Tomatoes (lat. Solánum lycopersicum)

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Abstract. The article discusses the main properties of tomato (tomato) 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 fruits are indicated, the use of tomato in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of tomato on the human body under certain medical conditions and diseases are analyzed separately. The scientific foundations of diets with its use are considered.

Keywords: tomato , tomato , beneficial properties, potentially dangerous effects, side effects, beneficial properties, contraindications, diets

Beneficial features

Chemical composition and presence of nutrients

Table 1. Chemical composition of red tomato (according to Food+).

Main substances (g / 100 g):	**Raw red tomato [18]**
Water	94.52
Carbohydrates	3.89
Squirrels	0.88
Fats	0.2
Calories (kcal)	eighteen
Minerals (mg/100 g):	
Potassium	237
Calcium	ten
Phosphorus	24
Magnesium	eleven
Sodium	5
Vitamins (mg/100 g):	
Vitamin C	13.7

Vitamin B4	6.7
Vitamin B3	0.594
Vitamin E	0.54
Vitamin B5	0.089

Medicinal properties

Tomato has in its composition a set of elements that have a beneficial effect on the cardiovascular system and help cleanse the body. Tomato is an important source of lycopene (a powerful antioxidant that has immunostimulatory and antitumor effects, slows down the aging of the body) and glutathione (a substance that protects cells from toxic free radicals) [16,17] . Thanks to these properties, tomato is an indispensable food in any balanced diet, as well as in a low-fat diet, anti-cancer diet, etc.

Lycopene is the component that makes tomatoes red. Accordingly, the “redder” the tomato, the more of this substance in it. This microelement has properties similar to beta-carotene (contained in carrots), namely, an anti-carcinogenic effect. Studies show that this flavonoid stimulates bone formation. It is recommended for people diagnosed with osteoporosis, menopause or brittle bones. Lycopene reduces the risk of certain types of cancer, such as prostate, stomach, bladder, and uterine cancer. It is found in fresh tomatoes, but it is especially abundant in tomatoes that have undergone heat treatment, as the cooking process helps to release lycopene and improve its absorption in the body [18,19] .

Glutathione - has the properties of a powerful antioxidant, helps get rid of free radicals that provoke many diseases. A large amount of glutathione is found in the skin of many vegetables, so it is useful to eat a tomato also raw, in salads. This is a very important element that removes toxins, especially heavy metals (which, when accumulated, lead to a deterioration in the body's condition).

Scientific studies have shown that tomato and tomato sauce help reduce the risk of prostate cancer. This effect is observed due to the antioxidant properties of tomato. It is assumed that lycopene and glutathione attach to prostate tissues and thus reduce the risk of damage to its DNA.

Tomatoes are rich in potassium. This microelement takes part in the exchange of fluids in the body, and is also responsible for the health of the nervous system, heart and muscles. Potassium, like calcium, is abundant in tomatoes. Due to the presence of water and many minerals, tomato is recommended as a remedy for restoring the normal amount of fluids in the body during dehydration.

Vitamin A and vitamin C are considered important components that help cleanse the body - and they are rich in tomato. Vitamin A, first discovered in 1913, helps with cell growth, strengthens the immune system, and is essential for the eyes. Vitamin C is a powerful antioxidant, as it is involved in the process of free radicals release, not only those that come from outside, but also those that the body produces on its own. This vitamin has been proven to cleanse the body. In addition, it has a positive effect on the treatment of Alzheimer's disease and other dementias, as well as in diseases such as fibromyalgia and multiple sclerosis [18] .

Tomatoes provide a significant reduction in blood pressure. During studies, after 8 weeks of daily intake of tomatoes (in the form of an extract - lycopene complex), the systolic pressure of patients fell by 10 units, and diastolic - by 4 units.

Lycopene has been seen to work as a natural sunscreen and protect against UV rays.

Tomato is a rich source of riboflavin, which helps ease migraine attacks. It is also beneficial for the nervous system as a whole.

Eating tomatoes helps increase protection against flu and colds, especially when drinking tomato juice.

Due to their high content of vitamin C, tomatoes have a beneficial effect on diabetes by helping to absorb insulin and glucose [24] .

In traditional medicine

The main component contained in tomatoes, which draws attention to modern traditional medicine - **lycopene** . As mentioned, it is a powerful element that reduces the risk of developing certain types of cancer (prostate, breast), has a beneficial effect in the treatment of cancer of the lungs, stomach, esophagus, pancreas, bladder and cervix. In addition, studies have shown that lycopene reduces the oxidation of cholesterol and reduces the risk of heart disease. There is even some evidence that lycopene may reduce the risk of cataracts and sunburn.

