Red Lentil- The powerhouse of nutrients

Sheryl Salis

Registered Dietician and Certified Diabetes Educator

Founder-Nurture Health Solutions

The use of lentils dates back to ancient times with lentils being used in the folk medicine of many ethnicities to treat different illnesses. Red lentils also called Masur dal are not only tasty and versatile, they are also a storehouse of nutrition providing a vast array of nutrients offering numerous health promoting benefits

They form an essential food item for all, especially in the diet of vegetarians and vegans. Each serving of lentils provides considerable amounts of nutrients and hence they are an ideal food group to be included in a healthy and balanced diet.

B013. Lentil, dal *(Lens culinaris)*; A. Masur dail; B. Mosur dal; G. Masoor ni daad; H. Masoor dal; Kan. Laki Bele; Kash. Masoor; Kh. U dai saw; Mal. Vattu parippu; M. Hawai Masuri; Mar. lank dal; N. Musuroo ko dal; O. Masura dali; P. Dhooli masari dal; S. Triputta; Tam. Khesari paruppu; Tel. Lanka pappu.

Nutritive value of 100g of Red lentil is as follows:

Calories-331 calories, Protein 21.7 g, Carbohydrate-55g, Total Fat 1.56 g, Total Fiber- 9 g, Soluble Fiber-2.39g, Insoluble Fiber-6.67 g.

Like all other lentils, red lentils are low in fat and a rich source of protein and fiber mainly insoluble fiber and resistant starch. Being a vegetarian source, they are cholesterol free. Red lentils are a good source of beta-carotene, folate magnesium, phosphorus and selenium. In addition, they have a low sodium levels and relatively high levels of potassium thus helpful in lowering blood pressure levels. They are a rich source of phytosterols thereby providing a hypo-lipidemic and an anti-inflammatory effect.

According to a study published in the FASEB journal, dehulled Red Lentil are higher in bioavailable iron compared to other legumes In addition to all these nutrients, red lentils contain good amounts of antioxidants like anthocyanin that help in destroying free radicals.

Resistant starch resists digestion in the small intestine and acts like fiber in the large intestine. As it resists digestion, foods containing this type of starch have low glycemic index. Lentils contain about 25 g Resistant Starch (RS)/100 g total starch FM, representing about 48 % of total starch content with a value that reaches up to 65.2 %. Due to the presence of RS and other fibers, lentils and other fiber-containing food exhibit bifidogenic effect even it is low when compared with that of other pulses such as peas and chickpeas . As shown by in vitro fermentation studies, the indigestible fraction (IF) of lentils fermented by colonic bacteria is the best substrate for the fermentative production of short chain fatty acids (SCFA), especially butyric acid, which is important for intestinal health.

According to the USDA ORAC values 2007, lentils had a higher Oxygen radical absorbing capacity (ORAC) value than most of the common fruits and vegetables including apples, plums, blackberries, cherries, figs, peaches, pears, oranges, garlic, cabbage and almonds

Recent reports have indicated that quercetin diglycoside, catechin, digallate procyanidin, and p-hydroxybenzoic were the dominant phenolics in red lentils providing the highest antioxidant benefits. The high amounts of antioxidants present in these lentils destroy the free radicals and minimize the cell damage caused by them making it best anti-aging foods.

Red Lentils and Cardiovascular Health

In humans, Lentil consumption has been inversely associated with the incidence of cardiovascular diseases (CVD), including hypertension. Recently, Boye et al. found that lentils possess angiotensin I-converting enzyme (ACE) inhibitor activity. The authors concluded that red lentil protein hydrolysates could contribute to the blood

pressure lowering effects of lentils. Accumulating evidence supports the cardioprotective, hypolipidemic, and hypo homocysteinemic effects of lentils. Hyper homocysteinemia has been linked to an increased risk of CVD. The Framingham Heart study found that lentils contributed 1.7 % of total folate intake. Also, they showed that serum folate concentrations were significantly increased, whereas serum homocysteine concentrations were significantly decreased in a dose-dependent manner regardless of the source of folate This finding led to speculation that lentils could exert a beneficial effect in reducing the extent of hyper homocysteinemia by virtue of their high content of folate, and thus in ameliorating coronary heart diseases (CHD). Red Lentils also contains important minerals like magnesium that helps to boost heart health.

Shams and colleagues found that addition of 50 g cooked lentils to the diet of a patient with diabetes led to a significant decrease in TC but not in LDL, HDL and TG. They explained their findings under the light of the low glycemic index (GI) value of lentils. In such low GI foods, the reduction in blood lipids is thought to be due to the greater amounts of amylose in comparison to amylopectin. Digestion and absorption of amylose part of starchy foods are much slower than that of amylopectin. Consequently, GI of amylose is less than that of amylopectin, a matter that could explain the blood lipid and glucose lowering effect of lentils which have higher amylose to amylopectin fraction. The hypo lipidemic effect of lentils had been ascribed also to increased biliary cholesterol and decreased biliary phospholipids in such a way that the biliary cholesterol saturation index rose from 110 to 169 %

Red lentils and Diabetes.

