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Hypercholesterolemia - As a Serious Independent Risk Factor for Health

Amir Aliyev*, Yagut Hajiyeva

Azerbaijan Medical University, Azerbaijan

Abstract Cholesterol is a lipid (fat), which is mainly formed in the liver and is of key importance for the normal functioning of the body. Cholesterol forms and supports cell membranes, regulates the permeability of molecules into cells, participates in the production of sex hormones (androgens and estrogens and bile, is necessary for the production of a number of other hormones, is important for metabolism of fat-soluble vitamins, isolates (protects) nerve cells [1-3]. Cholesterol is transported in the blood by special substances (molecules) - lipoproteins, consisting of lipid to protein. In the body there are 3 types of lipoproteins. One type - low-density lipoprotein (LDL) - the so-called “bad cholesterol”. LDL carry cholesterol from the liver to the body cells. If LDL enters the cells in large quantities, then the body is seriously harmed, in the first place, there is a risk of developing cardiovascular diseases. Usually, the blood contains 70% of LDL. The second type of high-density lipoprotein (HDL) – “good cholesterol”; - carries cholesterol from cells to the liver, where it is split or excreted from the body. HDL prevents the development of cardiovascular diseases. The third type is triglycerides - they are chemical forms, together with cholesterols form plasma lipids (or blood fats). Nutritional calories are used by organisms not immediately and in tissues are transformed into triglycerides. When the body needs, triglycerides are released from fat cells and serve as energy sources. This process controls hormones.

Keywords Hypercholesterolemia, Low-density lipoprotein, High-density lipoprotein

Cholesterol is a lipid (fat), which is mainly formed in the liver and is of key importance for the normal functioning of the body. Cholesterol forms and supports cell membranes, regulates the permeability of molecules into cells, participates in the production of sex hormones (androgens and estrogens and bile, is necessary for the production of a number of other hormones, is important for metabolism of fat-soluble vitamins, isolates (protects) nerve cells [1-3].

Cholesterol is transported in the blood by special substances (molecules) - lipoproteins, consisting of lipid to protein. In the body there are 3 types of lipoproteins. One type - low-density lipoprotein (LDL) - the so-called "bad cholesterol". LDL carry cholesterol from the liver to the body cells. If LDL enters the cells in large quantities, then the body is seriously harmed, in the first place, there is a risk of developing cardiovascular diseases. Usually, the blood contains 70% of LDL. The second type of high-density lipoprotein (HDL) - "good cholesterol" - carries cholesterol from cells to the liver, where it is split or excreted from the body. HDL prevents the development of cardiovascular diseases. The third type is triglycerides - they are chemical forms, together with cholesterols form plasma lipids (or blood fats). Nutritional calories are used by organisms not immediately and in tissues are transformed into triglycerides. When the body needs, triglycerides are released from fat cells and serve as energy sources. This process controls hormones [4, 5].

The content of cholesterol in the human blood is as follows: the optimal level is less than 5 mmol / L, the high level cell is 5-6.4 mmol / L, the moderately high level is 6.5-7.8 mmol / L, the very high level, or hypercholesterolemia - more than 7,8 mmol / l. High levels of cholesterol have an aggravating systemic effect on the body, contribute to the development of various diseases, among which stand out such formidable cardiovascular diseases as atherosclerosis, infarction, angina, stroke. Although there are no specific symptoms of hypercholesterolemia, symptoms of the disease caused by it are observed [6, 7].

Causes of increasing the level of cholesterol in the body, many authors see in the inadequate way of life of most people. Especially in this respect, the peculiarity of their eating behavior is highlighted. Foods such as eggs, kidneys, some seafood and others containing cholesterol do not do much harm to its level in the blood. However, saturated fats, contained in red meat, cakes, sausages, hard cheeses, fat,

* Corresponding author:
amirvugar@mail.ru (Amir Aliyev)
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flour confectionery, cookies, cream and many others, contribute to the increase in cholesterol in the body [1, 8].

The same role is played by low physical activity of the population (hypodynamia). For example, among people leading a sedentary lifestyle, usually have a high level of LDL and a low level of HDL [9, 10].

The same picture is observed among people who have excess body weight and the more obesity [11, 12]. Smoking, alcohol can also have a role in increasing the level of LDL [13]. However, on all these issues the questions remain open. There is no specific data on cholesterol-containing foods and when consumed, how many they are in violation of the LDL / HDL balance. What is the level of physical activity and what measures can it be taken to prevent the increase in cholesterol levels. To what extent can tobacco-alcohol dependence lead to an increase in cholesterol level [4].

According to some reports, it is known that a number of diseases - diabetes, hypertension, high triglycerides, liver and kidney disease, decreased thyroid function, cause an increase in LDL in the blood. And so treatment of these diseases leads to normalization of LDL in the blood [14, 15]. But there is no reverse evidence that the increase in the level of LDL density contributing to the formation of these diseases [16].

