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## IMPROVEMENT OF LIPID PROFILE WITH OATS

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**Abstract: BACKGROUND:** Hypercholesterolemia is a strong predictor of coronary Heart Disease mortality. The prevalence of Coronary Artery Disease (CAD) is known to be very high both among migrant Asian Indians and also among people within the Indian sub continent. Evidence suggested that high – fiber diets in accordance with American Heart Association (AHA) reduces serum cholesterol by 11 - 32 percent. Many studies have shown that soluble fibre beta-glucan present in oats have a beneficial effect in reducing cholesterol. So, the study was carried out with the following objectives. **OBJECTIVES:** to study the comparative effect of two different oat bran recipes, namely oat bran biscuits and oat bran porridge on hypercholesterolemic subjects and to check whether there is an effect in the food processing method employed. **DESIGN:** Prospective design with purposive sampling technique was employed for the study. 12 hypercholesterolemic subjects were selected belonging to the age group of 40-55 years. Baseline information of the selected subjects were obtained using an interview schedule which includes information regarding age, sex, physical activity pattern, personal habits, dietary habits, anthropometric details such as weight, BMI, Waist circumference. The study consisted of two groups, each group consisting of six samples respectively in accordance with the type of supplementation namely oat bran biscuits and oat bran porridge. **RESULTS:** Significant difference was found to be observed in total cholesterol levels among both the group of subjects (at 5 percent and 1 percent significance levels). LDL was not found to be significant in experimental group 1 subjects whereas in experimental group 2 it showed significant results. Similarly HDL cholesterol also showed significant results in group 2. After comparing each parameter within the 2 groups the results showed that there was no significant difference in total cholesterol, LDL, HDL, triglycerides, VLDL and their ratios between both the groups. **CONCLUSION:** Comparison of oat bran biscuits and oat bran porridge supplementation proved that there is no difference in food processing method, with both the forms showing similar effects on hypercholesterolemia. Fibre supplementation in any form can be helpful for reducing the risk of complications and improving the lifespan from dreaded diseases like diabetes mellitus and cardiovascular diseases.

## I. INTRODUCTION

Hypercholesterolemia is a strong predictor of coronary Heart Disease mortality. Hypercholesterolemia is defined by total cholesterol levels greater than 240 mg/dl. The increase in cholesterol levels is presumed to be due to LDL cholesterol levels greater than 160 mg/dl. HDL cholesterol levels may or may not be low. Fifty percent of all cardiac deaths result from CHD<sup>1</sup>. The prevalence of Coronary Artery Disease (CAD) is known to be very high both among migrant Asian Indians and also among people within the Indian sub continent. Moreover CAD on Asian Indians occur prematurely (i.e) at least a decade or two earlier than that seen in Europeans. Almost 1 Million Americans die annually from Cardio Vascular Disease<sup>2</sup>

The prevalence of coronary Heart disease in India increased from 1.05 percent in 1960 to 9.67 percent and 7.90 percent in 1995 in urban populations. In rural areas, the prevalence increased from 2.08 percent in 1974 to 3.7 percent in 1995. In urban areas, there was a significant increase in the prevalence of coronary heart disease in men in the age group of 20 –29 years and 30 – 39 years, and women in the age group of 20 – 29 years 30 – 39 years and 40 – 49 years.

Results of the lipid research clinics on coronary primary prevention trial predict a two percent reduction in coronary heart disease for every one percent reduction in serum cholesterol<sup>3</sup>. Since diet is the predominant environmental cause of coronary atherosclerosis; their modification can reduce the risk of CHD. The 1985 consensus conference on lowering blood cholesterol reviewed diet, drug and lifestyle changes to treat hypercholesterolemia, stressing the value of diet therapy.

Evidence suggested that high – fiber diets in accordance with American Heart Association (AHA) reduces serum cholesterol by 11 - 32 percent<sup>4</sup>. Dietary fiber or non-starch Polysaccharides (NSPS) by definition is the component of the diet that is not digested or absorbed in the stomach or small intestine. The mechanisms of action included the fiber's binding ability to bile acids, lowering serum cholesterol to replete the bile acid pool. Colonic fermentation of bacteria and conversion of fiber to short chain fatty acids inhibits cholesterol synthesis. Several long epidemiological data indicated a positive association between increased fiber intake and a decreased risk of coronary heart disease. Oats, an important source of soluble fibers have long been recognized as a potential cholesterol-lowering dietary component. Beta- glucan, which is a non-starch polysaccharide have been ascribed to the hypocholesterolemic component in oats and oat products.

The present study was carried out with the following objectives:

1. To obtain general information and to assess the dietary intake of selected subjects through an interview schedule and 3- day dietary recall method.
2. To study the effect of two oat bran recipes before and after supplementation on the lipid profile in the two groups of hypercholesterolemic subjects.
3. To compare the effect of the two different recipes by supplementation between the two groups of subjects through reassessment of lipid profile.

