoids are responsible for anti diabetic property (Orhan et al., 2009).

Conclusion

Dill and Rosa Canina hydroalcoholic extracts reduce blood sugar, cholesterol, triglycerides and LDL and increase HDL in diabetic rats. Comparing therapeutic effect of dill and Rosa Canina extracts in diabetic rats show that dill extract has better effect in reducing blood glucose and lipid profile than that of Rosa Canina extract. And the composition of both extracts has more significant impact than Rosa Canina alone. However, more research is needed to understand the molecular mechanism of antioxidant combinations available in these plants.

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