



Lentils (lat. *Lens culinaris*)

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Abstract. The article discusses the main properties of lentils and its effect on the human body. A systematic review of modern specialized literature and relevant scientific data was carried out. The chemical composition and nutritional value of the product are indicated, the use of lentils in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of lentils on the human body under certain medical conditions and diseases are analyzed separately. The scientific foundations of diets with its application are considered.

Key words: lentils , benefits, harm, beneficial properties, contraindications

Beneficial features

Table 1. Chemical composition of lentils (according to [Food+](#)).

Main substances (g / 100 g):	Raw red lentils contains
Water	7.82 g
Carbohydrates	63.1 g
Squirrels	23.91 g
Fats	2.17 g
Calories (kcal)	358 kcal
Minerals	mg/100 g:
Potassium	668
Phosphorus	294
Magnesium	59
Calcium	48
Iron	7.39
vitamins	mg/100 g:
Vitamin B3	1.5
Vitamin B1	0.51
Vitamin B 6	0.4
Vitamin B5	0.35

Vitamin B2	0.11
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On the shelves of stores today, lentils are represented by a whole color palette. Depending on the variety, composition of the seed coat and cotyledons, lentils can be yellow, orange, red, green, brown or black.

The color of the shelled seeds is mainly related to the color of the cotyledons. Such lentils are yellow, red or green. The color of whole (unshelled) seeds varies from green and gray to brown and black. Since the seed coat contains a range of biologically active substances, the chemical composition of the same shelled and whole lentils will differ. Also, to a certain extent, the chemical composition of lentils of different varieties or grains grown under different conditions differs.

In the presented table, we have provided data for raw red lentils, since they are cooked more often in the kitchens of our country. It is not as coarse as whole lentils, it is easier to digest and assimilate, although unshelled lentils are a little more useful in some respects.

Whole lentils (as a percentage of the same mass of seeds) have more fiber, potassium, calcium, iron, phosphorus, and usually slightly more vitamins B6 and B2. At the same time, whole lentils contain fewer carbohydrates and calories. But in general, calorie values do not differ so much to change the culinary strategy for this.

However, lentils with green and gray shells contain higher amounts of flavan-3-ols (catechins), proanthocyanidins and some flavonols, which largely determines the potential of lentil seeds in a healthy diet.

Regardless of the presence or absence of the shell, lentils are products rich in vegetable proteins, among which globulin (more than 45% of the total amount of seed proteins) and albumin are distinguished. Among two dozen leguminous crops, lentils are in the “top 3” in terms of the percentage of starch (more than 47%), insoluble dietary fiber, and phenols, ahead of green peas, chickpeas and mung beans (mung beans) in the latter indicator. ^[2]

The seeds of this crop are considered a good source of prebiotics - they are found in prebiotic carbohydrates (12-14 g / 100 g of dry lentils), which help maintain the intestinal microbial environment and prevent gastrointestinal diseases.

In addition, lentils are relatively low in fat and sodium, but high in potassium (sodium to potassium ratio is approximately 1:30). ^[3] This makes lentils an excellent dietary option for obese and cardiovascular patients. Also safe for patients with cardiovascular diseases using anticoagulants in the treatment, makes lentils low content of phylloquinone - vitamin K (5 mcg / 100 g with a daily requirement in adults of about 80 mcg).

Among other vitamins, thiamine (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), pyridoxine (B6), folic acid (B9), α , β and γ tocopherols (E) were found in lentils. Minerals include zinc, copper, manganese, molybdenum, selenium and boron.

Medicinal properties

Ancient doctors believed that regular eating of lentils helps a person get rid of nervous disorders, become more calm. But already in the early Middle Ages, the famous Persian physician Avicenna, in fact, refuted the opinion of ancient Roman colleagues. He claimed that lentils can cause nightmares, which in turn lead to the appearance of circles under the eyes. In addition, he attributed to lentils the ability, by thickening the blood, to effectively stop bleeding and lower blood pressure.

Modern research data show other medicinal properties of lentils. According to them, the consumption of seeds of this legume is directly associated with a reduced risk of diabetes, cardiovascular disease, and cancer.

Of course, lentils should not be considered as a substitute for medicines. But as an adjunct, it can help in the treatment of these and other diseases, showing antioxidant, antibacterial, antifungal, antiviral, cardioprotective, anti-inflammatory, nephroprotective, antidiabetic, antitumor properties.

