

Table: Fatty acid composition of popular cooking mediums*

	Saturated (SFA)	Mono-unsaturated (MUFA)	Poly-unsaturated (PUFA)	Natural Antioxidants	Remarks
Recommended*	27-33%	33-40%	27-33%	–	–
Butter fat (desi ghee)	67	30	3	–	Very high SFA
Hydrogenated fat (vanaspati ghee)	60	40	–	–	Contains Trans Fatty acid
Palm oil	60	40	10	Tocopherols Tocotrienols	High SFA
Safflower oil (Kardi oil)	9	13	78	Tocopherols	Very high PUFA
Sunflower oil	12	19	69	Tocopherols	Very high PUFA
Soybean oil	15	24	61	Tocopherols	High PUFA
Corn oil	13	28	59	Tocopherols	High PUFA
Cottonseed oil	26	19	55	Tocopherols	High PUFA
Mustard oil	4	67	29	Tocopherols	Contains undesirable erucic acid
Canola oil	6	62	32	Tocopherols	Near ideal fatty acid composition
Olive oil	16	75	9	Tocopherols	Near ideal fatty acid composition
Groundnut oil (Peanut oil)	20	48	32	Tocopherols	Near ideal fatty acid composition
Rice Bran oil (revised)	24	42	34	Tocopherols Tocotrienols Oryzanols	Near ideal fatty acid composition

*Report of WHO NIN Workshop on Dietary Fats, & Non-communicable diseases, July 7-8, 2005, NIN, Hyderabad.

Mustard oil is not considered very healthy due to its high erucic acid content; canola (rapeseed oil) is not suitable for frying due to high linolenic acid content. Olive oil is costly and also has a low smoke point (180°C). Thus, both olive and rapeseed oils are not suitable for Indian style cooking, since fried foods are a way of life here. Groundnut oil is poor in antioxidants. Hence, RBO is a better choice looking to its high smoke point, fatty acid composition and presence of nutraceuticals.

Thus, it is apparent that we need to bring rice bran oil preferably that blended with oils rich in omega-3 fatty acids to our kitchens, since it is nutritive, full of health benefits and is suitable for Indian style cooking, which includes frying chips *pakoda*, *puri*, *kachauri*, *jalebi*, *vada*, *paratha* and *dosa*. Not only this, we can use it to maintain the health of our skin also. The majority of oils on the market is chemically extracted using solvents like hexane and high heat, but if available the cold pressed RBO should be preferred. A final caveat - RBO may be good, but fat moderation is the key to good health.

Rice Bran Oil - A Cooking Medium with Health Benefits

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Editing and layout : B. N. Sarangi, G.A.K. Kumar and Sandhyarani Dalal

Photography: P. Kar and B. Behera



Rice Bran Oil A Cooking Medium with Health Benefits

Srigopal Sharma and Avijit Das



Rice bran oil (RBO) is being increasingly recognized as a useful cooking medium with health benefits. Various brands of pure RBO and edible oils blended with up to 80% RBO are commercially available in India. The RBO is relatively less absorbed by food during cooking/frying and is rich in components, which reduce blood cholesterol and thus help maintain a healthier heart. Besides, it strengthens immune system and promotes skin health. The RBO also contains **nutraceuticals** - food components with medicinal value and **antioxidants**- substances that prevent oxidative damage to cells by mopping up free radicals before they harm the cell structure, thus mitigating cancer development and ageing. All this adds to a better general health and life quality.

What is Rice Bran Oil ?

In its natural state, rice is harvested as a covered grain called paddy. Removal of the inedible cover (husk) of paddy grains results in rice grains with a brownish outer coat hence called brown rice. Milling of brown rice yields white or milled rice (the normally eaten rice) due to the removal of the brown colored layer and germ, which collect as a powder called rice bran. The bran makes up about 7% of paddy and contains nearly 18-20% oil. Most of the bran is used for animal feeds. The stabilized rice bran is used as a source of dietary fiber and protein. It is extracted with hexane or cold pressed to obtain rice bran oil. Stabilization sterilizes the bran, inactivates lipase activity (also lipoxigenase and peroxidase), and improves oil extraction efficiency. Methods for stabilization of rice bran include dry heating, wet heating, and extrusion, the last one being the most practical method. Bran stabilization is necessary because in intact grain, the lipase and oil are physically isolated, but as soon as rice is milled (or even when paddy is dehulled), the two get mixed resulting in hydrolysis of

oil and a rapid increase in the free fatty acids causing drastic quality reduction of the rice bran. In high humidity storage, the rate of hydrolysis is 5 -10% per day and about 70% in a month. The stabilized bran is extracted with organic solvents (preferably hexane, which is recovered later) to ensure better extraction of RBO. The crude oil so obtained is dark in color and is degummed, dewaxed, decolorized and deodorized to obtain refined edible grade RBO.

India is presently the largest importer of vegetable oils in the world. During 2010-2011, we imported nearly 90 lakh tonnes of edible oil worth Rs.35, 000 crores, which is a huge burden on exchequer. Thus, RBO production needs to be encouraged to salvage the situation at least partly. Currently, India has the potential to produce 1.4 million ton (Mt) of RBO, but only 0.9 Mt is being produced; still we are the leading producer of RBO in the world. India imports about 0.05 Mt of RBO to meet its current requirement. About 2 lakh tonnes of refined RBO are used for direct human consumption. The rest is used for blending, bulk frying and vanaspati and saturated fats.

