DIETARY PATTERNS AND LIFESTYLE OF PATIENTS AFTER MYOCARDIAL INFARCTION

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ABSTRACT

Civilization diseases, including cardiovascular, are major health problems in current modern society. Numerous studies provided sufficient evidence that variety of risk factors are involved in cardiovascular diseases formation. Of the most important is the lifestyle that largely contributes to our health, up to 50 – 60%. Lifestyle includes all modifiable risk factors that together affect the development of these diseases. In our study we searched and evaluated the nutritional parameters and lifestyle of patients hospitalized in Cardiocentre Nitra. In order to obtain the necessary information we chose the questionnaire method. In our survey 194 patients were included, of which 155 were men (79.89%) and 39 (20.11%) women. These patients were hospitalized with acute myocardial infarction diagnosis. The vast majority of patients had overweight and obesity caused by improper eating habits. The high prevalence of overweight, BMI in the range $25 – 30$ kg/m^2, was also confirmed as statistically significant, $p < 0.05$ ($P=0.02$). BMI over 25 kg/m^2 was present in 85% of men and 80% of women. The consumption of selected food commodities with evidence of a positive or negative impact on the emergence of acute myocardial infarction was not statistically significant ($p > 0.05$) when evaluating dietary habits. But we can confirm too frequent consumption of chicken at the expense of other types of meat and relatively frequent consumption of fish (once a week). We recorded the preference of semi-skimmed dairy products, but also high and inappropriate consumption of full-fat dairy products in men and women (37% and 17.8%, respectively). Daily intake of fruits and vegetables was in 85.9% of women and 64.7% of men. Everyday intake of bread and pastries was confirmed by 100% of respondents. Lifestyle was evaluated according to the presence of smoking, excessive alcohol consumption, and physical activity. Up to 60.5% of men and 26.4% of women admitted smoking, while 34.6% of men and 7.5% women ended up with the habit after myocardial infarction. The excessive alcohol consumption was not detected in the study group. Approximately 67% of men and 56% of women carry out an easier walking and moderate physical activity while taking into account their health status.

Keywords: dietary habits; lifestyle; nutrition.

INTRODUCTION

Cardiovascular diseases are one of the major causes of death and sick leave of inhabitants all around the world despite the ever increasing medical expertise and care. The World Health Organization (WHO) defines cardiovascular diseases (CVD) as a group of disorders of the heart and blood vessels that includes coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, and deep vein thrombosis and pulmonary embolism. The most common acute clinical manifestations of CVD are myocardial infarction and stroke (**Michas, Micha, Zampelas, 2014**). In the European Union, in 2000, 115 people per 100000 died due to coronary heart disease. By 2010, this figure had dropped to 76 per 100000. However, despite this progress, CVD still represents the major cause of adult morbidity and mortality in most developed and many developing countries (**Murray et al., 2012**). At current death trend in the world, the number of cardiovascular diseases in 2020 may increase up to 25 million (**Riečanský, 2009**). Cardiovascular diseases are

disproportionately high price that mankind pays for an unhealthy lifestyle. It includes unbalanced caloric intake and expenditure. This is connected with the increase in obesity during childhood (**Riečanský, 2009**). Childhood obesity has been identified as one of the most important risk factors of developing cardiovascular diseases. Many of overweight or obese children will become obese adults with enhanced risk for cardiovascular diseases. Childhood obesity is often accompanied by serious consequences such as dyslipidemia, hypertension, diabetes, pro-inflammatory state and non-alcoholic fatty liver disease (**Sypniewska, 2015**). Since a large share on these disorders development have modifiable risk factors, mainly related to lifestyle, the effort of all professionals in the medical circles as well as among nutritionists about their reversal is therefore understandable. The aim is to show and teach the general public a healthier lifestyle. Hypertension, high LDL cholesterol and triglyceride concentrations, insulin resistance, inflammation and disturbances in adipocytokines secretion are associated with endothelial dysfunction which precedes the

