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COCONUT OIL IN HUMAN DIET – NUTRITION VALUE AND POTENTIAL HEALTH BENEFITS

Olej kokosowy w diecie człowieka - wartość odżywcza i potencjalne korzyści zdrowotne

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Abstract

Introduction and aim: Coconut products are becoming increasingly popular both in Poland and in the world. Their assortment is constantly increasing, but the most well-known coconut product is oil. Its use in human nutrition raises a lot of controversy, mainly due to the high proportion of saturated fatty acids. However, there are many clinical studies that suggest its positive effect on the human body. The aim of this article is to review the available literature on the nutritional value of coconut oil and health benefits after its consumption.

Brief description of the state of knowledge: Coconut oil belongs to the group of saturated fats, whose share in this type of oil is over 90%. The dominating fatty acid found in coconut oil is lauric acid (about 50% of the total of all acids), while the shares of other medium chain fatty acids (myristic, caprylic, capric) also has a high content of 5-20%. In addition, unrefined coconut oil is a valuable source of many biologically active compounds, such as sterols, tocopherols, and phenolic compounds, whose content in 100 g of product is 70 mg, 4 mg and 50 mg, respectively. Clinical studies show the beneficial effect of coconut oil on skin, heart, brain and liver. Coconut oil supplementation is also important both in the prevention and treatment of cancer, helps to reduce body fat, and also reduces the biological activity of many bacteria, viruses and fungi.

Summary: The collected data confirm that unrefined coconut oil is a valuable source of medium chain fatty acids and biologically active compounds such as sterols, tocopherols, and

phenolic compounds. Such chemical composition of coconut oil suggests its beneficial effects on the body, both for children and adults.

Key words: coconut palm, coconut oil, nutrition value, health benefits

Introduction

Coconut (*Cocos nucifera* L.), commonly known as coconut palms, it is one of the most important rainforest trees grown in more than 90 countries in the world. Coconut palm is called the "tree of life" because of the wide range of possibilities for its use [1]. For example, leaves and trunks are building materials, and roots are used in healing. The most important part of the plant is a fruit in which we can distinguish the outer layer (husk), used in the manufacture of carpets, ropes and fibres, and the inner layer which is processed into cosmetic products and various food items – coconut water, coconut milk, coconut shavings, coconut flour and coconut oil (endosperm) [2].

Oil is the most well-known food product obtained from dried coconut pulp, called the copra [3]. Depending on the method used to extract fat from the material, we can distinguish different types of the final product:

- virgin oil (unrefined oil), obtained from fresh and mature coconuts by pressing process, the oil obtained in this way does not contain chemical solvents and other bleaching or deodorizing agents [4], also keeps its natural sensory characteristics and a high content of bioactive compounds [5],
- refined oil, obtained by extruding from coconuts and then the oil is subjected to further processing like refining, bleaching and deodorizing, as a result of these processes there is a tasteless and odorless oil product and also it has a higher smoke point [6],
- oil obtained by fermentation method, pure cultures of probiotic bacteria are used here to oil extract from the coconut milk, the aim of this process is to bring the emulsion to instability and as a result the oil phase accumulates at the top of the surface and separates from other fractions such as carbohydrates, proteins and water, the oil obtained by this method is yellow and has a characteristic fermented odor [7].

The use of coconut oil in food raises many controversies, mainly because of the high content of saturated fatty acids (90%) commonly regarded as harmful to health. However, there are many clinical studies that clearly suggest its positive effect on the development of the organism and on the maintenance of the living functions, both children and adults [3]. Therefore, the purpose of this article is to review available literature about nutritional value and health benefits of the coconut oil consumption.

Nutritional value of coconut oil

Fatty acids composition

The most well-known division of fatty acids includes saturated and unsaturated fatty acids (mono- and polyunsaturated) [8].

It is generally believed that the saturated fatty acids have a negative influence on human health, mainly because of their effects on the cholesterol level in blood serum, both total and LDL fraction (Low Density Lipoproteins). In addition, they promote the platelet aggregation, and thus increase the risk of thrombus formation in blood vessels. Despite many adverse effects on the human body, they are a good source of energy [9].

Different effects on the human organism show unsaturated fatty acids, characterized by the presence of at least one double bond in the structural chain molecule. These acids are responsible for the increase in the level of HDL fraction (High Density Lipoproteins), they

also cause the decrease in the level of LDL cholesterol in blood serum [9], additionally they have anti-inflammatory, antiallergic and anticancer properties [10, 11].

