

# Effect of *Cinnamomum Cassia* on Lipid Profile of Apparently Healthy Subjects

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**Abstract-**The objective of this study is to detect the effect of *Cinnamomum Cassia* (or cassia cinnamon, known in Sudan as Cinnamon) on lipid profile of apparently healthy subjects. To achieve this objective, 84 apparently healthy volunteers, between 30 and 60 years old, 42 of them (21 female, 21 male) were given one gm of grinded cinnamon for 60 successive days, and the other 42 (21 female, 21 male) given one gm of placebo (whole ground wheat) for the same period. All patients were interviewed before the study for their diet and daily activity with continuous assessment during the duration of the study. The serum LDL (low density lipoprotein), HDL (high density lipoprotein) and triglyceride, of both groups were measured before having *Cinnamomum Cassia*, in 45<sup>th</sup> day, and in the 60<sup>th</sup> day using Auto analyzer XL 7-8036 (selctra xl) .LDL values for volunteers, was changed from (83.1 mg/dl, before, to 70 and 66.5 mg/dl of blood in the 45<sup>th</sup> and in the 60<sup>th</sup> day of having 1gm. of *Cinnamomum Cassia* with a reduction of 15.76% and 19.97% respectively. A reduction of 15.38% and 17.38 % in the mean serum triglycerides between values before and in 45<sup>th</sup> and 60<sup>th</sup> day following *Cinnamomum Cassia* was observed. Values changed from 105.3 to 89.1 to 87 mg/dl of blood respectively. The starting mean of fasting HDL in apparently healthy volunteers was 38.3 mg/dl of blood, which was raised to 39.9 mg/dl, (4.2%) and 40 mg/dl of blood, (4.44%) in the 45<sup>th</sup> and 60<sup>th</sup> day of having 1 gm of *Cinnamomum Cassia*.

**Index terms:-** *Cinnamomum Cassia*, LDL, HDL, Triglycerides

## I. INTRODUCTION

Cholesterol is a natural substance made by the body, about 75% is produced by the liver, and the remaining 25% comes from the food.

Cholesterol plays a vital role in maintaining cell membranes and synthesizing hormones.[1] Elevated blood cholesterol levels, which is the most worrying issue to human health these days, can build up in arteries causing atherosclerosis, which can lead to serious medical problems such as heart attack or stroke [2]. One third of adults have high cholesterol levels [3]. The American Heart Association recommends all adults over age 20 should have their cholesterol levels checked every four to six years. [3] Low density lipoprotein (LDL), often tends to deposit on the walls of the arteries, forming artery-narrowing plaque, when combines with white blood cells, which restricts blood flow. The optimal level of LDL cholesterol is 100 mg/d, or lower, if there is any risk of heart disease or diabetes [4]. High density lipoprotein (HDL) cholesterol, works to keep the LDL, from building up in arteries. The higher the HDL, the better. HDL levels of 60 mg/dL and higher can help reduce risk for heart disease [5,6]. Normal levels of triglycerides are 150 mg/dL and lower. Levels higher than that can raise risk for heart disease. Obesity, diabetes, smoking, alcohol abuse, and lack of exercise can all lead to high triglyceride levels [7].

Total cholesterol levels of 200 mg/dL or lower is considered optimal, higher levels can cause greater risk for developing heart disease. [7, 8] Cholesterol ratio, is the total cholesterol divided by HDL cholesterol, the lower the ratio, the lower the risk of heart disease. Ratio of 5 to 1 or lower is recommended [3]. The optimal ratio is 3.5 to 1. [9] For most people, the cholesterol in eaten food has a minimal effect on blood cholesterol levels.

Responders, who are affected by food high in cholesterol are only about 30% of people, they should avoid foods high in saturated fats and trans fats, such as oil, fatty meats, full fat dairy products, egg yolks [3, 7].