development of atherosclerosis **(Sypniewska, 2015)**. Atherosclerosis is a chronic inflammation of the arteries, which develops over decades in response to the biologic effects of underlying risk factors **(Nabel and Beaunwald, 2012)**, a multi-factorial disease with both genetic and environmental etiology. The primary modifiable risk factors are dyslipidemia, hypertension and smoking. Nutritional habits, especially dietary fat are implicated in the process of atherosclerosis **(Perk et al., 2012)**. Atherosclerosis's deceit lies in the fact that etiopathogenetic process occurs in the blood vessels for years confidently and without pain, and the first manifestation of the disease may mean the death of man. Today it is clear that atherosclerosis etiology is multifactorial. It is considered to be an inflammatory and immunomodulatory response taking place in the vessel wall **(Balagopal, 2011)**. Risk factors of CVD are influenced by both genetic and environmental factors. Although it is difficult to alter genetic factors, modifiable environmental factors such as smoking or dietary patterns could be targeted in preventive interventions aimed at lowering these risk factors **(Mirmiran et al., 2009)**.

MATERIAL AND METHODOLOGY

We chose the questionnaire method to obtain information on dietary habits and lifestyle of people after myocardial infarction. Of the 238 hospitalized patients, 194 patients were diagnosed acute myocardial infarction, of which 155 were men and 39 women. The collection of data was carried out by a questionnaire method through guided conversation. The survey covered lying patients who were hospitalized in Cardiocentre Nitra. The questionnaire was anonymous, its completion was voluntary with only one response to be circled for each question. Data collection was carried out simultaneously with somatometric and biochemical examination of the respondents. Recorded eating habits and lifestyle of respondents were compared with the current recommendations of nutritional criteria for patients with cardiovascular disease.

RESULTS AND DISCUSSION

The number of hospitalized patients with acute myocardial infarction was 194, of which 155 were men and 39 women. Average age of patients was 59.2 for men and 64.4 years for women. From the social factors we positively consider the fact that up to 86% of patients lived with their family in the same household. More than half of the patients were retired, while their highest level of education was mainly secondary education with graduation. In the context of a positive family history it is an interesting fact that up to 51.5% of men indicated cardiovascular diseases among first-degree relatives. This finding is even more important, whereas up to 88.9% of men reported that the disease occurred among male relatives. Among women, the positive family history was confirmed in 22%.

We calculated BMI from data on height and weight of respondents. The results are shown in Figure 1. Our survey confirms high prevalence of overweight and obesity among people with cardiovascular disease. We also confirmed a statistically significant overweight occurrence (BMI in the range $25 - 30$ kg/m^2), $p <0.05$ ($p =0.02$), in patients with acute myocardial infarction. Overweight and obesity are considered to be a significant risk factor influencing creation of these diseases and their presence often worsens their course. Obese patients develop more CVD risk factors than normal weight controls. BMI $\geq$40 kg/m^2 exhibits increased prevalence of type 2 diabetes mellitus and hypertension. Dyslipidaemia peaked around BMI 35 to <37.5 kg/m^2 and CVD at BMI 37.5 to <40 kg/m^2 in men and BMI $\geq$40 kg/m^2 in women. A 10% weight loss reduced the OR for type 2 DM by 30% and CVD by 20%, while 10% weight gain increased type 2 DM risk by more than 35% and CVD by 20% **(McQuigg et al., 2008)**.