Coconut oil is considered as one of the most important vegetable oils in the world. It belongs to a unique group of oil products called lauric oils, characterized by the high content of saturated fatty acids (90%), especially the contribution of lauric acid (C12: 0) [12]. The content of this fatty acid in coconut oil is about 35.25-52.48% [Tab. 1].

The data provided in Table 1 clearly indicate that coconut oil is a valuable source of saturated fatty acids. In predominant quantities, besides the earlier mentioned lauric acid, coconut oil contains myristic acid (C14:0) in an average amount of 17.19%. Palmitic acid, (C16:0), caprylic acid (C8:0) and capric acid (C10:0) are also present at relatively high levels in coconut oil. Their average shares in total fatty acids are respectively 8.80% for palmitic acid, 6.76% for caprylic acid and 6.37% for capric acid. Other saturated fatty acids are in the range of 0.50 (caproic acid (C6:0)) - 3.03% (stearic acid (C18:0)).

The unsaturated acids are characterized by a relatively low percentage level in coconut oil. Oleic acid (C18:1) and linoleic acid (C18:2) are the highest in coconut oil, with a content of 5.25-10.54% for oleic acid and 0.79-2.58% for linoleic acid [Tab. 1]. Linolenic acid (C18:3) was found only in Elsayed et al. [15] and Moigradean et al. [16] studies, in amounts of 0.01% and 1.10%, respectively.

Table 1. Fatty acids composition [%] in coconut oil by various authors.

No.	FATTY ACIDS COMPOSITION [%]										reference
	caproic acid (C6:0)	caprylic acid (C8:0)	capric acid (C10:0)	lauric acid (C12:0)	myristic acid (C14:0)	palmitic acid (C16:0)	stearic acid (C18:0)	oleic acid (C18:1)	linoleic acid (C18:2)	linolenic acid (C18:3)	
1.	0.52	7.60	5.50	47.70	19.90	0.00	2.70	6.20	1.60	0.00	13
2.	0.00	0.00	7.59	50.65	0.00	10.47	3.59	8.33	1.47	0.00	14
3.	0.53	7.78	7.19	35.25	19.17	12.60	3.99	10.54	2.58	0.01	15
4.	0.00	0.00	7.00	44.60	20.40	11.20	2.60	5.50	1.80	1.10	16
5.	0.50	7.80	6.70	47.50	18.10	8.80	2.60	6.20	1.60	0.00	17
6.	0.52	8.41	6.08	52.48	16.93	7.19	1.24	5.36	0.79	0.00	18
7.	0.57	7.39	6.15	48.05	18.45	8.94	2.96	6.18	1.31	0.00	19
8.	0.52	6.63	5.49	46.36	19.54	9.94	3.37	6.50	1.63	0.00	19
9.	0.57	7.21	6.07	48.42	18.95	9.06	3.15	6.35	1.36	0.00	19
10.	0.55	7.23	5.94	48.07	19.23	8.91	3.17	5.79	1.12	0.00	19
11.	0.63	8.24	6.53	47.42	18.26	9.33	2.68	5.25	1.57	0.00	20
12.	0.64	7.64	6.27	48.03	16.23	8.40	3.46	5.80	0.90	0.00	20
13.	0.69	7.53	6.05	47.10	18.51	9.52	3.53	6.11	1.27	0.00	20
14.	0.58	7.97	6.22	47.81	16.99	9.11	3.15	6.36	1.38	0.00	20
15.	0.52	8.13	6.49	47.21	17.28	8.47	3.09	6.36	1.41	0.00	20
16.	0.61	8.60	6.59	46.89	17.03	8.84	3.23	6.36	1.43	0.00	20
min.	0.00	0.00	5.49	35.25	0.00	0.00	1.24	5.25	0.79	0.00	
max.	0.69	8.60	7.59	52.48	20.40	12.60	3.99	10.54	2.58	1.10	
\bar{x}	0.50	6.76	6.37	47.10	17.19	8.80	3.03	6.45	1.45	0.07	
δ	0.20	2.68	0.57	3.60	4.73	2.65	0.62	1.29	0.40	0.27	

Medium chain triglycerides (MCTs) are found in many food products, but the most known their source is coconut oil. MCTs are the class of saturated lipids (3 fatty acid molecules are linked directly to the glycerol skeleton) and they contain in their structural chain from 6 to 12 of carbon atoms [21].

