

Socio-medical Characteristics of Coronary Disease in Bosnia and Herzegovina and the World

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REVIEW

SUMMARY

Introduction: Coronary heart disease and its etiology are complex socio-medical and clinical problem in this century. World Health Organization defined coronary artery disease as acute and chronic heart ailments due to disruption of flow and myocardial blood supply. Diseases of the cardiovascular system in spite of preventable risk factors are responsible for approximately 50% of all deaths in the developed world, and this ratio is higher in developing countries. Risk factors: Coronary heart disease risk factors can be divided in those which are not preventable such as: personal and family history of cardiovascular diseases, age and gender and preventable risk factors including: high blood pressure, elevated blood cholesterol, smoking, reduced physical activity, elevated blood sugar, increased body weight, alcohol use, psychosocial factors and nutrition. There are also newly emerging risk factors which includes increased homocysteine, thrombogenic and inflammatory factors. Prevention of coronary heart disease risk factors: The concept of risk assessment factors, their reduction, initially begun in the Framingham Heart Study and refined in other models. Primary prevention relates to changing lifestyle and influencing preventable risk factors. Numerous studies and meta-analysis showed that lifestyle modification, risk reduction factors, particularly by changing diet, stopping smoking, increasing physical activity, blood pressure control can be effective in the prevention and reduction of coronary heart disease. Primary health care physicians i.e. family physicians need to take an active role in assessment of risk factors for coronary heart disease. Conclusion: The data in this paper, based on the findings from other studies, suggest the importance of using a modified algorithm in order to estimates the overall risk of coronary disease in high-risk groups among the patients in the primary health care settings..

Key words: heart attack, coronary disease, risk factors, prevention of heart diseases.

1. CORONARY HEART DISEASE AS A HEALTH AND ECONOMIC PROBLEM

Knowledge of the social conditions of people's lives is important for proper understanding and explanation of the many changes related to health promotion, including the prevention and treatment of coronary heart disease.

The style and pace of life brought changes to the habits of the traditional family, the type and change of working conditions in factories, schools in the sphere of education, and in the spheres of political and social order, economic welfare, the extent of human rights and freedoms. All listed in different ways affects the quality of life and health.

Coronary heart disease and its etiology are complex socio-medical, epidemiological and clinical problem in this century, and perhaps in the near and distant future, unless something drastically changes in access to prevention and treatment of this disease. World Health Organization in 1957 defined coronary artery disease as acute

and chronic heart ailments, which are due to disruption of flow and myocardial blood supply in relation to events in the diseased coronary arteries. Depending on the speed of development of narrowing of the arteries and the severity of consequences, coronary heart disease can be manifested as angina pectoris, myocardial infarction, heart rhythm disorder, heart decompensation and sudden cardiac death. Basically, atherosclerosis is a prerequisite for the occurrence of pathological changes in coronary blood vessels, and with the present state of medical science is inevitable. People who have no risk factors for atherosclerosis in the age of 85 in 60% of cases have atheromatous coronary arterial circulation covered with plaques, but if they were smokers they will experience it at age of 65 years and if there was an elevated blood pressure limit is 52 years, while with the diabetes the disease can start at the age of 42 years (1).

Coronary heart disease as the leading disease of the cardiovascular system, causing high morbidity, loss of work capacity and mortality in most productive age.

Coronary heart disease is characterized by pain, accompanied by fear of death. Symptoms of disease vary considerably among patients, so some feel pain, and no ischemia, while others have ischemia but do not feel pain, what is called a “silent” or “asymptomatic ischemia” (2).

Diseases of the cardiovascular system in spite of preventable risk factors are responsible for approximately 50% of all deaths in the developed world, and this ratio is higher in developing countries (3).

Heberden and Rougnon were first to describe in history the coronary disease, but this disease is known for hundred years before our era. Hippocrates known steno cardiac pain. Seneca described the pain of “illness that occurs suddenly like a storm, with anxiety and chest pains and pains that tear at your soul.” In the eighteenth century Balkonius was among the first who related steno cardiac pain to the heart, and Heberden classic form of the disease called angina pectoris.

The complex etiology of coronary heart disease is associated with smoking, diet, genetic inheritance, high arterial blood pressure, lipid levels and blood sugar, increased body weight, stress, lack of physical activity, and sudden weather changes. Age, gender and family history, complicate the risks of disease (4).

Despite numerous limitations, prevalence and incidence of diseases of the heart and blood vessels are mainly based on the analysis of mortality statistics and results of the WHO MONICA Project (Multinational Monitoring of Trends and Determinants in Cardiovascular Disease) which is covered by the populations of 35 to 64 in 35 countries worldwide.

In industrialized countries, heart disease and blood vessels diseases make up one third to half of all deaths (from 33% in France and 39% in Japan to 48% in England and Wales and 52% in Finland) (5).

According to WHO estimates, in the world, during 1999 from cardiovascular disease died about 17 million people, more than 4 million were the inhabitants of Europe. According to projections for 2020 nearly 25 million people will be victims of one of the diseases from this group. The increase in deaths from ischemic heart disease being greater in the developing (128% in women and 137% in men) than in developed countries (29% women and 48% in men), which is associated with changes in the structure of the population and the prevalence of factors risk. In the structure of dying from heart and blood vessels diseases, according to WHO estimates, ischemic heart disease, on average, is represented with 41%, infarction with 32% and other diseases of the heart with 27%.

Coronary heart diseases are the leading cause of death in Australia (30% of all deaths), during 1993-1994 they spent a total of 12%, or \$ 3.9 billions of total annual cost for health care (Keirnan E 2003). In the USA in 2003 the total cost of heart disease and infarction was 351 billion dollars, 209 billion was spent on health care, 142 billion for lost productivity due to death and disability.

The new indices that are used for the analysis of global cardiovascular situation and development of new prevention strategies show that cardiovascular diseases are responsible for 10% of the “lost years of healthy life” (DALYs

– disability adjusted life years) in the underdeveloped and developing countries, and 18% in developed countries, all of which naturally affects the entire economy of these countries. It is well known that this negative score can be prevented by the combination of simple, effective social and individual efforts to adverse action of major risk factors, such as high blood pressure, elevated blood cholesterol, obesity and tobacco smoking.

According to the guide of the World Health Organization to monitor cardiovascular disease and risk factors that lead to their creation, one of the goals is to combat the syndrome of atherosclerosis, thereby reducing the mortality from cardiovascular diseases in people under 65 years of age, for at least 15% by year 2010, as well as improving quality of life for people who suffer from cardiovascular diseases, which unfortunately has not been reached. Developed countries have set up preventive programs for control and monitoring of risk factors and reduce rates of morbidity and mortality from coronary heart disease (6). In Western Europe for the past 30 years there has been a continuous downward trend in morbidity and mortality from coronary heart disease, while in Eastern Europe and countries in transition, the trend is steadily increasing (7).

Thanks to the continuous implementation of prevention programs, research, and actively search for people at increased risk for coronary diseases reduction and elimination of risk factors, changing life styles, and the therapeutic application–pharmacological measures have significantly reduced the trend of morbidity and mortality from coronary heart disease in developed countries (8).

