Quality of Dietary Fiber on Serum Glucose and Serum Lipids of Uncomplicated Non-Insulin Dependant (NIDD), of Elderly Egyptian Males

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ABSTRACT

Four samples of dietary fiber (Dephytinized wheat bran, citrus pectin, debittered lupine seed flour, and germinated mung bean flour) were investigated to evaluate the effect of this certain diets on glycemia and serum lipids. 200 patients of non-insulin dependent diabetes (NIDD), were divided into four groups. The patients of each group were allowed to receive one of these powders 4 gm daily for 4 months. For each group patients full history of clinical examinations were done to fulfill the selective criteria (Blood sugar, serum lipids, blood urea) were measured before and after the given powder and were analysis chemically and statistically. The data revealed that the best hypoglycemia affect and improvement in lipid (Total cholesterol, HDLC, and LDLC) were obtained with the use of germinated mung bean flour.

Abbreviation:
BU = Blood Urea, BS = Blood Sugar, CP = Citrus Pectin, DF = Diabetes Mellitus, DWB = Dephytinized Wheat Bran, GMPF = Germinated Mung Bean Flour, HDLC = High Density Lipoprotein Cholesterol, IDDM = Insulin Dependant Diabetes Mellitus, LDLC = Low Density Lipoprotein Cholesterol, LF = Lupine Seeds Flour, NFDDM = Non Insulin Dependant Diabetes Mellitus.

INTRODUCTION

Human food Contains a variety of carbohydrates including monosaccharides (glucose, fructose), disaccharide (maltose, sucrose), trisaccharides (trehalose, raffinose), devtrins and other short chain sugars, and polysaccharides such as starch, cellulose, hemicellulose and pectines. Nutrionally, these compounds are subdivided into available and unavailable carbohydrates (Mc Cance and Lawrence, 1929) and Southgate, 1969 (a and b) dependings on their breakdown in, and "absorption" for energy metabolism. The majority of food carbohydrate is thought to be available for absorption, only a small fraction (about 8% in diet) beings unavailable. This fraction, now called dietary fibre, comprises polysaccharides (with glycosidic links not usually susceptible to hydrolysis by human digestive enzymes and lignin.

There is increasing evidence that the amount and type of dietary before in the human diet is important in determining susceptibility to a wide variety of diseases such as gall-stones, obesity, diabetes most large bowel disorders, and coronary heart diseases (CHD) (Southgate, 1995).

It has been suggested that diabetes may be a fiber deficiency disorder" or that at least one causative factor may be a lack of fiber in the diet (Trowel, 1975).
The exact incidence of Insulin independent diabetes Mellitus (IDDM) in Egypt was estimated to be about 2 per 1000 in 1989 (Abdula, 1989). This ratio increased during recent years. The prevalence rate of IDDM was found to represent 2.5% of Egyptian population according to the Minietry of Public Health and Population 2002. therefore, IDDM is considered as a major health problem in Egypt as it affects millions of Egyptians.(Gabr *et al.*, 1962)

The main manifestation of IDDM is hyperglycemia in which carbohydrates are efficiently metabolized leading to disturbance in both lipid and protein metabolisms.

Previous studies showed great positive association between carbohydrate intake and incidence of glucose intolerance (Tabekha 2001).
Rapid modernizations also, is another cause of IDDM due to the lack of dietary fiber content in diet.

Consume while bread, rise and tinned meat and Epidemiological studies has found higher content in dietary fibers are relatively protective against cardiovascular diseases (CD) and large bowels cancer as well. The physical properties of certain types of fiber was found to reduce the risk of (CD) by lowering the Plasma cholesterol concentration. Higher fiber intake can also improve the glycamia response to a glucose by slowing its absorption. Youssef *et al.*, (2000) and Tabekha (2001) studied the effect of some certain dietary fiber for non independent Diabetes Mellitus (NIDDM) to improve Blood glucose and total cholesterol.

The aim of this study was, therefore, to investigate the effect of some dietary fibers such as dephytinized wheat bran (D.W.B), citrus pectin (C.P), Lupine seed flower (L.F) and germinated mung bean flower (G.M.B.F) on the glycemia control and serum lipid of uncomplicated (IDDM) of elderly Egyptian males.

MATERIALS AND METHODS

Materials: Four dietary fiber sources were used as follows: -

Dephytinized wheat bran (DWB):

This DWB was prepared from durum wheat bran and dephytinized according to the method described by Tabekha (1982).

Citrus pectin (CP)

Citrus pectin (CP) was prepared from lime citrus fruits according to the method described by Tabekha (1992).

Lupine seed flower (LSF)

Lupine seed flower (LSF) was also prepared by debittering lupine seeds and trying according to the methods of Youssef *et al.*, (2000).

Germinated mung bean flower (GMBF)

Seeds of (GMBF) were germinated on wet cloth for two days. The dried and milled to 60 mesh and were used as flour.

Methods

Each dietary fiber was given to a group of IDDM (50 patients). Each patient received four gm. Of dietary fiber daily after breakfast for four months continuously.

