Polish Forum for Prevention Guidelines on Diet

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Introduction

The Seven Countries Study [1] was of great importance for the development of cardiovascular disease (CVD) prevention. The study showed that the risk of death from ischaemic heart disease (IHD) correlated positively with diet containing a lot of saturated fatty acids (SFA) and trans fatty acids (TFA), and negatively with a diet rich in unsaturated fatty acids and natural antioxidants. Dietary modification on the basis of the aforementioned associations is significant in the prevention and treatment of CVD. The Mediterranean diet has been considered as a model for the so-called 'healthy diet':

The Mediterranean diet is characterised by:

- a high content of seafood and plant products, such as vegetables, fruit, legumes, nuts and grains,
- moderate intake of dairy products (mainly cheese and yoghurt),
- low intake of red meat,
- olive oil consumption as the main fat,
- egg consumption up to 3 times a week,
- wine consumption limited to small or moderate amounts, usually with meals,
- desserts consisting usually of fresh fruit, nuts and honey limited to holidays.

Regarding the proportions of individual nutrients contained in the Mediterranean diet, the low intake of SFA and high intake of monounsaturated and polyunsaturated acids (MUFA and PUFA) as well as a low proportion of omega 6 to omega 3 acids and high intake of natural antioxidants and high amount of fibre should be highlighted [2].

In the Lyon Heart Study [3] in patients after myocardial infarction a 27-month Mediterranean diet rich in alpha-linolenic acid, one of the omega 3 fats, resulted in a decrease in myocardial infarction recurrence by 70%, in coronary deaths by 76% and in total death by 70% as compared with the control group. The authors strongly stressed that the low proportion of omega 6 to omega 3 fatty acids is very important for the prevention of atherosclerosis. Their study showed a proportion of 4.4:1, whereas it exceeds 10:1 in a typical diet in Northern Europe. A traditional Mediterranean diet in Crete showed a proportion lower than 2:1.

The selection of fats in the diet plays a very important role in prevention of atherosclerosis. SFA, contained mainly

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in animal fats, increase the serum LDL cholesterol levels and the proportion of LDL to HDL cholesterol. TFA have a similar effect on LDL cholesterol levels and, additionally, they reduce HDL cholesterol levels. MUFA and PUFA from the omega 6 family (PUFA n-6) lower the LDL cholesterol concentration, as well as the proportion of LDL to HDL cholesterol levels.

The atherogenic effect of SFA results from a reduction of LDL receptors. Additionally, they present some pro-thrombotic effects.

The necessity of maintaining the proper proportions of PUFA n-6 and n-3 intake can be understood from their metabolic pathways. The parent fatty acids to the n-6 and n-3 families are linoleic and alpha-linolenic acid respectively. They are both contained in plant products. In animals the linoleic acids are converted into arachidonic acid and docosapentaenoic acid, whereas alpha-linoleic acid is converted into eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Both arachidonic acid (family n-6) and EPA (n-3 family) are the substrate for thromboxane (TXA), prostacyclin (PGI) and leukotriene B (LTB) synthesis. However, arachidonic acid transforms into highly active TXA_2, PGI_2 and LTB_4, whereas EPA is the source of the weaker TXA_3 and LTB_5, as well as the strongly active PGI_3. A low intake of n-6 acids and high intake of n-3 acids results in a dominant anti-atherogenic action of prostacyclin over the proatherogenic effect of thromboxanes and leukotrienes.

It is known that vegetables and fruit are a major source of flavonoids and antioxidant vitamins (C, E, beta--carotene), which inhibit the oxidant modification of lipoproteins. Some vegetables additionally provide a large amount of alpha-linoleic and folic acids. The latter enhances methionine metabolism and reduces the concentration of serum homocysteine. Moreover, vegetables and fruit are a major source of fibre, which plays a significant role in the prevention of atherosclerosis.

In the context of the above facts, it is worth mentioning the study by Rissanen et al., who during a 16-year study including 2682 men showed that cardiovascular mortality decreased along with an increase in the intake of fruit and vegetables [4]. In the case of a daily intake higher than 400 g there was no further decrease in mortality. Therefore, it is recommended that daily intake of fruit and vegetables should not be lower than 400 g.

The DASH study (Dietary Approaches to Stop Hypertension) clearly proved that a high intake of fruit and vegetables along with a decreased consumption of fats, meat and sweets leads to a decrease in blood pressure [5]. Reduced sodium intake reinforces its hypotensive effect. The DASH diet provided considerably higher amounts of potassium, magnesium and calcium than the control diet. The study confirms again the positive effects of a high intake of fruit and vegetables in CVD prevention.

Since 1970 a clear reduction in cardiovascular mortality rates has been observed, which results to a large extent from positive changes in dietary habits. A spectacular example of this relationship is Poland, where between 1991 and 2006 the mortality rates decreased by 42% in men and by 38% in women. Between 1989 and 2004 the intake of animal fats decreased by half and the intake of vegetable fats almost doubled. There was a significant increase in the consumption of fruit and poultry and decrease in red meat intake [6]. However, in Poland the rates of premature mortality are still higher than in the old Member States of the European Union. Therefore, it is necessary to develop actions to prevent CVD in Poland with respect to both the population (population strategy) and high risk groups (individual strategy).