2. EPIDEMIOLOGIC CHARACTERISTICS OF CORONARY HEART DISEASE

Today we talk about the global epidemic of cardiovascular diseases. According to the World Health Organization (WHO), cardiovascular diseases are the leading cause of death worldwide, of who die every year 16.6 million people, of which 4 million in Europe. The leading diagnostic subgroups were coronary heart disease accounted for 43.3% at the world level and 48.1% in Europe, and cerebrovascular disease accounted for 32.9% at the world level and 29.4% in Europe. It is estimated that worldwide occurs 32 millions heart attacks and strokes, of which 12.5 million ending fatally (9).

Cardiovascular diseases are directly responsible for 4 million deaths across Europe in 2000 of which 1.9 million in the European Union, participating with 43% in overall mortality all ages for men and 55% of total mortality in women (10). Cardiovascular diseases are also the most common cause of hospital morbidity in Europe during 2002 with a rate 2557/100000. In addition, the rate of 695/100000 is caused by coronary heart disease and 375/100000 population of stroke, but more than half died from other chronic heart diseases. It is estimated that the total cost of care for cardiovascular diseases in the European Union was 168,757 million Euros in 2003 (11).

Mortality from cardiovascular disease is different depending on age, gender, socio-economic conditions, ethnicity and geographic area. Mortality increases with

age, and is higher among people with low socio-economic status in Central and Eastern Europe. There is a difference in morbidity and mortality within European countries and this is explained by the fact that there are significant socio-economic differences in conventional risk factors such as smoking, high blood pressure, elevated cholesterol and blood sugar (12).

However, since 1970 in Western Europe, because of taking a series of preventive measures, there has been a significant decline in mortality rates from cardiovascular diseases for the population of middle-aged and elderly. In the Central and Eastern Europe there is decline in mortality rates in recent years but still remains very high (12).

The decline in mortality rates of coronary heart disease is registered mainly in the countries where were performed extensive preventive measures of population change in lifestyle, especially diet and reduction of smoking in Western and Eastern Europe. Incidence of morbidity from coronary heart disease also dropped in Western Europe, but it increases in the Eastern Europe (13). Coronary heart disease in 1990 was the leading cause of mortality and the fifth leading cause of illness in the world. In the next few decades is expected to double the share of coronary diseases in overall morbidity and mortality and will become the leading cause of morbidity and mortality worldwide (9). Coronary heart disease causes one third of the total permanent disability, and have a large share of total health care costs (14).

The basic epidemiological characteristics of coronary heart disease as the population disease of middle aged and elderly, but with a pronounced tendency to increase the number of patients at a younger age. So far, mostly men are affected. It is clear what are the individual, familial, economic and social consequences of this disease (15).

Coronary heart disease is the single largest killer of American women and men and a total of seven million Americans suffer from coronary heart disease and nearly half a million people die each year from heart attacks caused by coronary artery disease (16). In the USA during 1996 the mortality rate from coronary heart disease was 120/100000 men and 58/100000 women (16). In addition, Yugoslavia has been involved with four groups of population in one of the most cited epidemiological prospective observational study–The Seven Countries Study, with a population of Belgrade (university professors), Zrenjanin (workers in the food industry Combine “Servo Mihalj), Velika Krsna (farmers) and Croatia (Dalmatia and Slavonia) (17). Bosnia and Herzegovina belongs to the group of countries in transition and have a steady increase in morbidity and mortality from coronary heart disease. About 50% of all deaths in both genders in B&H occur due to cardiovascular diseases, where coronary heart disease represents half of this figure. According to statistics, since 1960 to 2000 the mortality from cardiovascular diseases increased thrice. Federation had the highest overall mortality from cardiovascular disease in the last three years with the rate in 2005 of 443/100000, in 2006 of 352/100000, in 2007–371/100000. Compared to neighboring countries (Slovenia–288/100000, Croatia 448/100000, EU countries–498/100000) B&H is at the middle score.

In the overall group of cardiovascular diseases, the leading cause of mortality is stroke: in 2005–10%, 2006–11%, 2007–10%, in second place is myocardial infarction: 2005–9%, 2006–8.5%, 2007–9.2%. Specific mortality from myocardial infarction by sex is: 2005–male–10%, women–7%, 2006–men–10%, women–7%, 2007–men–10%, women–7%, it means somewhat higher in women than in men (18).

Risk population for coronary heart disease accounts for 20% of the general population is exposed multifactorial etiology. Many developed countries, led by the United States have carried out an intensive campaign to eliminate smoking and physical inactivity, as a potential cause of coronary heart disease over the past twenty years.

3. RISK FACTORS FOR CORONARY DISEASE

Degenerative diseases of the heart and blood vessels are for decades at the first place of the morbidity and mortality in the developed world, as well as developing countries in the background are most atherosclerotic process and the development of this process affects cardiovascular risk factors.

Reports of the World Health Organization (The Comparative Risk Assessment Collaborating Group module of the Global Burden of Disease 2000 study World Health Organization initiative) (16) contain recommendations to significantly improve population health is possible if the successful modification of risk factors present. Expert Group has identified smoking, high blood pressure, high cholesterol levels, to become the most important factor in the lost years of healthy life (19).

An important shift in the primary prevention of coronary heart disease is the attempt to look at the total atherosclerotic potential (circles), which causes the disease, depending on the interaction of various risk factors.

The Framingham study as most extensive longitudinal epidemiological study of coronary disease in the world based on the concept of risk assessment factors, their reduction represents a basic form the basis for the management of patients by lowering the incidence of coronary heart disease (20).

The emergence of the process of atherosclerosis, we first explained the presence of the following risk factors: smoking, poor eating habits, high blood pressure, increased serum total (and LDL) cholesterol, low HDL cholesterol, diabetes mellitus, men aged >55 years and women after menopause and old age > 65, elderly.

One of the important indicators is the anthropometry, which makes a positive index of health in the fall and the value of psychometrics, sociometrics and biological standards. Anthropometric measurements can study the influence of external factors on human development: the impact of nutrition, housing, economic status, physical activity, and general living conditions. Physical indicators of the height, weight, sitting height, head circumference, the size of certain body parts, body volume and the power of man. Deviations from the normal body development under certain conditions it may be the cause of the disease,

including coronary heart disease.

Since a significant number of patients with coronary heart disease does not had represented so called main independent risk factors, in explaining the occurrence of atherosclerosis in such cases, an attempt was made to the inclusion of other risk factors.

This is a group of predisposing risk factors: obesity, abdominal obesity, low physical activity, sedentary lifestyle, positive family history for ischemic heart disease in early life ages (<55 in men; <65 years for women, ethnic characteristics, psychosocial factors (21).

In estimating total cardiovascular risk are included also the conditional risk factors: elevated triglycerides, increased small LDL particles, elevated homocysteine, elevated lipoprotein Lp (a), elevated fibrinogen, elevated inflammatory markers (C reactive protein) prothrombogens (22).

Until the mid-nineties, the intervention attempts to change some of the risk factors were based on opinions regarding the value of each factor and their changing (hypertension, smoking, dyslipidemia, etc.). However, since the mid nineties, the type and intensity of intervention in risk factors are determined on a more sophisticated level by determining the overall potential for atherosclerotic coronary artery disease (taking into account not all, but the main risk factors).

One of the largest case-control study in the year 2002, the INTERHEART study investigated the assessment of materiality and risk factors of heart disease and the study results show that nine out of ten heart attacks can be predicted on the basis of nine risk factors that are the same and have been found in studies around the world (22).

Increased fats and smoking are 2/3 of the total risk, other risk factors include high blood pressure, elevated blood sugar, increased body weight, lack of physical activity and stress (22).

