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Specific Inadequate Nutrition and Acute Myocardial Infarction in NIS, Serbia

Zorana Deljanin

Institute of Public Health Nis, Center for Disease Control and Prevention, University of Nis, Faculty of Medicine

Abstract

Introduction/Aim. Epidemiological investigation of risk factors for acute myocardial infarction (AMI) does not work is to primarily find new risk factors, as they have already identified a few hundred, but to investigate the representation in that area, in order to take appropriate preventive measures that could stop the further growth of diseased and dying from this disease. The aim of this study was to investigate the unhealthy nutrition as risk factor for acute myocardial infarction in examined population. Methods. A case-control study with 155 patients with a first myocardial infarction and 155 controls, matched with respect to sex and age (± 2 years) from the city of Niš, was used. Data was obtained throught the epidemiological questionnaire. Results. Number of servings (p=0,009), eating pieces of bread, white bread, consuming the meat and meat products more than 3 times per week (p for trend for all <0,001), eating fried foods, sweets and higher intake of eggs, as roasted as boiled was significantly higher in patients (p<0,001). Regular intake of food (p<0,001), eating dairy products (p<0,001), fresh fruit (p<0,001), and fresh vegetables (p<0,001) is significantly more often in healthy subjects. The use of fat was even in childhood in both groups (72,50% respectively 71,80%), but before disease, it was significantly more often in patients (p<0,001) as well as the use of oil (p<0,001). In the univariate model, as the strongest independent risk factor was the irregular nutrition (OR 14,217, p<0,001), used meat products more than 3 times a week (OR 9,525, p<0,001) and fried foods (OR 8,868, p<0,001). As a protective factor, frequent use of fresh vegetables (OR 0,333, p<0,001) and fresh fruit (OR 0,511, p=0,004). In the multivariate model as the strongest risk factor was the irregular nutrition (OR 47,839, p<0,001) and the use of the meat more than 3 times per week (OR 38,925, p<0,001). Conclusion. These findings are very important for further epidemiological research and should improve preventive strategies of this serious disorder in different geografical areas.

Key words: unhealthy nutrition; acute myocardial infarction; case-control study.

Introduction

Myocardial infarction is of major socio-medical importance, particularly in developing countries, due to high mortality and disability, as well as large financial resources allocated for prevention, treatment and rehabilitation. Epidemiological investigation of risk factors for acute myocardial infarction (AMI) does not work is to primarily find new risk factors, as they have already identified a few hundred, but to investigate the representation in that area, in order to take appropriate preventive measures that could stop the further growth of diseased and dying from this disease.

Etiopathogenesis of ischemic heart disease (IHD) and therefore myocardial infarct tion (MI) is not yet been fully elucidated and that's why we talking about risk factors that predispose certain individuals / populations for developing these disease, with greater frequency, than the population that is not exposed to the same risk factors [(1)].

One of the most important modifiable risk factors for cardiovascular disease (CVD) and AMI is diet. Risk factors recognized as elements of inadequate food intake in both qualitative and quantitative terms [(2,3,4)]. Some changes in diet can help prevent this disease (primary prevention). Exist widespread consensus that very important action is needed to improve population diets to reduce the preventable burden of morbidity and

mortality from AMI [2,3,4].

Population dietary goals for the prevention include limiting intake of sodium, solid fats and added sugars as well as increasing intakes of fruit, vegetables, dietary fibre and whole grains. Intake of poultry, fish, legumes, nontropical vegetable oils and nuts are dietary pattern. In addition is shown limited or moderate alcohol intake, maintenance of healthy body weight and participation in physical activity too [3,5,6].

General conclusion is that diet which increases the risk of IBS are rich in fat, saturated fat, cholesterol, salinity and free sugars (fatty types of meat, processed meat, full- fat milk and dairy products, sweets and visible fat used for cooking or as a spread and dressings), and low in complex carbohydrates, fruits and vegetables [3, 4, 5, 6, 7,8,9,10].

Nutrition is irregular and is considered a risk for AMI if the energy that comes from total fat exceed 30% of total energy intake, energy from saturated and trans fatty acids is higher than 10% of total energy intake, cholesterol intake greater than 300 milligrams per day, daily intake of dietary fiber below 30-40 grams, salt intake above 8 grams per day, alcohol consumption greater than 30 milliliters per day, total carbohydrate intake below 55% total energy intake, sugar intake higher than 10% of total energy intake, intake of alpha-linolenic acid below 2 grams per day and polyunsaturated fatty acids of long chain n- 3 group (the fish) less than 200 mg per day [6,11].

