International Journal of Social Science and Economic Research

ISSN: 2455-8834

Volume: 01, Issue:12 "December 2016"

EFFECT OF GRAM DIET ON LIPID PROFILE, IN NORMAL AND DIABETIC SUBJECTS

Dr. Sweta Vyas

College Lecturer, Department of Home Science,
Government Girls College, Nathdwara, Rajsamand (Raj.)

INTRODUCTION

During last few decades considerable attention has been focused on the various plant fibers because of their influence on gastrointestinal physiology. Evidence is emerging that plant fibers have profound influences on human nutrition because they alter the absorption and metabolism of many nutrients.

It was suggested that high plant fiber, high-carbohydrate diets were of long term benefit in reducing insulin requirements of patients with diabetes. Four patients who consumed large quantities of uncooked vegetables, seeds, nuts, and fruits had sizeable reductions in insulin doses while eating these "raw" diets. These diets, high in carbohydrate and low in fat and contained plentiful quantities of plant fibers in their natural or undisrupted form. Since cutting, mincing, or cooking foods alter the physical and physiological properties of plant fiber[2]. These impressive reductions in insulin doses may have been related in part to the uncooked plant fiber content of these diets.

Numerous studies have demonstrated that addition of non-digestible fiber such as pectin, whole wheat bran or guar gum to food improved glucose tolerance in non-insulin dependent and decreases insulin requirement in insulin dependent diabetic patients". Most of these studies, however, were short term experiments extending over hours to days and did not establish the feasibility or the efficacy of chronic fiber treatment. In the few long term studies available in which both carbohydrate and fiber content of the diet were increased, making it difficult to determine which was responsible for the beneficial effects. Furthermore, the mechanism by mechanism by which fiber improve metabolic control in diabetic patients remain unknown.

Jenkins et al.[3] have reported an improvement in glucose tolerance when a fiber source was added to the test meals of either healthy or diabetic subjects. Although gums and viscous types of fibers (i.e. guar and pectin) were found to be most effective in glucose tolerance as it also improved by

ISSN: 2455-8834

Volume: 01, Issue:12 "December 2016"

methyl cellulose and wheat bran. Monnier et al.[6] also reported similar effects with pectin and cellulose phosphate, but not with cellulose.

In contrast, Williams et al. were unabled to detect a significant change in the post prandial glucose rise of diabetic subjects when 10 gm guar, pectin, agar or locust bean gum were added to a test meal. Jenkins et al.[8] had reported no significant difference in post prandial glucose responses healthy volunteers to meals with whole grain cereal foods as compared to corresponding fiber-depleted refined cereal foods (Bread, spaghetti, or rice).

Vario "us plant fibers may influence serum cholesterol concentrations by three principal mechanisms : (1) Altering intestinal absorption, metabolism and release of cholesterol : (ii) Altering hepatic metabolism and release cholesterol : (III) Altering peripheral metabolism of lipoproteins.

Plant fiber supplements are accompanied by increased fecal excretion of neutral sterols such as cholesterol and plant sterols as well as bile acids[9]. Cholesterol is bound by certain fibers that may retard its absorption. The formation of gels in the intestine and colon may partition cholesterol in such a manner that gut absorption is reduced. Whether plant fibers alter the incorporation of cholesterol into chylomicrons and very low density lipoprotein (VLDL) or influence their secretion has not been examined. The several mechanisms by which plant fibers may alter bile acid absorption or metabolism include: binding of bile acids, sequestration of bile acids in fiber gels, selective binding of de-conjugated bile acids to alter the composition of the bile acid pool.

Synthesis, metabolism, and release of cholesterol from the liver may be directly or indirectly altered by plant fibers. Some studies suggested that hepatic cholesterol synthesis was increased by plant fiber intake whereas other ~ suggested that synthesis was decreased.

Balmer and Zilversmit10 suggested that plant fiber intake enhances cholesterol removal from plasma but the mechanism was unclear.

In experiments utilizing an oat bran preparation containing approximately 25 per cent plant fiber further documented the hypocholesterolemic effects of oat preparations. These observations with soluble plant fibers suggested that these substances may have a role in the treatment and prevention of hyper cholesterolemia in man. Further studies are required to delineate the effects of these plant fibers on the low density lipoprotein cholesterol and the high density lipoprotein (HDL) cholesterol concentrations ' suggested that long-term therapy with a diet containing approximately 60 g of plant fiber per day is accompanied by a distinct reduction in the serum low density lipoprotein cholesterol and an elevation of the HDL cholesterol content to values above those of control.

ISSN: 2455-8834

Volume: 01, Issue:12 "December 2016"

Srivastava et al.[15] also reported the reduction in total cholesterol after feeding green gram diet to guinea pigs.

Dewan[16] observed that Bengal gram decreases serum cholesterol and triglycerides and also lowers heart attack by 24 per cent.