Together these factors account for 90% of risk for heart attacks and are the same throughout the world. The study showed that the risk of coronary disease can be assessed, and it is known the most about the causes and we have enough information to implement strategies for the reduction and elimination of these (22).

Areas where the MONIKA project is done refer to a high prevalence of coronary risk factors, especially hypercholesterolemia, with a high incidence of disease in the referral area (13).

The results were consistent with expectations, for areas with high mortality from coronary heart disease, with more than 80% of persons aged 25-64 years, and were at increased risk for the disease (13).

The results of most recent and previous research on risk factors and health behavior in the Federation B&H show that among the present population of highly unhealthy lifestyles are linked to smoking, physical inactivity, unhealthy eating, and therefore represent a significant health risk. As cardiovascular disease is responsible for leading disease burden of illness and death in the FB&H and the prevalence of the leading cardiovascular risk factors, including hypertension (41%) smoking (35%), obesity (33%), elevated blood sugar (10%) elevated cholesterol

levels in the blood (15%), sedentary lifestyle (85%), is quite high, as evidenced in conducted population research, by systematic approach to controlling risk factors among the adult population in the FB&H is a real need (18).

According to the results of the risk factors of cardiovascular disease, in the First Croatian Health Project of the Ministry of Health and the Croatian Health Insurance in Croatia, aged 18-65 years blood pressure was higher than 140/90 mmHg in 31.9% men and 23.6% women, increased body weight (BMI 25.0 to 29.9 kg/m²) was for 48.1% men and 34.7% women, and obese (body mass above 30 kg/m²) was 31.1 % men and 15.2% women. (table 1.)

Sebastian and colleagues have worked on patients in primary medical practice and identify them as carriers of multiple risks for coronary heart disease. This research puts the point in understanding the principles of assessment of multiple risk factors simultaneously to clinicians imposes primary prevention as a choice in the mass screening and early treatment of the risk of emerging diseases (23).

For health professionals, the challenge should be the inclusion of a large number of patients who are at an early stage of illness in assessing and reducing the overall cardiovascular risk, using the most appropriate interventions for primary prevention so that more individuals may realize the benefits of health care (24).

Stamler was reasonably recommended the seven criteria for assessing the importance of risk factors: the strength of the association of risk factors and diseases, partly step nature of association, temporal sequence of associations, consistency and independence of the association, and the ability to predict and coherence have been used in setting the proposed measures of prevention (25).

3.1. RISK FACTORS THAT CAN BE INFLUENCED

High blood pressure

High blood pressure is without any doubt a major independent risk factor for coronary morbidity and mortality in developed, but increasingly in developing countries (26). Prevalence of elevated blood pressure in the adult population is 20%, aged 65 years is 40-50%. For the development of coronary disease are equally responsible both systolic and diastolic blood pressure, with the proviso that in middle age are more common problems of coronary heart disease associated with elevated systolic blood pressure (27).

People with high blood pressure are twice the risk of heart attack compared to a person who does not have it (28). Epidemiological analysis and randomized clinical trials have shown the impact of high blood pressure as risk factors for microvascular and macrovascular disease in patients with diabetes (29).

Meta-analysis done on 14 large international studies of high blood pressure and cardiovascular disease, showed that treating high blood pressure, reduces the incidence of coronary heart disease by 14%, stroke by 42% during the period of 5 years (8).

Epidemiological study of high blood pressure in patients with diabetes showed that a high risk of cardiovascular events and death begins with blood pressure >115/75 mmHg in the general population and twice increases for each 20 mmHg systolic or 10 mmHg increase in diastolic BP (30).

Illnesses, states and injuries according to ICD-10	AGE (years)						
	Total	Under 1	1-6	7-14	15-18	19-64	65 and more
TOTAL NUMBER OF DISEASES (WITHOUT INJURIES), CHAPTER I-XVII, No. 1-185	1927528	85299	271181	259523	100462	828011	383052
89. Acute rheumatic fever (I00-I02)	371	0	2	5	5	243	116
90. Chronic rheumatic heart disease (I05-I09)	2108	0	2	2	1	827	1276
91. Hypertension (I10-I05)	192392	0	1	69	256	110953	81113
92. Acute myocardial infarction (I21-I22)	3643	0	0	2	6	2185	1450
93. Other ischemic heart disease (I20, I23-I25)	22087	2	1	4	175	11051	10854
94. Heart rhythm disorders (I44-I49)	8311	1	5	19	28	4244	4014
95. Other heart diseases (I26-I43, I50-I52)	21288	2	3	20	33	9313	11917
96. Intracranial hemorrhage (I60-I62)	1132	0	0	0	4	503	625
97. Other cerebrovascular disease (I63-I69)	7279	0	0	4	17	3268	3990
98. Arteriosclerosis (I70)	2685	0	0	1	0	1216	1468
99. Phlebitis, thrombophlebitis, embolism and vein thrombosis (I80-I82)	3308	0	0	1	18	2059	1230
100. Other circulation diseases (I71- I99)	13154	3	32	89	178	8349	4503
Total (sum of items 89-100)	277758	8	46	216	721	154211	122556

TABLE 1. Review of the presence of cardiovascular disease in the B&H by the age groups in 2009. Source: Report on diseases, conditions and injuries identified in the Bosnia and Herzegovina for 2009.

It is estimated that in the period since 1970 to 2000 the mortality from cardiovascular disease has declined in European countries, Canada, USA, Australia, Japan, while in countries of Central and Eastern Europe along with Russia, the incidence of cardiovascular disease increases. The reason for this is the proper treatment of high blood pressure in the first, in relation to elevated blood pressure and its inadequate treatment in countries in transition (9). In addition to coronary artery disease, high blood pressure significantly affects the onset and course of cerebrovascular events, heart failure and chronic kidney disease, especially among the older population (31). Decrease in high blood pressure and its proper treatment shows a reduction in mortality from cardiovascular disease by 60% in the group of treated subjects, compared to the group who were not taking medication for high blood pressure by the results of the Framingham study (32).

In the ALLHAT (Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack) study confirmed the effect of lowering high blood pressure, reduce heart attacks and even in preventing cardiovascular events (33). Also worthy are the results of the HOPE study (Heart Outcomes Prevention Study) which showed that lowering systolic blood pressure—the effect of ACE inhibitors for only 3.3 mmHg and diastolic by 1.4 mmHg leads to a 20% reduction in heart attacks, compared with those who received placebo.

Elevated blood cholesterol

There is a strong independent relationship between elevated cholesterol levels and risk of coronary heart disease. Elevated total cholesterol in serum in addition to smoking are the strongest single risk factor for the occurrence of coronary heart disease (26). The elevated levels of total lipids in blood such as cholesterol and triglycerides, are associated with various proteins, lipoproteins, and according to their size determine the degree and severity of atherosclerosis. High density lipoprotein (HDL) enter the artery wall very easy and so go out and do not cause atherosclerosis, compared to low-density lipoproteins (LDL), which easily penetrate the wall of an artery, causing it to retain atherosclerosis.

Connection between cholesterol and the occurrence of coronary disease were confirmed in many epidemiological and clinical studies with a moderate increase in cholesterol values, if present additional risk factors such as smoking, high blood pressure, elevated blood sugar.