Laboratory diagnostics of cholesterol is carried out by biochemical analysis of blood in polyclinic and stationary conditions, i.e. in the medical treatment of people for various ailments and diseases [17, 18].

For the treatment of hypercholesterolemia, it is recommended to perform: physical exercises; use of a large number of fruits, vegetables, whole grains, oats, good quality fat and avoid eating foods with saturated fats; normal sleep (8 hours a day); normalization of body weight and on the use of tobacco and alcohol [9, 19, 20].

However, these recommendations are so vast and inaccessible that most people ignore them [11]. Therefore, according to the testimony, doctors resort to medication [21] and first of all to statins [22]. But their high cost limits mass use. It is of interest to use the infusion of an anise lymph grass to lower the level of hypercholesterolemia, which leads to a significant decrease in cholesterol level [23]. It should be added that enough data from pilot studies have been accumulated, in which independent scientific groups studied the use of the drug "Mertenil" (statin-rosuvastatin) at a dose of 10-40 mg / day. In studies, data were obtained on the high hypolipidemic efficacy, tolerability and safety of this statin in different categories of patients, which allows one to recommend it for wider clinical use. Adequate statin therapy in accordance with the new European and Russian recommendations will allow to achieve target LDL-C levels more often, which will eventually lead to a reduction in the frequency of repeated cardiovascular complications in high-risk patients and will further reduce mortality [24, 25]. A necessary condition for successful primary and secondary prevention of cardiovascular disease is the long-term use of statins. A recent meta-analysis of 14 statin studies, including simvastatin, has shown that the best predictor of a decline in coronary events is a decrease in LDL cholesterol. A study of the relationship between LDL cholesterol lowering and coronary incidence showed that a decrease in LDL cholesterol by 1 mmol / l resulted in a decrease in the risk of coronary events by 11% during the first year of therapy, by 24% over the second year, by 33% during the third to fifth years, by 36% in the sixth and subsequent years [26, 27]. The results of such studies will be of great practical value. Such studies are very important for our republic.

In recent years, attention to family hypercholesterolemia has increased immeasurably. Family hypercholesterolemia according to the International Classification of Diseases of the 10th revision (ICD-10) is coded as E78.0. Family hypercholesterolemia is inherited in an autosomal dominant type, characterized by a high content of total cholesterol and LDL in the blood plasma, as well as the development of signs and symptoms of coronary and systemic atherosclerosis at a young age. This disease is also characterized by extravascular deposition of cholesterol in extravascular tissues (in the form of cutaneous and tendon xanthomas, periorbitalxantelasm, lipoid arches of the cornea). Family hypercholesterolemia can be the result of mutations of a number of genes, mutations of which are inherited by the dominant type and clinically manifest in both homo- and heterozygous forms [28, 29]. The total cholesterol concentration in patients with heterozygous familial hypercholesterolemia (genetic disorders inherited from one of the parents) is usually 350-550 mg / dl, and in homozygous form (genetic disorders inherited from both parents), 650 to 1000 mg / dl. Family hypercholesterolemia is one of the most common congenital metabolic disorders [30, 31].

The heterozygous form occurs in about 1 in 300-500 people, but in some populations (in the USA) this ratio is much higher. The homozygous form is quite rare-about 1 in 1 million people. Since familial hypercholesterolemia is the result of a genetic disorder or disorder, hypercholesterolemia develops from childhood, leading to early development of coronary heart disease. Special attention should be paid to carriers of homozygous familial hypercholesterolemia, in which severe hypercholesterolemia usually leads to severe atherosclerosis and cardiovascular diseases in childhood and adolescence [28].

One of the earliest symptoms of familial hypercholesterolemia arexanthomas (lesions of the skin and tendons). The reverse development of these xanthomas is difficult, they are more often removed cosmetically [28, 32]. Specific diagnostic signs of familial hypercholesterolemia are xanthomas of tendons, among which the xanthomas of the Achilles tendons and tendons of the extensors of the fingers of the hands (in the region of the metacarpophalangeal joints) are the most common and typical manifestations. In rare, atypical cases, complex formations may be similar in appearance to lipomas (on the elbows) [28, 33].

Family hypercholesterolemia is a curable disease. To achieve the required reduction in LDL cholesterol by 50% or

more, aggressive treatment with lipid-lowering is necessary. In addition to diet and lifestyle changes, safe and effective types of medical treatment are available, including statins and other lipid-lowering drugs. Despite the prevalence of this disease and the availability of effective methods of treatment, family hypercholesterolemia remains insufficiently diagnosed and studied, especially in children. According to some estimates, family hypercholesterolemia is diagnosed in about 20% of patients, and only a small proportion of them receive proper treatment [28, 34]. The duty of all primary care physicians and relevant specialists is the examination of all children and adults for hypercholesterolemia, as well as the appointment of treatment to patients with familial or severe hypercholesterolemia. Survey of the immediate family of a patient with family hypercholesterolemia, including siblings, parents and children, contributes to early detection and treatment. Long-term drug therapy in patients with familial hypercholesterolemia significantly reduces or eliminates the excess risk of developing coronary heart disease, reducing this risk in the general population [35-37].

