Effect Of Rice Bran On Blood Glucose And Serum Lipid Parameters In Diabetes II Patients

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Citation

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Abstract

Background & Objective: One of the most common endocrine disorder is Diabetes Mellitus. According to WHO 135 million of people of world affected by diabetes mellitus it's prevalence in Iran is 2-4%. Recently Diabetic patients have been encouraged to increase their fiber intake. The main aim of this study was to determine of effect of rice bran on blood glucose levels and plasma lipids in type II diabetic patients.

Methods: This study was a Double Blind clinical Trial. 60 non-smoker Diabetic Patients which had no renal and liver disorder and high hypertension after physical exam were selected and then randomly divided to intervention and control groups. The data were analyzed t-test and using SPSS and Food processor software.

Results: The fasting serum Glucose level and 2 hour after were reduced significantly in intervention group P<0/001 and differences between two groups were significant too P<0/02 . Triglyceride were reduced and HDL levels were increased significantly (P<0/01) and (P<0/015) in the intervention group and differences between two groups were significant too(P<0/001) and (P<0/013) LDL and chlesterol had reduced too but not significant.

Conclusion: Rice bran can be used as nutritional supplements for the control of diabetes mellitus patients.

INTRODUCTION

Diabetes mellitus is one of the most common endocrine diseases that according to WHO reports affects an estimated 135 million people in world.(1) According to CDC reports 35 million cases have diagnosed in America.(2)

About 46.9 cases of diabetes are diagnosed in Asian countries which this number is near to 50% of all worlds' people.(3) Recent studies showed that the prevalence in Iran is 2-4% and in different part of Iran people over 30 years(6-11%) have non insulin-dependent diabetes, also prevalence in urban regions is higher .(4,5)

Complications of diabetes are serious and affect vessels in the brain, kidney, extremities and eyes.(6,7,8) From each 3 diabetic patients 2 cases are at risk of heart & vascular diseases.(9) Prevention programs of diabetes become natia onal control program in Iran (5)

One of prevention program of diabetes is diet modification and education .(10) Some research shows that use of 20-30 g fiber can decrease the risk of heart-vascular by 25% and other studies show that fabric diet can effect on blood glucose and serum lipid (9,11)

There are two kinds of nutritional fibers: soluble and insoluble. Soluble fiber such as rice bran plays an important role in decreasing of cholesterol and controlling of blood glucose. Fibers have been shown to have significant effect on absorption of nutrients with producing SCFA (Short chain fatty acid) from the colon. These fatty acids can effect glucose metabolism and cholesterol synthesis. Cereals usually have a phitat component which can decrease ingestion of carbohydrates and have a negative relation to ingestion of carbohydrate and glycemic response.(12) Also rice bran have tocopherol, tocotrienol, gama oryzanol, polyphenol and lipase which most of them play an important role in modulating hyperglycemic consequences such as lipid peroxidation. Lipase has shown to increase changing of lipid to fatty acid and lead to fast analyses of triglyceride.(13) According to nutrients component each 100g of rice bran

have 381 kcal energy ,9.85g moist ,54.93g carbohydrates, 17.61g protein, 1.4g lipid, 7.7g fiber, 21.4g nutrient fiber, about 21.59 insoluble fiber and 31.9 soluble fiber, lipase and tripcine.([14])

There are different idea about effect of rice bran on blood glucose and blood lipids Qureshi et al showed that rice bran can decrease blood glucose, total cholesterol and triglyceride ([12,13]). But some studies have shown that it had not any effect on blood lipid and serum glucose ([15,16]), for this reason we decided to survey effect of soluble rice bran on blood glucose levels and serum lipids parameters in diabetic patients (type II).

MATERIALS AND METHODS

This study was a Double Blind clinical Trial with 60 Diabetic Patients (females and males which were nonsmokers, ranging frm 30-65 years and referred to the diabetes center of Bouali hospital of Ardabil). The protocol was approved by the research Review Board of Ardabil university and informed consent was obtained .