Antidiabetic activity of lentils

According to scientists, regular consumption of sprouted lentils is beneficial for the prevention and treatment of diabetes. ^[4] The seeds of this legume have the ability to improve the metabolism of glucose, lipids, and lipoproteins in the blood of overweight and obese type 2 diabetics. ^[5]

Animal studies have shown that the flavonoids and fiber in lentils play a significant role in intestinal motility and prevent impaired metabolic control in diabetic rats. It is too early to transfer the data to humans, but the scientists themselves call these results promising in terms of the use of lentil flavonoids in the treatment of patients with diabetes.

In human studies, some research projects have shown how regular consumption of boiled lentils (50 g) among patients with diabetes resulted in a significant decrease in fasting blood sugar levels.

The decrease in the glycemic index in the lentil diet is associated with the presence of polyphenols in the seeds, which affect metabolic disorders. In addition, in vitro (test tube) and in vivo (living organisms) studies have also demonstrated that lentils in the diet regulate starch digestibility, glycemic load and glycemic index, which reduces the complications of diabetes.

Cardioprotective effect of lentils

The use of phenol-rich lentil seeds reduces the risk of cardiovascular disease. Lentil polyphenols lower blood pressure and generally prevent the development of hypertension and coronary artery disease.

In experiments conducted on animals with hypertension, the administration of lentils significantly reduced total cholesterol, triglycerides, and low-density lipoprotein ("bad" cholesterol). In another study, lentils significantly increased high-density lipoprotein ("good" cholesterol) levels and lowered blood glucose levels in diabetic rats.

Antimicrobial activity of lentils

Containing flavonoids and lectins, lentils are non-toxic and safe for use in medical diagnostic kits. A biologically active "protective" peptide isolated from germinated lentil seeds exhibits antibacterial and antifungal activity (in particular, it inhibits the growth of *Aspergillus niger*).

These immune system peptides (defensins) are likely able to interrupt the viral digestive enzymes, ultimately preventing viral replication. In addition, defensins block ion channels and inhibit protein translation. Therefore, the "protective" peptides of lentil seeds, together with phenolic compounds, act as a potential inhibitor of microbial growth.

Anti-cancer potential of lentils

Some research suggests that eating lentil seeds may reduce the incidence of a variety of cancers, including colon, thyroid, liver, breast, and prostate cancers.

A large prospective epidemiological study involving 9.6 thousand women, which, among other products, "tested" polyphenol-rich lentils, revealed an inverse relationship between the use of this legume product and the risk of breast cancer. ^[6] That is, in those populations where it was customary to eat lentils, the number of cases of breast cancer was lower.

First, lentil seed polyphenols are hypothesized to absorb carcinogens, provide detoxification, and contribute to the accuracy of DNA repair. And, secondly, lentil lectins, together with phenolic compounds, have also proven themselves as therapeutic agents. They have shown the ability to bind to the membranes and receptors of cancer cells, inhibiting protein synthesis, causing cancer cell death. ^[7]

At least in rat experiments, lentil seeds have already demonstrated chemopreventive potential for colorectal carcinogenesis and significantly reduced neoplasms in the rat colon. ^[8] It is believed that flavones, flavonols, anthocyanidins, tannins and other biologically active compounds are responsible for the effectiveness of such chemoprophylaxis, which are significantly more in lentils than, for example, in green and yellow peas.

Finally, a number of test-tube studies have shown that lentils also have a higher total antioxidant capacity than chickpeas, beans, or soybeans. Lentil extracts have been shown to scavenge oxygen radicals with an efficiency equivalent to the antioxidant capacity of Trolox (Hoffman-LaRoche's water-soluble vitamin E analogue). Also, according to this indicator, lentils surpassed the simultaneously tested onions, horseradish, potatoes, wheat germ, blueberries, and cherries.

At the same time, despite a wide range of potential medicinal properties, lentils are still not used in medicine, and they remember it mainly when it is necessary to increase the amount of easily digestible vegetable protein in the diet due to nutrition.

In folk medicine

In folk medicine, lentils are used both alone and in combination with other "green pharmacy drugs". In both cases, lentils are usually taken in the form of decoctions or infusions, although there are also recipes with crushed seeds.