The risk factors for high cholesterol, are diets high in Trans fats, saturated fats, and cholesterol for Responders”, being overweight or obese, Sedentary lifestyle [10]. Unavoidable risk factors are age, gender and family history [9], Women generally have higher levels of HDL, because of the estrogen hormone which tends to raise HDL levels until menopause, then triglyceride levels start to rise, so it is important for women approaching menopause to eat a healthy diet, and maintain a healthy weight to help manage blood cholesterol levels. [11] Atherosclerosis, begins in childhood, and may play a role in development of heart disease in adulthood. Children with family history of high cholesterol, coronary atherosclerosis or any form of heart disease or heart attack should have their cholesterol levels checked. [7,12] The American Heart Association recommends children should be encouraged to exercise regularly, maintain a healthy weight, eat a healthy low fat diet with plenty of fruits and vegetables. [13-15] In case of high blood level of cholesterol, it can be very helpful to change diet and lifestyle to lower cholesterol. [10, 16] Fruits and vegetables, lower LDL. Moreover, they contain antioxidants that can be beneficial. Eating vegetables and fruits often results in eating fewer high-fat foods, this can lower blood pressure and promotes weight loss.[14,17] Fish Especially fatty one, as it is high in omega-3 fatty acids and low in saturated fat, is beneficial. Oatmeal or whole-grain cereal have fiber and complex carbohydrates that help to feel fuller for longer, so help to reduce LDL [1, 18] . Nuts help to lower cholesterol because as they are high in monounsaturated fat. Unsaturated fats (in sesame, olive, and safflower oils) lower LDL. Whole grains like beans, whole-wheat bread, and brown rice are high in fiber that can help lower cholesterol. [19] Short intervals of regular exercise can help lower LDL cholesterol and raise HDL cholesterol. Maintain an ideal weight for lower blood pressure and heart disease risk [1,3,7,9,20].

Around us a lot of herbs which are very popular, and of great health benefits, among them is *cinnamomum Cassia*, which is known since ancient times, every day scientists discover a new benefit of it, has been found to have a positive impact on memory and brain function,

has anti-clotting and anti-microbial actions, its calcium and fiber improve colon health. It is soothing for the stomach and may aid in ulcer prevention, suppresses bacteria that can lead to urinary tract infections and fungus related to yeast infections and has antioxidant effect [ 9,10,18].

Regarding its use as lipid lowering, some scientists worked on this effect on diabetic patients with controversial results, which made it of great interest to conduct this study [19, 20, 21, 22].

## II. MATERIALS AND METHODS

A prospective study was performed in the period of December 2013 – December 2014, in Omdurman - Khartoum state, Sudan. 84 apparently healthy subjects, between 30 and 60 years old , 42 of them (21 female , 21 male) were given 1 gm. of grinded *cinnamomum cassia*, as powder, for 60 successive days , and the other 42 (21 female, 21 male) given 1 gm of placebo (whole grinded wheat ) for the same period HDL , LDL, Serum triglyceride were measured before administration of *cinnamomum cassia*, in day 45 and in the 60<sup>th</sup> day using the very advanced auto analyzer XL 7-8036 (selctra xl) . All volunteers were interviewed before the study, for their diet and daily activities with weekly assessment, to insure that there is no change in diet as well as daily activities, Statistical analysis was done using t-test- simple paired test, with  $p < 0.05$  as significant.

### Preparation of *cinnamomum cassia*

*Cinnamomum cassia*, that imported from china, bought from the main importers in Omdurman – (whole sale market), backed in sealed containers, with the permissible limits of moisture , free of mold.

*Cinnamomum cassia* was grinded and packed in bottles, given with a measure (spoon of ½ gm)

Inclusion criteria of volunteers -  
Aging between 30 – 60 years old  
Apparently free from diseases  
Easy to contact.  
Co-operative.