In Serbia in the total population, dietary energy consumption during the 2006. was 2,748 and 2007. year was 2,710 kCal per person per day. Comparing with other countries in Europe, for Serbia we can say that is the lower caloric value of food intake. Vegetable consumption in Serbia was 2006. - 339 and 2007. year - 282 g per person per day. That the vegetables are concerned, in Serbia in comparison to other countries of Europe, is lower consumption [3]. Fruit consumption in Serbia was 2006.-274 and 2007. year-296 g per person per day, and it is medium in comparation with other countries in Europe [3]. Total fat consumption in Serbia, 2005-07, was 119 g and % of total energy available from fat was 39%, representing Serbia as one of the leading at a higher amount of fat in food intake [3].

The report of the World Health Organization (WHO) estimated that about 4% of all diseases (under 30% belong to IBS), in developed countries are caused by reduced consumption of fruits and vegetables (less than 600 g / day). They recommends that the intake of fruits and vegetables should be at least 400 g / day average (20 out of 25 countries in Europe adults consume less than 400 g / day) as well as use of fats in the diet should be less than 30% of the total energy input of food (in 21 of 26 countries is much higher) [12,13].

Total worldwide burden of disease could be reduced by 1.8% if individual fruit and vegetable consumption increasing to up to 600 g per day [13].

Franco HO et al. have published their own and other researchers on the effects of consuming certain foods in reducing CVD, for example consuming fish (114 g), 4 times a week reduces CVD by 14 % (Whelton et al), 100 g. brown chocolate consumed per day reduces systolic blood pressure by 5.1 mmHg, diastolic blood pressure by 1.8 mmHg and the occurence of cardiovascular disease by 21 % (14 – 27 %) (Taubert et al), fruit and vegetables in quantities of 400 grams a day reduces 4.0 mmHg systolic and 1.5 mmHg diastolic blood pressure (John et al), and only in the quantity of almonds 68 grams a day reduces the risk of CVD by 12.5 % (Jenkins et al, Sabate et al. From vegetables, garlic consumed 2.7 grams a day reduces the risk of CVD by 25 % (from 21.7 to 27.7 %) (Ackermann et al) [14].

The aim of this study was to investigate the factor of inadequate food consumption in the population of the city of Nis, which leads to the development of acute myocardial infarction, which would have a contribution in determining the Program of prevention of acute myocardial infarction in the study population based on the results of the study.

Materials and methods

The paper used descriptive and analytical epidemiological method. The survey was conducted by type case-control study.

The study included 310 people, aged 30-65 years, from the city of Nis. Metched was performed by sex and age. The study group (155 people) were patients with a diagnosis of AMI is set to the Clinical Center in Nis and the Institute for prevention, treatment and rehabilitation of cardiac and rheumatic patients "Radon" in Niska Banja in the period from 2009 to 2013, and only the affected persons from defined populations of Nis. In forming the group of patients respected the following principles: the criteria on which is based the diagnosis of disease are pre-determined

and clearly defined in the study, the new cases of AIM. The diagnosis was not older than two years. Members of the control group (155 healthy controls) were chosen depending on the choice of groups of patients, along with them - people who are not suffering from AIM, people outside health institutions, randomly selected members of the general, and that is the appropriate population of City of Nis and neighbors of patients who correspond by sex and age patients (±2years). Data were obtained from the epidemiological questionnaire. All the instruments are applied in the form of interviews conducted by the author on the paper. The survey was conducted from 2009 to 2014. All data from the questionnaires are encrypted, the database was created and carried out computer processing of the relevant epidemiological and statistical techniques.

Data are presented in the form of absolute and relative numbers. When comparing the values of the two samples was done by t-test. A comparison of the frequency characteristics of the two groups was performed by chi-square test (when the frequency is less than 5). For testing potencial risk factors for AMI was used logistic regression analysis.

Results

Was done individually metching patients and of the control group by sex and age (± 2 years). T-test was found (p = 0.228), with no statistically significant differences in age between the patients and the control group and thus met the criteria for such metching. By gender, in both groups was 110 males (71.00%) and 45 women (29,00) (Table 1).