MCTs have a different method of absorption and use compared to long chain fatty acids (LCTs). LCTs require a lipase enzyme to separate them from glycerol, and the resulting fatty acids (which form micelles) are absorbed and re-attached to the glycerol molecule so that they can reach the bloodstream. Short-chain acids (up to 30%) are absorbed in the small intestine in the intact form, they directly enter the portal vein. This process determines both, faster absorption and faster possibility of using them as opposed to long chain fatty acids. The next difference between MCTs and LCTs is the energy yield obtained in the oxidation process, for short chain acids it is 8.3 kcal/g and for long chains it is 9.2 kcal/g [21].

MCTs in coconut oil make it different from all other vegetable fats, it is not only with unique character but also with additional therapeutic properties. These acids are easily digested, absorbed and utilized by the human organism, and in addition they do not put a load on the gastrointestinal tract [22].

Sterols

Phytosterols are structural and functional analogues of cholesterol that are synthesized in the plant organism [23]. These ingredients have anti-tumor and hypocholesterolemic effects - they contribute to lowering the level of total cholesterol and LDL fraction, and also inhibit platelet aggregation [24].

The total content of sterols in coconut oil is about 70 mg/100 g [25, 26].

Several authors in their studies showed only 3 different sterol fractions in coconut oil - campesterol, stigmasterol and β -sitosterol. Their average content is 7.20, 12.30 and 38.97% respectively for campesterol, stigmasterol and β -sitosterol.

Table 2. Content of individual sterol fractions [%] in coconut oil by different authors.

No.	STEROLS [%]			source
	campesterol	stigmasterol	β -sitosterol	
1.	7.80	12.50	48.60	26
2.	7.10	12.90	29.00	27
3.	6.70	11.50	39.30	28
min.	6.70	11.50	29.00	
max.	7.80	12.90	48.60	
\bar{x}	7.20	12.30	38.97	
δ	0.56	0.72	9.80	

Tocols

Vitamin E plays a significant role as a natural antioxidant in food because of its protective properties against unsaturated fatty acids thanks to which it decreases the susceptibility of these components to unfavorable oxidation processes [29]. Tocols are a building block of cell membranes, they participate in many metabolic processes and prevent the aging of the body [30], also they have a positive influence on plasma lipids level [31].

It is estimated that the total tocols content in coconut oil is 4.20 mg/100 g [32]. Studies Arlee et al. [33], in which the test material was oil obtained from different varieties of

coconut, showed the content of these bioactive ingredients in the amount of 3.67-5.78 mg/100 g for cold press and 2.14-4.15 mg/100 g for fermented oils.

The dominant fraction of tocopherols in coconut oil is α -tocopherol (α -T), whose share is estimated at 0.20-1.82%. Other tocopherols such as γ , β and Δ -tocopherol (γ , β and Δ -T) in this oil are 0.12, 0.25 and 0.39%, respectively. In the coconut oil there are also fractions of tocotrienols, dominated by the content of α -tocotrienol (α -T3) in quantities ranging from 1.09 to 3.0%. The content of such tocotrienols as γ , β and Δ (γ , β and Δ -T3) is 0.33-0.64%, 0.00-0.17%, and 0.00-0.10%, respectively [Tab. 3].

Dauqan et al. [34] in their studies did not find any tocopherol and tocotrienol fractions in refined coconut oil.

Table 3. Content of tocols [%] in coconut oil by different authors.

No.	TOCOLS [%]								reference
	tocopherols				tocotrienols				
	α -T	β -T	γ -T	Δ -T	α -T3	β -T3	γ -T3	Δ -T3	
1.	0.20	trace	0.12	0.00	3.00	0.17	0.64	0.10	32
2.	1.82	0.25	trace	0.39	1.09	0.00	0.33	0.00	35
min.	0.20	trace	trace	0.00	1.09	0.00	0.33	0.00	
max.	1.82	0.25	0.12	0.39	3.00	0.17	0.64	0.10	
\bar{x}	1.01	0.13	0.06	0.20	2.05	0.09	0.49	0.05	
δ	1.15	0.18	0.08	0.28	1.35	0.12	0.22	0.07	

Phenolic compounds

Polyphenols are a group of chemical compounds that are classified as secondary metabolites of plants [36]. Their most important function is the ability to inactivate reactive forms of oxygen and nitrogen, as well as free lipid and protein radicals [37]. In addition, they have anti-inflammatory, bactericidal and anti-allergic properties, also they protect the skin from oxidative damage and prevent diabetes, cardiovascular diseases and cancer [38].