Inclusion criteria were: Diabetic type II patients which receive dGlibenklamid or metformine. Subjects were excluded if they were taking medication that might affect serum lipids (thyroid or steroid hormones, beta blockers, prednisone or diuretics), uncontrolled hypertension (systolic blood pressure >200 mm Hg or diastolic blood pressure >110 mm Hg), symptomatic coronary or vascular disease, thyroid disease, hepatic abnormality or renal disease (cr<.4mg/dl and abnormal SGOT). None had experienced weight change of >4.5 kg in the preceding 6 months. After physical exam and laboratory assessment patients were selected and then randomly assigned to groups intervention and control group.

First group intake 10g soluble rice bran 2 times a day (at morning and before sleeping) and the second group intake was a placebo. Rice bran were 80% from factory of bijar lahijan

From each patient a5cc blood sample was taken to assess blood glucose and plasma lipids levels (all patients had taken 24 hour recall of food). Then weight, high and blood pressure of patients and their activity levels at each day was determined. The patients received 20g\day rice bran or placebo for 30 days. Screening serum lipid levels (Triglyceride, HDL, cholesterol, LDL) were measured twice before and after of the study and blood glucose (fasting serum Glucose level and 2 hour after eating) and activity levels according to Krauses activity scale and 24 hour recall of food were checked every 15 days. The data were analyzed by paired t-test, independent t test and Anova, using SPSS and Food processor.

RESULTS

Of the 60 subjects who entered into the study, the data of 3 males and 27 females were used in the intervention group with an average 45±10 and 10 males and 20 females in the control group with an average 50±9.3 used for the final analysis. Average body weight in the intervention group was 74 ±7.7 and in the control group was 72.2±9.1, average hight in the intervention group was 157 ±3.9 and in the control group was 155.2±4 and average body mass index in the intervention group was 27 ±3.5 and in the control group was 26.2±4 kg/m2. Index of Age, (BMI), High and weight of patients are described in Table (1)

Figure 1

Groups	control		Intervention	
Variable		SD	μ	SD
Age(year)	50	9.3	45	10
(BMI) kg/m²	26.2	4	27.3	3.5
High(cm)	155.2	4	157.5	3.9
Weight	72.3	9.1	74.3	7.7

Analysis of food records showed that dietary intake did not change over the study duration, The mean energy, fat, protein and carbohydrate intakes were not significantly different among groups. Baseline macronutrient intake in each group is described in Table (2)

Figure 2

groups	control		intervention	
macronutrient intake	after	before	after	before
Energy(Kcal)	1606±240.8	1665±251	1884±233.2	1888±221.1
Carbohydrate g	234.9±31.2	240±51	258±32	260±41
protien g	55±6.3	56±7	55±6.0	55±6.5
lipid g	37.5±8.2	83.3±3.11	38.5±4.11	39±3.11

Mean blood glucose of Serum declined 24.8 ± 24.07 in the rice bran group and with ANOVA analyzing differences were statically significant which are shown in table (3)

Differences between control group showed that there were no differences in mean serum blood glucose before, after and medium of study time. The fasting serum Glucose level and 2 hour after were reduced significantly in the intervention group P<0/001 and differences between two groups were significant too P<0/02 .

Figure 3

Time of assessing of variable	before intervention		Medium intervention		after intervention		Results
	μ	SD	μ	SD	μ	SD	
Blood glucose fasting	177.4	69.08	159.8	66.2	142.6	45.1	P<0.001
Blood glucose 2 hour after eating	270.03	87.4	251.7	68.2	243.7	64.9	P<0.0001

Triglycerides were reduced and HDL levels were increased significantly (P<0/01) and (P<0/015) in the intervention group and differences between two groups were significant too (P<0/001) and (P<0/013) LDL and cholesterol had reduced too but not significant.

The fasting serum Glucose and Triglyceride, HDL, cholesterol, LDL before and after study (in intervention group) are described in TABLE (4)

Figure 4

variable	before study	after study	Results
Blood glucose mg/dl	177.4±69.8	142.6±45.1	P<0.001
Cholesterol mg/dl	215±41	204±31	P=NS
Triglyceride mg/dl	293.6±88	236.6±75	P<0.01
HDL (mg/dl)	46±13	53.5±14	P<0.015
IDL (mg/dl)	160±29	120±43	P=NS

DISCUSSION

The fasting serum Glucose level and 2 hour after eating were reduced significantly P<0/001. Triglyceride levels were reduced and HDL were increased significantly too (P<0/05) and (P<0/01) LDL and cholesterol had reduced too but not significant.

