

## Comparison of the *Descurainia sophia* and Lovastatin effect on the LDL cholesterol reduction, a clinical trial study

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### ABSTRACT

Hypercholesterolemia is the major risk factor for cardiovascular diseases. Considering the high prevalence of CVD in Khorramabad city, and the inhibitory effects of flavonoides on the LDL cholesterol oxidation, and the flavonoides present in *Descurainia Sophia*, the aim of this study was to compare the effects of *Descurainia sophia* and lovastatin on LDL cholesterol reduction for the first time. This research was carried out as a double blind study on 80 cardiovascular patients with high LDL cholesterol. Sampling was carried out by consecutive non probability. All patients signed the informed consent form and were randomly divided into two groups: A= intervention group that take 20mg of lovastatin with dinner + 8 grams of *D.sophia* per day before lunch, B= control group that take 20mg of lovastatin with dinner+ placebo per day before lunch. LDL cholesterol of all patients was measured before and after 5 months of the intervention. The mean and the standard deviation of LDL cholesterol in the intervention group were 209.40±52.649 and 106.85±23.368 before and after intervention, respectively. It was 198.50±38.443 and 108.233±841 in the control group. This difference was not proven statistically meaningful. Results showed that consumption of 8 grams of *D.sophia* per day+ lovastatin can reduce the LDL level of the patients' serum, although this reduction was not meaningful in comparison to the lovastatin. We propose that more thorough studies must be carried out to achieve further results about the effect of *Descurainia sophia* on LDL cholesterol.

**KEY WORDS:** Cardiovascular disease, *Descurainia Sophia*, Flavonoids, Cholesterol.

### 1. INTRODUCTION

Cardiovascular diseases, especially Atherosclerosis, are the number one cause of death in the world (Bays, 2012). 48% of annual deaths are due to these diseases. Cardiovascular diseases are also the main cause of non-contagious deaths among people under 70 years old (39 %), in Iran non-contagious diseases make up 72% of annual deaths, 45% of these diseases are cardiovascular diseases (Baghianimoghadam, 2013). One of the most lethal cardiovascular diseases is hypercholesterolemia (Kannel and Castelli, 1997). In the USA almost half of adults have a cholesterol level higher than 200 mg/dl. Studies carried out in Iran have shown that 23.9% and 12.4% of men and women, respectively, suffer from hypercholesterolemia (Majdi, 2012). Reducing blood cholesterol levels can reduce cardiovascular disease related deaths. The statins group E drugs are effective in reducing and controlling hypercholesterolemia and dyslipidemia (Harison, 2006). Interventional studies carried out on 90056 subjects have shown that the statins group of drugs has a meaningful effect on controlling and reducing cholesterol levels, LDL cholesterol levels (Sasaki, 2008). Today controlling peoples diets is the best way to control cholesterol levels but if diet change is of no effect then drugs are used (Safari, 2003). Today the science of herbal drugs has grown, herbal and chemical drugs are being prescribed to treat different diseases (Safdari, 2010). The WHO has announced that 80% of people from around the globe are, in some way, using herbs and plants for disease treatment (Akbari, 2011). Humans showed an intake of 0.023 to 1 gram of flavonoid components per day. Flavonoids are active in many biological activities, the oxidation effect of flavonoids has been studied more (Vaya, 2003). Epidemiological studies have shown that the intake of flavonoids has an opposite effect on the number of cardiovascular related deaths, the higher the flavonoid intake the lower the death rates (Kasaoka, 2002). *D. sophia* contains 15 types of flavonoides .e.g.: kaempferol, quercetin, isorhamnetine, serotonin,  $\beta$ -sitosterol,  $\beta$ - amyryne, and herbal choleasterol (ergosterol) (NH, 2009). The seeds of *Descurainia sophia* are 15-35×1-5 millimeters in size. They are dark yellow or light brown in color, the seeds are smooth and oval shaped, one side of this oval seed has a slash and a clear brown ring on it (GH, 1991).