The total content of phenolic compounds in coconut oil is 48.60-57.89 mg gallic acid (GAE)/100 g for products obtained by cold pressed method, while the oils obtained by the fermentation method are characterized by the polyphenols content of 48.17-55.45 mg GAE/100 g [33]. Nevin and Rajamohan [39] studies have shown that virgin coconut oil contains 7.78 to 29.18 mg GEA/100 g of phenolic compounds, while the refined oil has a content of 6.00-14.00 mg GEA/100 g of product.

The subject of Marina et al. [6] research was a comparison of the polyphenols content present in coconut oils. Based on the results, it was found that the oil obtained by the fermentation process had the higher percentage level of individual phenolic acids than the refined oil.

Refined oil is characterized by the content of only 3 phenolic acids, protocatechuic, ferulic, and p-coumaric acid, and their content is 0.16, 1.39 and 1.69 mg/kg, respectively. In the oil obtained by the fermentation method, 5 phenolic acids were found - vanillic 2.08 mg/kg, caffeic 0.12 mg/kg, syringic 0.45 mg/kg, ferulic 5.09 mg/kg and p-coumaric 75 mg/kg. In this product did not detect protocatechuic acid which was present in refined oil [Tab. 4].

Both, Kapila et al. [40] and Srivastava et al. [41], analyzed the content of individual phenolic acids in coconut oil obtained by two methods: cold extraction and hot extraction. In both oils, gallic acid has the highest content from 20.20 to 25.29 mg/kg (hot extraction) and from 18.01 to 28.10 mg/kg (cold extraction). A similar high content was found for ferulic acid (12.83-22.10%), but only in the case of hot extraction method. The content of the rest phenolic acids in coconut oil obtained by hot extraction method is: 0.00-1.80% vanillic acid,

1.59-4.60% caffeic acid, 33.5-4.10% syringic acid, 0.00-0.53% p-coumaric acid and 0.00-4.80% p-hydroxybenzoic acid. The ferulic acid content in coconut oil obtained by cold extraction method amounted to 2.36%, and also in this kind of oil was found only vanillic acid in the amount not exceeding 1.03% and syringic acid in the range of 1.40-1.89%. The authors did not find the presence of protocatechuic acid in both, hot and cold extraction [Tab. 4].

Table 4. Content of individual phenolic acids [mg/kg] in various forms of coconut oil.

No.	PHENOLIC ACIDS [%]								reference
	protocatechuic acid	vanillic acid	caffeic acid	syringic acid	ferulic acid	p-coumaric acid	gallic acid	p-hydroxybenzoic acid	
coconut oil obtained by fermentation method [mg/kg]	0.00	2.08	0.12	0.45	5.09	0.75	0.00	0.00	6
refined coconut oil [mg/kg]	0.16	0.00	0.00	0.00	1.39	1.68	0.00	0.00	6
coconut oil obtained by hot extraction method [mg/kg]	0.00	0.00	4.60	4.10	22.10	0.00	20.20	4.80	40
coconut oil obtained by hot extraction method [mg/kg]	0.00	1.80	1.59	3.35	12.83	0.53	25.29	0.00	41
coconut oil obtained by cold extraction method [mg/kg]	0.00	0.00	0.00	1.40	0.00	0.00	28.10	0.00	40
coconut oil obtained by cold extraction method [mg/kg]	0.00	1.03	0.00	1.89	2.36	0.00	18.01	0.00	41
min.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
max.	0.16	2.08	4.60	4.10	22.10	1.68	28.10	4.80	
\bar{x}	0.03	0.82	1.05	1.87	7.30	0.49	15.27	0.80	
δ	0.07	0.96	1.85	1.61	8.57	0.66	12.35	1.96	

The impact of coconut oil on human health

Cancers

Cancer diseases have a huge impact on the society of the whole world [42]. Their definition includes the uncontrolled spread of modified cells, which leads to education features of malignancy, and also reduces the growth of normal cells in the human body [43].

