

Effect of *Biebersteinia Multifida* DC. Root Extract on Cholesterol in MiceShahrzad Khakpour,*¹ Meisam Akhlaghdoust,² Sara Naimi,² S. Mohammad-Javad Mirlohi,² Media Abedian,² Nazilla Sadat Seyed-Forootan,² Fatemeh Foroughi²

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| Article information | Abstract |
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| <p>Article history: Received: 9 Oct 2012 Accepted: 23Jan 2013 Available online: 2 Feb 2013 ZJRMS 2013; 15(11): 49-51</p> <p>Keywords: Bibersteinia multifida DC. HDL LDL Mice</p> <p>*Corresponding author at: Department of Physiology, Medical Sciences Research Center, Islamic Azad University, Tehran Medical Branch, Tehran, Iran. E-mail: shahrzad_khakpour@yahoo.com</p> | <p>Background: Hypercholesterolemia and atherosclerosis are the most common causes of mortality and disability, especially in developed countries. The aim of this research was to evaluate the effect of <i>Biebersteinia multifida</i> DC. root extract on HDL and LDL blood level.</p> <p>Materials and Methods: In this experimental study, 35 male Balb/c mice were randomly divided in five groups such control, sham, and experimental groups which received <i>Biebersteinia multifida</i> DC. root extract with the doses of 4, 5 and 10 mg/kg; three last groups were daily fed orally, for thirty days. HDL and LDL blood serum levels were measured, in the last day and compared with control and sham groups.</p> <p>Results: The results after 30 days gavage of 4, 5 and 10 mg/kg of <i>Biebersteinia Multifida</i> DC. root extract showed that the root extract decrease of LDL level significantly. The doses of 4 and 5 mg/kg of the root extract were the effective dose in decreasing the serum HDL level. However, 10 mg/kg dose of root extract has no significant effect on HDL level in comparison with control and sham groups. 10 mg/kg of root extract had the maximum effect on reducing LDL level.</p> <p>Conclusion: According to this study, it is suggested that the root extract of <i>Biebersteinia multifida</i> DC. Can be efficient to reduce the level of HDL and LDL in blood serum.</p> <p>Copyright © 2013 Zahedan University of Medical Sciences. All rights reserved.</p> |

Introduction

Biebersteinia multifida DC. plant is from the family of Geraniaceae, which is one of the local plants of Iran with the local name of Chelle Dagh [1-4]. *Biebersteinia multifida* DC. plant with stem around 20-70 cm, thick root, and scattered clustered yellow flowers is one of the west local plants of Iran [5-6]. The power of the root of this plant in the form of cream is used for curing muscle disorders in traditional medical practices [7]. Recent studies emphasizes and confirms the effect of the root of this plant in curing the skeleton-muscle disorders, rehabilitating bone fractures [3-7], easing pain as well as its properties as an anti-inflammatory [2-4].



Figure 1. *Biebersteinia multifida* DC. plant

According to other published scientific information, this plant is effective in decreasing the severity of catatonia

resulting from perphenazin in Parkinson disease and it is also effective as antidepressants, anti-rheumatic [1-8]. In *Biebersteinia multifida* DC. plant, some compounds such as vasicinone, compounds of polysaccharide polypeptide have been reported as effective substances [4-9]. In addition to these, in traditional medical practices they use the boiled *Biebersteinia multifida* DC. plant for decreasing blood fat and in this paper the aim is to study this effect scientifically. Based on the previous researches, the main reason of heart and vascular is hypercholesterolemia [10]. So many results and finding indicate the hypercholesterolemia effect, HDL, LDL on obesity, diabetes, thyroid diseases, renal and hepatic disorders. According to published statistics, around 40% of all mortalities in Iran are due to heart and vascular diseases resulted from hypercholesterolemia [11]. Therefore as a result of considerable effect of HDL and LDL of blood cholesterol on emergence of different diseases we have decided to study the effect of extract of the root of *Biebersteinia multifida* DC. plant on cholesterol level of HDL and LDL of the blood serum, which is a new project.

Materials and Methods

The current research is experimental intervention method and has been performed in spring 2011, in the research center of Islamic Azad University, Medical

Tehran branch for duration of 1 month. In these research 35 male mature laboratory mice with the age of around 2 month of the Balb/c breed with a weight range of 20 to 25 g. has been purchased from Pasteur Institute. The laboratory mice were being kept in $23\pm 2^{\circ}\text{C}$ of temperature and pellet as their food, enough water and standard conditions of light (12 hours of lightness and 12 hours of darkness).

The mice under study has been divided into 5 groups of 7 mice accidentally, including controlled (untouched), observed (receiving extract solution), experimental groups receiving extract of the plant in doses of 4, 5 and 10 mg/kg and the extract of the *Beibersteinia multifida* DC. has been gavages to them once a day for 30 days in edible form to the mature male mice of experimental groups. The time of gavages with different doses was every morning at 10 to 11 am the duration of study and the amount of each dose have been determined based on previous studies [2].

