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Original Research Article

An Interventional Study: Correlation between Rice Bran Oil Intake and Lipid Profile in CKD-5 Patients on Hemodialysis

Neelesh Kumar Maurya[1]*, Pratibha Arya[1] and N. S. Sengar[2]

[1]Department of Home Science, Bundelkhand University, Jhansi, India
2Department of Medicine, MLB Medical College, Jhansi, India
**Corresponding author*

Keywords

Rice bran oil, CKD-5, Hypocholesterolemic, Correlation, Pearson coefficient

A B S T R A C T

Studies showed that RBO has important hypocholesterolemic effects. RBO incorporates a healthy diet and fitness regimen to improve cardiac health and other health conditions. It is important to remind everyone that RBO is not a drug, even with minor changes in your lipid profile. This concept could be beneficial. It is a convenient and cost-effective approach to a well-balanced life and better quality of life.

Introduction

Chronic kidney disease (CKD) is a significant contributor to morbidity and mortality related to non-communicable diseases and should be progressively treated to achieve the UN's Sustainable Development Goal to mitigate premature mortality due to non-communicable diseases by a third by 2030. The costs of healthcare for CKD rose since the 1960s, with the availability of renal replacement techniques making it easier for patients with end-stage renal disease (ESKD) to undergo life-saving but expensive treatment over the long term. The number of people undergoing renal replacement therapy exceeds 2·5 million and is estimated to double to 5·4 million by 2030; 2 however, short-term treatment is anticipated in many countries.[Bikbov *et al.*, 2020]. Dyslipidemia is well-established in the community at large as a risk factor for CVD, but this association in the population is not clear. Dyslipidemia in pre-dialysis CKD and the population with hemodialysis is correlated with CVD, but there is a lack of association evidence for patients with peritoneal dialysis. Treatments for modifiable identified risks, such as dyslipidemia, have a growing global CKD burden and are an important element in improving outcomes. Since the therapeutic intervention can be used to modulate hyperlipidemia, it can be studied and lipid profile anomalies compared with CKD patients [Mostafa *et al.*, 2020 and Maurya *et al.*, 2018].

Pandya *et al.*, (2015) studied that Lipid profile of kidney failure The lipid profile in patients with renal disease reveals both qualitative and quantitative abnormalities. Any of these abnormalities vary in the spectrum of kidney problems. Abnormal elimination is a significant contributor to lipid defects with reduced kidney function and diminished clearance. Hyper

triglyceridemia and low-density cholesterol (HDL) are typical initial abnormalities. Patients with renal disease are vulnerable to developing atherosclerosis and adding to their CVD burden by developing functional and physiological defects in HDL cholesterol. The level of CKD patients with lipoprotein lipase, hepatic lipase and high-low density (VLDL) and lipoprotein low-density (LDL) receptors have decreased. Bhat *et al.,* (2020) and khushwaha *et al.,* (2019) described that rice bran consists of pericarp, aleuron and a tiny portion of the endosperm the outermost layer. Rice bran includes 51% carbohydrates, 29% dietary and phenolic fibres, including 2600 ppm (α-oryzanol), tocopherol, tocotrienol, phenolic composites. Fibre and β-oryzanol are binding on bile acids in the diets and lower cholesterol in rice bran by binding on fat and cholesterol absorption Furthermore, soluble dietary fibres and tocotrienol in rice bran have been shown to minimize blood cholesterol inhibition.

Materials and Methods

Inclusion criteria and exclusion criteria

This study was conducted on 50 CKD-selected CKD-patients, each from 19 to 65 years of age (both male and female)and HD at least 3 months prior in one patient excluded from MLB Medical College, Jhansi, India, between February 25th of 2016 and November 30th. Each of the included patients have regular HD for two days a week and suffering from CKD stage 5 for the past sixmonths.CKD patients were eliminated, but the study did not mention patients with hepatic disease, hypertension, malignancy and diabetes. After prior consent from the Institutional Oversight Board (Human Ethics Committee), MLB, Medical College, Jhansi, India, the prospective study was carried out. The Human Ethics Committee approval number is NO-838/SURGERY/15 (Tripathi *et al.,* 2016).