## III. RESULTS AND DISCUSSION

Searching for new alternative lowering for high lipid profile was approached using different herbs and one of these herbs is cinnamon, which is very popular in Sudan. It is widely used as a spice. [4,5,19] It is principally employed in cookery as a condiment and flavoring material

but it has some medicinal value.<sup>(19,20)</sup> Different species of cinnamon exist, but in Sudan, *Cinnamomum cassia* species which is imported from china, is used[12] In this study the effect of cinnamon on lipid profile of healthy subjects was investigated. The mean fasting LDL before administration of cinnamon was found to be (83.1 mg/dl of blood), while it was (70 mg/dl of blood), (66.5 mg/dl of blood) , in the 45<sup>th</sup> and 60<sup>th</sup> day of having of 1gm. of cinnamon respectively , with significant reduction of 15.76% between values before administration

and in the 45<sup>th</sup> day of administration of 1 gm, and a reduction of 19.97% between values before and in 60<sup>th</sup> of administration of 1 gm, and a reduction of 5% between values in the 45<sup>th</sup> day and in 60<sup>th</sup> of administration of 1 gm Cinnamon. t-test showed Significant (0.0000) reduction in LDL values in both 45<sup>th</sup> and 60<sup>th</sup> day of administration of cinnamon compared with LDL values before having Cinnamon, while no changes in the control group taking placebo (fig 1)

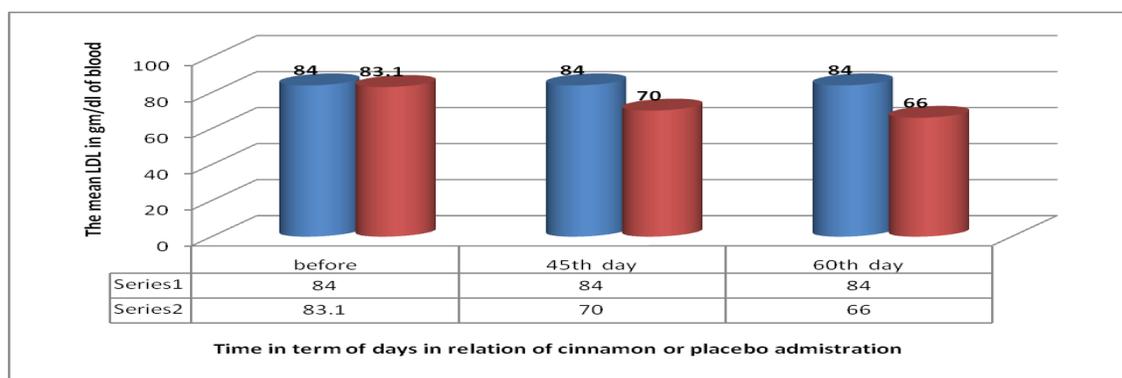


Figure 1: The mean LDL for apparently healthy subjects taking 1 gm of cinnamon, placebo

- (series 1) Apparently healthy subjects taking 1gm of cinnamon
- (series 2) Apparently healthy subjects taking 1gm of placebo.

The mean fasting HDL before having cinnamon was found to be (38.3mg/dl of blood), while it is (39.9 mg/dl of blood), (40 mg/dl of blood) ,in the 45<sup>th</sup> and 60<sup>th</sup> day of having 1 gm of *Cinnamomum Cassia* respectively , with increase of 4.2 % between values before and in the 45<sup>th</sup> of having 1 gm of cinnamon and 4.44 % between values before and in the 60<sup>th</sup> of having 1

gm of cinnamon . Statistical analysis confirms the significance increase in HDL values in 45<sup>th</sup> and 60<sup>th</sup> day of having *Cinnamomum Cassia* compared with HDL values before having *Cinnamomum Cassia* P ( 0.0000 ). While no significant changes between HDL values in 60<sup>th</sup> day of having placebo compared with those of the 45<sup>th</sup>, or before (Fig 2).