Thus, very scanty and diversant reports are available over human population on lipid profile and practically no report is available on the effect of gram diet on lipid profile in normal and diabetic subjects. Hence, it was thought worth-while to undertake the present problem to find out any beneficial effect of gram diet in normal and diabetic subjects.

MATERIALS AND METHODS

The present follow up study was conducted on 60 subjects aged between 25 to 65 year. They were randomly selected irrespective of their caste and creed. Detailed history was taken to exclude any major illness likely to affect lipid profile levels. The subjects having history of drug intake, radiation and any infection during the study were excluded from the present study. The subjects were divided into following groups.

GROUPA		NUMBER OF SUBJECTS
I	Normal control	30
II	Study Group (Diabetic subjects)	30

The follow up study was conducted in both the aforesaid groups before and after consumption of gram diet for 30 days. Each group acted their own control. Incomplete follow up cases were discarded. Initially 30 normal control were registered for follow up study. Six cases were dropped out before 15 days and 3 cases were dropped out before 30 days. Thus, only these 21 cases were included in control group who attended the follow up study completely for 30 days. Similarly, 30 diabetic subjects were registered for follow up study, out of them 2 patients dropped out before 15 days and 1 dropped out before 30 days. Thus, only 27 diabetic subjects were included in study group who attended the follow up study completely for 30 days. Only wheat chapaties were replaced by fiber gram chapaties in the diet of both the groups of subjects and rest dietary articles remained the same as taken before the intake of gram diet. Thus, any changes occurred in blood parameters reflect the effect of fiber gram diet on these parameters.

These subjects presented themselves for the present study on the basis of personal request, relationship and their eternal eagerness to know the effect of fiber gram diet on their blood

ISSN: 2455-8834

Volume: 01, Issue:12 "December 2016"

parameters in health as well as in their disease state of diabetes.

From each subjects of both the groups, 5 ml of fasting blood from ante-cubital vein was withdrawn before and after 30 days intake of fiber gram diet in perfectly disposable and was transferred to a clean dry centrifuge tube slowly by the side of the tube after removing needle to avoid hemolysis.

The blood was allowed to clot at room temperature for 30 minutes. The serum was separated by centrifugation at 3000 revolution per minute (rpm) for 10 minutes.

The sample was analyzed for the following parameters by semi auto analyzer using enzymatic kits. Blood Glucose, Total cholesterol, ITDL-cholesterol, Triglyceride, LDL-cholesterol and VLDL-cholesterol.

Mean Values of Blood Parameters (Mg%) in Normal and Diabetic Subjects Before and After Intake of Fiber Gram Diets for 30 Days

Groups	PARAMETERS					
	Glucose	**Total-Cholesterol**	**HDL-cholesterol**	**Triglyceride**	**LDL-cholesterol**	**VLDL-cholesterol**
NORMAL CONTROL Before fiber gram diet						
Mean (a)	86.1-10.2	188.7±23.9	51.1+5.4	105.6+20.1	116.5+27.6	21.1+4.0
After Gram diet (30 days)						
Mean (b)	79.8+8.7	173.6+18.7	54.6+4.9	94.5+17.3	100.2+22.0	I8.9±3.5
*P-value	< 0.01	<0.01	<0.01	<0.05	<0.01	<0.05
DIABETIC CONTROL						
Before Fiber gram diet						
Mean (c) **P value	206.7.-29.9 0.001	247.4+27.1 < 0.001	31.5+7.5 0.001	217.9+49.9 < 0.001	172.4+24.9 < 0.001	43.5+10.0 < 0.001

ISSN: 2455-8834

Volume: 01, Issue:12 "December 2016"

A tier Fiber gram diet 30 days						
Mean (d)	188.3129.6	221.1+24.9	35.716.5	190.8+47.6	147.1123.3	38.1+9.5
***P value	0.05	< 0.001	<0.01	<0.01	<0.001	<0.01

* Comparison between normal controls before and after gram diet (a & b).

** Comparison between diabetic and normal controls before gram diet (a & c).

*** Comparison between diabetic before and after gram diet (c & a).

RESULTS AND DISCUSSION

The fasting blood sugar levels were 86.1 + 10.9 and 206.7 + 29.9 mg per cent in normal and diabetic subjects respectively, which were reduced to 79.8 + 8.7 and 1 88.3 + 29.6 mg per cent after 30 days intake of gram diet in respective groups. The decrease was statistically significant at 1 and 5 per cent level in normal as well as in diabetic subjects respectively. The decreased in blood sugar level in gram diet taker might be due to the fact that fiber diet might have inactivated the digestive enzymes which in turn lowered the absorption of carbohydrate resulting decreased blood sugar level.

It is observed from the present study (Table 1) that serum cholesterol, triglycerides, LDL and VLDL cholesterol levels were found to be decreased significantly after 30 days intake of gram diet as compared to that their initial values. The decreased serum cholesterol might be due to the retardation of cholesterol absorption by the fiber diet as reported by Kay and

The decreased in LDL cholesterol in gram diet user might be due to fiber gram diet impaired the release of VLDL cholesterol from the liver which is a component of LDL. Besides this, hypocholesterolemia might be one of the cause of decreased LDL-cholesterol. Decreased in VLDL cholesterol might resulted due to fiber gram diet induced alteration in rate of delivery of fatty acids into the portal vein which might decreased the synthesis and release of VLDL cholesterol from the liver.