Subjects with incomplete primary education (p = 0,005), with primary school (p < 0,001) and secondary school (p = 0,041) were significantly more common in the patient group, and respondents with higher education and high school (p < 0,001) were significantly more common in healthy subjects. The patients were statistically significantly more frequently current smokers compared to healthy subjects (p < 0,001). Healthy subjects were significantly more likely to try to quit smoking (p < 0,001). Systolic and diastolic blood pressure were significantly higher in patients with myocardial infarction. BMI, cholesterol and triglicerids were significantly higher in patients with myocardial infarction (Table 1).

Table 1.Demographic and clinical characteristics of the patients

Parameter		Case	Control	p
Age		56,10±7,82	55,04±7,60	0,228†
Sex	M/F	110/45	110/45	1,000‡
	no school	1 (0,60)	0	1,000‡
	incomplete primary sch	18 (11,60)	5 (3,20)	0,005‡
Degree	primary school	28 (18,10)	7 (4,50)	<0,001‡
	secondary school	88 (56,80)	70 (45,20)	0,041‡
	higher school	7 (4,50)	31 (20,00)	<0,001‡
	high school	13 (8,40)	42 (27,10)	<0,001‡
	no	48 (31,00)	33 (21,30)	<0,001‡
Smoking	ex smoker	22 (14,20)	57 (36,80)	
	current smoker	85 (54,80)	65 (41,90)	
Have you tried to stop	yes	66 (42,60)	108 (69,70)	<0,001‡
smoking	no	41 (26,50)	14 (9,00)	
	no smoker	48 (31,00)	33 (21,309	
Consuming alcohol	do not drink	63 (40,60)	69 (44,50)	0,512‡
	at times	72 (46,50)	72 (46,50)	
	daily	20 (12,90)	14 (9,00)	
	yes	130 (83,90)	141 (91,00)	0,100‡
Consuming coffee	no	18 (11,609	12 (7,70)	
	at times	7 (4,50)	2 (1,30)	
Systolic TA – now		133,43±23,86	127,19±12,35	0,004†
Diastolic TA – now		82,66±13,79	79,97±8,23	0,038†
Sys TA–before AMI		154,61±36,02	142,71±22,04	0,001†
Dia TA–before AMI		106,32±86,02	91,11±14,72	0,031†
Before AMI - Ht		76 (49,00)	107 (69,00)	0,001‡

Regular treatment and control of Ht	yes	48 (31,00)	31 (20,00)	0,442‡
	no	32 (20,60)	27 (17,40)	
Body weight		81,09±10,43	79,40±11,57	0,178†
BMI		26,91±2,85	25,69±2,91	<0,001†
Cholesterol		6,32±1,24	5,50±0,90	<0,001†
Triglycerides		2,67±0,92	1,88±0,61	<0,001†

† - t test, ‡ chi-square test, data presented aritmetic mean ± standard deviation, frequency (%)

Number of servings and the number of pieces of bread was significantly higher in myocardial infarction patients (p = 0,009, respectively p < 0,001). Regular intake of food is significantly more often in healthy subjects (p < 0,001). The patients statistically more frequently eat white bread and consume the meat more than 3 times per week (p < 0,001). In the group of patients, they significantly more eat fried foods, then cured meat is eaten more than three times a week as like as sweets (p < 0,001), and significantly less likely to eat dairy products, fresh fruit and fresh vegetables (p < 0,001). Number of fried eggs consumption was higher in the group of patients (p < 0,001). The use of fat was even in childhood in both groups (72,50% respectively 71,80%). Before disease, fat was used 22.80% in patients and 5.40% in the control group. It was found that there is a statistically difference in the frequency of the use of fat between two groups (p < 0,001). The use of oil is significantly higher in patients than in the control group (p < 0,001). Added salt in food was equally in both groups in childhood (p = 0,753) and before disease (p = 0,083) (table 2).