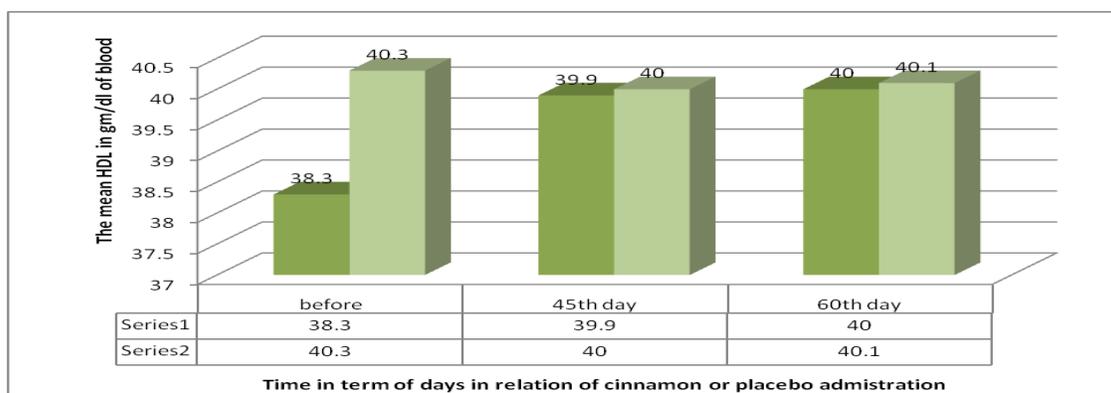


Figure (2) -The mean HDL for apparently healthy subjects taking 1 gm of *cinnamomum cassia*, or placebo

- (Series 1) Apparently healthy subjects taking 1gm of cinnamon
- (Series 2) Apparently healthy subjects taking 1gm of placebo.

The Mean Triglyceride before having cinnamon was found to be (105.3 mg/dl of blood), while it was (89.1 mg/dl of blood), (87 mg/dl of blood) in the 45<sup>th</sup> and 60<sup>th</sup> day of starting 1gm of *Cinnamomum Cassia* respectively, with statistically significant reduction. p (0.0000 ) of 17.38% between values before administration

and in the 60<sup>th</sup> day of having 1 gm of *Cinnamomum Cassia*, and 15.38% significant reduction values p ( 0.0000 ) before administration and in the 45<sup>th</sup> day of having of 1 gm of cinnamon (Fig 3). In those taking placebo, no significant changes in Triglycerides was observed in the three groups.

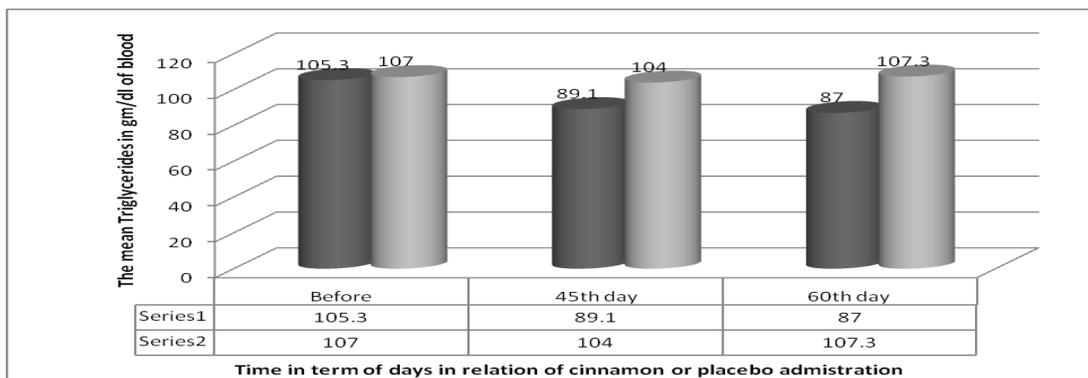


Figure 3: The mean Triglycerides for apparently healthy subjects taking 1gm of cinnamon, or placebo

- (Series 1) Apparently healthy subjects taking 1gm of cinnamon
- (Series 2) Apparently healthy subjects taking 1gm of placebo

Chemical medications for lowering (LDL) and (VLDL) lower the good cholesterol HDL too, in this study significant reduction in LDL values, as well as serum triglyceride values in 45<sup>th</sup> day and 60<sup>th</sup> day of administration of *Cinnamomum Cassia* compared with the same values before having *Cinnamomum Cassia*, while (HDL) increased after using cinnamon for 60 days.