Guidelines

1. Inadequate nutrition is one of the predisposing risk factors for cardiovascular diseases (CVD), whereas improvement of nutritional habits plays a crucial role in primary and secondary CVD prevention.
2. The decrease in mortality due to ischaemic heart disease in Poland after 1991 was associated with reduced intake of animal fat with simultaneous increase in vegetable fat and fruit intake.
3. All patients, irrespective of the degree of CVD risk, should be encouraged to maintain adequate nutrition, whereas patients with increased risk should receive individual, specialist dietary advice adjusted to the risk level. Consultancy should also include patients' family members and life partners.
4. Specialist dietary advice should include adjustment of calorie supply to the patient's energy expenditure, as well as maintenance of the following proportions of individual nutrients:

- fats <30% of the total energy intake, including:
  - saturated fatty acids making up less than 10% of the total energy intake (<7% of the total energy intake in patients with increased cardiovascular risk),
  - trans isomers of unsaturated fatty acids making up less than 1% of the total energy intake,
  - polyunsaturated fatty acids covering 6-10% of the total energy intake with the ratio of acids n-6/n-3 less than 4:1,
  - monounsaturated fatty acids up to 20% of energy intake,
- carbohydrates >55% of the energy intake,
- proteins 15% of the energy intake,
- sodium 2.4 g a day (6 g of salt), with <2 g of sodium in hypertensive patients (5 g of salt),
- antioxidant vitamins and flavonoids – appropriate amount in the diet is achieved with a daily intake of 400 g of fruit and vegetables (meaning the amount of food actually consumed excluding any waste or leftovers).

5. **Dietary ingredients – fats**

fatty acids	main source
saturated	animal products (meat, dairy), some oils (palm oil, coconut oil), cooking fats (stick margarine, lard)
trans	cooking fats, chocolate and confectionary, fast food
monounsaturated	olive oil, rapeseed oil
polyunsaturated n-6	soy oil, sunflower oil, corn oil
polyunsaturated n-3	ALA – rapeseed oil, soy oil EPA/DHA – fatty sea fish, capsules

ALA – alpha-linolenic acid, EPA – eicosapentaenoic acid, DHA – docosahexaenoic acid

Decreased intake of saturated fatty acids and trans fatty acids and replacing them with complex carbohydrates and poly- or monounsaturated fatty acids reduces the concentration of LDL cholesterol and CVD risk.

N-3 polyunsaturated fatty acids contained in fish, such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), reduce triglyceride concentration, arterial pressure and heart rate and have a favourable haemostatic effect. Having fish up to three times a month reduces death risk due to ischaemic heart disease by 11% and due to brain stroke by 13%. However, higher consumption limits the risk even more, so it is recommended to eat fish at least twice a week. In secondary prevention, it is recommended to include in the diet n-3 fatty acids (EPA/DHA) in the form of fish or capsules in a daily dose of 1 g in order to lower the CVD risk, or in a higher dose in patients with concomitant hypertriglyceridaemia. Rapeseed and olive oils are fats of high nutritive value due to the high concentration of monounsaturated fatty acids. They may be used for cold dishes (e.g. in salads), as well as in the thermal treatment of food. Other oils should only be used cold. Margarine with very low concentration of trans isomers of fatty acids (<1%) are preferred as bread spread. Plant stanols and sterols are recommended in individuals with hypercholesterolaemia.

6. **Diet ingredients – proteins.** There is no evidence showing any relation between protein quality and the development of atherosclerosis and cardiovascular risk. However, lean meat and low-fat dairy products are recommended.
7. **Diet ingredients – carbohydrates.** Carbohydrates should make up most of the energy intake. Products with low glycaemic index (<70) should be preferred.
8. **Diet ingredients – fruit and vegetables.** They are a significant source of vitamins, minerals, flavonoids and fibre. Each additional portion of vegetables and fruit reduces the risk of CVD events by 4% and that of a brain stroke by 5%. Increased consumption of vegetables and fruit along with dairy products and reduced salt intake (DASH diet) are more effective than reduced salt intake alone. Recommended vegetable and fruit consumption may lead to reduction in systolic blood pressure by around 4 mmHg and diastolic blood pressure by around 1.5 mmHg. Vegetables and fruit consumption should include at least five portions a day (at least 400 g altogether). Their caloric content (especially in the case of sweet fruit and vegetables) should be taken into account when calculating the energy balance of the body.
9. **Diet ingredients** – vitamins, fibre, minerals:
- Vitamins C and E, as well as carotenoids derived from natural sources, are elements necessary for adequate nutrition, since they reduce the risk of damage of the vascular endothelium due to oxidative stress. Vitamins B, especially B_6 and B_{12}, and folates are necessary to regulate the homocysteine concentration in the blood. However, these vitamins should not be taken in the form of dietary supplements in doses exceeding the daily requirement in primary and secondary CVD prevention.
- Fibre is mostly contained in leguminous plants, whole-grain products, vegetables and fruit – it is an integral element of a balanced diet; high concentration of it reduces the glycaemic index of food. The consumption of whole-grain products three times a day reduces CVD risk by about 25 to 30%; thus, it is recommended that they constitute at least half of the grain products included in the diet.
- Sodium and potassium – decrease in sodium intake and increase in potassium intake reduces arterial blood pressure. Adding salt to meals should be avoided. Preserved and processed products that contain large amounts of salt should be replaced with meals made of fresh products.

10. The most important features of inadequate nutrition:
- large intake of saturated fatty acids, trans isomers of fatty acids and cholesterol (increases serum concentration of LDL cholesterol),
- excessive intake of simple carbohydrates and meals with high glycaemic index (increases the risk of insulin resistance and type 2 diabetes),
- low intake of antioxidative vitamins (vitamins E, C, beta-carotene) and flavonoids (makes the LDL cholesterol more prone to oxidative modification),
- excessive sodium intake (increases the risk of arterial hypertension),
- high calorie intake combined with low level of physical activity – positive energy balance (leads to obesity, particularly abdominal, which increases the risk of metabolic syndrome).

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