Flavonoids control LDL cholesterol oxidization, *D. sophia* contains flavonoids. In comparison to chemical drugs *D. sophia* has much less side effects and is very cheap. As a results of the afore mentioned factors we decided to study the effects of *D. sophia* on Khorramabad's Ashayer hospital patients suffering from cardiovascular diseases and high LDL cholesterol levels.

## 2. MATERIALS AND METHODS

The present study was a double blind clinical trial study carried out on 80 cardiovascular diseases patients of Khorramabad's Ashayer hospital, the study was carried out from June 2012 until December 2012. The subjects were chosen by consecutive non probability method. Patients were selected according to certain norms: they had to be between 40-70 years of age, should not have had a history of consuming anti-lipids, statins, and steroid-based drugs, they had to have an LDL cholesterol level higher than 160 mg/dl, and they had to sign the informed consent form for participating in the study. After undergoing clinical examination, the subjects were taken to Ashayer hospital laboratory in order to calculate their LDL cholesterol levels. Also their diets were analyzed through a questionnaire. Patients were divided into two groups by stratified method, randomly: Group A: intervention group, these patients were given 20 mg of lovastatin daily+ 8 grams of *D. sophia*, Group B: control group: these patients were only given 20 mg of lovastatin daily. Before starting the intervention, the LDL cholesterol levels of the two groups were analyzed. The dose of lovastatin was given under the supervision of a heart specialist (cardiologist). According to traditional medicine a dose of 5-10 grams of *D. sophia* should be taken daily (HS, 2003; Naseri, 2007). After consulting with the heart specialist and gaining the consent of the herbal medicine research center, we decided to give the subjects a dose of 8 grams of *D. sophia* per day.

**Group A:** the group who received lovastatin+ *D. sophia* received 240 capsules of *D. sophia* each month over a 5 month period. Also they ate 20 mg of lovastatin daily over a 5 month period. All the *D. sophia* given to the study was bought from one specific store.

**Group B:** the group who received lovastatin, they received 20 mg lovastatin daily over a 5 month period. After 5 months of intervention, blood samples of all subjects were taken and the LDL cholesterol was measured.

At the end of study, the mean and standard deviation of LDL cholesterol levels and also mean LDL reduction levels of patients was compared. The present study was afforded by the ethical unit of the Lorestan University of Medical Sciences; also this research was registered at IRCT Network with the ID code: IRCT2013012612277N1. Furthermore, all patients willingly filled and signed the informed consent form.

## 3. RESULTS

From the 80 patients, one subject passed away before completing the study duration, thus at the end of the study there were 40 patients in the intervention group and 39 patients in the control group. The mean and standard deviation of LDL cholesterol levels of the intervention group was  $209 \pm 52.649$  and after five months of intervention with *Descurainia sophia* and lovastatin, LDL level was  $106.85 \pm 23.368$  mg/dl. In the control group, LDL level was  $198.50 \pm 38.443$  and after 5 months of only receiving lovastatin, their LDL level was  $108.233 \pm 23.841$ .

The results showed that in both the intervention and control groups most of the subjects were in 50-59 age group, and that the least number of subjects were in the more than 70 age group (table 1). According to results of the  $\chi^2$  test there was no significant relation between the age and experimental groups of patients.

In this study most of the subjects were illiterate; according to the  $\chi^2$  test, there was no significant relation between subjects' literacy and experimental group (table2).

With the exception of 1 subject, all the subjects of the intervention group were married. According to fisher's test, there was no meaningful relation between subjects' marital status and experimental group.

Most of the subjects in both of the groups took special drugs. None of the subjects had any history of being on a certain diet. Most of the subjects did not suffer from hypo or hyper thyroidism. According to the fisher test there was no meaningful relation between hypo or hyper thyroidism, kidney diseases, high blood pressure, and the type of the experimental group.

According to table 3 in both groups after 5 months of consuming *Descurainia sophia*+ lovastatin or only consuming lovastatin the mean LDL cholesterol levels of the patients decreased in a meaningful way, but this reduction in two groups was not significant.