No available data for these effects of *Cinnamomum Cassia* cinnamon in healthy subjects. In Sudan, Iman, etal (2012) studied the effect of *Cinnamomum Cassia* on lipid profile of diabetic patients type II. [13] by using two capsules of ½ gm each full of *Cinnamomum Cassia* powder, these capsules were ingested by diabetic patients type II for 40 days (25 female, 15 male). Total cholesterol, serum triglyceride LDL as well as HDL were monitored in 20<sup>th</sup>, 40<sup>th</sup> and 60<sup>th</sup> day of administration of 1gm of cinnamon. LDL value was changed from (93.1), of blood before to 92.5, 77.1, and 78.6 mg/dl of blood in 20<sup>th</sup>, 40<sup>th</sup> and 60<sup>th</sup> day of administration of 1gm of *Cinnamomum Cassia* respectively, with significant reduction of 17 % between values before and in the 40<sup>th</sup> day of administration of 1 gm. of *Cinnamomum Cassia* which was in line with this study.[13] Triglyceride value was reduced from (180.7) mg/dl before to (178), (141.7), and 140.3 mg/dl of blood in 20<sup>th</sup>, 40<sup>th</sup> and 60<sup>th</sup> day of administration of 1gm of cinnamon respectively,

with significant reduction of 21 % between values before and 40<sup>th</sup> of administration of 1 gm. of *Cinnamomum Cassia* Iman M. Hamad, etal 2012 which is in correspondence with the results obtained in this study .[13] Khan et al, (2003), studied 30 Pakistani diabetic participants type II, who administered Cinnamon (*Cinnamomum cassia*) orally for 40 days at three different doses (1, 3, or 6 grams per day). After 40 days, he reported significant reductions in total cholesterol, LDL and triglycerides [10, 14-18], but he didn't report any change in the HDL values. Khan et al, did the trial on only 10 diabetic patients for the dose of one gram of cinnamon.

On the other side Mang, in 2006 didn't observe any changes in cholesterol and triglycerides levels when he evaluated a water-soluble extract, corresponding to 3 grams of cinnamon, in 79 German participants with type II diabetes for four months,[12,20,21] Also a trial was published by Suppapatiporn and his research group in 2006 In their clinical trial, 60 Thai participants with type II diabetes took 1.5 grams per day of encapsulated whole cinnamon powder or placebo for 3 months. At the end of the trial period, no significant changes were evident in their lipid profile [8,22]. All known chemical medications lowering bad cholesterol (LDL) and (VLDL) lowers the good cholesterol too, [23,24,25] but *Cinnamomum Cassia* in this

study lowered (LDL) and increased the (HDL), although the increase was not that big, but significant at ( $p < 0.05$ ) which was in line with result obtained by Iman, et al (2012). [13] The effect of Cinnamon on the HDL was not studied by nor Khan et al, (2003) neither Mange et al (2006) or others [10,18,22].

#### IV. CONCLUSION AND RECOMMENDATIONS

According to this study *Cinnamomum Cassia*, was found to reduce LDL, serum triglyceride, while increasing HDL, of healthy subjects significantly.

Further study is needed on *Cinnamomum Cassia* involving larger No. of volunteers.

Findings about the effects of *Cinnamomum Cassia* on diabetic patients were controversial, a lot of studies are needed to show exactly the situation under which all these studies were conducted and why they are controversial?

More work is needed regarding *Cinnamomum Cassia* mode of action.

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