Each patient was examined for Blood sugar, Blood urea, creatinine, low density lipoprotein cholesterol (LDLC) and high density lipoprotein cholesterol (HDLC) before receiving this dietary fiber and at the end of the trial for four months.

Blood samples were collected into fluoridata tub and immediately centrifuged.

Blood samples were analyzed at the chemical and nutrition department at the high institute of public health (HIPH), University of Alexandria, Alexandria.

Statistical Analysis

All data were statistical analyzed using the statistical package for social science software (Anon a,b) 1990.

RESULTS AND DISCUSSION

Table (1): shows the effect of dietary fibers on blood sugar and urea and serum creatinine of IDDM patients.

Data revealed that the blood sugar of IDDM patients after two hours of breakfast decreased by 3.2, 3.9 and 5.8 % after receiving the DWBF, CP and GMBF, respectively for 4 months. On the other hand, however, the blood sugar increased by 1.9% for those patients received LSF for the same period.

These results are in agreement with those reported by Trout *et al.*,(1993), Batra *et al.*,(1994)

The later stated that the highest glycemia reduction of mung bean seed for diabetic patients was due to the high content of fibers in these seeds.

Blood urea was, also, affected by the dietary fiber received. This blood urea declined by 2.7, 1.8 and 15.8% in patients received CP, LSF and GMBF for 4 months.

On contrary, the blood urea increased 4.7% in those received DWB for 4 months.

Serum creatinine, decreased with all dietary fibers used. Decreased by 7.3, 11.1, 1.1 and 14.6% in the patients received DWB, CP, LSF and GMBF, respectively.

Therefore, the GMBF was a good source for hypoglycemia effect, as it reduced the blood sugar, urea and serum creatinine by 5.8, 15.8 and 14.6%, respectively, as compared to the other dietary fibers used. This effect might be due to its high fiber content or vitamins and minerals they contain.
Germination process of mung bean could increase these vitamins and minerals.

Table (2): shows the effect of dietary fibers on total cholesterol content, LDLC and HDLC of IDDM patients. Data revealed that the total cholesterol responded differently to the dietary fibers received by the patients. Both DWB and LSF increased the total cholesterol content by 2.1 and 1.4% respectively on those patients after 4 months.

The total cholesterol in those received CP and GMBF decreased by 2.6 and 2.9%, respectively after 4 months.

The HDLC increased in all patients when received the different dietary fibers. The HDLC increased by 1.7, 2.3, 1.6 and 23.3% with DWB, CP, LSF and GMBF, respectively.

The LDLC, however, decreased with all different dietary fibers. The LDLC decreased by 0.5, 4.6, 1.9 and 9.6% in the same order, respectively.
Comparing the four dietary fibers used the GMBF was, therefore, the best dietary fiber as it reduced both the total cholesterol and LDLC and increased the beneficial HDLC as compared to the other dietary fibers used in this study. These results are in agreement with those obtained by Stilling *et al.*, (1994), Faster and Miller, (1995) and Tabekha (2001).

Other dietary fibers used in this study were not as good as GMBF however, Sharafetdino *et al.*, (1993). showed that both citrus pectin and wheat bran had positive effect on hypocholesterolemia and hypoglycemia.

To conclude, the highest positive effect of GMBF on IDDM patients as compared to other dietary fibers used, might be due to the germination of mung bean which might increased the structural carbohydrates as compared to monosaccharides (Paul *et al.*, 1998).

REFERENCES

Adul-Al EA. (1989). Prevalence of diabetes in urban and rural school children in Assiut. Thesis, Assiut University Egypt.

Anonymous (1990). a-SPSS Inc/Pct Statistics 4.0 Chicago

Anonymous (1990). b: SPSS Inc Spsst Advanced Statistics 4.0 Chicago.

Batra. M, J. Shorma, V. Seth. (1994). Index of fermented and non-fremented Legume – based sank food. Asian Pacific Journal of clinical nutrition 3(4): 151-154.

Faster- Powel K, J. Brand Miller. (1995). International table of glycemia index. Am. J. of. Clin. Nutri. (4): 8715 : 8935.

Gabr. M. and E. Abdel-salam. (1962). Juveni diabetes, clinical survey of 19 cases admitted to Mansoura children hospital during the years 1958 – 1961. Gn3 Egypt Peg. Assoc. 123–130.

Paul. AA, DAT. Southgate, Mclance, and Widdowsons. (1998). The composition of foods. 4th Edition-London HMSO.

Sharafetdino-Khkh, O.A, Plotnikoya, TsagikianT. (1993). Comparative efficiency of various food fibers in the correction of carbohydrates and lipid metabolism in Patients with type 11 diabetes mellitus. Vopr. Pitan. 9-13.

Southgate, D.A.T. (1969a). Determination of carbohydrates in foods. I. Available carbohydrates. J. Sci. Fd. Agric. 20,326-330.

Southgate, D.A.T. (1969b). Dekrmization of carbohydrates in foods. II. Unavailable carbohydrates. J. Sci. Fd. Agric. 20, 331-335.

Southgate, D.A.T. (1995). Digestion and metabolism of sugar. Am. J. Clin. Nutri. 62:2035-2115.