The aim of the Kamalaldin et al. [44] study was to determine the effect of coconut oil on cancer cells located in the lungs (in vitro studies with human cells at a concentration of 1×10^5). The obtained results confirmed the ability of unrefined coconut oil to inhibit growth of cells (effects seen with coconut oil at a concentration of 10% during 72 h incubation) and induction of their death (added coconut oil at a concentration of 8.64 and 12.04% during 72 h incubation). Law et al. [45] analysed the importance of coconut oil supplementation for patients with cancer of the breast. The study was conducted with 60 women (≥ 18 years) in III or IV breast cancer, and also they had 6 cycles of chemotherapy. Patients ($n=30$ in the intervention group) received twice a day 10 ml of unrefined coconut oil as an addition to the 3, 4, 5 and 6 cycle of chemotherapy (opposed to the control group). The use of the coconut oil supplement has improved the general condition of the patients and has also helped to reduce the undesirable effects of chemotherapy.

Cardiovascular diseases

It is commonly believed that coconut oil contributes to increase the cholesterol content in the blood, due to the high concentration of saturated fats. This hypothesis is confirmed by most available studies, where the main subject of analysis was hydrogenated coconut oil, not natural [46]. In many clinical studies, there is no correlation between the consumption of virgin coconut oil and the development of coronary heart disease in people with a diet containing significant amounts of coconut oil [47].

It has been found that coconut oil, due to the presence of lauric acid, plays an important role in preventing of various cardiovascular diseases such as high blood pressure or atherosclerosis. In addition, it does not contribute to increase in LDL level [48].

Assunção et al. [49] compared the effect of soybean oil (a source of unsaturated fatty acids) and coconut oil on the lipid profile of women's blood. 40 women (20-40 years old) with low socioeconomic status showed the abdominal obesity determined by waist circumference (> 88 cm). The study included daily intake of 30 ml of coconut or soybean oil for 12 weeks. The lipid profile of women who consumed coconut oil was characterized by an increase in HDL cholesterol level and a decrease LDL: HDL ratio. Different results were obtained in women population with soybean oil diet. The content of total cholesterol and LDL fraction increased, and also HDL cholesterol fraction decreased. In both study groups, there was a decrease in body mass index (BMI), and in the group of women consuming coconut oil the waist circumference was also reduced.

Meaning for the brain

Ketone bodies are an alternative fuel for the brain cells in the case of insufficient amount of glucose. The human body is able to produce ketone bodies not only from stored fat (during starvation), but also from medium chain fatty acids whose the dominating quantities are found in coconut oil [50].

Alzheimer's disease is one of the neurological disorders observed as both memory loss and cognitive decline due to death of brain cells. Reger et al. [50] have shown that the use of MCTs in people (with Alzheimer's disease) diets has increased the level of β -hydroxybutyric acid (β -OHB) and had a positive impact on the rollback of memory reaction.

Hepatoprotective effect

The liver is considered the most important organ of the human body. It is responsible for storage control as well as carbohydrate metabolism, protein synthesis, and detoxification of the organism. Unfortunately, her exposure to the various environmental factors and drugs contributes to the formation of unwanted damages within it [3].

Current literature data suggest that coconut oil may have protective effects on the liver. Zakaria et al. [51] investigated the protective properties of coconut oil on rat liver. The tested animals (divided into 9 groups of 6 rats) were males weighing 180-220 g, which were fed with virgin coconut oil in amounts of 1.5 and 10 ml/ kg for 7 days. The results confirmed that the use of the coconut oil supplement reduces liver damage in animals, the authors also suggest the need of research to achieve similar results in the human body. In addition, in Shadnia et al. [52] publication described a medical case of a man (28 years) with an aluminium phosphate poisoning (AIP, a pesticide releasing phosphoric gas in contact with water or hydrochloric acid in the stomach), where metabolic acidosis and liver dysfunction were also observed. During hospital treatment (8 days), the patient received 200 ml of coconut oil every two hours (in combination with other medicines). Based on the results, the positive effect of coconut oil on the body detoxification has been unequivocally identified, as well as the possibility of using this oil in the treatment of acute aluminium phosphate poisoning in humans.