## II. MATERIALS AND METHODS

The study was undertaken to determine the comparative effects of two different oat bran recipes (Oat bran biscuits and oat bran porridge) on hypercholesterolemic subjects. The subjects were collected from Malar Hospital, Adyar and the patients residences were visited by the investigator for supplementing the products.

12 hypercholesterolemic subjects were selected belonging to the age group of 40-55 years. Baseline information of the selected subjects were obtained using an interview schedule which includes information regarding age, sex, physical activity pattern, personal habits, dietary habits, anthropometric details such as weight, BMI, Waist circumference. The study consisted of two groups, each group consisting of six samples respectively in accordance with the type of supplementation namely oat bran biscuits and oat bran porridge.

Information regarding the dietary intake was obtained through 3- day dietary recall method. Energy, protein, carbohydrate, fat and fiber content of the diet of the subjects were calculated. Food frequency questionnaire was administered to acquire the frequency of consumption of various foods.

Experimental group 1 received oat bran (Oat bran supplemented for the subjects was sponsored by Baggry's Oats Pvt. Ltd) biscuits which was prepared using 25 grams of oat bran and 25 grams of maida was mixed along with baking soda, to which 20 grams of sugar and 1 teaspoon of vanilla essence was added, egg white was used as a binding substance with 1 tea spoon of oil used to prepare the standardized biscuits which is three in number being served for all subjects for a period of 45 days. Experimental group 2 subjects received oat bran porridge prepared by the researcher using 25 grams of oat bran, which was added to the boiling water, after cooking for 2 minutes, 1 teaspoon of low fat milk and sugar was added to get 1 cup of standardized porridge. Subjects were provided with oat bran biscuits and oat bran porridge as a mid- morning snack for a period of 45 days.

Lipid profile namely total cholesterol, low density lipoprotein, High density lipoprotein, triglycerides, very low density lipoprotein, total cholesterol : HDL ratio and LDL : HDL ratio were recorded for the two experimental groups 1 and 2, who had got a total cholesterol above 200 mg/dl and blood analysis was recorded after 45<sup>th</sup> day of the study period.

The data collected was statistically analyzed and interpreted.

### III. RESULTS AND DISCUSSION

#### **Baseline information of the selected hypercholesterolemic subjects in the experimental group 1 and experimental group 2**

From the study it is evident that 83.3 percent were males, and 16.7 percent were females in experimental group 1, whereas among experimental group 2, 33.3 percent were males, and 66.7 percent were found to be females among the age group of 40-55 years. With regard to personal habits such as alcohol intake, 33.3 percent in experimental group 1 and 16.7 percent in experimental group 2 were reported to consume alcohol.

The results also showed about the exercising pattern of the two groups of subjects, wherein only 25 percent of experimental group 1 reported to be walkers, but in contrary 100 percent of experimental group 2 subjects were found to walk regularly.

#### **Dietary intake and food habits of the selected hypercholesterolemic subjects in experimental group 1 and experimental group 2**

Around 50 percent of subjects in experimental group 1 and 33.3 percent in experimental group 2 were non- vegetarians. Rice was consumed regularly by subjects belonging to both the groups. Deep fried foods such as Murukku, pooris and vadas were rarely consumed by both the group of subjects.

With reference to the type of cooking oil used, 50 percent of subjects in experimental group 1 reported that they use sunflower oil for cooking, whereas 83.3 percent of subjects in experimental group 2 were found to use gingili oil for cooking.

Average nutrient intakes of the selected subjects were recorded using the 3- day dietary recall method. Energy, protein, fat, carbohydrate and fiber content of the diet were estimated and they revealed the poor fiber intake, moderate protein, fat and calorie intake of the selected subjects.

**Effect of Supplementation of Oat bran biscuits on the lipid profile values in Experimental Group 1**

Lipid profiles values of the experimental group 1 before and after supplementation is described in table I

**TABLE I**

Effect of supplementation of oat bran on the lipid profile of Group 1 patients:

Lipid profile	Mean		't' value
	Before	After	
Total cholesterol	230.0	211.83	2.699*
High density lipoprotein(HDL)	47.67	47.83	0.094 <sup>NS</sup>
Low Density lipoprotein(LDL)	140.67	129.50	1.496 <sup>NS</sup>
Triglycerides	237.50	185.67	4.919*
Very low density lipoprotein(VLDL)	47.60	15.61	4.717*
Total cholesterol: HDL ratio	4.99	4.55	5.781*
LDL: HDL ratio	3.04	2.83	3.528*

\* Significant at 5 percent level \*\* - Significant at 1 percent level NS- Not Significant

It was seen that all lipid values except HDL cholesterol had reduced after supplementation of oat bran biscuits.