High BMI is associated with the development of cardiovascular risk factors such as hypertension, dyslipidemia, insulin resistance, and diabetes mellitus **(Wormser et al., 2011)**. BMI alone seems to present a U- or a J-shaped association with clinical outcomes and
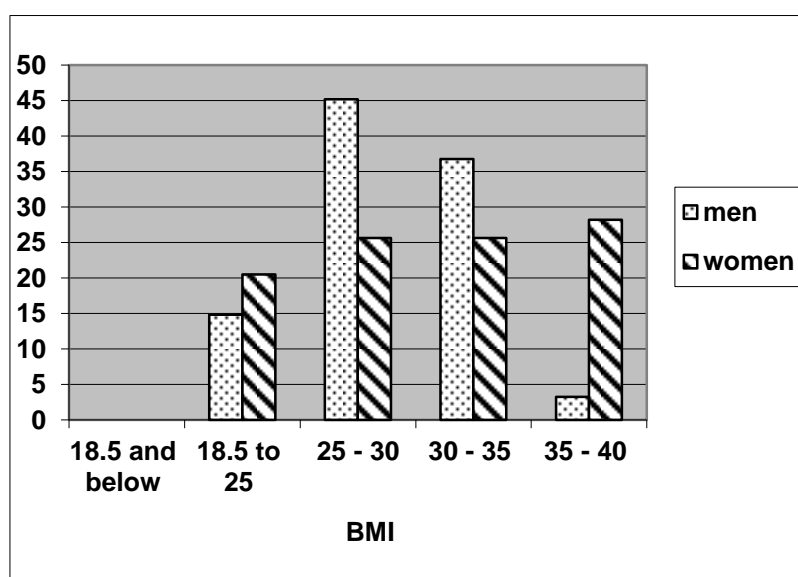

Figure 1 BMI of patients with myocardial infarction in %.

mortality **(Calle et al., 1999)**. Such an inverse relationship fuels a controversy in the literature, named the 'obesity paradox', which associates better survival and fewer CVD events in patients with mildly elevated BMI afflicted with chronic diseases **(Romero-Corral et al., 2007)**.

Dietary habits

Meat and meat products

Meat and meat products are often associated with an increased risk of cardiovascular diseases because they increase the total intake of fat, especially saturated. We consume 30% of total fat daily intake in form of the meat and meat products. The fat content depends on the type of meat **(Sergyi et al., 2011)**. Polyunsaturated fatty acids are mostly represented in the lean meat. All previous findings confirm that the saturated fatty acids increase the levels of total cholesterol and LDL cholesterol levels in the blood and vice versa, unsaturated fatty acids reduce them. Atherogenic potential of saturated fatty acids is significantly higher (about twice that high) than anti-atherogenic effect of unsaturated fatty acids **(Bada, 2001)**. The notion that meat consumption is associated with CVD risk has been reflected in the dietary guidelines that emphasize selecting lean meats. The association between meat consumption and the incidence of chronic disease and mortality has been evaluated in hundreds of observational epidemiologic studies over the past few decades. Despite this wealth of data, it is unclear whether higher intakes of specific meat groups (e.g., total, unprocessed or processed red meat) or individual meats (e.g., beef or pork) independently contribute to disease risk, or whether they are part of a broader diet and lifestyle pattern that is ultimately responsible for the disease **(Micha et al., 2013)**. Several individual studies and meta-analysis focusing on the relationship between dietary meat and CVD and total mortality have been carried out. These analyses support an association between red meat consumption and total mortality and CVD-related deaths, as well as the risk for CVD, ischemic stroke and type 2 DM. However, this association was driven in many cases by the consumption of processed meats rather than by that of fresh red meat **(Brown and Hazen, 2014)**. Therefore, some investigators propose that the preservatives used in food processing may be driving the deleterious effects. In fact, it has been suggested that the deleterious effects may relate to other ingredients, such as sodium, nitrites, heme iron, or L-carnitine **(Brown and Hazen, 2014)**. **Pan et al. (2012)** by combining data from the Health Professionals Follow-up Study and from the Nurses' Health Study concluded that both red and processed meat consumption is associated with an increased risk of CVD mortality. However, a recent investigation in the EPIC cohort, including 448,568 participants in 10 European countries, provided more evidence that unprocessed red meat intake was not significantly associated with CVD mortality; conversely, processed meat was associated with 30% higher CVD **(Rohrmann et al., 2013)**. Preferred types of meats between hospitalized patients are shown in Figure 2.