Moreover, after 5 months of consuming *Descurainia sophia*+ lovastatin or only consuming lovastatin, the mean Total cholesterol and Triglyceride blood levels of two patient groups decreased in a meaningful way ( $p < 0.05$ ), but this reduction in two groups was not significant. Also after intervention, HDL cholesterol levels of the two patients group was slightly increased, that, this increasing was not meaningful not through the each group and nor between two groups (table4).

## DISCUSSION

The present study, a double blind clinical trial, was carried out on 79 patients suffering from cardiovascular diseases and high LDL cholesterol levels. After 5 months of intervention, we saw a significant reduction in the total cholesterol, LDL cholesterol and triglyceride levels of both the groups. At the start of the study the LDL levels of the subjects within the groups were not equal; the intervention group had an LDL level of 209, the control group 198. Comparing the LDL levels between the groups and within the groups seemed difficult, thus we calculated the mean reduction of LDL levels between the groups. The results showed that mean reduction of LDL levels in the

intervention group was more than the control group, 102 in comparison to 89, but this difference was not statistically significant ( $P=0.298$ ). The existence of different types of flavonoids in *Descurainia sophia* could be one of the factors influencing the decrease in blood cholesterol levels. Many studies have been carried out to analyze the decreasing effects different flavonoids have on blood lipids and their effects on improving cardiovascular diseases.

Safari, studied the effects of 6 flavonoids, epigenin, genistein, morin, naringin, pelargonidin, and quercetin. Safari reported that quercetin and morin had a greater effect in reducing the formation of peroxidase of lipids and TBARS (the effective material of thiobarbituric acid) (Safari, 2003). Knerl, found that consuming high doses of quercetin reduces the death rates among patients suffering from cardio ischemic diseases (Knerl, 2002).

Frankel, reported that after vitamin E, the most effective material that controls LDL oxidation is the phenolic material found in red wine (Frankel, 1993). De-Rijke, reported that, regarding in vivo study, consumption of red wine has no effect on LDL oxidation (De-Rijke, 1996). Aviram, found that consumption of foods rich in poly phenols e.g. red wine, Glycyrrhizin glabra, reduces LDL oxidation (Aviram, 1998). Nawal and Atta reported that, according to their studies, the *Descurainia sophia* extract is antiseptic, anti-allergic, and reduces fever (NH, 2009). Lee, and Wang, managed to extract 15 different chemical compounds, including quercetin and kaempferol, from *Descurainia sophia* seeds. They reported that the extracted compounds are anti inflammatory and anti-cancerous (Lee, 2013; Wang, 2004). Tang, extracted 3 compounds from *Descurainia Sophia*, the compounds could stop saturation of linoleic acid (Tang, 2007). Also this study showed that lovastatin and nor lovastatin+ *Descurainia sophia* have no significant effect on increasing HDL cholesterol of two patient groups. In the present study we did not find a statistically meaningful relation between the independent variables, age, literacy, diabetes, high blood pressure, and receiving *Descurainia sophia* and lovastatin. The mentioned variables were not found influential in the reduction effects of *Descurainia sophia* and lovastatin.

**Table.1. Subjects divided according to age and experimental group**

| Groups of Patient   | Age Category |           |             |            | Total      |
|---------------------|--------------|-----------|-------------|------------|------------|
|                     | 50>          | 50-59     | 60-69       | 70≤        |            |
| A<br>(intervention) | 12<br>%30    | 18<br>45% | 7<br>17/5%  | 3<br>7/5%  | 40<br>100% |
| B<br>(control)      | 10<br>25%    | 18<br>45% | 6<br>15%    | 6<br>15%   | 40<br>100% |
| latoT               | 22<br>27/5%  | 36<br>45% | 13<br>16/3% | 9<br>11/3% | 80<br>100% |