Total cholesterol reduced significantly by 5 percent level, with HDL cholesterol and LDL cholesterol showing statistically not significant results. The triglycerides, VLDL, total cholesterol: HDL ratio, LDL: HDL ratio had also shown reduction with 1 percent significance. The total cholesterol level decreased from 230 mg/dl to 211.83 mg/dl with triglyceride reducing from 237.50 mg/dl to 185.67 mg/dl. Total cholesterol: HDL ratio decreased from 4.99 to 4.55 and reduction from 3.04 to 2.83 in LDL: HDL ratio, suggests the importance of ratios reduction, which is very important in assessing the cardiovascular risk profile.

**Effect of Supplementation of oat bran porridge on the lipid profile of experimental group 2 subjects****TABLE II**

Effect of supplementation of oat bran porridge on lipid profile of group 2 subjects

Lipid profile	Mean		't' value
	Before	After	
Total cholesterol	238.0	210.0	7.930*
High density lipoprotein(HDL)	41.50	48.83	4.163*
Low Density lipoprotein(LDL)	159.50	131.33	6.518*
Triglycerides	191.33	157.50	2.407 <sup>NS</sup>
Very low density lipoprotein(VLDL)	38.33	31.53	2.412 <sup>NS</sup>
Total cholesterol: HDL ratio	6.24	4.52	4.233*
LDL: HDL ratio	4.20	2.90	3.764*

\*\* - Significant at 1 percent level NS- Not Significant

From table II, it was observed that the total cholesterol decreased from 238 mg/dl to 210mg/dl at 1 percent significant level. Similarly in LDL, there was a highly significant reduction ( $p < 0.01$ ) from 159.5 to 131.33 mg/dl. The HDL level increased from 41.5 to 48.3 mg/dl at 1 percent significant level. But the triglycerides and VLDL showed statistically not significant results. Total cholesterol: HDL ratio reduced from 6.24 to 4.52, the same way LDL: HDL ratio reduced from 4.20 to 2.90 which were considered to be the most important predictors of coronary heart disease risk.

**Comparison of the effect of supplementation of oat bran biscuits and oat bran porridge on the lipid profile between experimental group 1 and experimental group 2**

**TABLE III**

**Lipid profile values before and after the study period in both experimental group 1 and experimental group 2 subjects**

Lipid profile parameters	Groups	Mean		't' value
		Before	After	
Total cholesterol	Group 1	230.00	211.83	Before Vs After- 0.684 <sup>NS</sup> After Vs After - 0.285 <sup>NS</sup>
	Group 2	238.00	210.00	
High Density lipoprotein	Group 1	41.67	47.83	Before Vs After- 0.739 <sup>NS</sup> After Vs After - 0.074 <sup>NS</sup>
	Group 2	41.50	48.33	
Low Density lipoprotein	Group 1	140.67	129.50	Before Vs After- 1.484 <sup>NS</sup> After Vs After - 0.210 <sup>NS</sup>
	Group 2	159.53	131.33	
Triglycerides	Group 1	237.50	185.67	Before Vs After- 1.189 <sup>NS</sup> After Vs After - 0.764 <sup>NS</sup>
	Group 2	191.33	157.50	
Very low density lipoprotein	Group 1	47.60	37.23	Before Vs After- 1.194 <sup>NS</sup> After Vs After - 0.774 <sup>NS</sup>
	Group 2	38.33	31.53	
Total cholesterol: HDL Ratio	Group 1	4.99	4.55	Before Vs After- 1.543 <sup>NS</sup> After Vs After - 0.076 <sup>NS</sup>
	Group 2	6.24	4.52	
LDL: HDL Ratio	Group 1	3.04	2.83	Before Vs After- 1.880 <sup>NS</sup> After Vs After - 0.187 <sup>NS</sup>
	Group 2	4.20	2.90	

NS- Not Significant

Table III depicts the comparative effect of supplementation of both oat bran biscuits and oat bran porridge before and after the study period between experimental group 1 and experimental group 2. It was seen that there is no significant difference between oat bran biscuits and oat bran porridge groups before and as well after supplementation on the lipid profile parameters such as total cholesterol, HDL, LDL, triglycerides, VLDL, total cholesterol: HDL ratio and LDL: HDL ratio. All of the above mentioned parameters showed not significant results before and after the study period between the two experimental groups, showing that there is no difference in the form of oat bran supplemented. Both the forms showed similar results.

#### IV. Summary and conclusion

The study revealed the hypocholesterolemic effect of oat bran, showing significant reductions in total cholesterol, LDL cholesterol, triglycerides and their ratios. Comparison of oat bran biscuits and oat bran porridge supplementation proved that there is no difference in food processing method, with both the forms showing similar effects on hypercholesterolemia.

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