

## Effect of Psyllium Fiber on Lipid Profile in Hyperlipidemic Patient

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### Abstract

Dyslipidemia is a lipid metabolic disorder which is marked by raised total cholesterol, LDL, triglycerides and also reduction of HDL. It has been identified as a prominent independent risk factor in the development of Cardiovascular Disease (CVD). Psyllium in the diet may reduce the risk of Cardiovascular Disease (CVD), diabetes mellitus and colonic cancer. Total 60 hyperlipidemic subjects were enrolled in this study. They were divided in two groups, 30 (Gr-A) patients were on psyllium husk fibers (10 gram daily in divided doses) and 30 (Gr-B) patients were kept on placebo (containing equal amounts of cookies) as control group. Lipid profile of all participants was estimated at day-0 and at day-60. Psyllium fiber significantly decreased serum total cholesterol from 216.76±31.63l (day-0) to 177.42±18.25 (day-60), triglycerides 194.06±37.61 (day-0) to 166.08±28.71 (day-60). LDL level at day-0 was 103.06±21.40 reduced to 78.36±21.74 at day-60 and HDL at day-0 was 46.43±6.08, which increased to 53.58±9.87 on day-60. Results of all parameters (TC, TG, LDL and HDL) were statistically significant. At end of the research work it was concluded that psyllium is very effective agent to maintain lipid profile parameters at normal limits in hyperlipidemic patients.

**Keywords:** Hyperlipidemia, Atherosclerosis, Psyllium fibers, Cardio Vascular Disease (CVD).

### Introduction

Dyslipidemia is one among the main modifiable factors for the event of type 2

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diabetes, atherosclerosis, stroke and cardiovascular diseases.<sup>1</sup> With rapid socioeconomic development and associated lifestyle changes, the prevalence of dyslipidemia has increased dramatically over the past decade in Bangladesh.<sup>2</sup> It plays an important role in the development of cardiovascular diseases, which has become the leading explanation for death in most developed countries also as in developing countries, including Bangladesh. If no early intervention steps are taken the burden with CVD may increase. Dietary intervention is a smaller amount expensive and price effective for primary intervention of heart diseases. As a neighborhood of a comprehensive strategy to scale back the complications of hypercholesterolemia, NCEP (National Cholesterol Education Programme)

endorsed the utilization of several lipid lowering dietary agents like dietary fiber.<sup>3-6</sup> Consumption of foods containing dietary fiber, may reduce the atherogenic LDL.<sup>7</sup> Psyllium (*Plantago ovata*) seed husk fiber, may be a widely used soluble fiber. Since pre historic times psyllium husk has been used as antidiarrheal and constipation relieving agents but it's been proved that psyllium fibers reduce bad cholesterol; i.e. low density lipoprotein cholesterol and increase good cholesterol i.e. high density lipoprotein cholesterol. These fibers has effects on serum total cholesterol too. Triglycerides are not reduced significantly. Psyllium is additionally getting used as weight reduction and hypotensive agent.<sup>8</sup> These fibers bind with bile acids and reduce their absorption from terminal ileum. This successively stimulates the hepatic synthesis of steroid from cholesterol and thus reduce the entire and low density lipoprotein cholesterol levels. It also decreases the reabsorption of cholesterol from intestine by decreasing the micelle formation. It also undergoes fermentation to short chain fatty acids (SCFA) within the colon thus reducing endogenous synthesis of cholesterol. It also decreases dietary glucose absorption.<sup>9-12</sup> The aim of this research was to evaluate the effect of psyllium husk fiber in hyperlipidemic patients.

## Methods

The research was conducted at Sylhet Women's Medical College Hospital. This interventional research was carried out in the Department of Medicine from August to September 2018. Hyperlipidemic patients age range from 30 to 45 years, were randomly selected. After selection when they are agreed to participate,

informed written consent was obtained from all the subjects. Patients with diabetes mellitus, peptic ulcer, renal disease, hepatic disease, hypothyroidism and alcoholism were excluded from the research. Detailed history, general physical examination and systemic examination were performed for all the participants. Total 60 subjects were enrolled in the research. They were divided into two groups; 30 (Gr-A) patients were on psyllium husk fiber's (10 gram daily in divided doses) and 30 (Gr-B) patients were kept on placebo (containing equal amounts of cookies) as control group. Lipid profile of all participants was estimated at day-0 and at day-60. During study period lipid lowering drugs also stopped. Blood sample was collected after overnight fasting under all aseptic precautions and sample was centrifuged at 3000 rpm for ten minutes. Lipid profile estimation which includes serum cholesterol, serum triglyceride, high density lipoprotein, low density lipoprotein was done on auto analyzer.

Statistical analysis was done by computer programs using SPSS 22. Data were expressed as the mean $\pm$ SD and "t" test was applied to determine statistical significance as the difference. A probability value of <0.05 was the limit of significance.

## Results

The mean age was 40.9 $\pm$ 2.9 & 41.9 $\pm$ 2.7 years old in group A & group B respectively. Mean BMI of group A was 22.0 $\pm$ 3.3 kg/m<sup>2</sup> & group B was 22.5 $\pm$ 3.9 kg/m<sup>2</sup>. WHR of group A was 1.11 $\pm$ 0.2 & 1.0 $\pm$ 0.1. There was no significant difference between ages, BMI & WHR. The patients profile, BMI, WHR are shown in (Table I).