Informed written

Patients whose inclusion and exclusion requirements appealed for the report were asked for approval before admission. A detailed history of health and clinical assessments was done.

Statistical analysis

Statistical details have been recorded in the Microsoft Excel program. The association determined through the correlation between rice bran oil intake and lipid profile three months duration by using the Graph Pad Prism 8 program.

Results and Discussion

Figure 1 to 4 shows the association of one parameter to another. LDL and HDL were found to be negatively correlated to each other with r^2 value 0.040. Cholesterol level and HDL were also found to be negatively correlated with very small r^2 value of 0.001.A slight positive correlation was found between Triglycerides level and HDL with Pearson's coefficient as 0.015.

Figure 2: as far as the effect of rice bran oil is analyzed on the lipid profile of patients it was found to have TC negatively correlated with consumption of rice bran oil with r^2 value as 0.002. There is no correlation found between TG and Rice bran oil intake for the patients of the experimental group.

LDL for the patients consuming rice bran oil was found to be negatively correlated with the amount of rice bran oil consumption with Pearson's coefficient as 0.027. VLDL was also found to be unaffected by the amount of rice bran oil consumption. Kaesler *et al.,* 2021 concluted that dyslipidemia is a common problem in chronic kidney disease patients. Dyslipidemia is a significant risk factor in their cardiovascular disease in

chronic patients with renal disorders. The goal of the research is to improve prevention measures and to treat dyslipidemia in patients with chronic kidney disease. Zavoshy *et al.,* 2012 studied that despite traditional notions of cardiovascular disease (CVD) as "Western" affluence disease, more than three-quarters of global CVDs are now occurring in middle-and lower-income countries.

Serum TC and LDL improve the prevalence of atherosclerosis and coronary heart disease. Utarwuthipong *et al.,* (2009) reported that consumption of rice bran oil/palm oil (3:1) a mixture of oils rich in oleic acid and equivalent in linoleic acid and palmitic acid could minimize total cholesterol and LDL-cholesterol, as in our previous olive oil intervention analysis (known for its high level of MUFA) where LDL was substantially decreased. Chen and Cheng *et al.,*(2006) reported that oryzanol had affected biliary secretions and faecal excretion of cholesterol and bile acids. The faecal excretion of bilious acids and neutral sterols increased significantly.

They proposed that the observed hypolipidemic effect of the RBO diet could be due to increased hepatic LDL-receptor development, which facilitated lowering of LDL and increased CYP7A1 expression, which facilitated cholesterol catabolism, and then increased HMG-CoA reductase expression, to synthesize cholesterol for in vivo cholesterol homeostasis. Zavoshy *et al.,* (2012) proposed that the prevention of atherosclerosis should be directed towards improving the quality of the diet by enhancing dietary antioxidants such as vitamin E.

Vitamin E isomers (tocopherols and tocotrienols) that are also present in RBO can confer additional health benefits, in particular antioxidant activity, on this compound. Substantial reductions in atherogenic TC, LDL and TC/HDL levels by 10.3, 8.6 and 7.1 per cent, respectively, over a four-week diet that requires RBO. These findings are consistent with a recent study that showed that RBO extended over four weeks substantially lowers blood TC and LDL in people with mild hypercholesterolemia.

The present study also observed a slight positive correlation was found between Triglycerides level and HDL with Pearson's coefficient as 0.015 after intervention RBO, Kustiyah *et al.,* (2019) observed 4 weeks increase in HDL but not statistically important, and in the TRO community, HDL increased significantly from 35.6 mg/dL to 42.5 mg/dL. Serum Low-Density Lipoprotein (LDL) decreased significantly. Rice bran oil, total cholesterol, decreased dramatically by 10.3 per cent.

