



## Hidden Treasures of Edible Oils and Their Health Benefits

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Among many edible oils peanut, rice bran and sesame oils have fatty acid composition closer to the recommendation of the ICMR. These oils are potential source of phytonutrients having various health benefits. Oryzanol which is found in rice bran oil is effective in lowering cholesterol level in blood, reduces liver cholesterol synthesis, provide anti-inflammatory effect, inhibit the growth of cancer cell, etc. Lignans from sesame oil have potential as hypocholesterolemic agent, maintain good cholesterol level, are good antioxidants. Resveratrol which is present in considerable amount is known for reducing cardiovascular disease. It has antioxidant, anticancer, anti-aging properties. Health benefits of these hidden treasures are being highlighted in this article.

### Introduction

Oils and fats are recognized as essential nutrients in both human and animal diets. They provide the most concentrated source of energy, supply essential fatty acids, are carriers of fat-soluble vitamins, contribute greatly to the feeling of satiety after eating, and serve to make foods more palatable. Fatty acids are the building blocks of lipids and generally comprise 90% of the fats. These are compounds that are of interest while labelling lipid content of oils and fats and can be divided into three categories: Saturated fatty acids (SFA), monounsaturated fatty acid (MUFA) and polyunsaturated fatty acid (PUFA). SFAs are known to increase serum total and bad-cholesterol levels, reduce insulin sensitivity and enhance thrombogenicity and increase cardiovascular disease (CVD) risk. MUFA has been highlighted as the most valuable fat component for the prevention and treatment of heart disease. It lowers bad cholesterol, triglycerides, blood pressure and increases good cholesterol when used as a cooking medium. High intake of MUFA is inversely related to heart disease. PUFAs are essential components of cell membranes. PUFA like Linoleic acid (omega 6 fatty acid) and Linolenic acid (omega 3 fatty acid) are called as essential fatty acids as they must be obtained through diet, they cannot be synthesized by the body. They are vital for cell structure and serve as raw material for a number of regulatory substances called prostaglandins which help lower bad cholesterol, maintain blood pressure and prevent clot formation. The imbalance of these fatty acids can cause higher rates of diabetes, cancer, heart disease, stroke, arthritis and skin disorder. For insuring an appropriate balance of these fatty acid components, the National Institute of Nutrition (NIN) and the Indian Council of Medical Research (ICMR) recommend using oils having an almost equal proportion of Saturated fatty acids/ Monounsaturated/ Poly unsaturated fats in it. As per latest recommendations of ICMR the ideal fatty acid composition is 27-33 % : 33-40 % : 27- 33 % (SFA: MUFA: PUFA).

Based on fatty acid composition, edible oils can be grouped into three categories namely saturated oils (Coconut oil, palm oil) containing higher amount of SFA and are

relatively considered as unhealthy because of their contribution to higher cholesterol levels and heart disease, monounsaturated oils (Peanut oil, Rice bran oil, Sesame oil, Olive oil etc.) with higher percentage of MUFA, are liquid at room temperature and solidify when chilled, polyunsaturated oils (Sunflower oil, cotton seed oil, soybean oil, Flaxseed oil, etc.) remain liquid at room temperature or when refrigerated. Monounsaturated oils like, Peanut oil, Rice bran oil, Sesame oil which have fatty acid compositions closer to the recommendation of ICMR, are potential source of phytonutrients which have various health benefits. The phytonutrients present in these oils such as oryzanol in rice bran oils, lignans in sesame oil and resveratrol in peanut oil makes these edible oils as healthy and nourish mental and physical health.

The new world of technology has no dearth for information and people are aware to seek information from various sources. In fact, people are so aware of reading the contents present in the chocolate, biscuits, savouries, sweets etc in all kinds of foods. As a rule, all the processed foods have to disclose the contents along with unit present in the food item. Fitness freaks and health conscious people do not forget to read the number of calories given on the packets. Likewise, there is lot of awareness generated among the consumers about quality of oils and fats, due to which the present oil industry is consumer driven. The numbers of varieties of oils present in the shelves of our super market are not less than any cosmetic section of the market giving wide choice for the customers. However, very little information is available about the phytonutrients present in these edible oils. In the present paper, health benefits of phytonutrients present in rice bran oil, sesame oil and peanut oil have been discussed.

### **Oryzanol**

Rice bran oil, unlike other vegetable oils, has very high content of unsaponifiable matters of about 4% and is a very rich source of antioxidants like vitamin E complex, tocopherols and tocotrienols, phytosterols, polyphenols and squalene, and a unique powerful antioxidant known as oryzanol. The oryzanol is about 20% of unsaponifiable fraction which measures 2000 ppm in rice bran oil. Chemically, oryzanol is a mixture of ferulate esters of sterols and triterpene alcohols containing at least 10 components. Oryzanol is effective in lowering cholesterol levels in the blood, reducing liver cholesterol synthesis, provide anti-inflammatory effects, inhibit the growth of cancer cells, improve the immune system and have other health benefits. Oryzanol and other micronutrients protect cell membrane by blocking the oxidation of the unsaturated fatty acids and acting as a scavenger of free radicals and combat the effects of aging. In comparison of Vitamin E, oryzanol is more active in fighting free radicals.