But, despite all these extraordinary properties, there is one problem. A reduction model is used to isolate it from a tomato. New formulations containing lycopene are hitting the market at exorbitant prices. At the same time, there is evidence that these lipid supplements do not have the same effect as the product contained directly in the fetus. Lycopene is an extraordinary product in combination and interaction with other substances that we can get by eating directly tomato and tomato products [24] .

In folk medicine

- Leaf decoction

In alternative medicine, dried or fresh tomato leaves are often used. It consists of vitamins, minerals, fiber, essential oil, phytoncides and organic acids. It is believed that infusions from it help in the treatment of rheumatism, fungal diseases, ulcers, sciatica. However, the tops also contain toxic substances with which one must be careful [21] .

Leaves can be harvested at any time, both young and mature are suitable. It is necessary to thoroughly wash the tops, finely chop and dry. Leaves should be stored in cloth or paper bags for 12 months. Ready infusion can be stored for no more than two days. It can be used both externally - rubbing into painful areas of the body or in the form of compresses, and internally (only after prior consultation with a doctor). In addition, an infusion of tomato leaves can be added to a hot bath. The tops are used both independently and in combination with other herbs - celandine, burdock, calendula, oak bark, verbena, sage, sweet clover, drupe, birch buds, chamomile [20] .

- Fetal use

Outwardly, tomato is used as a bactericidal agent for purulent wounds, in the form of gruel. For varicose veins, tomato slices are applied to problem areas, fixed with a bandage and held until a tingling sensation appears. Then the feet are washed with cold water. It is believed that such procedures should be carried out daily for a month [21] .

With sluggish and dry facial skin, tomato is used as a cosmetic. In addition, tomato pulp can be used as a hair growth stimulant. Tomato can be used in creams and masks. Nourishing tomato cream with the addition of lanolin and oatmeal is suitable for all skin types. As one of the components of face masks, tomato can be used for dry, normal, oily, combination and aging skin. Also, tomato is used in body masks and peels. [22] .

- Juice

Freshly squeezed tomato juice can be used for liver diseases (together with honey), loss of strength (adding chopped parsley, dill and salt), atherosclerosis, obesity, anemia, constipation. Tomato juice enhances the secretion of gastric juice and intestinal peristalsis, suppresses the action of unfavorable intestinal microflora.

in oriental medicine

In traditional oriental medicine, the tomato is of particular importance because it can be used both as a fruit and as a vegetable. One of the ancient Chinese dietary books describes the tomato as " *sweet and sour in taste, cold in nature* ". The book also mentions that tomato is good for health, as it cools the body and reduces the "heat of the liver", thereby maintaining its balance and removing toxins. Therefore, a tomato is indispensable in the following cases:

- for people with high blood pressure, which in Chinese medicine is often thought to be caused by " *liver heat* ";
- for those who suffer from reduced appetite or indigestion, a feeling of a full stomach, discomfort in the abdomen or constipation. Cooked tomato is especially good for children with poor appetites;
- for people who drink alcohol. Tomato juice drunk before, during or after alcohol consumption helps the liver absorb it and quickly eliminate toxins from the liver and the body as a whole;
- The tomato is "cold" in nature, so it is more useful than ever on hot days and in summer. Chinese medicine has an understanding of the body and nature as one inseparable whole, therefore, in the heat, the body will especially suffer from external heat. Heat causes changes in the body and can lead to symptoms such as dry skin, thirst, dark urine, sweat, overheating of the body, emotional volatility, and insomnia. The cooling qualities of tomatoes help to ease these symptoms and avoid heat stroke. The tomato is a summer fruit and is especially suitable for consumption during the hot season [23] .

In scientific research

Despite the abundance of modern plant species and the already studied data on the beneficial properties of tomatoes, scientists continue to explore many aspects related to the tomato. So, for example, much attention is paid to artificial cultivation and genetic engineering to improve the taste properties of a plant, its resistance, the presence of nutrients, growth rate, and aroma.

An important place in research is also occupied by the study of the origin of the tomato and, in particular, some of its species. For example, genes responsible for the production of stem cells are being studied, studies that, as a result, can optimize the size of a fetus of any kind [26] . The difference between organically grown and large-scale agriculturally grown tomatoes is also being explored [25] .

In 2017, scientists in their work on assessing the biofilm -forming properties of the *Listeria bacterium monocytogenes* (the causative agent of a severe infectious disease), the tomato was one of the vegetables that was studied in three categories of interaction (deceleration or acceleration of growth, no effect). As a result of this study, it turned out that the strain that is present on the surface of a tomato (as well as daikon , apple and lettuce) stimulates the growth of the studied bacterium [38] .