In ancient herbalists, lentil infusion is mentioned as a remedy for smallpox. In modern collections of traditional medicine, lentil preparations correct the work of the gastrointestinal tract, kidneys, liver, accelerate wound healing, treat eye diseases (external compresses).

- For the treatment of urolithiasis, lentil seeds (1 tablespoon) are poured with water (350 ml) and boiled for about 30 minutes. The liquid is not drained, but drunk three times a day, 50 ml each.
- To get rid of constipation, a liquid decoction of lentils is prepared, often reinforcing its action with the addition of prunes. To get rid of diarrhea - on the contrary - they use thick lentil porridge boiled in vinegar.
- Gargling with a decoction of lentils eliminates perspiration, cough and inflammation of the oral mucosa.
- Puffy eyes are relieved with a mixture based on rose oil, prepared from lentil seed powder mixed with sweet clover.
- A compress of lentil flour mixed with cabbage juice is applied to the site of inflammation of the mammary gland.
- Deep wounds on the body, in the absence of antiseptics, are recommended to be covered with lentil flour mixed with honey. And small cracks, redness and rashes - with lentil flour mixed with egg white. Against skin rashes in folk medicine, compresses are made from lentils cooked with peel and juice of unripe grapes or vinegar.

Also, in modern folk medicine, pregnant women are advised to increase the consumption of lentils, explaining this by the abundance of folic acid, which is necessary for the normal development of the fetus.

Another practice is to strengthen the gums and teeth with the help of lentil infusion, which is used to rinse the mouth.

in oriental medicine

A detailed description of the properties of lentils was given by the recognized classic of medieval Persian medicine, Ibn Sina (Avicenna). According to his ideas, lentils are a product that requires moderation, a food that can be eaten in far from any combination. So, lentils will not harm if you eat them with fatty meat, almonds, vinegar. But in combination with salted fish, sugar and other sweet ingredients, lentils can provoke an exacerbation of hemorrhoids, cause dropsy, worsen urination. Abuse of lentils can cause melancholy, lead to visual impairment, and even create prerequisites for contracting leprosy.

Representatives of modern Tibetan medicine also consider the combination of lentils with some sweet foods, especially brown sugar, to be harmful.

In traditional Chinese medicine, lentils are responsible for the circulation channels of Qi energy, correlated with the stomach and spleen, on which lentils have a healing effect. Grains of the plant are recommended to be eaten to get rid of edema and stop diarrhea, as well as to be more actively introduced into the diet with a lack of Yin energy.

As a prophylactic, lentils are eaten to reduce the risk of cancer and to prevent the appearance of helminths.

In scientific research

We have already mentioned the numerous scientific studies of lentils, which studied the role of this legume in improving the condition of diabetics, as well as the cardioprotective, anti-cancer, antimicrobial potential of seeds. But in this section, we want to talk more about how these studies are conducted, using the example of a scientific work that evaluated the chemoprophylactic effect of exposure to raw and cooked lentils on colorectal cancer foci.^[9]

To explore the hypothesis that the grains of this legume in the diet can suppress early carcinogenesis and that culinary heat treatment can affect the chemopreventive potential of the product, 4 types of lentils were used: raw whole, raw peeled, boiled whole and boiled peeled. In addition, previously well-studied soybeans participated in the comparison.

Sixty male rat pups aged 4 to 5 weeks were randomly divided into 6 groups (10 animals per group). After acclimatization for 1 week (at the age of 5 to 6 weeks), all animals were transferred to the control and treatment diet for 5 weeks. At the end of the 5th week of feeding, all rats received 2 subcutaneous injections of the carcinogen at a rate of 15 mg/kg of rat body weight per dose once a week for 2 consecutive weeks. All animals were euthanized 17 weeks after the last injection and their colonic condition was analyzed for multiple parameters.

Based on their analysis, the researchers concluded that lentil consumption may protect against colon carcinogenesis and that hydrothermal treatment even improved the chemopreventive potential of whole lentils.

Weight regulation

The calorie content of whole green and brown lentils is estimated at about 300 kcal / 100 g of dry product. In boiled form, after increasing the moisture content by 6-7 times, the calorie content of 100 grams of boiled lentils will be about 100-105 kcal/100 g. For dry peeled red lentils, these figures are 315-320 kcal/100 g before cooking and 100 kcal/100 d - after boiling. That is, lentils in dishes are not a very high-calorie product, and by this alone it attracts the attention of people who want to lose weight.