Why Rice Bran Oil ?

RBO is edible oil with nearly ideal combination of saturated, mono-unsaturated and polyunsaturated fatty acids (SFA, MUFA and PUFA, 24:42:34), which is very close to the latest recommendations (Table) of the National Institute of Nutrition (NIN). It is also closest to the recommendations of the American Heart Association (AHA) for a healthy heart. Rice bran oil is considered to be a good cooking medium for being less sticky with the cooked food and is 15 - 20% less absorbed. So it is economical, adds fewer calories to the fried food and is suitable for calorie conscious people. More merits of RBO include:

- Its smoke point (255°C) and fire points (352°C) are very high compared to the values for oils of groundnut, rapeseed, soybean and olive. Hence, it is very little degraded during cooking and exhibits little polymerization on cooling.
- It is least allergenic to people and has no trans fats, which are believed to cause cancer.
- The food fried in RBO is tastier and has pleasant flavor.
- It is good for grilling / baking food and also for salad dressings as it gets easily emulsified.
- It is nutritive and healthful as it strengthens the immune system besides having hypocholesterolemic and anti- cancer properties.

Rice Bran Oil is especially good for heart

- The RBO is naturally rich in several nutraceuticals. The refined RBO contains two kinds of vitamin E (tocopherols, 0.02-0.08% and tocotrienols, 0.025-0.17%) and gamma-oryzanol (1.2-1.7%). These antioxidants not only enhance the shelf life of RBO (2 years in sealed container and 6 months after opening) but also provide protection to the consumer against, cardiovascular diseases, tumors and even cancer.
- No popular cooking oil other than RBO contains **gamma-oryzanol**, a group of ferulic acid esters of triterpene alcohols and phytosterols, which help **reduce serum triglycerides and total cholesterol levels, cholesterol absorption and atherosclerosis** (hardening of arteries). It is heart-friendly as it increases good cholesterol i.e. high density lipoprotein (HDL) cholesterol and facilitates excretion of

fecal bile acid. Less than two table spoons are required daily to avail the benefits. It is also suggested in treating disorders related to menopause and nerve imbalance.

- Diets of animals supplemented with a concentrated form of tocotrienols rich fraction (TRF) obtained from RBO has been shown to cause 42% reduction in total cholesterol and 62% reduction in bad or low density lipoprotein (LDL) cholesterol.
- It has the highest content (2417 ppm) of antioxidants (tocopherols, tocotrienols & gamma-oryzanol) and thus is far ahead of rapeseed oil (650 ppm), sunflower oil (487 ppm) and soybean oil (1000 ppm) in this regard. Phytosterol, squalene (0.3-0.4%) and polyphenols are other useful antioxidants present in RBO. There are 27 different phytosterols in RBO; they are more abundant in RBO than any other oil and shown to reduce cholesterol, provide anti-inflammatory effects, inhibit the growth of cancer cells, improve the immune system and have other health benefits.

Rice Bran Oil is used in Cosmetics

1. As RBO is rich in vitamin E and gamma-oryzanol, it is used in skin creams and soaps which are claimed to slowdown ageing and appearance of facial wrinkles. Japanese women, who rub RBO on their face to keep skin smooth and shiny, are called *Nuka-Bijin* (bran beauties). Massage oils containing oils of rice bran, sesame, jojoba, apricot and almond are already available in the market.
2. RBO is also used in cosmetics like lipsticks, sun screen products (as it intercepts the UV rays and thus impedes the melanin pigmentation) and hair conditioners.

One deficiency of RBO needs mention. The omega-3: omega-6 fatty acid ratio in RBO is about 1:20, whereas it should be 1:1 in an ideal oil. Hence, those using only RBO need to increase omega 3 consumption or supplementation through suitable foods such as sea foods, walnuts and flax seed (linseed) oil. Omega-6 (linoleic acid or LA) and omega-3 fatty acids (alpha-linolenic acid or ALA) are essential polyunsaturated fatty acids (PUFA) that are important for good health. Our body cannot produce some of them, and thus we need to consume them through foods every day. The omega -3 fatty acids have important roles in the modulation and prevention of human diseases, particularly coronary heart disease. The evidence is now strong that omega -3 fatty acids are essential for human development in utero and in infancy and are likely to have a role throughout life. Within the body, omega-3 fatty acids are converted to docosa-hexa-enoic acid (DHA) and eicosa-penta-enoic acid (EPA) that play very important roles in the vision development and brain function of infants. As both families of PUFAs have similar metabolic pathways, they compete for limited supplies of desaturase and elongase enzymes, which are believed to favor ALA over LA. However, if LA consumption is very high compared to ALA, the omega-3 metabolic pathway may be deprived of the enzymes needed to make EPA and DHA. Omega -3 PUFAs also compete with omega -6 PUFAs for inclusion in phospholipid synthesis. Looking to the health benefits of RBO and omega-3 and omega-6 fatty acids, awareness campaign has to be undertaken in our country to increase the acceptability of RBO, particularly of the one blended with a source of omega-3 fatty acids, as Indians are becoming increasingly prone to life style-induced diseases including cardiovascular diseases. The Solvent Extractors Association of India (SEA) has instituted awards for three top RBO producers. The rice producing states have several solvent extraction plants; Odisha has eight.