In addition, it is worth noting that the tomato, as one of the most common products in the domestic diet, often becomes the object of research in economics, nutrition, innovative science, and agricultural sciences. For example, when analyzing the diversification of agricultural production, the cultivation of tomatoes is considered as one of the promising branches of agriculture. It is expected that the development of this industry has the potential to bring high income, tax benefits, lack of competition in

the domestic market and a good harvest throughout the year when growing tomatoes in a greenhouse [39].

Tomatoes are also mentioned in interdisciplinary research - for example, in work on the images of plants in artists' paintings as a resource for information on the history of agronomy. This study provides an example of paintings by L. E. Melendez (1772) and P. Lacroix (1864), which show how the tomato changed its shape as a result of selection towards smoother and less ribbed (for more convenient transportation and harvesting).

Thus, the tomato as a subject of comprehensive scientific research does not lose its relevance and importance [40].

Weight regulation

Nutritionists value tomatoes primarily for their beneficial and medicinal properties. They include sugars (mainly fructose and glucose), mineral salts (iodine, potassium, phosphorus, boron, magnesium, sodium, manganese, calcium, iron, copper, zinc). Tomatoes are also rich in vitamins - A, B, B2, B6, C, E, K, P, beta-carotene. Tomatoes contain organic acids and a powerful antioxidant lycopene , which can protect against prostate and cervical cancer, stop tumor cell division and DNA mutation, and reduce the risk of developing cardiovascular diseases. Thermally processed tomatoes contain even more lycopene than raw tomatoes, which is why cooked tomatoes are often recommended by nutritionists.

Tomatoes regulate the functioning of the nervous system, have an anti-inflammatory and antibacterial effect, improve metabolism and digestion, help with asthenia and atherosclerosis, and are also a good diuretic for diseases of the kidneys and bladder [28].

Many organic acids are present in tomatoes, especially malic and citric acids. Salts of organic acids in the process of assimilation leave a significant reserve of alkaline mineral components in the body and thus contribute to the alkalization of the body and the prevention of acid shifts. Thus, tomatoes maintain the necessary acid-base balance in the body. The low content of purines in tomatoes is an important link in the structure of purine -free nutrition for the prevention of atherosclerosis. Tomatoes contain folic acid, which plays an important role in hematopoiesis, and also contributes to the formation of choline in the body, a substance that normalizes cholesterol metabolism. Thus, tomatoes can be widely used in the diet of mature and elderly people, as well as patients with impaired uric acid metabolism (gout) [27].

In cooking

Tomatoes are widely used in cooking. They are used as an ingredient in appetizers, first and second courses, salads - both raw and cooked. We have become completely familiar with salads with fresh tomatoes, tomato soups, sauces, pizza and pasta with tomato dressing. Tomatoes are successfully used for the preparation of various types of canned food. The fruits contain a significant amount of acid, which makes it possible in the manufacture of canned food to be limited to sterilizing them in boiling water. Depending on what taste the hostess wants to achieve, tomatoes can be pickled, salted, boiled sweet sauce, juice or compote. As a rule, sugar, salt, vinegar, citric acid and all kinds of spices are used in any kind of preservation [29]. With proper preparation, the product can be stored in a dark, cool place for several years. Preservation data is always a great addition to side dishes, meat, fish, salads and an independent snack. A well-known tomato product is ketchup, a spicy tomato sauce with seasonings.

Combination with other products

According to the rules of a healthy diet, it is not advisable to combine a tomato with starchy and cereal products. It is recommended to eat tomatoes with herbs and vegetables that do not contain starch. It is advised to take tomatoes with proteins and fats, thus improving their absorption. A healthy combination is tomato and avocado, as well as broccoli [34] .

The usual combination of tomatoes and cucumbers is not as useful as it seems - the components of these vegetables, according to recent studies, mutually interfere with the absorption of each other's medicinal components [35] .

Useful combinations are also considered tomatoes and liver, olive oil [37] .

Beverages

The most famous tomato drink, as you might expect, is **tomato juice** . It is consumed both in its natural form and with the addition of salt, pepper, celery, Worcester sauce, lemon juice and lime. In addition, tomato juice is used as a component of several alcoholic cocktails. Tomatoes can be added to vegetable smoothies based on yogurt or kefir, and they can also be used to make compote with spices [36] .