A possible explanation for decreased serum triglyceride level in gram diet user is that fibers decrease the absorption of Triglyceride and fatty acids. Secondly, fiber gram diet might increases the fecal excretion of fat including fatty acids resulting decreased synthesis of triglycerides.

A slight increase of serum HDL cholesterol was recorded in gram diet user. It might be possible that fiber gram diet might alter the proportion of cholesterol incorporated into HDL resulting

ISSN: 2455-8834

Volume: 01, Issue:12 "December 2016"

increased serum HDL-cholesterol level after intake of gram diet.

SUMMARY AND CONCCLUSION

The present follow up study was conducted in normal and diabetic subjects before and after consumption of gram diet for 30 days. The fasting blood sugar was reduced after intake of gram diet in both the groups. The fiber gram diet might have influenced the absorption of carbohydrate resulting decreased blood sugar level. Total cholesterol, LDL, VI, DL cholesterol and triglyceride levels were also lowered after 30 days intake of gram diets as compared to their initial values. It might be possible that fiber gram diet may retard the absorption of cholesterol and triglycerides as well as reduced the synthesis and release of VLDL cholesterol from the liver. A slight elevation of HDL cholesterol was also recorded after intake of gram diet. It might be possible that fiber gram diet might alter the incorporation of cholesterol into HDL, resulting increased serum I IDL cholesterol after intake of gram diet.

REFERENCES

1. Douglass, J.M. "Raw diet and insulin requirements". Ann. Internal Mod. 1975,82 : 61-64.
2. Haber, G.B., Heaton, K.W., Murphy, D. and Burroughs, L.F. "Depletion and disruption on dietary fiber. Effect on satiety, plasma glucose and serum insulin". Lancet, 1977, 2 : 679-680.
3. Anderson, J.W. and Chen, W.L. "Plant fiber. Carbohydrate and lipid metabolism". Am, J. Clin. Nutr. 1979, 32 : 346-348.
4. Simpson, H.C.R., Lousley, S., and Geekie, M. "A high carbohydrate leguminous fiber diet improves all aspects of diabetic control". Lancer, 1980, 1:1-2.
5. Jenkins, D.J.A., Wolever, T.M.S. and Leeds, A.R. "Dietary fiber analogues and glucose tolerance : Imporance of viscosity". Br. Med. J. 1978, 1 : 1392-1394..
6. Jenkins, D.J.A., Woller, T.M.S., Taylor, R.H., Barker, H.M., Fielden, H. and Gassull, M.A. "Lack of effect of refining on the glycemic response to cereals". Diabetes care, 1981, 4:509-510.
7. Monnier, L., Pham, T.C., Aguirre, L., Orsetti, A. and Mirouze, J. "Influence of ingestible fibers on glucose tolerance". Diabetes Care, 1978, 1 : 83-88.
8. Williams, D.R.R., James, W.P.T. and Evans, I.E. "Dietary fiber supplementation of a 'normal' breakfast administered to diabetics". Diabetologia, 1980, 18 : 379-380.

ISSN: 2455-8834

Volume: 01, Issue:12 "December 2016"

9. Kay, K.M. and Truswell, A.A. "The effect of wheat fiber on the plasma cholesterol in rats". Proc. Nutr. Soc., 1975, 34 : 17A.

10. Balmer, J. and Zilversmit. D.B. "Effects of dietary roughage on cholesterol absorption, cholesterol turnover and steroid excretion in the rat". J.Nutr. 1974,104: 1319-1321.

11. Beher, W.T. and Casazza, K.K. "Effects of psyllium hydrocolloid on bile acid metabolism in normal and hypophysectomized rats". Proc. Soc. Exptl. Biol. Med. (1971): 136, 253-254.

12. Boyd, C.A.R. "Dietary bran, gum and blood cholesterol : a role for hydroxycitrate?" Lancet (1975) : 1, 1345-1346

13. Durrington, P.N., Manning, A.P. Bolton, C.H. and Hartog, M. "Effect of pectin on serum lipids and lipoproteins, whole gut transit-time and stool weight" Lancet (1976) : 2 , 394-394.

14. De Groot, A.P., Luyken, R. and Pikaar, N.A. "Cholesterol lowering effect of rolleld oats" Lancet (1963) : 2,303-303.

15. Srivastava, A., Joshi, L.D. and Singh, S:P. "Changes in Serum lipids in normal and diabetic guinea pigs on feeding phaseolus aureus (Green gram)". Ind. J. Clin. Biochem. (1989), 4 : 50-57.

16. Dewan, "A. Risk of heart attack and heat stroke increases in hot weather". Renaissance Universal (2009), 1:1-6.