Slimming properties

Numerous studies conducted with the human participation, both men and women, have confirmed the dietetic properties of coconut oil. This product do not only reduce the overall level of body fat but also speeds up the metabolism. For example, analyses conducted by Tsuji et al. [53] with the healthy people participation have confirmed, that diet rich in MCTs is a weight loss factor and helps to reduce body fat. Other authors have investigated the effect of MCTs on people with high triglyceride levels in serum. In addition to reducing body fat, the proportion of triglycerides decreased by 15% [54].

Infections

It is believed that coconut oil exhibits antifungal, antimicrobial and antiviral properties. Its use in sick places causes the barrier to protect against many external factors (dust, fungi, bacteria, viruses). The Vala and Kapadiya [48] article mentions the ability of coconut oil to inactivate microorganisms that cause such diseases as influenza, measles, hepatitis, pneumonia, urinary tract infections, mycosis.

It has also been found that lauric acid, which is the dominant fatty acid in coconut oil, exhibits very strong inhibitory activity against *Propionibacterium acnes* (a cause of juvenile acne). These bacteria live in the sebaceous glands of the facial skin, and their occurrence causes an inflammatory response in the form of lumpy cysts. Studies were conducted with human cells at a concentration of 1×10^6 in 1 ml for cell growth inhibition and 1×10^7 in 1 ml for bactericidal properties. Cells were incubated at 37°C with lauric acid (0.24-500.00 µg/ml) for 72, 48, 24 h (cell growth) and (0.00-100.00 µg/ml) for 5 h (bactericidal properties). It has been found that the application of lauric acid do not only reduce bacterial growth, but also reduces the edema and inflammation [55]. Therefore, it is believed that coconut oil may have therapeutic relevance in the acne treatment.

The importance of coconut oil for children's health

The characteristic feature of coconut oil is its easy assimilation and a high calorific value, estimated 862 kcal per 100 g of product. These elements are often used in the children diet with low weight mass to increase the calories content of their meals [56].

Analyses conducted by many researchers have shown that diets rich in coconut oil produce faster weight gain than diet supplemented with soybean oil [56]. Vaidya et al. [57] during a 12-month study with infants (the number of children with a coconut oil diet – 24) with a low birth weight of 1250-1500 g, they observed faster weight gain. These children were fed a milk blend with coconut oil, whose content in the feed was 2 drops (1 drop = 30 mg) per 5 ml. It is believed that the results of the study are related with easy MCTs assimilation.

Skin changes

Atopic dermatitis is a chronic disease whose characteristic feature is a defective skin barrier, and the inflammations are constantly appearing on its surface. In addition, the degree of hydration of the skin is also decreasing. Evangelista et al. [59] investigated the effect of coconut oil on the children aged 1-13 years with mild to moderate atopic dermatitis (n = 59 children). Patients applied 5 ml coconut oil twice a day to the entire skin surface for 8 weeks. During the experiment, the researchers observed the improvement of the Severity Scoring of Atopic Dermatitis index (SCORAD), skin capacity, and a positive effect on skin hydration. They also found more beneficial effects with coconut oil using compared to mineral oil.

Another dermatological disease is infectious mollusc caused by viruses from the group of smallpox. Symptoms of this disease are skin lesions, in the form of hard nodules. Kattoof [60] found that the coconut oil use in the amount of 14 g twice a day for 2 weeks (then for 2 months) in children (n = 20) with this infection, the coconut oil treatment is highly effective, and also prevents the occurrence of this infection.

Summary

The collected data confirm that coconut oil, especially virgin coconut oil, is a valuable source of many biologically active compounds such as sterols (70 mg/100 g), tocopherols (4 mg/100 g) and phenolic compounds (50 mg/100 g). Its fatty acids composition is dominated by medium chain fatty acids (more than 90% of the sum of all fatty acids), which are a special group of saturated fats having beneficial effects on the human body. The content of lauric acid in coconut oil is almost 50%, while the content of other medium chain fatty acids (myristic, caprylic, capric) is in the range of 5-20%.

Until recently, it was believed that coconut oil should not be used in nutrition, both children and adults. A number of clinical studies clearly show its beneficial effects on the skin, heart, liver and brain of humans. Coconut oil supplementation is also important in the prevention and treatment of cancer, helps to reduce body fat, and reduces the biological activity of many pathogenic bacteria and viruses.

The beneficial properties of coconut oil on the human body have been confirmed by many scientists, however research in this direction should be continued, both with human participation and more people in the group.

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