Table 2. The characteristics of food in relation to the occurrence of acute myocardial infarction

Parameters nutrition		**Case**	**Control**	**p**
Number of meals		2,83±1.089	3,00±0,77	0,009†
Regularly meals		43 (27,70)	131 (84,5)	<0,001‡
	breakfast	14 (9,0)	13 (8,4)	0,534‡
The most abundant meal	lunch	128 (82,6)	135 (87,1)	
	dinner	13 (8,40)	7 (4,50)	
Number of pieces of bread		9,90±4,56	4,68±2,17	<0,001†
	white	143(92,30)	107 (69,0)	<0,001‡
Type of bread used in nutrition	semiwhite	9 (5,80)	34 (21,90)	
	black	0	8 (5,20)	
	rye	3 (1,90)	6 (3,90)	
	never	0	9 (5,80)	<0,001‡
	1-3 times a week	9 (5,80)	38 (24,50)	
Frequent consumption of meat	1-3 times p month	0	10 (6,50)	
	> 3 times a week	142 (63,2)	98 (63,20)	
	pork	133(85,80)	82 (56,20)	<0,001‡
Type of meat	chicken	15 (9,70)	34 (23,30)	
	veal	3 (1,90)	12 (8,20)	
	beef	4 (2,60)	18 (12,30)	

	fried	114(73,50)	37 (25,30)	<0,001‡
	roast	9 (5,80)	4 (2,70)	
Method of cooking	boiled	20 (12,90)	97 (66,40)	
	boiled on water	0	5 (3,40)	
	BBQ	12 (7,70)	3 (2,10)	
	never	6 (3,90)	18 (11,60)	<0,001‡
	1-3 times a week	19 (12,30)	71 (45,80)	
Frequent consumption of meat products	1-3 times p month	3 (1,90)	16 (10,30)	
	> 3 times a week	127 (81,9)	50 (32,30)	
Number of fried eggs		5,36±3,31	2,92±2,18	<0,001†
Number of eggs		2,74±2,15	0,85±1,10	<0,001†
	never	0	17 (11,00)	<0,001#
Consumption of dairy products	rarely	43 (27,70)	66 (42,60	
	often	95 (61,30)	89 (57,40)	
	never	0	4 (2,60)	<0,001‡
Consumption of fresh fruit	rarely	77 (49,70)	48 (31,00)	
	often	78 (50,30)	103 (66,5)	
	rarely	55 (35,50)	24 (15,50)	<0,001‡
Consumption of fresh vegetable	often	100 (64,50)	131 (84,50)	
	never	27 (17,40)	3 (1,30)	<0,001‡
Consumption of candy	rarely	72 (46,50)	106 (68,4)	
	often	56 (36,10)	47 (30,30)	
	never	7(4,70)	30(20,10)	<0,001‡
Used fat in meals	in childhood	108(72,50)	107(71,80)	
	before AMI	34(22,80)	8(5,40)	
Used oil in meals	never	18(54,50)	42(87,50)	<0,001‡
	before AMI	15(45,40)	6(12,50)	
	never	78(64,50)	106(89,10)	<0,001‡
Mixed fat and oil	in childhood	4(3,30)	5(4,20)	
	before AMI	39(32,20)	8(6,70)	
Added salt in food	in childhood	84(57,90)	87(56,10)	0,753‡
	before AMI	88(60,30)	78(50,30)	0,083v

† - t test, ‡ Chi-square test , # Fisher's test , data display arithmetic mean ± standard deviation, frequency (%)

In the univariate model, all tested risk factors related to diet have been shown to be statistically significant independent risk factors for myocardial infarction with the exception of the number of meals. As the strongest independent risk factor is the irregular nutrition (OR 14,217, p < 0,001), the use of dried meat products more than 3 times a week (OR 9,525, p < 0,001) and fried foods (OR 8,868, p < 0,001) (Table 3). As a protective factor

allocated to the frequent use of fresh vegetables (OR 0,333, p < 0,001) and the frequent use of fresh fruit (OR 0,511, p = 0,004) (Table 3).