The consumption of poultry meat was the most common among the patients, however the consumption was not statistically significant, $p > 0.05$ ($p = 0.358$).

Fish

There is strong scientific evidence in many studies that n-3 fatty acids derived from fish or fish oil significantly reduce the effect of risk factors of heart diseases. Omega-3 polyunsaturated fatty acids have been observed to decrease the production of pro-inflammatory eicosanoids and cytokines and thus, fish consumption is believed to protect from diseases involving inflammatory processes **(Wall et al., 2010)**. Fish consumption and omega-3 polyunsaturated fatty acids intake have also been suggested to slow the progression of atherosclerosis **(Massaro et al., 2008)** and to reduce arterial stiffness **(Hall, 2009)**. Optimum preventative dose for the average consumer is considered to be 40 – 60 g of fish meat twice a week **(Kerestéš et al., 2011)**. However, this fact has not been confirmed by our research, whereas 87% of women and 77.5% of men indicate the frequency of fish consumption at least once a week, mainly in a canned form. It can also be affected by smaller portions of fish, despite the fact that they are consumed relatively quite frequently. Fish consumption in the frequency of once a week is not statistically significant in both men and women, $p > 0.05$ ($p = 0.17$).

Milk and milk products

Dairy products, in their natural form, contain relatively high fat and high saturated fat and cholesterol. Therefore, after occupying a prominent position among recommended
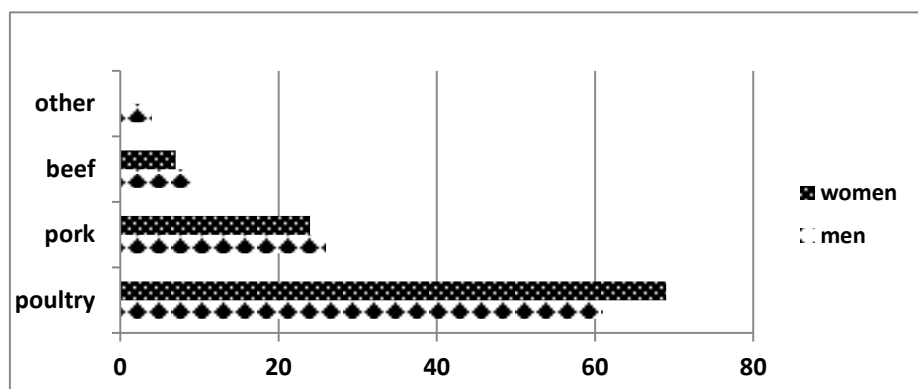

Figure 2 The preference of each types of meat in %.

foods for decades, especially for children and adolescents, this food group also suffered from the consequences of the fight against saturated fat and cholesterol. Some of the fats previously deemed as good might not be so healthy (ie, omega-6 polyunsaturated fats) and, conversely, that some of the bad fats might be healthy (ie, saturated fats from dairy foods) (**Lawrence, 2013**). Milk and dairy products are not only a source of energy and high quality proteins, but also an important source of trace elements in our diet. It has been also proven that they have beneficial effect on lowering blood pressure and increasing HDL cholesterol, which is associated with a reduced risk of cardiovascular diseases (**German, 2009**). Milk fat has a high content of saturated fatty acids (60%) and it is known that some of the saturated fatty acids may increase serum cholesterol (**Riečanský, 2009**). A systematic literature review of observational studies on the relationship between dairy fat and high-fat dairy foods, obesity, and cardiometabolic disease was conducted by **Kratzet et al. (2013)**. Results suggest that dairy fat or high-fat dairy foods do not contribute to obesity or cardiometabolic risk, and imply that high-fat dairy consumption within typical dietary patterns is inversely associated with obesity risk. **O´Sullivan et al. (2013)** found that high intakes of dairy products were not associated with a significantly increased risk of mortality compared with low intakes. Some authors use the current evidence to recommend even an increase of dairy products in order to achieve a more complete and balanced nutrition. Fulfilling the recommended amounts, ie, 3 servings daily for individuals ≥ 9 years, helps to accomplish current overall nutrient intakes and recommendations. Moreover, consuming more than 3 servings of dairy per day leads to better nutrient status and improved bone health and is associated with lower blood pressure and a reduced risk of CVD and type 2 DM (**Rice, Quann, Miller, 2013**). It can be concluded that consumption of dairy products is either protective against CVD or has no adverse effects. In our research, two thirds of patients reported that they consume milk and dairy products every day and the remaining one-third of them indulges that at least two to four times a week (Figure 3).