The grains of the plant also contain several antinutrients that are thought to play a role in energy regulation. The seeds of this crop are rich in fiber, have a relatively low energy density (about 1.3 kcal/g or 5.3 kJ/g), and are considered a good source of digestible protein. The carbohydrates in lentils are digested slowly, providing long-lasting satiety, and exhibit one of the lowest glycemic index values among carbohydrate-containing foods. According to the Harvard Medical School, the glycemic index of lentils is 32 ± 5 .^[10]

In favor of the fact that lentils can be used in the fight against obesity, there are also some human studies^[11], in which the effect of lentils was compared with the effects of other legumes (chickpeas, purple beans, yellow peas). In experiments, lentils showed the strongest satiating properties and, in general, helped to reduce the amount of food consumed. And although the percentage of this decrease was relatively low - only 8% - it still helped to reduce body weight and waist circumference, although not radically.

Indirectly, animal experiments also speak about the benefits of lentils in the fight against extra pounds. In particular, the lentil diet has been found to affect the gut microbiome and markers of obesity in animals, reducing animal body weight and body fat percentage.^[12]

But, despite this, data on the effect of lentils directly on body weight and waist circumference remain controversial. Sometimes these beans are credited with effects that can be explained not by the lentil specificity of the diet, but by the general lifestyle and nutrition. In addition, all human studies conducted have included only participants who were initially overweight or obese, so normal weight people who want to lose a few more pounds with lentils may not achieve the desired result.

At the same time, lentils can be considered as a product that helps to control existing body weight, fill up faster and make longer intervals between meals.

In cooking

Judging by the biblical texts, the birthright was once obtained for lentil stew, and brother was ready to quarrel with brother. And although in this case, we are not talking so much about the taste of the stew, but about the symbol of food as such, this only emphasizes the fact that there were times when lentils were highly valued and occupied a central place on the dining table, often replacing other dishes.

Today, lentil soup and mashed potatoes are prepared from it, lentils are served with meat, fish and vegetables, steamed in the oven and boiled in a slow cooker. In Spanish and Italian cuisines, where seeds are preferred to be eaten whole, large-grain beans are more common (for example, varieties of white Provencal, Heller lentils). And in the eastern culinary tradition, not only are small-grain varieties willingly prepared, but they are often ground into flour even at the stage of preparing the dish.

Despite the variety of culinary approaches, it is believed that lentils are easy to prepare, and almost anyone can make a delicious and nutritious dinner based on them. It is only necessary to take into

account that whole seeds with a shell require pre-soaking and take longer to cook, while peeled grains (for example, red lentils) cook faster.

But in fact, the secrets of cooking lentils are a little more. For example, professional cooks tend to use last year's lentil seeds in cooking, believing that such raw materials have a more expressive taste. But this also sets a certain dependence: the longer the seeds were stored before the dish was created, the longer they need to be soaked. Those that have lain for up to six months are usually soaked for 6-8 hours, and those that have been stored for about a year can be left in water even for a day. In this case, the seeds are saturated with water and approximately double in size.

It is not recommended to speed up the soaking process by adding soda - this will ruin the taste.

However, at home, impatient housewives usually significantly reduce the soaking time to 1-2 hours for green and brown seeds. And red and yellow grains, as a rule, are not soaked at all - such varieties are already well boiled, so they are taken for thick lentil soups and mashed potatoes. However, in any case, the grains are thoroughly washed beforehand.

In cosmetology

Lentils are included in the list of those products, the use of which leads to a noticeable change in the condition of the skin. A bean-vegetable salad with olive oil was even tested on volunteers in one of the experiments of scientists at the University of Melbourne (The University of Melbourne). As a result, the number of facial wrinkles in people who switched to such a diet decreased by 32%.

But lentil components can directly affect the skin, which is widely used in home cosmetology in the manufacture of moisturizing, healing and anti-aging masks.