The Framingham study suggests that the risk of coronary heart disease increases with the increase in plasma cholesterol (32). Cholesterol reduction of 1% reduced by 2% risk of a heart attack. In people with a lower risk of developing cardiovascular disease (<5%) considered that the target values of total cholesterol should be lower than 5.0 mmol/l, LDL cholesterol <3.0 mmol/l and HDL cholesterol >1.0 mmol/l. The level of cholesterol increases in 40 years old men, when the values are 5.9 mmol/l, and in women continues to rise until the age of 60 and reaches a peak of 6.7 mmol/l.

Joint presence of hypertriglyceridemia, hypertension, lowering the concentration of HDL cholesterol and insulin resistance is called X syndrome by Reaven who in 1988 observed the correlation of the metabolic syndrome X and coronary heart disease (34).

Many American and European studies with a large number of patients have shown that lowering cholesterol significantly reduces the risk of coronary heart disease and heart attack, explaining that the reduction in cholesterol leads to atherosclerosis plaque stabilization and better functioning of the endothelium of blood vessels (35).

Results of the 4S study (Scandinavian Simvastatin Survival Study) clearly confirmed the beneficial effect of lowering cholesterol to reduce cardiovascular risk after myocardial infarction by 28%, and in patients with angina pectoris by 24% (36). Results of the LIPID study (Long-term Intervention with Pravastatin in Ischemic Disease) showed a favorable effect of pravastatin—drug for lowering cholesterol, by 20% reduction in risk of mortality from coronary heart disease in patients with acute myocardial infarction and unstable angina pectoris. Reduction of elevated cholesterol levels in patients with diabetes showed positive results and the CARDS (Collaborative Atorvastatin Diabetes Study) study examined the effect of medicines

used to treat elevated cholesterol levels in the primary prevention of major cardiovascular events in patients with type 2 diabetes. Study results showed a 36% reduction in acute coronary heart disease and 48% reduction in infarction.

The mortality rate was reduced by 27% in the atorvastatin group, indicating the efficiency of atorvastatin for primary prevention (37). The first study in the world ASCOT-LLA (The Anglo-Scandinavian Cardiac Outcomes Trial-Lipid-Lowering Arm) has shown the benefits of lowering lipids in patients with high blood pressure and three assigned to cardiovascular risk factors in the reduction of cardiac stroke (1).

There is a statistically significant correlation between the reduction in vascular risk with the use of statins in patients with coronary heart disease. The evidence suggests that statins reduce the progression of plaque, a reduction in total serum cholesterol reduces the incidence of coronary attack (38).

Smoking

Tobacco smoking and cardiovascular risk are in a strong causal relation, continuous, stepped and independent, with a linear relationship between the risk of coronary disease and number of cigarettes smoked (8). It is estimated that 17 million people worldwide die from cardiovascular disease each year, a significant number of these deaths is attributable to smoking, which increases the risk of dying from coronary heart disease and cardiovascular disease by 2-3 times (9). It is estimated that in the U.S. total direct and indirect expenditures related to tobacco amount to 75 billion dollars. Nicotine increases the cardiovascular risk with age, up to 50 years the risk is two times higher in men, to be matched with women in post menopause period. The risk is even greater in women than in men. (39). Confirmed is the strong association of smoking status in heavy smokers, smokers experience and duration of early starting smoking, with the occurrence and death from coronary disease (40). Robson and colleagues have calculated how long after quitting the risk of former smokers is the same as the risk of smokers. The results suggest that only those persons, who have stopped smoking for at least 15 years ago, are similar to people who do not smoke (6). United INTERHEART case control study showed that smoking six to ten cigarettes a day by twice increased risk of heart attack, smoking 20 cigarettes a day increases the risk by four times and smoking 40 cigarettes increases the risk nine times (22). In contrast a heart attack decreases by 50% in people of both gender groups, who have stopped smoking, especially in the first two years after quitting. Quitting smoking has shown that the risk declines in patients with or without established coronary disease (8). People who have stopped smoking for a period of 5-15 years prior myocardial infarction, had levels of other risks, like the people who did not quit.

Reduced physical activity

Epidemiological and prospective studies that were conducted during 50-ies have shown that lifestyle which is passive, without physical work and sitting have a negative impact on health and present a risk of morbidity and death from all types of cardiovascular disease (8). WHO estimates that approximately 60% of the world’s population has

decreased physical activity (9). It is known that a certain level of physical activity is important in the prevention and correction of obesity, increased fat in the blood, elevated blood pressure, elevated blood sugar, or the risk of danger for the development of cardiovascular disorders, especially for developing coronary heart disease.

Regular physical activity, particularly in the middle and older age have a beneficial effect on reducing morbidity and mortality of cardiovascular diseases, as well as reducing the overall risk of heart disease and cardiovascular disease (41).

In physically inactive people there is two times higher risk of heart disease and cardiovascular disease in relation to persons who are physically active. Physical inactivity increases the risk of coronary heart disease by eight times, and stroke by two times compared to those who have a satisfactory physical condition. High levels of physical activity contribute, also, to reducing obesity, reducing plasma lipid levels and decrease in blood pressure. It has been shown that patients with Atherosclerotic changes in blood vessels are equally expressed in plaque regression when they are physically active and those who take medication for lowering blood fat.

Decrease in physical activity, and if you do add more and inheritance leads to obesity, which contributes to disease development cardiovascular diseases.

Obesity is a serious chronic disease that can lead to many medical complications that impair quality of life and reduce the life duration, and whose treatment has a high cost. Obese people have higher morbidity and mortality in the population of Bosnia and Herzegovina and even in the world.

The measurement of obesity is in some way, “Sisyphean task”. However, various international groups have concentrated their work on finding appropriate measures of obesity. One of them is the BMI-- Body Mass Index. BMI is a single measure of obesity, independent of other parameters, adopted in 1990 as a method of choice for measuring obesity.

It is a relationship between weight and height used to estimate the impact of obesity as a risk factor to health. It is presented by the mathematical formula that correlates with body fat in adults, and is calculated as weight in kilograms divided by the bodily height in meters squared (2).

$$T T = \text{Body weight} ; T V = \text{body height}$$

BMI is used to assess health risks in adults. Does not depend on gender and age because there are a wide range of applications (19-70 years).

BMI	Body weight	Risk of illness based on BMI	Risk of illness based on BMI and co morbidity
< 18.5	Skinny	Minimal	Low
> 18.5-25	Normal weight	Low	Moderate
> 25-30	Over weight	Moderate	High
> 30-35	Moderately obese	High	Very high
> 35-40	Very obese	Very high	Extremely
> 40	Extremely obese	Extremely high	Extremely

Table 2: Body weight and health risk based on BMI; source: (2)

Comorbidity is a condition associated with obesity, which worsens with increasing BMI, and often improves

if obesity is treated successfully. Co morbidities associated with obesity: hypertension, cardiovascular disease, dyslipidemia, type II diabetes, "sleep" apnea, osteoarthritis, and infertility, other pathological conditions (idiopathic intracranial hypertension, varicose veins of the lower extremities, gastroesophageal reflux, and urinary stress incontinence). The presence of one or more comorbid conditions increase the health risks linked only for BMI.

Elevated blood sugar

The prevalence of diabetes is steadily increasing, especially in developed countries. It is estimated that 195 million people worldwide suffer from diabetes and this number will grow to at least 330 million in 2030. In patients with diabetes mellitus, coronary heart disease is among the leading causes of morbidity and mortality. The likelihood of developing coronary heart disease is 2-3 times higher in men and 3-5 times higher in women with diabetes compared to people without diabetes. In addition to microvascular changes, such as nephropathy, retinopathy and neuropathy, diabetes leads to atherosclerosis or macrovascular changes.