However, only 16.2% of men and 26.1% of women choose low fat dairy products deliberately. It is highly inappropriate that there is up to 37% preference of full fat dairy products among men and 17.8% among women. Milk and milk products consumption was not statistically significant ($p > 0.05$). The most popular dairy products are yoghurt and cheese.

Fruits and vegetables

Fruits and vegetables have always been considered health-promoting foods. This is due to the association of a higher intake of these products with a reduced risk of developing chronic illnesses, including CVD (**Berciano and Ordovás, 2014**). Therefore, current dietary guidelines and WHO recommend increasing fruit and vegetables intake to ≥5 servings per day. This recommendation is based on the belief that eating fruit and vegetables may reduce cardiovascular risk through a combination of beneficial micronutrients, antioxidants, phytochemicals and fiber in these foods. It has been found that those with higher carotene intake had about 46% lower risk of dying from cardiovascular diseases than those who had low or no intake of these active substances (**Liu et al., 2000**). A recent report based on the Health Survey for England studied the eating habits of 65226 people. The report found that eating ≥7 portions of fruit and vegetables daily reduced the specific risks of death by cancer and heart disease by 25% and 31% respectively. This report also showed that vegetables have significantly higher health benefits than fruit (**Oyebode et al., 2014**). **Mirmiran et al. (2009)** found that consumption of fruit and vegetables was inversely related to total cholesterol and LDL cholesterol concentrations, independent of age, sex, smoking status, exercise, and educational attainment. According to the Italian study, a diet rich in bulb vegetables can have a beneficial influence on the risk of acute myocardial infarction occurence. This is explained by the effect of
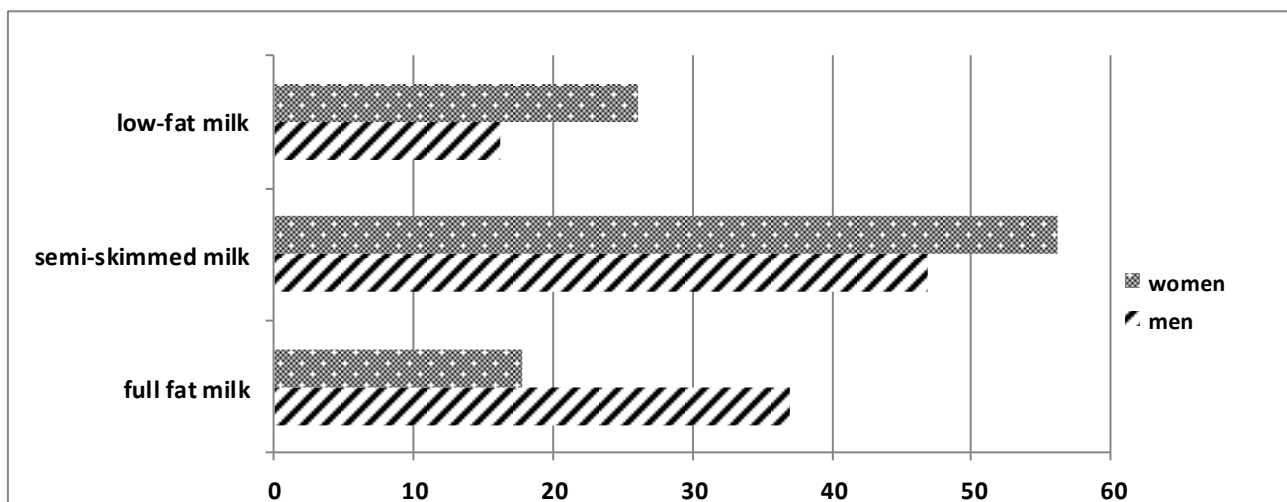