Results of this study indicate that the fasting serum Glucose level and 2 hour after eating were reduced significantly (P<0/001), Triglyceride levels were reduced significantly (P<0/05) and HDL were increased significantly (P<0/01) LDL and cholesterol had reduced too but not significant. Qureshi et al (2001) fed 60 days diabetic patients with stabilized rice bran and its fractions, rice bran water soluble and rice bran fiber concentrates which plus AHA step-1diet to determine possible effect on serum hemoglobin carbohydrate and lipid parameters. The results showed that the fasting serum glucose levels were reduced significantly (p<0.001) with stabilized rice bran (9%) rice bran water solubles (29%) and with rice bran fiber concentrates (19%). Also their results showed that with stabilized rice bran and its fractions, rice bran water solubles and rice bran fiber concentrates Triglyceride levels and HDL were increased, cholesterol and serum Glucose were reduced significantly. ($_{12}$) Other researches of Qureshi et al(2001) showed that Novel Tocotrienols of Rice Bran can Suppress cholesterogenesis in Hereditary Hypercholesterolemic swines. Four groups were fed a corn-soybean control diet, supplemented with 50 μg of either TRF25, -tocotrienol, d-P21-T3 or d-P25-T3 per g for 6 wk. Group 5 was fed the control diet for 6 wk and served as a control. After 6 weeks, serum total cholesterol was reduced 32–38%, low density lipoprotein cholesterol was reduced 35–43%, apolipoprotein B was reduced 20–28%, platelet factor 4 was reduced 12–24%, thromboxane B2 was reduced 11–18%, glucose was reduced 22–25% ($P < 0.01$), triglycerides were reduced 15–19% and glucagon was reduced 11–17% ($P < 0.05$) in the treatment groups relative to the control. Cholesterol and fatty acid levels in various tissues were lower in the treatment groups than in control. After being fed the tocotrienol-supplemented diets, two swine in each group were transferred to the control diet for 10 weeks. The lower concentrations of serum lipids in these four treatment groups persisted for 10 wk.($_{13}$). Full-fat rice bran was compared with oat bran and a rice starch placebo in hyperlipidemic humans to see if it might have a role in the treatment of hyperlipidemia. Moderately hypercholesterolemic (5.95-8.02 mmol/L), nonsmoking, nonobese adults were studied in a 6-wk, randomized, double-blind, noncross-over trial. Three groups added 84 g/d of a heat-stabilized, full-fat, medium-grain rice bran product (n = 14), oat bran product (n = 13) or rice starch placebo (n = 17) to their usual low-fat diet. Serum cholesterol, triglycerides, HDL-cholesterol (HDL-C), LDL-cholesterol (LDL-C), apoA1 and apoB were measured before and at the end of the supplementation period. Serum

cholesterol decreased significantly (P 0.05) by 8.3 ± 2.4% and 13.0 ± 1.8% in the rice bran and oat bran groups, respectively, but there was no change in the rice starch group.. There was no consistent effect on triglycerides within each group and HDL-C and apoA concentrations did not change. The LDL-C:HDL-C ratio decreased significantly in the rice bran and oat bran groups. Stabilized, full-fat rice bran or oat bran, added to the prudent diet of hyperlipidemic adults, similarly reduced cholesterol and LDL-C and improved lipid ratios in 78% of these individuals. Rice bran, as well as oat bran, should be included in the prudent diet of individuals with hyperlipidemia.($_{15}$)

Sanders T, Reddy S, (1992) compare Influence of Rice Bran and wheat bran on plasma lipids and lipoproteins in Human volunteers. Their results showed that rice bran declined serum Triglyceride and had no effect on cholesterol($_{16}$)