The root of *Beibersteinia multifida* DC. plant has been gathered from western part of Iran and was identified by pharmacognosy department of Tehran University. The root of the plant has been dried in standard condition away from light, humidity, microbe contamination in dry shade and was powdered by electrical grinder and has been kept in freezer. For preparing the extract of the root of the plant the percolation method with high pressure has been used. The prepared powder of the root has been mixed with alcohol of 80% and was dried for 24 hours in a sterile environment. The prepared powder of the root of the plant was mixed in percolator device containing water and ethanol solution with the ratio of 1 to 2 and after 24 hours, followed by filtration in the room temperature and an environment without any microbe was extracted. Then obtained filtrate was dried in a temperature between $30-40^{\circ}\text{C}$ in an environment without any microbe.

The animals in the 3th day, two hours after taking the medicine, were put under mild anesthesia with ether 2 and after anatomy, the blood was taken from their heart with a syringe about 2 ml from each animal. Then HDL and LDL of the blood serum of the animals have been measured with Radio Immune Assay method and were compared with the controlled and observed groups. It should be mentioned that all the moral considerations regarding experiments on animals have been taken care of as per the animal experiments in Helsinki statement of ethical principles [7].

Statistical study of the obtained findings with the use of SPSS-17 software and ANOVA program statistically and $p < 0.05$ was considered as significant difference. All the data have been shown in the form of deviation from index.

Table 1. The effect of taking edible hydro alcoholic extract of the root of *Beibersteinia multifida* DC. plant in doses of 4, 5, and 10 mg/kg on LDL and HDL of the blood serum of mice

| Group | Sham | 4 mg/kg | 5 mg/kg | 10 mg/kg | Control | p-Value |
|-------------|------|---------|---------|----------|---------|---------|
| Serum level | | | | | | |
| HDL | 100 | 83.29 | 81.57 | 60.85 | 100 | 0.05 |
| LDL | 50 | 42.29 | 39.43 | 50 | 50 | 0.05 |

Results

Considering the obtained results, it appears that the extract of *Beibersteinia multifida* DC. plant with doses of 4, 5 and 10 mg/kg for a duration of 30 days in a defendant way to dose results in a significant decrease of LDL in animals blood serum in comparison to controlled group. Doses of 4 and 5 mg/kg result in a relative decrease in LDL ($p < 0.05$), while the extract of *Beibersteinia multifida* DC. plant with a dose of 10 mg/kg results in a significant decrease in the rate of LDL ($p < 0.01$). Also edible consumption of the hydro-alcoholic extract of the root of the plant with doses of 4 and 5 mg/kg for 30 days in a dependent way to dose resulted in a significant decrease in HDL of the blood serum of the animals. However, the 10 mg/kg dose did not cause any change in the HDL rate of blood serum (Table 1).

Discussion

The current research indicates that consumption of extract of *Beibersteinia multifida* DC. plant can significantly decrease the LDL level. Increase of the lipoprotein cholesterol with low density is one of the most common reasons for heart vascular diseases [12], and is one of the most factors of death in so many countries including Iran [1]. It has been reported that the increase of the level of cholesterol in eating diet will result in creating atherosclerosis diseases due to increase of the rate of lipid peroxidation [13-16]. On this basis with decreasing the cholesterol level of LDL and increasing the capacity of its anti-oxidant, heart and vascular diseases can be prevented [17]. For decreasing the level of LDL and cholesterol, usage of medicines with less side effects and more effective are so much important [18, 19], so the plants used in traditional medical practices can be a good option.

In the previous studies, the effect of *Beibersteinia multifida* DC. plant in curing different diseases in human and animals' samples has been presented. Anti-inflammation, easing pain, repair of bone fractures effects of this plant have been studied [2-4] and some of the studies have shown the anti-depressant and synergy of this plant. Studies show the effectiveness dependent on the dose of extract of *Beibersteinia multifida* DC. plant in curing depression, decreasing severity of catatonia resulting from perphenazine in Parkinson disease. Also considering the results of some of the studies has reported the effectiveness of this plant's root on dopaminergic system, depending on the dose. 1, 8 it should be mentioned that considering the studies of other researches, so far no research has been performed regarding the effect of the extract of the root of *Beibersteinia multifida* DC. plant on the levels of LDL and HDL. Due to the obtained results after 30 days of edible taking of the extract of the root of *Beibersteinia multifida* DC. plant in doses of 4, 5, and 10 mg/kg, significant decrease has been observed in the level of LDL. Doses of 4 and 5 mg/kg of the extract of the root of *Beibersteinia multifida* DC. plant are effective on the rate of the HDL in blood serum. However, the dose of 10 mg/kg of the extract did not make any change in the rate

of HDL of blood plasma in comparison with the controlled group. Among the different doses of the extract, the dose of 10 mg/kg has the highest effect on decreasing the LDL level in blood serum. It appears that consumption of extract of the root of *Biebersteinia multifida* DC. plant can be effective in regulating the blood cholesterol. Hence, it is recommended due to the side effects of chemical medicines, herbal medicines would be used due to their fewer side effects. With more studies the basic scientific of these effects can be specified and determined.