**Table.2. Subjects divided according to literacy and experimental group**

| Groups of Patient   | Level of Literacy |                   |            | Total      |
|---------------------|-------------------|-------------------|------------|------------|
|                     | Illiterate        | Diploma and Under | University |            |
| A<br>(intervention) | 26<br>65%         | 11<br>25/5%       | 3<br>7/5%  | 40<br>100% |
| B<br>(control)      | 28<br>70%         | 10<br>25%         | 2<br>5%    | 40<br>100% |
| Total               | 54<br>67/5%       | 21<br>26/3%       | 5<br>6.3%  | 80<br>100% |

**Table.3. Comparison of LDL cholesterol, before and after intervention in two groups**

| Groups of Patients | LDL cholesterol Before treatment (mg/dl) | LDL cholesterol After treatment (mg/dl) | Rate of LDL reduction (mg/dl) | ** P - value |
|--------------------|--|---|-------------------------------|--------------|
| a                  |  |   |                               |              |
| number             | 40                                       | 40                                      | 40                            |              |
| mean               | 209.40                                   | 106.85                                  | 102.55                        | <./001       |
| SD                 | 52.649                                   | 23.368                                  | 54.118                        |              |
| b                  |  |   |                               |              |
| number             | 40                                       | 39                                      | 39                            |              |
| mean               | 198.50                                   | 108.333                                 | 89/871                        | <./001       |
| SD                 | 38.443                                   | 33.841                                  | 53.370                        |              |
| Total              |  |   |                               |              |
| number             | 80                                       | 79                                      | 79                            |              |
| mean               | 203/95                                   | 107/58                                  | 96/29                         | <./001       |
| SD                 | 46.131                                   | 28.836                                  | 83.784                        |              |
| * P-value          | 0.294                                    | 0.821                                   | 0.294                         |              |

\* Related to the covariance test. All the analyses were performed bearing in mind the manipulative effects of age group, level of literacy, intake of any special drug, and being diabetic

**Table.4. Comparison of Total cholesterol, Triglyceride and HDL cholesterol before and after intervention in two groups**

| Blood parameter/ intervention group | Number | Mean $\pm$ SD               | Mean $\pm$ SD              | P - value<br>** |
|-------------------------------------|--------|-----------------------------|----------------------------|-----------------|
|                                     |        | (mg/dl)<br>Before treatment | (mg/dl)<br>After treatment |                 |
| Total cholesterol                   |        |                             |                            |                 |
| a                                   | 40     | 285.11 $\pm$ 38.92          | 184.20 $\pm$ 27.94         |                 |
| b                                   | 39     | 277.60 $\pm$ 28.16          | 186.2308 $\pm$ 37.52       | <./05*          |
| HDL Cholesterol                     |        |                             |                            |                 |
| a                                   | 40     | 49.26 $\pm$ 8.71            | 52.125 $\pm$ 16.24         |                 |
| b                                   | 39     | 47.57 $\pm$ 12.03           | 51.154 $\pm$ 14.82         | >./05           |
| Triglyceride                        |        |                             |                            |                 |
| a                                   | 40     | 228.67 $\pm$ 22.45          | 184.20 $\pm$ 27.94         |                 |
| b                                   | 39     | 231.13 $\pm$ 25.21          | 186.2308 $\pm$ 37.52       | <./05*          |

\* Related to the covariance test. All the analyses were performed bearing in mind the manipulative effects of age group, level of literacy, intake of any special drug, and being diabetic.

#### 4. CONCLUSION

We propose that because there have not been studies on the reducing effects of *Descurainia sophia* on lipid profiles such as total cholesterol, LDL and HDL cholesterol and triglyceride levels and that in the present study the number of the patients was not great and the subjects had to consume many capsules each day, more thorough studies be carried out. we propose that the studies be carried out in which the subjects receive higher doses of *Descurainia Sophia*, the study be carried out over a longer period of time and that the subjects receive *Descurainia sophia* in solution or sachet form.

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**Conflict Of Interest:** There is not any conflict of interest in this study.

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