Table 3. Risk factors related to diet for the occurrence of AMI - Univariate Model

Risk factor	OR	95%CI	p
Number of servings	0,844	0,664-1,073	0,166
Irregular meals	14,217	8,125-24,887	<0,001
Number of pieces of bread	1,567	1,410-1,741	<0,001
Consumption of white bread	5,346	2,707-10,556	<0,001

Consumption meat three times a week	6,353	3,300-12,232	<0,001
Consumption of pork	5,382	3,104-9,332	<0,001
Consumption of fried food	8,868	5,306-14,820	<0,001
Consumption of meat products 3 times a week	9,525	5,607-16,182	<0,001
Number of fried eggs	1,410	1,271-1,564	<0,001
Number of eggs	2,524	2,005-3,179	<0,001
Frequent consumption of fresh vegetables	0,333	0,193-0,575	<0,001
Frequent consumption of fresh fruit	0,511	0,323-0,809	0,004
Frequent consumption of dairy products	1,174	0,746-1,848	0,488
Frequent consumption of the candy	1,300	0,809-2,088	0,278

OR – odds ratio, 95%CI – 95% confidence interval

In the multivariate model as the strongest risk factor stood out irregular diet (OR 47,839, p < 0,001) and the use of the meat more than 3 times per week (OR 38,925, p < 0,001) (Table 4).

Table 4.: Risk factors related to diet for the occurrence of AMI - a multivariate model

Risk factor	OR	95%CI	p
Irregular meals	47,839	13,324-171,757	<0,001
Number of pieces of bread	1,519	1,221-1,888	<0,001
Consumption of white bread	0,153	0,039-0,601	0,007
Consumption meat three times a week	38,925	7,092-213,642	<0,001
Consumption of pork	1,574	0,497-4,982	0,441
Consumption of fried food	5,710	1,559-20,913	0,009
Consumption of meat products 3 times a week	3,170	1,257-7,993	0,015
Number of fried eggs	1,251	0,981-1,596	0,072
Number of eggs	1,378	0,944-2,012	0,097
Frequent consumption of fresh vegetables	1,033	0,314-3,403	0,957
Frequent consumption of fresh fruit	0,534	0,125-2,274	0,396

OR – odds ratio, 95%CI – 95% confidence interval

Discussion

Inadequate nutrition as factor for AIM is shown in recent epidemiologic evidence that the reduction of food consumption can reduce the incidence of disease. Results of many studies in Serbia showed that the diet of this population is unsatisfactory and often associated with the onset of this disease. Extensive research conducted in Serbia in 2000 to over 17 thousand participants and over 6.5 thousand families have confirmed the long-term conclusions. Lack of fruits and vegetables consumed between 55 % and 65 % of respondents, and for food preparation half, and as a spread-third of respondents use mainly animal fats. One quarter of people surveyed every or every other day eating pork meat or meat products, while never eat fish more than 60 % of the surveyed population of Serbia. About 45 % of adult respondents and 60 % of children and youth in the diet consumed only white bread. In addition to the lack of knowledge about proper nutrition, bad habits and attitudes related to diet, one of the reasons for such unfavorable results obtained in the study, and bad socio-economic status of the population. Three regular meals in Serbia has 70% of children and young people and only 50% of adults, and expenditures monthly household income for food are enormous. Over 70% of respondents spent for food more than 50% and even 44% of respondents more than 70% of monthly income [(15)].

One of the world's biggest study that was done was INTERHEART where is proven that major modifiable risk factor for AIM is diet but with varies in world different regions [(16)].

In our study a greater number of meals, as well as a number of pieces of bread was significantly higher in patients suffering from MI (p = 0.009 and p < 0,001). However, in the univariate model, all tested risk factors related to diet was statistically independent risk factors for AMI with the exception of the number of meals (O R 0.844, p = 0.166). As the strongest independent risk factor (in the univariate model), was the irregular diet (O R 14.217, C = 8.13 to

24.89, p < 0,001) than, consumptions of dried meat products more than 3 times a week (O R 9.525, C I = 5.61 to 16.18, p < 0,001) and fried foods (O R 8,868, C i
= 5,31-14,82, p < 0,001).

Regular intake of food is significantly more often in healthy subjects (p < 0,001). As the strongest independent risk factor in the univariate model (O R 14.217, C = 8.13 to 24.89, p < 0,001), as well as in the multivariate model (O R 47,778, p < 0,001), allocated to irregular diet as one of the strongest risk factors that lead to AMI.