HDL decreased at 2nd week and increased at 4th week. In the TRO category, the HDL level increased substantially from 35.6 mg/dL to 42.5 mg/dL. Hongu *et al.,* showed a decrease in low-density lipoprotein (LDL) cholesterol (difference 22.3 ± 25.2 g/dL vs. 4.4 ± 18.9 g/dL; p = 0.062) among healthy overweight adults receiving rice bran and plant sterol compared to only rice bran treatment. Choudary *et al.,* (2013) analyzed in among 60 moderately hyperlipidemic patients who received blended rice bran and olive oil showed that LDL cholesterol levels decreased by 9.0 per cent, but not statistically significant.

A substantial decrease in serum triglyceride levels and VLDL levels on RBSO intake was observed in this study. Hota *et al.,* (2020) argued that the decrease in triglyceride levels in prediabetic (p=0.005) and diabetic (p=0.008) RBSO-consuming groups was statistically important.

Fig.1 Correlation between rice bran oil intake and cholesterol level in the experimental group

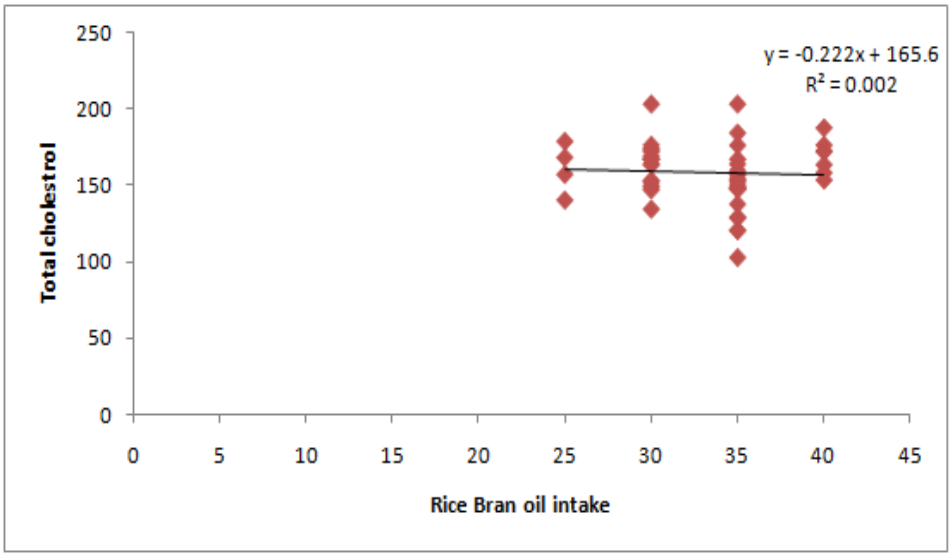


Fig.2 Correlation between rice bran oil intake and triglycerides in the experimental group