Figure 3 The preference of each types of milk and milk products in %.

bioactive ingredients such as phenol and organosulphate compounds which have antithrombotic and protective effects on the endothelium (**Galeone el al., 2009**). Despite daily intake of fruits and vegetables, which was declared by 85.9% of women and 64.7% of men among hospitalized patients in our survey, these people were diagnosed by myocardial infarction. This may be caused by an insufficient amount of eaten fruit and vegetables, despite their introduction into the daily diet. The consumption of fruit and vegetables was statistically insignificant in the study group (p >0.05). .According to the recent findings it is recommended to eat up to 8 servings of fruit and vegetables to the people with cardiovascular risk, while one serving is considered to be 80 g. This corresponds to a small banana, medium sized apple, pear, orange or medium-sized carrot (**Marmot, 2011**). Among the most preferred fruit in our survey were apples, pears and bananas. Citrus and exotic fruits were less consumed. The most preferred kinds of vegetables were leafy and root vegetables.

Bread and pastry

Researchers from the University of Barcelona found out that eating bread on every day basis is a good way how to prevent the development of cardiovascular diseases. Its consumption is associated with better lipid profile. This means that the person has lower levels of bad LDL cholesterol and higher levels of good HDL cholesterol. In a sample of older volunteers with high risk of cardiovascular diseases occurence, the results showed that those who ate bread daily had healthier lipid profile and lower insulin levels than those who did not consume it daily. Metabolite which caused change in the lipid profile was also determined. The content of this metabolite was higher in those who ate wheat bread (**Nordqvist, 2012**).
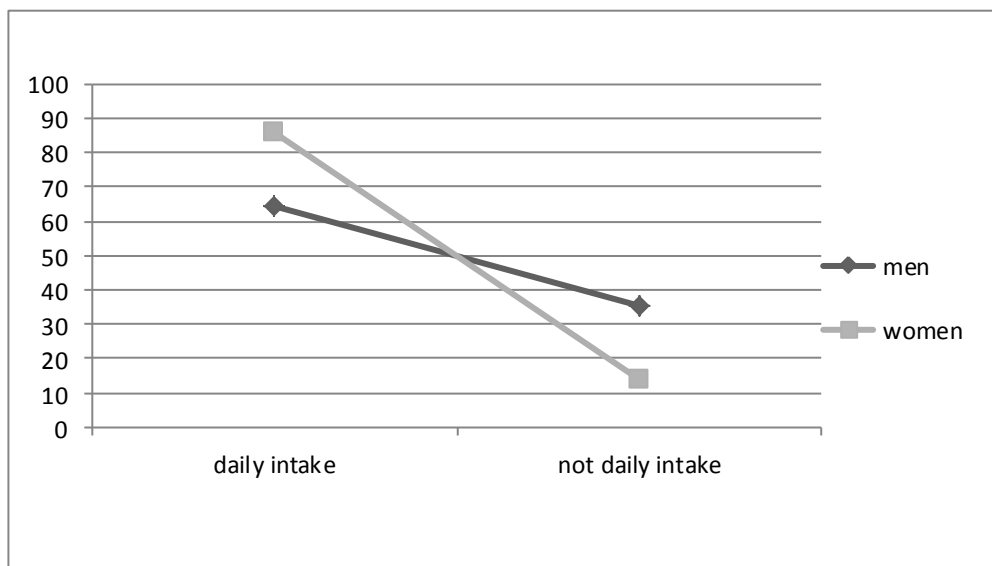