It has been strongly suggested that eating pulses is beneficial in the prevention and management of diabetes. Therefore, consumption of a wide range of carbohydrate foods from pulses and other rich sources both for the general population and for people with diabetes, especially those with type 2 diabetes is generally recommended. Lentil derived leguminous fibers have been found to prevent the impairment in the metabolic control for diabetic rats when total carbohydrates intake was increased, suggesting that lentil carbohydrates, including their dietary fibers, could have promising implications for diabetic patients

Glycemic index is a measure of the increase in blood glucose, which occurs after eating a preset portion of available carbohydrate from a test food, compared to a reference food. Consumption of foods with high GI and high GL is associated with hyperglycemia and hyperinsulinemia.

Red lentils have low glycemic index of 26, which makes them an ideal food for people with diabetes. They are rich in resistant starch which is not digested and hence does not cause sudden spikes in blood glucose levels. The American Diabetic Association recommends that people with diabetes should include lentils in their diet several times a week. Although lentils are healthy, people with diabetes should take care to keep a check on portions in order to manage their blood sugar effectively. Since red

lentils and pulses in general come under the category of carbohydrates, too much consumption can cause changes in the blood glucose levels.

Shams et al found that addition of 50 g cooked lentils to the diet of a person with diabetes led to a significant decrease in fasting blood glucose. In this study, the administration of lentils significantly decreased serum blood glucose. The glucose-lowering effect of lentils was ascribed by the researchers to probable influences of low GI diets on glucose metabolism

Red Lentils and food intake and body weight

The high fiber content and low glycemic response of lentils have been looked at as a means for increasing satiety, reducing the food intake, and thus controlling body weight. Among four different pulses, lentils exhibited the strongest satiating properties, resulting in lower food intake compared to other dietary meals. Lentils led to 8 % lower cumulative energy intake compared to a reference meal. This evidence improves the observational studies that consistently show an inverse relationship between pulse consumption and BMI or risk for obesity

Red lentils and skin benefits

Red lentil works as an excellent cleanser by removing impurities. Applying face masks made with red lentils can leave skin looking young, supple and glowing .The red lentil face pack is very effective in tightening the pores of your skin and exfoliating it. It not only helps in cleansing skin, but also helps in making it soft and smooth. Red lentil also reduces excess oil on skin hence preventing acne. It increases the elasticity of skin and reduces the appearance of fine lines, wrinkles and dark spots.

Red Lentil and Cancer

Lentils are dietary component traditionally consumed in populations where cancers of the colon, breast, and prostate are low.

Poly-phenolics have shown chemo preventive ability against cancer with several plausible molecular, genetic and bio-chemical mechanisms. Plant lectins are unique group of proteins and glycoproteins in lentils with potent biological activity. Several lectins have been found to possess anticancer properties in vitro, in vivo, and in human case studies. Roy et al. suggested that most studies investigating anticancer effects of lectins used lectins from lentil and various pea varieties, further confirming the uniqueness of lectins from these pulses compared to other natural sources. Hence, lectins from lentils and other pulses may have great potential to be as functional foods for reducing the risk of certain cancers.

Red lentils contain considerably high amount of the pivotal folic acid, which is expected to be involved in the cancer preventive effect of lentils. Folic acid is considered to be among the most potent agents that suppress gene expression by DNA methylation. In animals, it was found that folate supplementation before the initiation

of neoplastic foci significantly decreased the number of small-intestinal adenomas and colonic aberrant crypt foci (ACF) .In humans, higher folate intake has been inversely associated with the risk of colon cancer.

The presence of a wide spectrum of bioactive phytochemicals and peptides in lentils makes it a functional food with chemo preventive effect against colorectal cancer

Phytic acid present in red lentils and split lentils in general could reduce colon cancer via chelation of iron and suppression of iron related initiation and promotion of carcinogenesis. Further, it may have potential therapeutic use in cancer due to its property of enhancing the activity of natural killer cells associated with suppressed tumor incidence.

Conclusion

When comparing the vast amount of literature investigating red lentils, a compelling body of evidence confirms that red lentil is one of the most nutritious and health-improving foods known to man. According to recent definitions, lentil could be considered a prophylactic and therapeutic functional food due to its considerable content of essential macronutrients, namely functional proteins and low GI and GL carbohydrates, and essential micronutrients, as well as bioactive phytochemicals such as phytates and polyphenols promoting good health and reducing risk of several chronic illnesses

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