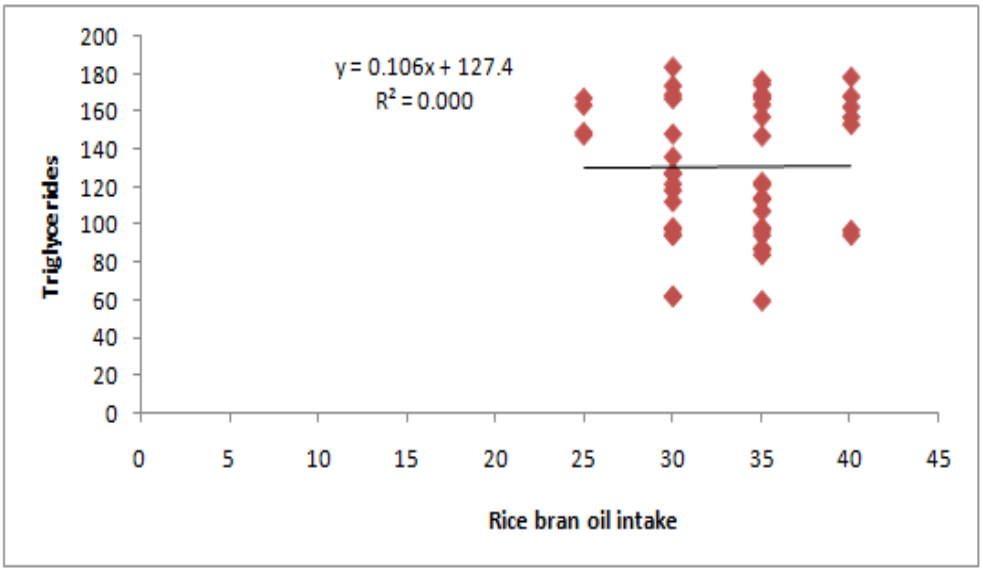


Fig.3 Correlation between rice bran oil intake and LDL in the experimental group

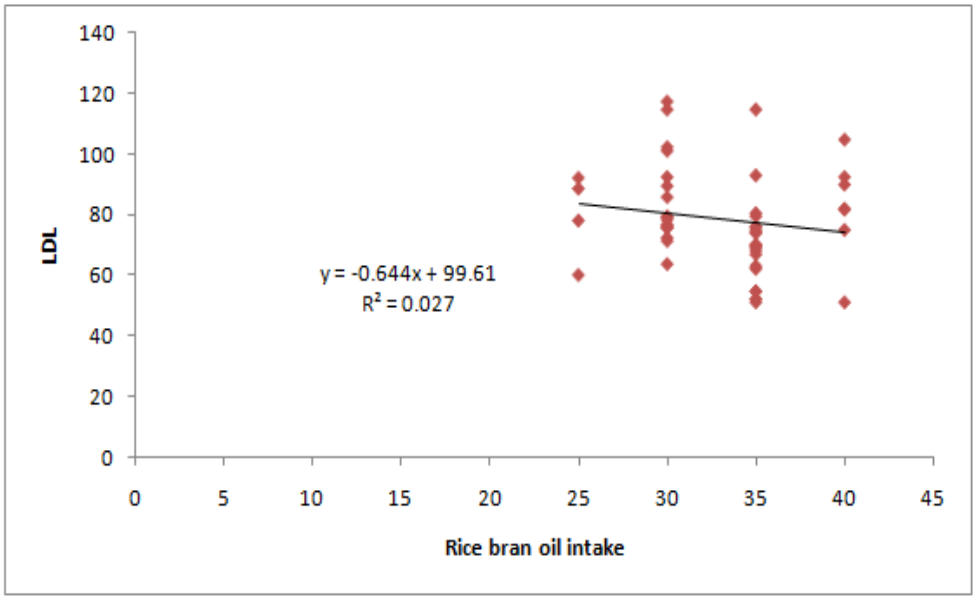
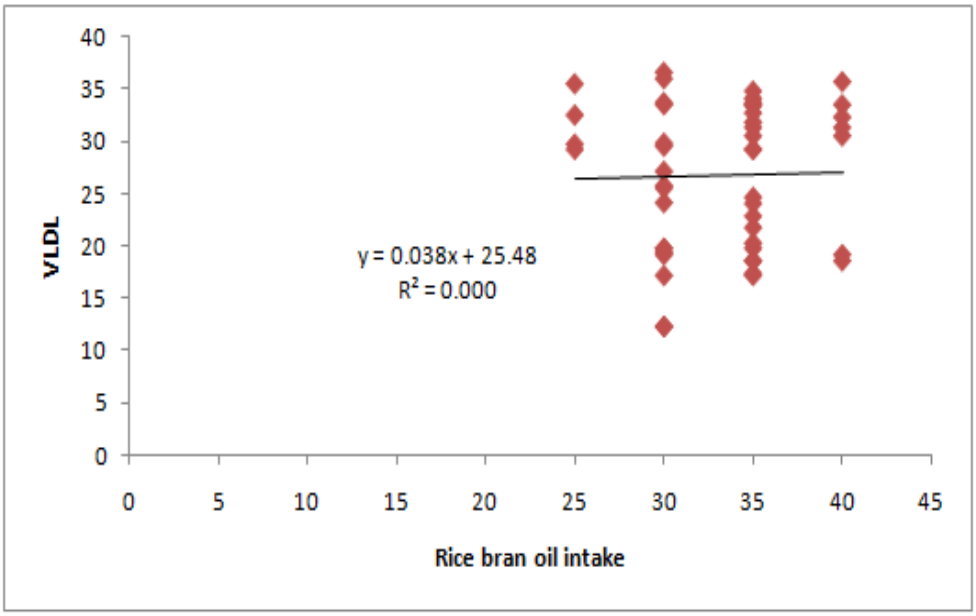