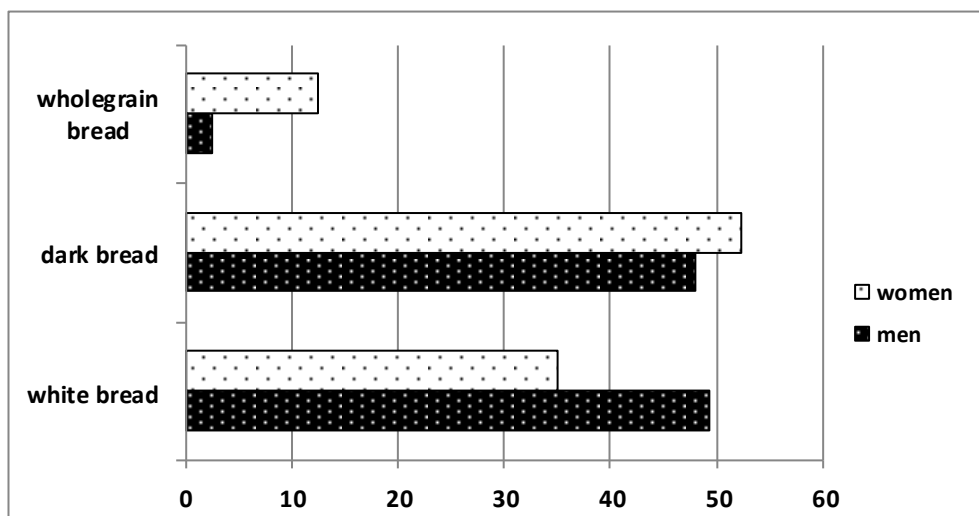**Figure 4** The consumption of fruit and vegetables in %.

Figure 5 The preference of each types of bread and pastry in %.

American scientists highlight the high proportion of salt, which is found in some types of bread. Too much sodium in the diet increases the risk of high blood pressure and it is one of the major risk factors of heart diseases (**Paddock, 2012**). From the answers of our respondentswe found out that bread and pastries are daily consumed by 100% of the respondents, while white bread is preferred by 49.4% of men and 35.1% of women. Dark breads are preferred by 48.1% of men and 52.45% of women. The rest of the respondents are consuming cereal kinds of bread (2.5% of men, 12.45% of women).

Lifestyle
Smoking

Smoking, both active and passive, is an established vascular risk factor and one of the most serious global health problems and its harm to human health is of no doubt. It clearly leads to the progression of atherosclerosis. This risk increases with the number of cigarettes smoked per day (**Jurkovičová, 2005**). Severity of disease and mortality sharply increases from 20 cigarettes per day. The average life-shortening of smokers regardless of the type and method of smoking in men is more than 13 years and in women it represents 14.5 years (**Rosamond et al., 2007**). The results of our research show that up to 60.5% of men smoked in the past and 34.6% of men stopped smoking due to the disease. Smoking among women in the past was confirmed by 26.4%, while 7.5% gave up this habit due to hospitalization. In the number of cigarettes smoked per day, up to 58.7% of all smokers reported under the category of 10 to 20 cigarettes per day. More than 20 cigarettes per day are lighted by 24% of smokers (mostly men).

Cigarette smoking exaggerates the link between dyslipidaemia and CVD; total cholesterol, triglycerides and low-density lipoprotein levels are elevated, whereas HDL cholesterol levels are decreased in smokers, possibly due to changes in lipid transport enzymes (**Chelland et al., 2008**). Of note, abstinence from smoking was associated with increases in HDL cholesterol, total HDL and large HDL particles despite weight gain, especially in women (**Gepner et al., 2011**).