During the 2 months period of psyllium use the mean serum total cholesterol decreased from 216.76 $\pm$ 31.63l on day- 0 to

177.42±18.25 on day-60. This reduction in total cholesterol was highly significant ( $p<0.001$ ) when levels on day-0 and those on day-60 were compared. The mean serum triglycerides level of 25 patients treated with psyllium fibres was 194.06±37.61 on day-0 which reduced to 166.08±28.71 on day-60. These differences were highly significant ( $p<0.001$ ). Mean serum LDL level at day-0 was 103.06±21.40. This level reduced to 78.36±21.74 at day-60. When compared between the day-0 to day-60, this change was highly significant ( $p<0.001$ ).

The mean HDL at day-0 was 46.43±6.08, which increased to 53.58±9.87 on day-60. The result was marginally significant ( $p<0.05$ ) when values were compared at day-0 to day-60 (Table II). In 20 patients with placebo group serum total cholesterol reduced from 210.52±35.34 to 205.23±48.05, triglycerides reduced from 190.03±49.92 to 183.31±30.42, LDL reduced from 103.06±21.40 to 98.53±22.16. HDL raised from 34.58±11.36 to 38±13.77 in 2 months of period. All results of placebo group were decreased but the decrease was not statistically significant (Table III).

**Table I Anthropometric parameters of study subjects**

	Gr-A	Gr-B	p value*
Age (yrs)	40.9±2.9	41.9±2.7	0.4
BMI	22.0±3.3	22.5±3.9	0.43
WHR	1.11±0.2	1.0±0.1	0.17

\* Unpaired t test done, level of significance was  $p<0.05$

**Table II Changes in lipid profile in psyllium husk group of patients (Gr-A) (n= 30)**

Lipid profile (mg/dl)	At day-0	At day-60	p-value*
S.TC	216.76±31.63	177.42±18.25	<0.001
S.TG	194.06±37.61	166.08±28.71	<0.001
HDL	46.43±6.08	53.58±9.87	<0.05
LDL	103.06±21.40	78.36±21.74	<0.001

\* Paired t test done, level of significance was  $p<0.05$

**Table III Changes in lipid profile of patients on placebo group (Gr-B) (n= 20)**

Lipid profile (mg/dl)	At day-0	At day-60	p-value*
S.TC	210.52±35.34	205.23±48.05	0.598
S.TG	190.03±49.92	183.31±30.42	0.259
HDL	34.58±11.36	38±13.77	0.293
LDL	103.06±21.40	98.53±22.16	0.186

## Discussion

Dislipidemia is a lipid metabolic disorder which is marked by raised total cholesterol, LDL, triglycerides also reduction of HDL. It has been identified as a prominent independent risk factor in the development of CVD. Psyllium in the diet may reduce the risk of Cardio Vascular Disease (CVD), diabetes mellitus and colonic cancer.<sup>13</sup> In the present research total 60 hyperlipidemic patients were included, 30 (Gr-A) patients on psyllium husk group and 30 (Gr-B) patients on placebo group were studied for their lipid profile. Effect of psyllium fiber intake at 10 g/dl in divided dose was investigated over a period of 60 days. Psyllium fiber was significantly decreased serum total cholesterol from day-0 to day-60,

triglycerides reduced day-0 to day-60, LDL level was reduced from day-0 to day-60, and HDL was increased from day-0 to day-60. Results of all parameters (TC, TG, LDL and HDL) are statistically significant. This findings were matched with the results of a research conducted by Carlos et al.<sup>14</sup> They used ispaghula fibers 12 gram daily, in divided doses in twenty nine primary hyperlipidemic patients of both genders, i.e. male and female with age range from twenty eight to sixty years for the period of one month. They observed that psyllium husk reduced low density lipoprotein cholesterol, serum total cholesterol, triglycerides and increased HDL. These results are in contrast with our research work observations. Another research was conducted by Guido et al on placebo controlled trials, in which 19 male primary hyperlipidemic patients were treated with six gram psyllium husk fibers in divided doses, thrice daily for the period of three months. Results of the trial almost matched with the current research results. Their results showed, total-cholesterol triglycerides reduction was statistically significant ( $p < 0.001$ ). Low density lipoprotein was reduced, ( $p < 0.001$ ) and very low density lipoprotein was also reduced ( $p < 0.001$ ) respectively. Parameter of VLDL was not included in the current research.<sup>15</sup> Current study findings also matched with the results of a study conducted by Reid et al, in which 60 primary hyperlipidemic patients were treated by psyllium husk 8 gm daily in divided dose for the period of 4 months, in their observation triglycerides, low density lipoprotein was reduced. Serum total cholesterol, HDL estimation were not included in this research work.<sup>13</sup> Only the reduction of

triglycerides, low density lipoprotein parameters were matched with the present research. This research findings were similar to some related researches where found significant lowering of total cholesterol, triglycerides, low density lipoprotein and significantly increased HDL.<sup>16,17</sup> Another placebo-based double blind research was conducted by Fratimunari et al in which 37 primary hyperlipidemic patients were treated by psyllium fibers, nine grams daily in divided doses for the period of six months. In their observation triglyceride, low density lipoprotein were significantly reduced and HDL increased significantly. Total serum cholesterol estimation was not included in their research work.<sup>18</sup> Various human clinical trials on psyllium suggest that, this dietary fiber food item is effective in lowering total cholesterol, LDL, triglycerides and improving the concentrations of good cholesterol HDL in the serum of hypercholesterolemic subjects.<sup>19-23</sup>

## Conclusion

CVD morbidity is increasing at an alarming rate nationwide and thus it becomes essential to prevent or treat dyslipidemia to regress the associated metabolic derangements. Fortunately today it is combatable initially through diet and physical activity before switching on to cholesterol lowering drug therapy. The current research has shown that the fiber supplementation using psyllium is effective in lowering the total cholesterol, triglycerides, low density lipoprotein cholesterol and also increasing the concentration of HDL. For this perspectives psyllium could plays an important role in the prevention of cardiovascular diseases.



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