Kestin et al compared in 24 mildly hypercholesterolemic men the effects of adding 11.8 g dietary fiber/d from each of three cereal brans (wheat, rice, and oat) to a low-fiber diet for 4 wk each. Plasma total- and low-density-lipoprotein-cholesterol concentrations were significantly lowered only by oat bran. Compared with wheat bran, the ratios of plasma high-density-lipoprotein cholesterol to total cholesterol and of apolipoprotein A-I to B were significantly increased with oat bran (both by 4.7%, P less than 0.05), and rice bran (2.3%, P less than 0.05, and 3.9%, P less than 0.05, respectively). Blood pressure, blood glucose, and serum insulin responses to a common test meal were unaltered. Oat and rice bran exert a small but potentially useful effect on plasma lipoprotein risk factors for cardiovascular disease.($_{17}$)

CONCLUSION

In conclusion, rice bran, when added to the prudent diets of moderately hyperlipidemic individuals, produces significant reduction in Triglyceride levels and improvement in the HDL ratio in most of these individuals. There was no significant difference between the effectiveness of the rice bran and serum cholesterol or LDL, as rice bran has some insoluble fiber sincluding cellulose and hemicelluloses which can band to Bile Acids

It is probable be reason of no difference of cholesterol level.

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References

1. Rezvaneyan H, Omidiyani T and Amini M.survey effect of pantocsi philin on diabetic nephropathy protienureau and compare with captopril in type II diabetic patients .Endocrine and metabolism of Iran fall 1999;no 3 vol 11 pp:71
2. Boyle S, Salyn N. Rice bran lowers diabetic blood sugar. Web MD Health 2002.
3. Khaghani Sh and Boshehrie H .Scientific treatment of diabetes.Auther: pendesi Sh, moses S.Iran:Tehran,1999 pp: 12-75.
4. Azizie F.Status of endocrine and metabolism diseases in Iran in 1999. Endocrine and metabolism of Iran summer1999; no 2vol 10 pp: 71
5. Azizie F.5th congress of nutriation of Iran
6. Association of special diseases. Nutrition education for diabetic patients. Iran: Tehran.Endocrine and metabolism researches center.1999 pp: 1-9
7. Do not worried about your diabetes you can live look like others. Association of special diseases.1999 no 9 :pp74
8. Powers A. Broun wal E, favci A, Kasper D, et al. Harrisons rinciples of Internal Medicine. 15 t ed. The McGraw-Hill companies; (2001); (2): 2109-2127.
9. News letter.gif 2002. Diabetic. com.
10. Sadr F, Afshars M, Sarblokie Sh.Effect of fasting on blood glucose, lipid, weigh and blood pressure in diabetic patients type II. Feays. 1996 second year,no2pp:71-76
11. http://www.Qualitycounts.com
12. Qureshi A, Sami S, Khan F. Effect of stabilized rice bran, Its soluble and fiber fractions on blood glucose levels and serum lipid parameters in Humans with Diabetes Mellitus Type I and II. Journal of Nutritional Biochemistry. 2002; 13: 145-187.
13. Qureshi A, Peterson D, Masler-Rapacz J, et al. Novel Tocotrienols of Rice Bran Suppress Cholesterogensis in Heredierary Hyper cholestemy swine. Journal of Nutrition. 2001; 131(2): 223-30.
14. Movahedie A and Rosta R .table of nutriant materials.Assosiation nutrition and dustery of food researches of Iran.1998 pp :9-13
15. Ann L. Gerhardt and Noreen B. Gallo. Full-Fat Rice Bran and Oat Bran Similarly Reduce Hypercholesterolemia in Humans. The Journal of Nutrition Vol. 128 No. 5 May 1998, pp. 865-869.
16. Sanders T, Reddy S, The Influence of Rice Bran on plasma lipids and lipoproteins in Human volunteers. European Journal of Clinical Nutrition. 1992; 46: 167-172
17. M Kestin, R Moss, PM Clifton and PJ Neste. Comparative effects of three cereal brans on plasma lipids, blood pressure, and glucose metabolism in mildly hypercholesterolemic menAmerican Journal of Clinical Nutrition, Vol 52, 661-666, Copyright © 1990
18. Omidvaran N, Aminpour A, Riazie R.Application of food in health and diseases.Auther: zimen F.Tehran: shercate sahami enteshar.1994 pp: 745-750

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