Dangerous properties of tomato and contraindications

Despite all the useful properties of tomatoes, there are several contraindications to their use:

- You need to be as careful as possible with the leaves of the plant bush, as they are poisonous.
- People who are prone to heartburn and high acidity should be wary of tomato fruits.
- Also, tomato can cause severe allergies.
- According to some studies, people with chronic kidney disease should eat tomatoes with caution due to their high potassium content.
- Tomatoes can exacerbate irritable bowel syndrome and diarrhea, and are also contraindicated in gallstone disease [41] .
- It is not recommended to use store-bought tomato paste, as it contains preservatives that are harmful to the body.
- With hypertension, cardiovascular diseases, it is not recommended to use pickled and salted tomatoes, as they can provoke the appearance of stones in the bladder. In addition, kidney stones can appear with the regular use of canned tomato juice, as it contains starch.
- With pancreatitis and ulcers, moderate consumption of tomatoes is shown, as they can provoke an exacerbation.

origin of name

In France, the tomato was called the "apple of love" (" *pomme d'amour* "), as it was believed to have aphrodisiac properties .

Latin name for tomato, *Lycopersicum esculent* , was introduced by the French botanist Joseph Pitton de Tournefort in the 17th century and meant " *wolf peach* ". Round and juicy, the tomato fruit was mistakenly equated with belladonna berries and was considered poisonous - hence the name.

Tomato, in turn, comes from the Spanish **tomate** - a derivative of the ancient Aztec word **tomatl** [2] .

The name tomato came to us from the Italian language, " *golden apple* " - pomo d'oro , since yellow varieties of the fruit were probably originally used in Europe [4] .

Story

It is a vegetable of the nightshade family, originating from South America, and occupying a leading position in the world among vegetable crops [3].

In 1519, the conquistador Fernando Cortes first saw the bright red fruit in the gardens of Montezuma. Impressed, he brought tomato seeds to Europe, where they began to grow it as an ornamental plant.

The first country to start cultivating tomatoes was Italy [1]. From the point of view of botany, the fruits of a tomato are considered berries, but in everyday life and in the way they are used, they have long taken their position among vegetables [5].

Varieties

There are hundreds of varieties of tomatoes - small cherry tomatoes the size of grapes, huge " *Oxheart " tomatoes* weighing 600-800 grams, juicy for salads and meaty for pasta, *campari* and " *cream* " - these are just the most famous of the many varieties. The color of the fruit, in addition to red, can vary from white, orange, yellow, green to purple and chocolate [6,10].

Growing Features

The plant can be annual or perennial.

The annual bush reaches a height of 60-90 centimeters, at the tips of the branches instead of leaves there are buds. The fruits ripen, as a rule, all at once, and after ripening the plant dies.

The perennial tomato is a climbing plant that requires support with stakes or a cage. Such a tomato will bear fruit until it freezes. The fruit usually ripens later than the annual plant, but generally yields more. The flower is usually found on the main branches. The height reaches 1.5-3 meters, provided that the plant is constantly supported and climbs [8].

Tomato is a rather whimsical plant. He likes space, warmth (temperature about 25 degrees) and a lot of light. Seeds should be located at a sufficient distance from each other so that the branches can break through without interfering with each other [7,11]. Free air circulation is necessary for the full growth of the tomato, as well as warm soil. Sufficient moisture is also very important. The best time for planting is late spring and early summer, but seed preparation begins at the end of January by heating and processing. In the first half of February, the seeds are planted, and seedlings appear in March [12]. You can grow a tomato in the ground, in a greenhouse or in pots, upside down. The latter method is convenient where there is little space or infertile soil [9].

Selection and storage

Ripe tomatoes have a fairly rich flavor. If there is no smell, most likely the tomatoes were picked unripe. The stem should be small. When choosing tomatoes, you need to pay attention to the smoothness of the skin, the absence of cracks, spots and impact marks [14].

A fully ripe tomato is soft and springy, but you can only opt for it if it is consumed immediately. An overripe tomato is always good for sauces and soups. In healthy fruits, the skin is thin, and the flesh is plain.

If white thin veins are visible in the pulp, there are white spots in the core, and it is “plastic” to the touch, then there are nitrates in the tomato [13].

The storage conditions of a tomato directly depend on how ripe it is. Room temperature will speed up the ripening process. Therefore, if you want the tomato to ripen, feel free to leave it warm. Ripe tomatoes are best stored at around 12 degrees Celsius. At this temperature, the tomato will stop ripening, but will not lose its taste and useful properties [15] .

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An extended HTML version of the article is available on the website edaplus.info.

Tomato - useful properties, composition and contraindications

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