However, despite the obvious importance that diabetes has in the pathogenesis of coronary diseases, in approximately half of patients remain undetected. People with elevated blood sugar have a high risk of coronary heart disease, stroke, peripheral vascular disease and renal disease (42). Diabetes increases the risk of coronary heart disease by 2 to 3 times, stroke by 3-4 times, and peripheral arterial disease for 2 to 4 times.

According to the results of the Euro Heart Survey research, diabetes and abnormal glucose tolerance are present in most patients with coronary heart disease in a study GAMI (Glucose Abnormalities in Patients with Myocardial Infarction) found that 67% of patients with myocardial infarction without previously diagnosed diabetes have or newly discovered diabetes or abnormal glucose tolerance.

The young people who are healthy and have elevated blood glucose, often found and elevated levels of total cholesterol, low HDL cholesterol values and elevated or borderline high blood pressure. Elevated blood glucose values, even those who are still within the reference value are an independent prognostic predictor of early mortality in patients with acute myocardial infarction. The pathophysiological mechanisms responsible for cardiovascular changes in patients with diabetes include insulin resistance, hyperinsulinemia, hyperglycemia, elevated levels of free fatty acids, dyslipidemia and arterial hypertension are often present. Metabolic disorders leading to endothelial dysfunction, vasoconstriction, inflammatory response and prothrombotic state, and ultimately to atherosclerosis and its clinical manifestations.

Both types of diabetes mellitus type 1 and type 2 are correlated with significantly increased risk of coronary disease, cerebrovascular disease and peripheral vascular disease and these diseases are the leading cause of morbidity and mortality in patients with diabetes (43).

In people with altered glucose metabolism, progression to diabetes can be prevented or delayed with lifestyle changes and habits. Tendency to develop diabetes is present in those who are overweight (44). Lowering of blood glucose substantially achieve the reduction of incidence

of cardiovascular and coronary heart disease according to a study STOP-NIDDM (Study To Prevent Non-Insulin-Dependent Diabetes Mellitus), where it is found that acarbose, which specifically reduces postprandial glucose levels jump, can reduce the incidence of cardiovascular complications, and meta-analysis of seven studies of acarbose in patients with type 2 diabetes showed that the risk of myocardial infarction was significantly lower in patients treated with acarbose compared to placebo.

In patients with diabetes is important the strict regulation of blood sugar, but also a comprehensive control of other cardiovascular risk factors, especially elevated blood lipids and elevated blood pressure.

Increased body weight

According to the World Health Organization estimates that approximately 1 billion people worldwide have increased weight or are obese. (9).

WHO estimates that about 18 million of children under 5 years old have increased body weight and these children are at increased risk for developing high blood pressure and dyslipidemia in early adulthood (9). Effect of obesity for the occurrence of cardiovascular disease can be divided into direct (effect on heart) and indirectly (through the development of dyslipidemia and hypertension). Indirect effect is a consequence of metabolic changes known as insulin resistance. (table 2.)

Already mentioned Framingham Heart Study showed that weight is the third most important risk factor for coronary disease in men. There are concerns that estimates of obesity index was the best predictor of cardiovascular risk and cardiovascular risk factors: body mass index (BMI), measurement of waist circumference (WC), or the ratio of waist and hip circumference (WHR). Recent studies have shown that the regional distribution of fat may be more important cardiovascular risk assessment of the total body weight. Abdominal obesity in particular has shown great association with metabolic and cardiovascular risk. (45).

Regardless, this measurement of cardiac risk are simple, inexpensive and widely accepted, and increased abdominal obesity (WC), and the relationship between waist-hips are at greatest risk for developing cardiovascular disease, as demonstrated cohort and case-control study (46). Follow-up study of obesity and abdominal fat distribution in older women in America (The Iowa Women's Health Study) showed that in general both measuring thickness distribution in addition to body mass index (BMI), may provide additional information to assess cardiovascular risk (47).

Report of the WHO and the American Institute of Cardiovascular and Lung Diseases (NHLBI) of obesity suggest that measures of abdominal obesity is used as an indicator of metabolic risk factors within each category of body mass index (BMI) (9). Worldwide trend of overweight has doubled in parts of the world where there has been increasing westernization of the traditional diet, as are vegetables, fruits and whole grains replaced with calorific foods, high concentrations of fat, sugar and refined carbohydrates.

3.2. RISK FACTORS FOR THAT CAN NOT BE INFLUENCED

Personal and family history

For most cardiovascular disorders, there are indications that the inherited tendency to get sick. It is not a classical hereditary transmission of the disease, but it is a clear correlation between the disease in parents and occurrence in children.

Genetic endowment or a family history (increased risk in first degree relatives who have had coronary or cerebrovascular disease before the 50-year male gender, before 55-years for females) is indicative of the degree of coronary risk assessment.

Information about premature death due to cardiovascular diseases in a family history should be taken into account in assessing risk in healthy individuals. Needed are advice on positive habits and necessary are also appropriate treatment of risk factors in the case of families with a high prevalence of cardiovascular disease (8).

Special attention is directed to any family of hypercholesterolemia are related to high risk of cardiovascular disease and this requires urgent action because the complications of treatment starting from 30 years of age.

Age

By aging the human body is increasingly exposed to adverse environmental influences and consequences of complications are more common in all organic systems, including the heart and blood vessels.

Risk for coronary heart disease is higher in men above 40 years of age and women over the age of 50 with two or more risk factors.

Risk factors that are directly related to age, coronary heart disease are usually after the sixties, and reduction of risk factors is necessary and advisable in all years except when life is seriously threatened (48).

In an adult male incidence of coronary heart disease increases with age until 60 years of age, and a similar trend in women ranging from 50 years of age.

It is known that coronary heart disease effectively arises and begins in the younger years, and to accelerate in the presence of risk factors. That is why the necessity of correction of risk factors at an early age, and their detection and treatment of all living groups.

Old age is the most important independent risk factor for cardiovascular disease, the risk of stroke doubles in every decade after the age of 55.

Gender

It is known that male gender has a greater risk of developing cardiovascular diseases than women, as long as women are of childbearing age. This effect is attributed to the protective effect of hormones.

In men, cardiovascular risk increases with age. After menopause the incidence of coronary heart disease in men and women are gradually equalized.

At sixty years of age the ratio is 1:1. According to statistics, women get sick less often, but if they get sick more often die as it explains the greater the expected length of life.

3.3. OTHER RISK FACTORS WHICH CAN BE INFLUENCED

Low socio-economic status, such as continuous, inverse relationship with risk of coronary and cerebrovascular disease, then, the use of certain medications (some of oral contraceptives and hormone substitution therapy) may increase the risk of coronary heart disease. Expansion of the left ventricle of the heart is an important indicator of impending cardiovascular death.

Alcohol

Use alcohol at level, for example, one to two drinks a day may reduce coronary heart disease up to 30%, but higher intake can damage the heart muscle. Public recommendations for safe alcohol limit the amount of used and continue to be difficult to make because the harmful social and health effects of alcohol influence and reduce the possible positive effects of moderate alcohol consumption on coronary risk (49). The mechanism of the harmful effects of alcohol on the cardiovascular system refers to an increase in blood pressure and flow to the risk of stroke and coronary attack, the incidence of cardiomyopathy, an increase in the incidence of cardiac arrhythmias (50).

