

INFLUENCE OF RICE BRAN OIL ON SERUM LIPID PEROXIDES AND LIPIDS IN HUMAN SUBJECTS

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Abstract : To study the effect of rice bran oil (RBO) on serum lipids and lipid peroxides in human volunteers. Nine healthy volunteers, aged between 42 to 57 years were given 75 ml of RBO thrice daily as the cooking medium with break fast, lunch and dinner for a period of 50 days. At the beginning and at the end of 50 days, 5 ml of blood were drawn from an ante cubital vein. Serum lipids and lipid peroxides levels were estimated from the blood sample. There was a significant decrease in the levels of lipid peroxides, triglycerides, LDL, VLDL, and total cholesterol in human volunteers who switched over to RBO. RBO has evidently antioxidant and antilipidemic activities in human subjects.

Key words : rice bran oil serum lipids serum lipid peroxides

INTRODUCTION

Rice bran is the most important byproduct of rice (*Oryza sativa*). Though it is a good source of protein and fat, it is presently very much underutilized as a food material. The average oil yield from the Indian rice bran is reported to be 12-14%. Refined RBO is as good as refined ground nut or cotton seed or sun flower oil for edible purpose and has better keeping qualities due to the presence of antioxidants like alpha and gamatocopherols (1).

Rice bran contains an enzyme, lipase that causes rapid decomposition of oil in to free fatty acids and glycerol. RBO has a high

unsaponifiable matter (4.2%) and it is rich in minor constituents such as phytosterols, triterpene alcohols, tocopherols, and tocotrienols. It was reported to possess hypolipidemic effect due to the presence of minor constituents in unsaponifiable fraction of RBO (2).

The principal esters from rice bran are cycloartenyl, 24-methylene cycloartanyl and campesteryl ferulate. RBO has low levels of 24-methylene cycloartanyl but high levels of cyclobianol esters. Oryzanol is a class of non-saponifiable lipids of RBO. More specifically, oryzanol is a group of ferulic acid esters of triterpene alcohol and plant sterol. Oryzanol has been reported to

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possess cholesterol lowering effect (3). The main aim of the present study was to investigate the antilipidemic and antioxidant effects of rice bran oil in human volunteers upon sub-chronic consumption.

METHODS

Nine male healthy volunteers, between 42–57 years with the mean (\pm SD) height and weight being 175.3 ± 5.7 cm and 72.3 ± 6.3 kg respectively, participated in the study. All the subjects were free from any major clinical illness during the preceding 6 months and underwent thorough physical examination. All the subjects were advised to be on uniform diet and not to consume eggs or any other cholesterol rich food products. No major alterations (both qualitative and quantitative) were permitted in their food during the entire period of the study. The subjects were earlier using refined ground nut oil as the cooking medium prior to the study. Precaution was also taken to avoid variation in the consumption level of the RBO. The study protocol was approved by the Institutional Ethical Committee.

Each volunteer consumed approximately 75 ml of RBO thrice daily as the cooking medium for making breakfast, lunch and dinner for a total period of 50 days. At the beginning and the end of the study period, 5 ml of blood were drawn after an over night fast from ante-cubital vein. Serum lipid peroxides and lipid levels were determined from the blood samples.

(A) Estimation of serum lipid peroxides

The TBA reactive products were estimated by measuring the intensity of pink color produced at 532nm. using Systronics spectrophotometer. The concentration of lipid peroxides was expressed in terms of MDA equivalents (4).

(B) Estimation of serum lipids

1) Estimation of total and HDL-cholesterol :

Total cholesterol and HDL-cholesterol were determined using kit method (Monozyme India Limited) (5).

2) Estimation of serum triglycerides :

The serum triglycerides were determined after enzymatic hydrolysis with lipases using kit method (Monozyme India Limited) (6).

3) Estimation of LDL, VLDL-cholesterol :

LDL, VLDL-cholesterol levels were estimated using the following relationships.

$$\text{VLDL} = \text{Triglycerides}/5$$

$$\text{LDL} = \text{Total cholesterol} - (\text{HDL} + \text{VLDL}) \text{ cholesterol}$$

RESULTS

Mean (\pm SD) of serum lipid peroxides and different serum lipids of human volunteers before and after administration of RBO are given in Table-I. There was a

TABLE I: Mean±(SD) values of Serum lipid peroxides, triglycerides, LDL, VLDL, HDL and total cholesterol levels in human volunteers.

Parameter	Before RBO	After RBO
Lipid peroxides*	0.621±0.21	0.535±0.16***
Triglycerides**	138.66±40.22	111.82±40.05***
LDL Cholesterol**	172.67±25.91	157.19±24.38***
VLDL Cholesterol**	27.73±8.05	21.59±7.09***
HDL Cholesterol**	54.85±1.39	59.67±11.79
Total Cholesterol**	264.71±23.5	234.81±29.39***

*nM of MDA

**mg/dl

***Significant (P<0.01)

highly significant reduction in serum lipid peroxides level from 0.621 ± 0.21 to 0.535 ± 0.16 ($P < 0.01$). Total cholesterol, triglycerides, and LDL cholesterol levels decreased significantly from 264.71 ± 23.5 to 234.81 ± 29.39 ($P < 0.01$), from 138.66 ± 40.22 to 111.82 ± 40.05 ($P < 0.01$) and from 172.67 ± 25.91 to 157.19 ± 24.38 ($P < 0.01$). VLDL cholesterol levels decreased significantly from 27.73 ± 8.05 to 21.59 ± 7.09 ($P < 0.01$). The HDL cholesterol levels showed a define, but not a significant increase from 54.85 ± 1.39 to 59.67 ± 11.79 ($P > 0.05$).

DISCUSSION

From the result of this investigation, it is evident that rice bran oil significantly reduced serum lipid peroxides, serum total cholesterol, triglycerides, VLDL and LDL levels. The presence of antioxidants like alpha and gama-tocopherols in RBO may be responsible for lowering of serum lipid peroxides levels.

Fall in triglycerides, VLDL, LDL and total cholesterol levels suggests that antioxidants, Phytosterols, triterpene alcohols, tocopherols, tocotrienols, and other constituents present in rice bran oil may be reducing cholesterol deposition in peripheral tissues, including blood vessels. Moderate rise in HDL-cholesterol (though not significant) is a remarkable and beneficial change brought about by rice bran oil.

Since the present study indicates a significant decline in lipid peroxides, triglycerides, and other forms of cholesterol, it is clear that rice bran oil consumption provides antioxidant and antilipidemic effect in human subjects.

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