- **Moisturizing lentil mask.** The ground seeds of the plant (2 tablespoons) are poured with warm milk until the lentils have a puree-like consistency. Olive oil (1 tsp) is added to the resulting slurry, after which the mask is applied to the face for a quarter of an hour. Wash it off with warm water, rubbing the skin with an ice cube.
- **Lentil mask for oily skin.** Lentil seeds (2 tablespoons) are boiled, the water is drained, and the remaining grains are mashed, where honey (1 teaspoon) and egg white are then added. 15 minutes after application, the mask is washed off with water at room temperature.
- **Lentil rejuvenating mask.** Raw lentils are crushed and mixed in equal proportions with sour cream. For one mask, you will need about 1 tablespoon of the ingredients. A quarter of an hour after application, such a mask is washed off with green tea.

There is also a summer “life hack” associated with lentils: in case of a sunburn, gruel from ground seeds will relieve inflammation and restore skin regeneration.

Dangerous properties of lentils and contraindications

If you follow simple dietary rules, lentils do not have a harmful effect on human health, but in certain cases, its use should be limited.

So, you will have to abandon lentils during exacerbations of gastrointestinal diseases. In addition, due to the purine compounds contained in lentils, they (like most other legumes) should not be eaten with gout and in case of a predisposition to this disease.

As for potentially dangerous compounds, toxic fasin and phaseolunatite were found in raw lentils. But they are neutralized by soaking and exposure to high temperatures during cooking. And since lentils are not eaten raw, this danger should be classified as conditional.

Also, phytic acid contained in whole lentils (about 0.45-0.5%) can have a potentially dangerous effect on the body. However, a significant part of it can also be neutralized during long-term (about 12 hours) soaking in warm acidified water and cooking the product for 20-30 minutes. The harm from phytic acid is also reduced when lentils are combined with carrots, pickled vegetables and foods containing vitamin A. In addition, the human body itself is able to effectively cope with phytates.

Selection and storage

When choosing lentils, they are most often guided by what dishes are supposed to be prepared from it.

- **Red (bright orange) lentils.** It cooks faster than other types, it is very soft, and therefore it is chosen for mashed potatoes. At the same time, it does not retain its bright color in the dish, becoming yellow-brown after cooking.
- **Yellow lentil.** Initially, it has a yellow color of almost ripe grain. It is popular because it also cooks quite quickly, while the grains retain their shape. Choose yellow lentils usually for soups.
- **Olive green lentils.** Most often, unripe seeds of a plant have this color, although "French" lentils can also be found on store shelves, where dark green is the color of the cultivar. In this case, bluish dots are usually visible on the grains. They choose green lentils for salads and "species" side dishes, since these seeds almost do not boil soft, although they take a long time to cook.
- **Black lentil.** As a rule, black lentils on the shelves are the seeds of the Beluga plant. It is small, therefore, it resembles beluga caviar in size and color, which is why it got its name. It is taken for any dishes, but it looks especially expressive as a side dish. At the same time, Beluga lentils should not be confused with simply overripe and darkened grains. However, the risk of making a mistake is minimal, because Beluga is usually sold already packaged with a label from the manufacturer.

When buying packaged lentils, you should pay attention to the presence of condensation on the inside of the packaging surface. It shouldn't be. Also, there should be no mold, pests, dust and foreign particles. The grains should be the same in size and color, smooth, with even edges, have a crumbly structure (do not stick together). It is important to pay attention to the limitation on the expiration date indicated on the package.

If lentils are sold by weight, then you can try to evaluate its smell. The smell of the grains is not very strong, but good lentils usually manage to capture the nutty flavor. But the healthy appearance of the seeds still remains the main criterion when choosing a product.

In addition, you can buy canned lentils in stores. Here, first of all, you need to pay attention to the stamped expiration date and the absence of damage on the jar or lid. If lentils are preserved in a glass jar, then the number of grains in it should exceed the amount of liquid poured.

It is better to store such jars, like packaged lentils, in a dark place at room temperature. For lentils poured into a cloth bag or plastic container, it is important that the storage location is as dry as possible.

As you can see, there were times when lentils were one of the most important components in the human diet. And although it has never completely fallen out of the list of valuable products, in our country its popularity has not been very high until recently. However, we hope that with the growth of people's awareness of the beneficial properties of lentils, the share of lentil dishes in our menu will also grow.

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Lentils - useful properties, composition and contraindications

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Received 05.04.2021

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