Protective effects of moderate alcohol consumption are related to the modification of several well-known pathological mechanisms that lead to atheroma and that the HDL cholesterol, a favorable effect on fibrinolysis, decrease in platelet aggregation. It is clear that it should be noted that moderate alcohol consumption up to 30 grams per day is not harmful to the cardiovascular system, but without pointing out its protective effects, since it would encourage alcohol consumption could be misinterpreted and lead to excessive intake of alcohol, which increases the risk for total mortality of the population (8).

Psychosocial factors

There is more information and many are professional records that stress, lack of social support, depression and lower social status represents associated (increased) risk factors for coronary heart disease (51). Psychosocial profile of the patient has the strongest argument in explaining the importance of socioeconomic gradient in coronary heart disease emerging.

Heavy physical exertion, inability to control the situation at work, lack of support at work and lack the psychological capacity to successfully cope with stressful situations in life makes it impossible to predict the occurrence of coronary heart disease (52).

There is a general opinion that stress is an important risk factor in the development of myocardial infarction. Among other things, the goal of a five-year INTERHEART study was to examine the relationship between psychosocial factors and stress globally, the incidence of myocardial infarction and results of studies have shown that depression is associated with increased risk for coronary heart disease (22). The results of INTERHEART study showed that the presence of psychosocial stressors is associated with an increased risk of developing acute myocardial infarction (22).

However, stress is a very broad term, consists of several interconnected elements, and therefore it is very difficult to objectify. Psychosocial stress concept includes

external stressors such as workplace stress, severe life events, financial problems, and reactions to such factors as depression, fatigue, anxiety, sleep disorders, etc. Psychosocial stress (chronic life stress, social isolation and mental anxiety increase the risk of coronary and cerebrovascular disease. It is shown that the presence of psychosocial stressors is associated with an increased risk of developing acute myocardial infarction (53).

Nutrition

World Health Organization and other interest groups have shown that a diet with plenty of red meat and fat, excess salt and refined sugar are correlated with increased risk of heart disease (9). In contrast, the diet with more fruits, vegetables, whole grains, seeds, fish and chicken can be protective. Mediterranean diet and the diet rich in fish oil may be helpful in preventing morbidity and mortality from coronary and cardiovascular diseases (54). An unhealthy diet—it is estimated that reducing the intake of fruits and vegetables leads to 31% of patients to coronary artery disease and 11% of cases of stroke worldwide. High intake of saturated fats increases the risk of coronary and cerebrovascular disease by activity of increased fat in the blood on the development of atherosclerotic changes in the vessel wall.

3.4. "NEW" RISK FACTORS

Homocysteine

By the research of the population health status it was found that 1-2% of the population has an increased value of homocysteine, which is determined by the frequency of cerebral and peripheral vascular disease by 20-40% and coronary heart disease by 10-25%.

Homocysteine is an amino acid which is one of the most important for the production of proteins and tissue regeneration. Increased values of homocysteine in the blood in combination with smoking and high blood pressure causes further thickening of the arteries. High levels of homocysteine are associated with early diagnosis of heart and blood vessels and are an independent risk factor for developing coronary disease. A recent prospective study exploration of risk factors to cardiovascular disease have shown that even moderately increased value of homocysteine in the blood, increasing the risk of coronary arteriosclerosis, cerebral and peripheral blood vessels and increase the risk for death from cardiovascular disease.

Meta analysis of 27 research studies of coronary disease showed that homocysteine levels increase for every 5 micromole/l, increases the risk for coronary heart disease by 60% in men and 80% in women. Elevated homocysteine levels showed a correlation with the risk of developing coronary heart disease, and are especially recommended for testing and inclusion of treatment for asymptomatic people who have coronary disease, but have a family history of the early coronary heart disease (55).

Thrombogenic factors

Abnormal coagulation of blood—elevated levels of fibrinogen and other markers of coagulation increases the risk of cardiovascular complications. Fibrinogen is a specific blood protein important for normal blood clotting, but an excess causes agglutination of platelets, causing the artery creates cloth. Fibrinogen can indicate inflammation that

accompanies atherosclerosis and further aggravating the already existing damage to the artery walls. It has been noted that smoking, then sedentary lifestyle, alcoholism, use of estrogen significantly increases the concentration of fibrinogen in the blood.

In addition to fibrinogen and several other factors involved in blood coagulation, which are associated with increased risk of coronary heart disease. The level of factor VII was predictive factors of myocardial infarction in some studies. Plasminogen activator inhibitor 1 (PAI-1) was observed to increase the risk of re-occurrence of myocardial infarction. Increased platelet aggregation is related to increased risk of coronary heart disease. Activation of platelets may be risk factors for acute myocardial infarction and is related to the accelerated glukoprotein IIb / III

Inflammatory factors

It was confirmed that cardiovascular incidents have a higher incidence in patients who have had repetitive viral or bacterial infection. Epidemiological research studies of inflammatory factors and cardiovascular disease have confirmed the correlation of cardiovascular disease and acute incidents with chronic periodontal inflammation, *Helicobacter pylori* infection, *Chlamydia pneumoniae* infection, cytomegalovirus infection.

CRP—C-reactive protein has emerged as an interesting and powerful new clinically useful marker for increased cardiovascular risk (56). C-reactive protein is produced by the liver in the normal immune reaction to injury or infection. Studies have shown that women who have high CRP are seven times more likely to develop heart attacks than women with the low level is one of the explanations that the accumulated cholesterol and fat to burn the blood vessels and because the body reacts by creating an inflammatory elements occurs fat and plaque rupture, followed by vessel blockage (57). The results of the research levels of inflammation markers in patients with cardiovascular incidents—fibrinogen, CRP and others have shown elevated levels (58).

The combination of major coronary risk factors and CRP showed the highest relative risk for myocardial infarction. Large epidemiological studies have shown that increased concentrations of CRP in serum are associated with increased cardiovascular risk in both sexes of patients with coronary disease (24).

In elderly people—men and women, elevated levels of CRP were associated with increased 10-year risk of coronary heart disease, regardless of the presence or absence of other cardiac risk factors (59). Inflammation and several inflammatory factors associated with increased cardiovascular risk, such as elevated C-reactive protein—CRP (60). Results published meta analysis of inflammatory indicators and cardiovascular disease showed that fibrinogen, CRP, inverse protein and the total number of leukocytes in the blood indicate a strong relationship to cardiovascular risk (1)

Prevention of coronary heart disease risk factors

An important shift in the primary prevention of coronary heart disease is the attempt to look at the total atherosclerotic potential, which causes the disease, depending on the interaction of various risk factors.

The concept of risk assessment factors, their reduction, initially begun in the Framingham Heart Study and refined in other models, a basic form the basis for the management of patients by lowering the incidence of coronary heart disease (Pitt B 1999). Primary prevention measures to be taken are to changing lifestyles, reducing risk factors of paramount importance is to reduce morbidity and mortality from cardiovascular disease and improve the overall health of the population. Numerous studies and meta-analysis showed that lifestyle modification, risk reduction factors, particularly by changing diet, stopping smoking, increasing physical activity, blood pressure control can be effective in the prevention and reduction of coronary heart disease. Thus, in Finland, the implementation of prevention programs, reduced incidence of diseases of the circulatory system, close to 70%.