Although the above data were obtained in outpatient-stationary settings, nevertheless a number of authors extrapolated them to the population of individual regions, which to a certain extent makes it possible to judge the extent of the prevalence of hypercholesterolemia at the population level. It is known that hypercholesterolemia, together with arterial hypertension and smoking, are among the first 3 most powerful risk factors for the development of cardiovascular diseases [38]. In Kyrgyzstan, hypercholesterolemia above 5.0 mmol / l was noted in 23.6% of the examined. With age, the prevalence of hypercholesterolemia increases dramatically. So, if in persons aged 25-44 years this indicator was 17%, then at the age of 45-64 years it increased by 2 times (34.7%). In addition, there were also gender differences; in women, this indicator is much more common than in men (29.9% versus 17.5%) [39]. According to a study by Interapid (2012), hypercholesterolemia was registered in 41.4% of the population and also increased in women compared with men (45.5% vs. 36.3%) [39]. Moreover, high levels of hypercholesterolemia are also present in other countries: according to the National Institute of Health in the United States, the prevalence of hypercholesterolemia was 25% [40], in Russia, in a recent ESSE study, 57% [41].

In India, it was shown that among women (given the age), the prevalence was greatest among rural women compared to urban women from poor families and the middle class: 13.5, respectively; 27.7 and 37.4% [41]. In Kazakhstan, the average level of hypercholesterolemia was 4.79 ± 0.02 mmol / l [43]. There are data on individual regions of Russia. In Adygea, the level of hypercholesterolemia among the population is 19.8% [44], in the Krasnodar Territory - 31.6%, in the Ryazan region, an increase in cholesterol above 5 mmol / l was registered in 84.1% of the examined, while the proportion of people with "more atherogenic "The lipid spectrum was significantly higher in the rural population - 89.6% compared to 82.3% of urban residents. In a representative sample of Novosibirsk, the prevalence of HDL cholesterol ≤ 34 mg / dl (0.9 mmol / l) in 3.5% of respondents aged 25-34 years and 7.6% 35-44 years, TG> 200 mg / dL 2.3 mmol / L) in 6.3% in the 25-34 age group and 7.4% in the 35-44 age group [1, 45].

According to the results of the ESSE-Russia study, on average in 13 regions of the country included in the study, the prevalence of elevated cholesterol is 57.6%, among men 58.4%, among women 56.3%; elevated levels. The prevalence of hypercholesterolemia is, in turn, associated most often with low and medium education, heavy physical labor and rural living [44, 46]. The data given were obtained mainly on clinical material, i.e. at the population level, hypercholesterolemia has not been studied. This is mainly due to the fact that hypercholesterolemia can be diagnosed only by careful analysis of the history and laboratory biochemical examination of a sample of his blood, and this is possible only in outpatient settings [47, 48]. Only in recent years a portable device has been proposed that allows in the field for no more than one minute to determine the level of cholesterol and its fractions in the finger sample of blood, which opens up wide opportunities for population studies. However, the relative high cost and inadequate supply of it to the practical network limits these opportunities so far [49].

Therefore, measures to prevent hypercholesterolemia at the population level have not yet been developed. Its prevention is carried out in the framework of programs for the prevention of cardiovascular diseases [50, 51], often hypercholesterolemia is considered as a biomarker of cardiovascular diseases [52]. In rural areas, measures to reduce the level of hypercholesterolemia by modifying the way of life of the rural population are proposed to implement preventive programs for cardiovascular diseases [53]. But as a rule, in all these programs, hypercholesterolemia is considered as an independent risk factor for cardiovascular diseases, especially atherosclerosis [54].

According to many experts, it is necessary to consider the development of hypercholesterolemia for the successful control and prevention of cardiovascular diseases, arterial hypertension, diabetes mellitus, obesity and other pathological conditions of the organism; contributing to the global high incidence of the world population, hypercholesterolemia; as a serious independent risk factor for health [11, 53, 55]. In the aspect of the above, extensive research is needed on the prevalence of hypercholesterolemia in regions with different socioeconomic conditions and ethnic and ethnic characteristics of the population, identifying and assessing the risk factors for hypercholesterolemia, the nature of eating behavior of the population, its awareness and adherence to the correction of hypercholesterolemia and other sociohygienic aspects of hypercholesterolemia. So, the results of these studies will allow developing a rational package of preventive measures for hypercholesterolemia, which will not only reduce the level of hypercholesterolemia among the population, but also allow to accelerate the pace

of a positive solution to the problem of cardiovascular diseases [49, 50, 54, 56, 57].

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