Fig.4 Correlation between rice bran oil intake and VLDL in the experimental group



The decrease in VLDL cholesterol levels was important (p=0.001) in the RBSO diabetic population. Yalagala *et al.*, studied the impact of RBO and Sesame oil on inflammatory markers and reported that the upregulation of the Sterol Regulatory Element-Binding Protein (SREBP)-2 and the peroxidant proliferator-activated gamma receptor (PPARΔ) and the down regulation of the nuclear factor-kappa B (NF-ΔB) p65 resulted in the hypolipidemic and anti-inflammatory properties of rice bran oil and sesame oil. Clinically, consumption of 50 g RBO per day for 4 weeks of hypercholesterolemia by male

subjects substantially decreased overall serum cholesterol levels and consumption of 75 ml RBO per day for 50 d stable subjects decreased overall serum cholesterol levels. Devarajan *et al.*, which assessed the impact of mixing rice bran oil and sesame oil in diabetic subjects of type II and recorded that 20 per cent cold-pressed unrefined sesame oil and 80 per cent physically refined rice bran oil lowered blood glucose levels and improved lipid profile in diabetic type II. Al-Okbi *et al.*, (2020) concluded from the study that both gamma oryzanol and gamma oryzanol were present. Rice bran oil mixtures are used to protect against CVD and cardio-renal. Syndrome, contributing to the suppression of hepatic carcinoma. Tabassum *et al.*, (2005) observed LDL and very-low-density lipoprotein (VLDL) were found to be significantly lower ($p<0.05$) in the RBO community at the end of the study, 104.5 and 32.5 mg/dL, respectively, compared to the control groups 195.7 and 57.3 mg/dL. The present study showed that the baseline control group decreased to 1.04 per cent after 60 days, as in the experimental group after RBO supplementation it increased to 0.98 per cent.HDL increased after treatment with rice bran but was not statistically significant. In this present interventional study was no substantial association between TG and Rice bran oil intake for the patients of the experimental community. However, LDL for the patients consuming rice bran oil was found to be negatively associated with the amount of rice bran oil consumption with Pearson's coefficient as 0.027. VLDL is also found not to be impacted by the amount of rice bran oil consumed. Kennedy *et al.*, (2010) found oil blends (Rice bran and sunflower oil blend) and the subjects were asked to repeat visits on Day 15, Day 30, Day 45, and Day 60, with an improvement in total cholesterol (mg/dL) of 218±5.9 baseline, after 60 days of 217.7±5.7.HDL (mg/dL) baseline of 43.5±1.6, after 60 days of 44.6±1.5, LDL (mg/dL) baseline of 141.7±6.7, after 60 days of 142.3±5.5, VLDL (mg/dL) baseline of 141.7± 6.7, after 60 days of 142.3±5. Erlinawati *et al.*, (2017) observed improvements following RBO supplementation, 45gm/day total cholesterol (mg/dL) 242.3±33.6 baseline, 4 weeks 228.8±16.9, HDL (mg/dL) baseline 40.7±7.02, 4 weeks 45.7±10.06, LDL (mg/dL) baseline 173.7±43., after 4 weeks 157.10 ± 25.4, Triglycerides (mg/dL) at baseline 175.0 and after 4 weeks 161.0.Present study statically was not significant but slightly difference observed was important by RBO.

The present research, it may be concluded that RBO, a growing option as cooking oil, has specific hypocholesterolemia effects, particularly for its principal constituent gamma -Oryzanol. The use of RBO, together with a nutritionist and a healthy lifestyle, can help improve cardiovascular health. Dietary change along with the adoption of a healthy lifestyle, specifically physically active lifestyle can be helpful to reduce the risk of secondary metabolic disorder of occurrence of CVD. Everybody should remember that RBO is not a medicine, even with minor improvements in the lipid profile, even if it is beneficial, thus adding such ingredients to their diet is important for better health without any extra expense.

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