For eating bread in the literature are controversial opinions, which is probably due to the different environments where the tests are performed, and even depending on the population that consumes larger or smaller amounts, as well as a different type of bread which, in different ways, with different composition ready. People suffering from AMI in this study, the population of the city of Nis, significantly more often eat larger number of pieces of bread (O R 1,567; C i = 1,41-1,74; p < 0,001) and white bread (O R 5,346; Ci = 2,71-10,56; p < 0,001). Many studies had examinations, but it is related to the consumption of "whole grain" of wheat, rice, oats and rye and prove that their increased intake has a protective effect on myocardial infarction. There are counted unprocessed bread, where Nurse's Health Study showed that < 1 serving a week is a risk factor for nonfatal MI (R R = 1,13; Ci = 0,89 - 1,43) and concluded that it is more common intake, the lower the risk [(17)]. Findings from meta-analysis showed when they conducted the subgroup analysis by geographic location, statistically associations were found between whole-grain intake and CHD in the United States and Europe [(18)]. In conclusion, this meta-analysis indicates that higher whole-grain intake has a protective effect against CHD [(18)].

Treatment of 14 different studies, Anderson WJ et al. concluded that the greatest inverse relationship between the intake of whole grains and "whole" white bread and risk of MI (RR = 0,64, Ci = 0,56 - 0,73) [(19)]. Fraser GE in a study of California seven-day Adventist showed that eating whole grains (wheat grains only) has a protective effect for non-fatal MI, compared to people who consumed white bread, p < 0,01 (RR = 0,56, Ci = 0,35-0,89) [(20)], but without the comparisons in an amount and frequency of the consumption of bread.

People suffering from AMI in this paper, compared to the control group of healthy subjects consume meat more than three times a week in their diet, with statistical significance p < 0,001 compared to people who never those who rarely consumed (1 - 3 times per month). In the univariate model shows a high statistical significance as a risk factor for AIM (O R 6,353, Ci = 3,30-12,23, p < 0,001). In the multivariate model, the use of meat more than 3 times a week (O R 37,311, p < 0,001) was independent statistically important risk factor. In our work, the use of pork is a risk factor for the development of AIM (OR 5,382, Ci=3,10-9,33, p < 0,001). In the group of patients significantly more likely to eat cured meat, more than three times a week (p < 0,001), as the univariate model, as the strongest independent risk factor singled out the use of cured meats more than 3 times a week (O R 9,525, p < 0,001).

Many studies, shows relationship between meat consumption and risk of C H D. Similar results like ours for meat consumptions were obtained Kontogianni MD at al. in the CARDIO2000 case–control study, in a Greek sample [(21)], Seven Countries Study [(22)], Gramenzi A. et all in the study of women[(23)], as well as in the CORA study [(24)]. Than, case- control study in South Asia received the results for the risk of AMI due to consumption of meat OR = 1.50, 95% CI = 0.85 to 2.64 [(25)]. Mann et al. in their study comparing vegetarians and people who eat meat, have proven that eating meat > 1 a day represents a risk for CHD (RR = 1.18, CI = 0.64 to 2.18) [(26)]. Rastogi T. et al. from the medical studies done in India show that more than 6 servings of meat per month (chicken, goat, beef, pork), representing a slight risk of AMI (1.29 C = 0.92 to 1.81), but without statistical significance [(27)].

Enough controversial opinions exist about the link between the consumption of products of animal origin, such as red meat (beef, pork, lamb), white meat (poultry, fish), eggs and dairy products (milk, cheese) and the risk of AMI. These differing opinions come primarily because of the large number of studies that have studied certain nutrients specific product, not individual foods, different dietary patterns reflect different traditions in nutrition around the world, which explains the different rates of AMI in different cultures as well as due to different units for different foods. International correlation between per capita consumption of food and disease rates have been severely veiled konfaunding lifestyle factors with the economic situation [(28)].

Some other studies showed different

conclusions. Micha R. et al. collected that data and told that 20 studies showed that consumption of unprocessed red meat – pork, beef and lamb is not in association with risk [29]. In contrast, serving of processed meat - bacon, hot dog, salami, was associated with 42% higher CHD risk (50 -g serving per day) [29]. Roger VL et all. showed similiar results from 17 prospective cohort and 3 case - control studies (with > 1 . 2 million participants from different countries) [30].

Nurses' Health Study, in multivariable analyses (26 years of follow-up) showed that higher intakes of fish, poultry and nuts were significantly associated with lower risk [17,31].