Rice bran oil beats olive oil and other vegetable oils in its vitamin E power, as it contains both the tocopherols and tocotrienols forms of the vitamin E, whereas olive oil contains only the tocopherols and is less than that of rice bran oil. Among the vegetable oils, rice bran oil has the highest total antioxidant amount (2447 ppm) which makes it a choice for improving different health conditions. The most advertised application of oryzanol is its body building ability for athletes. Many individuals who are involved in weight training as well as aerobic exercise programs are reportedly using oryzanol as a steroid alternative to help build lean muscles. It has also found major application in cosmetics due to its favourable action on the sebaceous glands. This works as sunscreen agents, promotes hair growth, improves immune systems, prevents skin ageing. Oryzanol for its hypocholesterolemic property is also used in place of Statin a pharmaceutical drug to balance cholesterol. This is effective in the treatment of menopausal symptoms, including hot flashes. Considerably balanced fatty acid compositions and presence of highly potent phytonutrients, make rice bran oil a unique vegetable oil and is extensively used in Japan, Korea, China, Taiwan and Thailand as

premium edible oil and is known as Heart Oil. Owing to cholesterol lowering properties, rice bran oil has acquired the status of “Health Food” with the Americans.

### Sesamin and Sesamolin

The sesame (*Sesamum indicum* L.) is one of the oldest cultivated oilseed crops which is known for its food and medicinal value, which is being used in the practice of Ayurveda. Oil extracted from sesame is honoured as a rich food because of its high nutritive quality and stability. Sesame oil is rich in unsaturated fatty acids where the fatty acids composition is 14% saturated, 39% mono-unsaturated, and 46% poly-unsaturated fatty acids. Decorticated sesame seeds have 45-63% oil, 19-31% (averaging about 25%) proteins, about 14% carbohydrates and about 3% ash. Sesame seeds contain two unique substances, sesamin (0.4-1.1%), and sesamolin (0.3-0.6%) whence during refinement the two phenolic antioxidants, sesamol and sesaminol, are formed. Both of these substances belong to lignans. Sesame is also a rich source of calcium (approx 1%), phosphorous (approx 0.7%), iron, magnesium, manganese, zinc, copper and vitamin. The oil is of oleic (43%), linoleic (35%), palmitic (11%) and stearic acid (7%). The total phytosterol content in sesame seeds is ~400 mg/100 g, which is higher as compared to English walnuts and Brazil nuts (113 mg/100g and 95 mg/100 g, respectively).

Many health benefits of sesame may be attributed to its lignans especially sesamin. Sesamin increases the fat burning process and decreases the storage of fat in the body. Sesamin has been shown to increase the production of ketone bodies. Increased production of ketone has protein-sparing effect as less amino acids are needed to create ketones eventually sparing muscle mass while dieting. Sesamin has received a great deal of interest regarding its potential as a hypocholesterolemic agent in humans. Molecules of sesame seed oil maintain good cholesterol (high density lipoprotein, HDL) and lower bad cholesterol (low density lipoprotein, LDL). A clear hypocholesterolemic effect elicited by Sesamin was reported in studies conducted in rats and have been shown to possess cholesterol-lowering effect in humans. The lignans present on sesame have antioxidant and health promoting activities. The important antioxidants in the sesame oil are sesaminol, sesamol, sesamolin and sesamin which maintain the fats including Low Density Lipoproteins (LDL). Feeding sesame lignans to rats have shown to reduce Fe<sup>2+</sup> induced oxidative stress. Compared with those fed with groundnut oil, sesame oil fed rats had lower levels of hepatic thiobarbituric acid reactive substances.

Sesame oil has been found to inhibit the growth of malignant melanoma in vitro and the proliferation of human colon cancer cells. Myristic acid has cancer preventive capability and is found in sesame seed ranging from 328 to 1,728 ppm. Oral administration of sesamin or the crude sesame oil extract was neuroprotective in terms of reducing ischemic damage. Sesamin and sesamolin have potential for neuroprotection against hypoxia or brain damage. Since the crude sesame oil extract demonstrates the same neuroprotective effect as the purified sesamin, this crude sesame oil extract seems to possess market potential as a supplement in health food products. It is revealed that the sesamin and its active metabolites can induce antihypertensive effects in experimental animal models. Sesamin is valuable for prophylactic treatment to fight the development of cardiac hypertrophy and renal hypertension. In sesame kernel a major peptide of approximately 5.8 kDa has been identified to be an antimicrobial peptide having bactericidal activities against *Klebsiella* species, responsible for human urinary infection. Sesamin curbs delta-5-desaturase activity and subsequently decreases the formation of pro inflammatory mediators.

### Resveratrol

Peanut is another important oilseed crop of India. The hidden phytonutrient of peanut oil is ‘resveratrol’. All parts of the peanut contain resveratrol from the roots to the skins and even

the shell. Resveratrol is a stilbenoid group of phytoalexins present in more than 72 plant species. Among them peanuts contain highest amount of resveratrol. Resveratrol is known as a bioactive compound that reduces cardiovascular disease and cancer risk. In addition to this, it has antioxidant property and is an anticancer, antiaging, anti-inflammatory, antifrailty and antiallergenic agent. Resveratrol is thought to increase endurance and contribute to longevity.

### **Conclusion**

Considering the above compositions of various edible oils, it is necessary to consume variety of edible oils in a proper proportion as their fatty acid composition is an integral part of balanced diet and thereby influencing human health. Many edible oils especially rice bran oil, sesame oil and peanut oil serve as source for lesser known phytonutrients which have beneficial effects on health but these phytonutrients are present in unsaponifiable fractions of the oil which are generally discarded during processing. The fraction containing these valuable nutrients should be remixed with the oil after purification. Though significant progress has been achieved in research and development with respect to fatty acids and phytonutrient composition, further research on discovery of their usefulness has to be explored to generate adequate information on components present in edible oils. This information may further help in improving and nurturing the physical and mental health of mankind. Additionally, fatty acids and phytonutrient concentrations may be included while labelling edible oils so as to create awareness among consumers about their health benefits.