CLINICAL RESEARCH STUDY

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A Blend of Sesame and Rice Bran Oils Lowers Hyperglycemia and Improves the Lipids

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ABSTRACT

BACKGROUND: Considering the health benefits of sesame oil and rice bran oil, the study was conducted to determine the extent to which the daily use of this blend of oils controls hyperglycemia and improves the lipid profile.

METHODS: In this 8-week open-label randomized dietary intervention study, 300 type 2 diabetes mellitus patients and 100 normoglycemic subjects were grouped as 1) normoglycemic subjects (n = 100) treated with sesame oil blend Vivo (Adani Wilmar, Ahmedabad, Gujarat, India), 2) type 2 diabetes mellitus patients treated with sesame oil blend (n = 100), 3) type 2 diabetes mellitus patients treated with glibenclamide (n = 100; 5 mg/d), and 4) type 2 diabetes mellitus patients treated in combination of glibenclamide (5 mg/d) and sesame oil blend (n = 100). Twelve-hour fasting blood glucose, glycated hemoglobin (HbA1c), and lipid profile followed by postprandial blood glucose were measured at baseline. Sesame oil blend was supplied to the respective groups, who were instructed to use as cooking oil for 8 weeks. Fasting and postprandial blood glucose was measured at week 4 and week 8, while HbA1c and lipid profile were measured at week 8.

RESULTS: At week 4 and week 8, type 2 diabetes mellitus patients treated with sesame oil blend or glibenclamide or combination of glibenclamide and sesame oil blend showed significant reduction of fasting and postprandial blood glucose ($P < .001$). HbA1c, total cholesterol, triglycerides, low-density lipoprotein cholesterol, and non-high-density lipoprotein cholesterol were significantly reduced ($P < .001$), while high-density lipoprotein cholesterol was significantly increased at week 8 ($P < .001$) in type 2 diabetes mellitus patients treated with the sesame oil blend or combination of glibenclamide and sesame oil blend; whereas glibenclamide-alone-treated type 2 diabetes mellitus patients showed a significant reduction of HbA1c ($P < .001$) only.

CONCLUSIONS: A novel blend of 20% cold-pressed unrefined sesame oil and 80% physically refined rice bran oil as cooking oil, lowered hyperglycemia and improved the lipid profile in type 2 diabetes mellitus patients.

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Type 2 diabetes mellitus has become a challenging global public health concern, and has become a tremendous worldwide social and economic burden because of its risk for cardiovascular diseases.[1] The incidence of type 2 diabetes mellitus patients is on the increase and it is estimated that there will be 366 million cases in 2030.[2] Metabolic and lifestyle factors, including obesity, diet, physical activity, and smoking, influence the risk of developing diabetes, as does genetics.[3-9] The increasing incidence of type 2 diabetes mellitus and the prevalence of cardiovascular risk emphasize the need for appropriate dietary modifications as a critical addition to the pharmacological intervention for preventing and treating them. Therefore, it is important to identify modifiable risk factors of diabetes mellitus, such as diet, and look for the beneficial foods that could help to reduce the risk of diabetes mellitus.

CLINICAL SIGNIFICANCE

- Cooking with a blend of unrefined cold-pressed sesame oil and physically refined rice bran oil effectively reduced hyperglycemia. However, a combination of sesame oil blend and antidiabetic medication yielded even more promising results to reduce hyperglycemia in patients with type 2 diabetes mellitus.
- Use of sesame oil blend as cooking medium for 8 weeks seemed to make a difference on lipid levels by reducing total cholesterol, triglycerides, low-density lipoprotein cholesterol, and non-high-density lipoprotein cholesterol, and increased high-density lipoprotein cholesterol.

Evidence from observational and experimental studies suggests that dietary factors have a major role in the prevention and management of diabetes mellitus.[10] Among the dietary factors, saturated fatty acids consumption has been implicated as one possible factor for diabetes risk.[11] Epidemiological studies have indicated that the replacement of foods high in saturated fatty acids with food sources of mono- and polyunsaturated fatty acids could be favorable in the prevention and progression of diabetes development.[12] Several studies have shown that edible oils rich in mono- and polyunsaturated fatty acids favorably affect the diabetes risk.[13,14] Sankar et al[15] reported that the use of sesame oil as cooking oil reduced blood glucose, glycated hemoglobin (HbA1c), and cholesterol, and thereby helped to control type 2 diabetes mellitus. Likewise, rice bran oil, an edible oil extracted from the inner husk of rice bran, rich in monounsaturated fatty acids, oryzanol, tocopherols, and tocotrienols lowered hypercholesterolemia and hyperglycemia in humans and animal models.[16,17] Gamma-oryzanol (mixture of ferulic acid esters of sterol and triterpenoids) has been shown to have both antidiabetic and cholesterol-lowering effects.[18,19]

A novel oils blend with a rich source of antioxidants, and mono- and polyunsaturated fatty acids, may provide increased opportunities for optimizing the unsaturated fatty acids/antioxidants as a dietary supplement to improve type 2 diabetes mellitus and other associated cardiovascular risk factors. It was hypothesized that a blend of sesame oil and rice bran oil may elicit different effects from what they reflect individually as cooking oil. The objective of the study, therefore, was to investigate the relative effects of an oils blend including cold pressed, un-refined, antioxidants and lignans-rich sesame oil and physically refined γ-oryzanol-rich rice bran oil (20:80) on hyperglycemia and lipid profile in individuals with type 2 diabetes mellitus.

MATERIALS AND METHODS

Subjects

Study subjects were men and women (n = 300) with newly diagnosed type 2 diabetes mellitus, with a mean (±SD) age of 50.5 ± 10.8 years. Normoglycemic subjects were men and women (n = 100) with a mean (±SD) age of 32.6 ± 10 years, and with normal plasma glucose levels. Type 2 diabetes mellitus patients were required to have no evidence of cardiovascular or liver disease; no usage of antidiabetic or cholesterol-lowering medication; no adherence to a prescribed diet; and no pregnancy or lactation. Lifestyle habits of the study participants, including smoking, alcohol intake, and physical activity, were obtained by a questionnaire, and the family history of type 2 diabetes mellitus was defined as a history of their parents, who were once diagnosed as having type 2 diabetes mellitus.

Study Design

Eligible type 2 diabetes mellitus patients and normoglycemic subjects referred by the diabetes outpatient clinics of the Hindu Rao Hospitals, New Delhi, and Dr. Ambedkar Multispecialty Hospital, Noida, India were randomized to the following treatment groups (**Figure 1**): 1) normoglycemic subjects treated with sesame oil blend (n = 100); 2) type 2 diabetes mellitus patients treated with sesame oil blend (n = 100); 3) type 2 diabetes mellitus patients treated with glibenclamide (n = 100; 5 mg/d); and 4) type 2 diabetes mellitus patients treated in combination of glibenclamide (5 mg/d) and sesame oil blend (n = 100). All participants were clinically assessed at baseline for 12-hour fasting blood glucose, HbA1c, total cholesterol (TC), triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), non-high-density lipoprotein cholesterol (non-HDL-C), and high-density lipoprotein cholesterol (HDL-C) followed by postprandial blood glucose. Sesame oil blend was supplied to the respective groups at every 2-week interval for a maximum of 4-5 liters, and they were instructed to use it as the only cooking oil for 8 weeks. They were using mustard oil, palm oil, sunflower oil, and soybean oil at random prior to their inclusion in this study. In accordance with the daily requirement of calories from fat, we advised the participants

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