In this paper, we detected and the number of consuming eggs a week (fried and boiled) as a risk factor for AMI (compared to people who do not use this product in the diet treated with no other ingredients), and the results show that the greater the number of eggs used in nutrition week, the larger the risk, and the largest statistical significance was observed in people who use ≥ 5 pieces of fried eggs a week (O R 1.410, CI = 1.27 to 1.56, $p < 0,001$) and in people who used ≥ 4 pieces of cooked eggs a week (O R 2,524, Ci = 2,01-3,18, $p < 0,001$).

Some research showed the same results, for example Spence et al. reported in persons who consuming 3 or more eggs per week, increased carotid plaque area and the authors suggested that persons at risk of CVD should avoid regular consumption of egg yolk [32]. Mann et al. proved by comparing vegetarians and people who eat animal products to more than 6 eggs per week significantly significant risk of IHD $p < 0,01$ (R R = 2,68, Ci = 1,19-6,02) [26]. Reduced consumption of eggs is recommended for reducing serum cholesterol and preventing AMI (IBS). Kritchevsky SB et al. have shown that eggs contain an average of 30% in total cholesterol from food. When the consumption of eggs examined as a risk factor for IHD alone, without other foods, is a main factor [33]. Gramenzi et al. showed the results of the study of the history (for Italians), to 1-2 eggs per week does not represent a risk for AMI [23]. Rastogi T. et al. get their anamnestic studies done in India to more than two eggs a week are a negligible risk, 1.52 (Ci = 1,01-2,27), but without statistical significance [27]. Frank B Hu et al. examined this association in 2 cohort studies where 14 women and followed another study 8 years men and came to the following results: although they can not exclude something small increase in risk consumption of eggs in the formation of CHD (which are classified non-fatal MI), or higher risk in some other subpopulations, their results indicate that the consumption of eggs per day unlikely increases the risk of CHD (< 1 / week OR = 1,0; 1 / week OR = 0,82; 2-4 / week OR = 0,99; 5-6 / week OR = 0,95, 1+ / per day OR = 0,82; 95% Ci = 0,60-1,13, p = 0,95) [34]. But, in prospective eastern Finnish cohort, Voutilainen S. at al. found that Finnish people consume on average 3,4 eggs weekly and during 18.8 years of follow-up, egg consumption was not associated with increased risk of AMI [35].

Analytical epidemiological studies (cohort and case-control), comparing the individual information of each person within the population, can not prove the connection between diet and the development of AMI, or the most valid data are obtained when comparing the groups with extremely different eating habits. Otherwise, it is often difficult to identify the relationship between diet and the development of disease in populations where the diet and way of storing food homogeneous. This proves the direct link between intake of saturated fat to elevated concentrations of total cholesterol and on the occurrence of CHD. Depending on the intake of unsaturated fats there are differences. Thus, for example. own countries in the Mediterranean high intake of unsaturated fat (more than 40 % of total energy intake), but above all, olive oil, and the rate of CHD is low [11].

In US, their dietary guidelines recommend a restriction of consumption saturated and replacement it with polyunsaturated fat for reducing CVD risk, but their studies couldn't find a strong link between intake total saturated fat and CVD events [36-39]. Some investigators like de Oliveira Otto M., et al. investigated the association of consumption saturated fat from different food sources and the incidence of events of cardiovascular diseases in a multiethnic population and they found that higher intake of dairy saturated fat was associated with lower but a higher intake of meat saturated fat was associated with greater CVD risk [40]. Jacobs DR. at al. consistent with the concept of food synergy [41].

The results of this study show that demonstrated significance of the types of fat in the diet of patients compared to the health group. The use of fat was even in childhood in both groups (72.50 % and 71.80 %). Before disease fat was

used in 22.80 % patients and 5.40% of healthy. There is a statistically difference in the frequency of the use of fat between two groups ($p < 0,001$).

How high intake of total fat in the diet is important factor for AMI showed a number of studies, however, made more precise methods of calculating the fat intake in relation to total energy intake, so the comparison is made on the basis of the conclusion. Increased intake of total fat in the diet that lead to the AMI was conducted in Korea in men, only for the group who consumed > 25 % total fat of total energy intake, OR = 1,08, Ci = 1,02-1,14 [(42)], with the caveat that in Korea in the whole population, on average, lower energy intake of total fat than in Serbia. Gamenzi et al. showed the results of the study of the history (for Italians), adding that the total fat in food pose a risk for AMI (OR = 1,6) [(23)]. Mann et al. in their study comparing vegetarians and people who consume animal products have proved that the use of the total animal fat is a risk for CHD $p < 0,01$ (RR = 3,29, Ci = 1,50-7,21) [(26)]. Anamnestic study was conducted in Spain showed that consumption of olive oil (moderately, 54g / dn) is a statistically significant protective effect on the emergence of AMI (OR = 0,18, Ci = 0,06 - 0,63) [(43)].