Alcohol consumption

A lot of attention is given to the relation between alcohol and cardiovascular diseases. Epidemiological studies have shown that persons consuming small amounts of alcohol have a lower death rate from cardiovascular diseases, in particular acute myocardial infarction, compared with those who drink much or do not drink at all. Overall, the evidence suggests a J-shaped association between alcohol consumption and coronary heart diseases risks, in which a moderate alcohol intake (eg, 2 glasses of wine per day) causes a significant increase in HDL levels and a reduction of coronary heart diseases risk, while the disease risk for a heavy drinker would be twice as high (**Eilat-Adar et al., 2013**). Recent reviews suggest that beer and especially red wine (**O´Keefe et al., 2014; Chiva-Blanch et al., 2013**) are associated with greater reductions in CVD risk due to their high polyphenol content. A recent meta-analysis found out a reduction of the overall mortality risk in men of 17% and women of 18% (**Di Castelnuovo, 2006**). Described effects are not attributable solely to the alcohol but to the other non-alcoholic substances in wine (especially red wine) and some types of beer (mainly black beer). These include polyphenols (catechin, quercetin, resveratrol) which improve endothelial function and increase HDL cholesterol (**Xin et al., 2010**). In our survey, the most preferred was the consumption of beer and wine among men and wine and liqueurs among women. The regular use of alcohol (at least once a week) was reported by 55.35% of men, while drinking at least 1 litre of alcoholic beverage per week and 33.4% of women consume 0.2 to 0.5 litres of alcoholic beverage per week.

Physical activity and inactivity

Concomitant with the rise in sedentarism has been an epidemic of chronic disease and mortality. Epidemiological data strongly suggest that the lack of physical activity significantly contributes to the increasing incidence of chronic diseases, especially cardiovascular. Physical inactivity increases the risk of disease to 1.5 times (**World Health Report, 2002**). The best type of exercise is endurance physical activity (walking, running, swimming) with alternating by resistance training. Regular physical activity has wide beneficial effects (**Perk et al., 2006**). In relation to the physical activity, we did not focus only on the current physical activity, but especially on sport activities in the past that could have had an impact on cardiovascular disease formation. Current physical activity of our respondents is very limited due to the bad health condition. In the past, 53% of men and 3% of women practised active sports, 37% of men and 70% women practised recreational sports. 27% of women and 10% of men said they had had no physical activity. Currently 67% of men and 56% of women practise easier walking and moderate physical activity. The health benefits and cardioprotective effects of physical activity are irrefutable. Reduced mortality and improvements in metabolic function, body composition, hemodynamics, musculoskeletal, and psychologic functioning are a few of the myriad benefits of increased physical activity. Even small increments in physical activity via reductions in sedentary behavior are beneficial, given that each is an independent risk factor for CVD (**Archer, Blair, 2011**).

CONCLUSION

Based on our research, we confirmed that the accumulation of various risk factors, particularly overweight and obesity, smoking, or poor composition of dietaryhabits, including physical inactivity has resulted in the development of cardiovascular diseases, which resulted in myocardial infarction. Based on research results we suggest to modify the diet of hospitalized patients to such an extent that approaches the most nutritious food. That meansthe regulation of energy intake according to the physical activity (control of body weight and its maintaining in a range of BMI between 18.5 to 25 kg/m^2. It is necessary to increase the consumption of fish and partially limit the meat consumption, and toincorporate other types of meats (beef and veal, turkey) into the diet more often, instead of chicken meat. When consuming dairy products it is necessary to draw attention to the low-fat products. Increased consumption of fresh fruit and vegetables according to the proposed standards is also

desirable. Within lifestyle it is indispensable to appeal to stop smoking and to introduce physical activity, of course, to the extent that is permitted bythe health of the patient. We can leave moderate red wine consumption within the recommended values, but certainly not higher. In order to supplement information on healthy lifestyle, regardless of the incomplexity of our research it is recommended to choosethe vegetable oils and margarines enriched by mono- and polyunsaturated fatty acids instead of hydrogenated margarines and butter, while limiting foods with high salt content, preparing meals low in salt, or without salt and limiting sugary drinks and foods.

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