Stilling, B. (1994). Blood sugar decreasing bread- like product for diabetics and a powdery mix for- producing some (patent). Int. Patent Application 26(5)-185.

Trout, DI, K. Bchall, M. O. Osilesi. (1993). Prediction of Glycemia index for starchy foods. Am.J. of. Clinic. Nutr.58(6): 873-878.

Trowell, H.C. (1975). Dietary fiber hypothesis of the etiology of diabetes mellitus. Diabetes. 24, 762.

Tabekha, M.M.. (1982). Significance of dephytinization process of wheat bran for producing fiber. X11 international congress nutrition- August 16-21 (1981) San Digo Cal. USA.

Tabekha, M.M.. (1999). Studies on Pectin. Mansoura Univ. J. of Agric. Sci. 25(1) 1110-1346.

Tabekha, M.M. (2001). Effect of Dieatry fiber on serum glucose of non-insulin dependant diabetes mellitus. 17th international congress of Nut. August 27-11 (2001) Vienna Austria.

McCance, R.A. and Lawrence, R.D. (1929). The carbohydrate content of food.

Youssef. M.KE., F.A.Abdel-Moezz, and O.A. Elshafiey. (2000). The effect of certain diets on the serum glucose and serum lipids of uncomplicated non-insulin dependant diabetic males. 1st Mansoura Conf. Of Food Sci. and Diary Tech. 17-19 Oct. 2000.

Table 1. Effect of dietary fiber on blood sugar, blood urea and serum creatinine of I.D.D.M patients.

Parmeters	Group I. W.B.			Group II .Citrus Pectin			Group III .Lupine seed flour			IV. Germinated Mung Beans flour		
	Before using (mg/dl)	After using (mg/dl)	± %	Before using (mg/dl)	After using (mg/dl)	± %	Before using (mg/dl)	After using (mg/dl)	± %	Before using (mg/dl)	After using (mg/dl)	± %
blood sugar (after 2h)	186.2	180.1	-3.2	230.3	221.3	-3.9	235.6	240.0	+1.9	362.0	341.0	-5.8
Blood urea	25.4	26.6	+4.7	36.2	35.2	-2.7	27.7	27.2	-1.8	30.2	25.4	- 15.8
Serum creatinine	0.82	0.76	-7.3	0.99	0.88	-11.1	0.94	0.93	-1.1	0.84	0.72	- 14.6

D. W. B. = Dephytinized Wheat Bran
C. P. = Citrus Pectin.
L.S. F. = Lupine Flour
G. M. B. F. = Germinated Mung Beans Flour
Mean value of each group

Table 2. Effect of dietary fibers on f total cholesterol, High density lipoprotein cholesterol (HDLC) and Low density lipoprotien cholesterol (LDLC)of I.D.D.M patients .

Parameters	Group .I. Dephytinized. W.B.			GroupII. Citrus Pectin			GroupIII .Lupine seed flour			GroupIV .Germinated Mung Beans		
	Before using (mg/dl)	After using (mg/dl)	± %	Before using (mg/dl)	After using (mg/dl)	± %	Before using (mg/dl)	After using (mg/dl)	± %	Before using (mg/dl)	After using (mg/dl)	± %
Total cholesterol	236.2	241.1	+2.1	288.7	281.2	-2.6	266.2	270.1	+1.4	270.1	262.1	-2.9
HDLC	51.3	52.2	+1.7	35.2	32.4	-2.3	56.1	55.2	-1.6	34.2	26.2	-23.3
LDLC	174.5	175.3	+0.5	199.3	190.0	-4.6	163.2	160.0	-1.9	199.5	180.3	-9.6

D. W. B. = Dephytinized Wheat Bran
C. P. = Citrus Pectin.
L. F. = Lupine Flour
G. M. B. F. = Germinated Mung Beans Flour

الملخص العربي

تأثير الألياف الغذائية على ليبيدات وجلوكوز سيرم الدم في علاج مرضى السكري من الرجال المصريين كبار السن الذين لا يعتمدون في علاجهم على الانسولين

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في هذا البحث تم دراسة تأثير أربعة أنواع من الألياف الغذائية (ردة القمح المنزوعة الفيتات – بكتين الموالح – دقيق حبوب الترمس المنزوع المرارة – دقيق فول المانج المنبتة) على مستوى البول السكري وليبيدات الدم على ٢٠٠ مريض سكري لا يعتمدون في علاجهم على الانسولين وتم تقسيمهم الى أربعة مجموعات وتم اعطاء كل مجموعة (أربع جرامات/اليوم) نوع واحد من الألياف الغذائية لمدة أربع أشهر وتم تسجيل الفحص الاكلينيكي الكامل لكل مجموعة تحت الاختبار (سكر الدم – ليبيدات الدم – يوريا الدم) قبل وبعد تناول الجرعة سابقة الذكر. وتم إجراء التحليل الكيماوي والإحصائي للنتائج المتحصل عليها. وأظهرت النتائج تحسن ملحوظ في ليبيدات الدم (الكوليسترول الكلي المنخفض والمرتفع في حالة المجموعة التي تم علاجها باستخدام جرعات من دقيق فول المانج المنبت) ٤ جرامات/يوم.