In the studied population of the city of Nis, statistically significant (univariate model), as a protective factor allocated was the frequent use of fresh vegetables (OR 0,333, $p < 0,001$) and the frequent use of fresh fruit (OR 0,511, $p = 0,004$), while rarely eat products of milk and sweets ($p < 0,001$).

Consumption of fruits and vegetables, major sources of antioxidants, have been inversely related to CHD. In large prospective Swedish Mammography Cohort study, higher total antioxidant of diet was statistically associated with lower risk of incident MI [(44)]. Cohort studies of healthy adults suggest that foods rich in fiber, such as vegetables and fruits, protect against CHD [(45)]. Akesson A. at al. in their prospective cohort study found thet eating a diet richer in minimally processed, healthful foods such as fruits, vegetables (nearly 5 daily serving), legumes, nuts, reduced-fat dairy, whole grains (4 daily serving) and fish (2 weekly serving) associated with a nearly 20 % lower risk of MI [(46)]. In regions where is the greater consumption of fruits and vegetables (potatoes not included), the incidence rates of AMI is lower (southern Italy and Greece). In China is necessary daily intake 400 gr [(11)].

INTERHEART anamnestic study indicated that consumption of green leafy vegetables (raw and cooked) and fruits was associated with reduced odds of AMI (OR 0.70, 95% CI 0.64 to 0.77) [(17)]. Gramenzi et al. showed the results of the study of the history (for Italians), that there is an inverse relationship to the greens (OR = 0,6) and for fresh fruit (OR = 0,4) for AMI [(23)], Hu BF in a number of prospective cohort studies that examined the relationship, found protective effects of total intake and fruits and vegetables [(28)]. Liu S. At
al. in his patient's medical history Women's Health Study demonstrated that a high intake of fruits and vegetables is associated with reduced risk of heart attack (RR = 0,62, Ci = 0,37- 1,04, $p = 0,07$) [(17)]. Consumption of fruit or vegetables decreases the risk of CHD by $\geq$ 30
%, irrespective of other lifestyle behaviors [(47)]. Epidemiological and clinical data shows that the vegetable diet and the complex carbohydrates are associated with a reduced risk of AMI[(2)].

Dilemma still exist whether eating chocolate is a factor for heart disease. Dark chocolate and cocoa contain a high concentration of flavanols (flavanoids which are also present in fruits, vegetables, tea, alcohol), and their action has a protective effect on endothelial function of heart [(43-45)]. Some studies showed protective effects of cocoa and cocoa products on some cardiovascular factors (blood pressure, cholesterol levels and atherosclerosis) [(48-51)]. In one German cohort study, consumption of 6 g of chocolate / day was associated with a 39 % lower risk of the MI [(48)]. In one meta-analysis, consumption of chocolate (4 % of total antioxidant capacity) have favorable effects on CV risk biomarkers such as flow-mediated dilation and diastolic blood pressure [(44)]. Buitrago-Lopez A. et al. found too that the frequent consuming chocolate were associated with a 37 % reduction CVD (relative risk 0.63 (95 % confidence interval 0.44 to 0.90)) [(52)].

Conclusions

1. Based on the study and statistical analysis confirmed that there was a significant correlation between inadequate diet and the occurrence of acute myocardial infarction in the city of Nis.
2. The larger amount of intake of certain foods is a risk factor, and the greater intake of bread, meat, meat products and eggs, leads to higher risk of AMI.
3. Regular intake of meals, fresh fruit and vegetables are protective factor for the occurrence of acute myocardial infarction.

4. The use of fat and oils represent a risk factor. In childhood, the use of fat is equally in both groups.
5. Add salt in food was not statistically significant in all treated groups.
6. Timely detection of inadequate nutrition as a risk factor and adequate choice and moderate amounts of certain ingredients in the investigated area, can lead to a significant reduction in morbidity and mortality from acute myocardial infarction.

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