For understanding the effect of plants in traditional medical practices and for a better understanding of the mechanism of the effect of the extract of the root of *Biebersteinia multifida* DC. plant, it is recommended to perform experiments on humans and animals with a greater and bigger sample size and for a more duration of time. In addition, it should be mentioned that changes in

the ratios of LDL and HDL have not been studied and therefore needs more studies.

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Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

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References

- Rostami R, Haghghian AR, Golestan B. [The effect of Citrus juice on blood lipids in hypercholesterolemic individuals] Persian. *Diabetes Lipid J* 2009; 5(2): 99-107.
- Khakpour SH, Hadipour MJ. [The effect of *Biebersteinia multifida* DC root extract on catatonia induced by Perfinazin in mice] Persian. *Danesh-e-Zisti Iran J* 2008; 3(3): 7-11.
- Amouoghli TB, Mohajeri D. [Protective effect of edible turmeric (*Curcuma longa* Linn.) powder on early hepatic injury in diabetic rats]. *Feyz* 2010; 14(3): 190-199.
- Arifkhodzhaev AO, Rakhimov DA. [Polysaccharides of saponin-forming plants & polysaccharides of the aerial parts of *Biebersteinia multifida*] Russian [Abstract]. *Chem Nat Compd* 2002; 38(5): 407-409.
- Arifkhodzhaev A, Arifkhodzhaev K, Khondratenko S. [Isolation and characterization of polysaccharides from *Biebersteinia multifida*] Russian [Abstract]. *Chem Nat Compd* 1986; 16(4): 755-757.
- Bakker FT, Culham A, Hettiarachi P, et al. Phylogeny of *Pelargonium* (Geraniaceae) based on DNA sequences of three genomes. *Taxon* 2004; 53(1): 17-31.
- Huang C, Fornage M, Lloyd-Jones DM, et al. Mitochondrial substitution rates are extraordinarily elevated and variable in a genus of flowering plants. *Proc Natl Acad Sci USA* 2004; 101(51): 17741-17746.
- Parkinson CL, Mower JP, Qiu YL, et al. Multiple major increases and decreases in mitochondrial substitution rates in the plant family Geraniaceae. *BMC Evol Biol* 2005; 5(3): 73-78.
- Farsam H, Amanlou M, Dehpour AR and Jahaniani F. Antiinflammatory and analgesic activity of *Biebersteinia multifida* DC. root extract. *J Ethnopharmacol* 2000; 17(2): 443-447.
- Hadipour-Jahromy M, Khakpour SH, Farnaghi S. [The study of Commiphora Mukul resin extract increases physical stamina in male rat] Persian. *Med Sci J Islamic Azad Univ Tehran Med Branch* 2008; 18(3): 149-153.
- Jain S, Kathiravan MK, Somani S and Shishoo J. The biology and chemistry of hyperlipidemia. *Bioorg Med Chem* 2007; 15(14): 4674-4679.
- Liu K. Longitudinal association of PCSK9 sequence variations with LDL-cholesterol levels: The coronary artery risk development in young adults study. *Circ Cardiovasc Genet* 2009; 2(4): 354-361.
- Kurbanov D, Zharekeev B. [Alkaloid of *Biebersteinia multifida* and *Peganumharmala* from the karakalpak ASSR] Russian [Abstract]. *Him Prir Soedin* 1974; 5: 685-686.
- Kawamoto R, Tabara Y, Kohara K, et al. Low-density lipoprotein cholesterol to high density lipoprotein cholesterol ratio is the best surrogate marker for insulin resistance in non-obese Japanese adults. *Lipids Health Dis* 2010; 9: 138.
- Khakpour SH, Hadipour-Jahromy M, Fotros A. [Effect of *Biebersteinia multifida* root extract on physical stamina in male mice] Persian. *Iran J Biolog Sci* 2007; 2(1): 31-37.
- Grapefruit juice influences certain cholesterol drugs. *Mayo Clin Health Lett* 2000; 18(3): 4.
- Tian L, Liu Y, Qin Y, et al. Association of the lowdensity lipoprotein cholesterol /high-density lipoprotein cholesterol ratio and concentrations of plasma lipids with high-density lipoprotein subclass distribution in the Chinese population. *Lipids Health Dis* 2010; 9: 69.
- Muse SV. Examining rates and patterns of nucleotide substitution in plants. *Plant Mol Biol* 2000; 42(1): 25-43.
- Zhang XF, Hu BL, Zhou BN. Studies on the active constituent of Tibetan herb *Biebersteinia heterostemon* Maxim. *Acta Pharmaceutica Sinica* 1995; 30(4): 211-21.

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