There are scientific evidences that lifestyle changes, while reducing risk factors may slow the development of coronary disease before and after the onset of clinical manifestations of disease (Raljević 2003). Until the mid-nineties, the intervention attempts to change people some of the risk factors were based on assessing the value of each factor and their changing (hypertension, smoking, dyslipidemia, etc.). However, since the mid nineties, the type and intensity of interventions to change risk factors are determined at a higher, more sophisticated level by determining the overall potential for atherosclerotic coronary artery disease (taking into account not all, but the main risk factors). Thus, in humans there is a multifactorial risk of coronary heart disease and the European Society of Cardiology determine the importance of multifactorial risk assessment in relation to the intensity of the intervention on individual habits, taking medication. The concept of probability of the emergence of coronary heart disease based on determining the risk factors, as well as set up tables for predicting the likelihood of the emergence of individual coronary heart disease by using their actual, measured data points that each of them shall give the probability of contracting, and people with coronary heart disease in the future. Although previously is published over 275 different tables for assessment of cardiovascular risk across the world for the occurrence of cardiovascular disease, there are specific characteristics of individual nations and of every population group, overall living standard, so we should take into account the significance that the tables are adequately adjusted. For all these reasons it is recommended the modification of "Tables for coronary risk" for each country (EupoenF. 2003).

Assessing the patient's ultimate or global risk of cardiovascular disease is the first level of prevention and enables physicians to identify and provide an acceptable method of treatment of risk factors (Assmann G.1999). A large study testing risk factors for asymptomatic patients showed the presence of risk factors, their ability to eliminate, so that only full knowledge of the status of the patient's risk factors is the basis in making decisions about how the treatment (JN Cohn 2003).

Since 1994 the European Society of Cardiology, the Association for arteriosclerosis and hypertension have been published "Recommendations for prevention of coronary

heart disease in clinical practice" (Raljević 2003).

In 1996 was organized the meeting of 37 national cardiology organizations in France and reached was an agreement for the strategy and the adaptation, dissemination and implementation of these recommendations in daily clinical practice. Also in 1996 at 27 Bethesda Conference established that treatment of risk factors should be an integral part of optimal care for patients with established diagnosis of disease or risk that can occur after the development of coronary heart disease (Pyörälä K.1994). From that time until today, risk factors, such etiological factors draw attention. Risk factors directly or indirectly modify the degree of development of disease. The concept of risk factors presented in the Framingham study, more than 50 years ago remains the gold standard in assessment of risk factors for coronary heart disease (Pearson T. 2002). Tables that are used to assess coronary risk is most often recommended are basically all purpose use or are based on Framingham study that prospectively followed a total of 5127 Framingham residents (2282 males, 2845 females) aged 30-59 years at the entrance to the study in 1949. Otherwise Framingham is a town about 30 miles west of Boston in New England in the United States at that time had a total of 28000 inhabitants mostly of European origin. Framingham study indicates up to 10 times higher rate in multifactorial etiology of coronary heart disease (Lloyd-Jones DM 2004).

PROCAM (Prospective Cardiovascular Munster) study is based on nine risk factors, where the figures used for the quantitative assessment of risk, using the algorithm and applying it to persons aged 40-65 years. Four-year monitoring of 2754 men aged 40-65 years observed the impact of different risk factors for cardiovascular complications. For those who only had diabetes or hypertension as only risk was 2.5 times higher. But if they were present together, the risk was eight times higher. Or, the presence of abnormal lipid profiles increased the risk by 16 times. But if it was present with diabetes or hypertension, the risk increased by 20 times (Assmann G. 1999).

European Society of Cardiology is using the database from Framingham study in 1994 made the tables prepared on the basis of which the purpose of implementing primary prevention measures based on the values of total cholesterol, systolic blood pressure, as well as continual performance and membership of a particular age group, gender, smoking status and presence of diabetes as a categorical value (membership categories) could determine ten-year risk of coronary heart disease.

New European table for the risk based on HeartScore system (Systematic Coronary Risk Evaluation) and the recommended risk maps established on the basis of large prospective studies in Europe. Table for risk is the result of 3rd Joint Task Force and Joint CVD Prevention Committee, and it is not just about predicting coronary risk but the overall cardiovascular risk. Levels of risk in the next ten years are given in categories below 5%, 5-10%, 10-20%, 20-30%, 30-40% and over 40%. Famous INTERHEART study identified nine risk factors for acute myocardial infarction among others are: blood lipids, smoking, elevated blood sugar, elevated blood pressure, abdominal obesity. The

study showed that the presence of the five most intense easily modified risk factors for coronary heart disease, making about 80% of the risk of acute myocardial infarction (Yusuf S.2005).

American Associations AHA/ACC in the risk assessment used a relationship of total cholesterol and HDL and to emphasize the advantage of the recent European tables. Since around Europe do not routinely measure HDL cholesterol, given the recommendation to use the total cholesterol that is accessible and tables can be used throughout Europe. When the AHA/ACC scoring system adds up all the points we get the so-called assessment of global risk for coronary disease. In the English tables also taken is HDL-cholesterol and factor in the presence or absence of signs of left cardiac ventricle hypertrophy.

In the French tables are also included family history and the entire spectrum of values—whether it is positive in the first predecessor in the family tree, or more distant, whether it occurred early or later.

It is understood that the use of tables, considering the fact that for example when it comes to age, they do not use the exact age (years) for decades, and as for smoking, not the number of cigarettes smoked and the smokers' overall experience, but only the fact of whether someone is a smoker or not, it is understandable that yield approximately a not absolutely accurate value of future risk. However, it is better than no value. In addition, the application of these tables has a very important role in education and health care professionals and patients, because it points to the total coronary atherosclerotic milieu, which exists in every individual, and as you pointed out, there is a relative balance of risks in the same person depending on how to modify risk factors or the relative risk relationships between people.

Practically, the table according to which an individual determines the risk, as well as changing of the risk of coronary heart disease, according to the correction of certain risk factors (smoking, hypertension, cholesterol) is a precious value that can direct the efforts of medical services in the further course of action.

The importance of prevention of risk factors confirmed the evaluation of the risk of coronary disease in primary care, comparing three different tables, and recently has shown that certain risk factors can be eliminated and others reduced, thus slowing the evolution of coronary heart disease and thus moving away occurrence of clinical events and improve prognosis (Isles CG, 2000).

For a correct assessment of the degree of coronary disease severity or risk for its occurrence, the estimated coronary risk, getting so far known and scientifically proven fact that, combined in absolute risk, an indication of the situation and suggest a strategy to modify and eliminate the risk (1). Assessment of coronary disease risk and that risk reduction is the responsibility of medical staff and doctors, particularly primary health care level.

The path of the coronary disease risk assessment and risk reduction is basically based on three steps: 1. assessment of risk factors and other clinical data collection related to patient risk, 2. interpretation of risk and risk indicators in absolute values (in relation to emergence of the dreadful event for a certain time period), or relative risk (presence,

a strong middle, or high risk were compared with age- and sex), 3. based on results of recent risk-appropriate interventions to minimize and eliminate the risk of disease and prevention of risks in the future (65). Estimating total risk of cardiovascular disease we receive the clear data to determine the intensity of preventive measures.

Neither the European nor the American table to determine the future of the absolute risk is not excluded in the risk assessment a positive family history of coronary artery disease, improper nutrition, obesity, physical inactivity, psychosocial factors (personality type, life style, stress), ethnic characteristics, excessive alcohol consumption, hypertriglyceridemia, insulin resistance, the level of homocysteine, lipoprotein (a), fibrinogen, C reactive protein etc. In addition to the tables in some way provide a picturesque understanding and insight into the game and the mutual influence and synergistic risk factors increase or decrease the likelihood of diseases such as coronary heart disease, there are computerized programs that after completing the data input passing through all the tables and automatically reads the likelihood. Such programs are based on a Framingham study (U.S.) or PROCAM (Germany) study and other studies in the world. However, for any individual patient it is necessary to consider their absence or presence in estimating the absolute risk of diseases such as coronary heart disease. One of the weaknesses of these tables is that the absolute risk is underestimated if there is only one risk factor or long-term action may lead to cardiovascular disease (e.g., elevated blood pressure).

Regardless of all the tables and the opportunities that are now provided in the treatment of coronary disease in general should be accessible to every individual patient to assess his risk.

Identification of risk factors and estimates of absolute short term (ten years) and long-term risk of coronary heart disease is the first step in primary prevention. The second step is a kind of re-evaluation of the absolute risk, taking into account the conditional and predisposing risk factors which have not yet found their place in the table. Once determined the absolute risk, the second step is a modification of risk factors that can influence. Risk factors for cardiovascular disease can be divided into four categories according to the possibilities of interventions to modify them individually and so reduce the risk: (I) modify its proven to reduce the risk of CVD, (II) modify their likely reduces the risk of CVD, (III) their modification could reduce the risk of CVD, and (IV) the risk factors that can not be modified. Prediction of absolute risk for coronary disease is not determined by those patients who already have a coronary event, because it is considered that their risk of repeating is more than 20% over the next 10 years. However, no small number of younger patients who are seen in clinical practices that virtually had neither one of the risk factors and look healthy, it is necessary to evaluate cardiovascular risk, and therefore carry out preventive activities.

Regardless of the current research we does not yet know the exact etiopathogenesis of atherosclerosis and coronary heart disease caused by it, but our understanding of

the concept of reduced exposure to various factors, and the theory of probability of action of these factors on the process of atherosclerosis. Since atherosclerosis is in some sense is a generalized disease, it is considered as equivalent to coronary disease, to begin with secondary prevention, it can take a peripheral vascular disease and/or cerebrovascular disease.

4. CONCLUSION

All the above mentioned impose conclusion that at all, especially at the primary health care level, where the determining role of family physicians need to conduct research which would include examination of risk factors for coronary heart disease. These data in this paper, based on the experiences of different studies in the world confirms the importance and significance of using a modified algorithm estimates the overall risk of coronary disease adaptable to our conditions in order to assist the physician practitioners in primary line that easily identifies high-risk groups among their patients, to focus attention on high-risk patients and therapeutic possibilities for them, and point to high risk groups in an effort to encourage the reduction of risk factors to reduce and neutralize the occurrence of coronary disease.

Work should be done on strengthening preventive medicine, which today is increasingly losing its place importance which it deserves and it, or by its methods try to predict or stop the disease until it has not progressed or at least slow down and not deal with the consequences of the disease which is usually treated by aggressive methods. Namely, the results of these methods are very small and barely visible, and sometimes it's too late to apply therapy. All it costs society in terms of frequent absence from work, and increase the number of young disabled, which is a consequence disability by coronary disorders. We should not forget that health is a precious good about where care should be taken not to deal with it only when it is violated, it is important to work on developing the individual's consciousness from an early age, developing healthy eating habits and healthy living. Mentality of our people is such that they start to think about your health only when they lose health, which should be changed in people's mind.

REFERENCES

1. Grundy SM, J. Balady GJ, Criqui MH, Fletcher G, Greenland P (1998) Primary Prevention of Coronary Heart Disease: Guidance From Framingham Circulation, 1997: 1876 – 1887.
2. Masic I, Dilic M, Raljevic E, Vulic D, Mott D. Trends in Cardiovascular Diseases in Bosnia and Herzegovina and Perspectives with HeartScore Programme. *Med Arh.* 2010; 64(5): 260-263.
3. Rahimic M. Ispitivanje modifikiranih algoritama procjene rizika obolijevanja od koronarnih bolesti. Magistarski rad. Medicinski fakultet Univerziteta u Sarajevu. Sarajevo, 2009: 5-40.
4. Epstein HF. The Epidemiology of Coronary Heart Disease. *Am. J Ch Dis.* 1965; 18: 735.
5. World Heart Federation. Available at: <http://www.worldheart.org> Accessed August 20, 2002.
6. Robson J, Boomla K, Hart B, Feder G. Estimating cardiovascular risk for primary prevention: outstanding questions for primary care. *BMJ.* 2000; 320: 702-704.
7. Sans S, Kesteloot D. On behalf of the task force. The burden of cardiovascular disease mortality in Europe, *Europ.heart J.* 1997; 18: 1231-1248.
8. Raljević E, Dilić M, Čerkez F. Prevencija kardiovaskularnih bolesti, Sarajevo 2003: 30-59.
9. World Health Organization. Noncommunicable Diseases and Mental Health, Geneva. 2002: 35. Cardiovascular Disease Programme. Integrated Management of Cardiovascular Risk. Report of a WHO Meeting, Geneva, 9-12 July, 2002.
10. Petersen S, Peto V, Rayner Leal M, Luengo-Fernández R, Gray A. European Cardiovascular Disease Statistics: British Heart Foundation, London, 2005.
11. Leal J, Luengo-Fernández R, Gray A, Petersen S, Rayner M. Economic burden of cardiovascular diseases in the enlarged European Union. *Eur Heart J.* 2006. 27: 1610–1619.
12. Kesteloot H, Sans S, Kromhout D. Dynamics of cardiovascular and all - cause mortality in Western and Eastern Europe between 1970 and 2000. *Eur Heart J.* 2006; 27: 107–113.
13. Tunstall-Pedoe H, Kuulasmaa K, Mahonen M, Tolonen H, Ruokokoski E, Amouyel P. WHO MONICA - monitoring trends and determinants in cardiovascular disease project. Contribution of trends in survival and coronary-event rates to changes in coronary heart disease mortality: 10-year results from 37 WHO MONICA Project populations. *Lancet.* 1999; 353: 1547-57
14. Isles CG, Ritchie LD, Murchie P, Norrie J. Risk assessment in primary prevention of coronary heart disease: randomised comparison of three scoring methods. *BMJ.* 2000; 320: 690-691.
15. Robinson K, Canary RM, Mulcahy R. When does the risk of acute coronary heart disease in ex-smokers fall to that in non-smokers? A retrospective study of patients admitted to hospital with a first episode of myocardial infarction or unstable angina. *Brit Heart J.* 1989; 1: 9-16.
16. American Heart Association. Heart disease and stroke statistics - 2006 update. Dallas, Tex.: American Heart Association, 2006. Accessed December 13, 2006.:
17. Keys A. Coronary heart disease in several canties. *World Health Organization, World Health State.* 1970; 41: 4.
18. Godišnji izvještaj o zdravstvenom stanju stanovništva Federacije BiH. Zavod za javno zdravstvo FBiH, Sarajevo, 2007.
19. Ezzati M, Lopez AD, Rodgers A, et al. Comparative Risk Assessment Collaborating Group. Selected major risk factors and global and regional burden of disease. *Lancet.* 360: 1347-1360.
20. Pitt B, Waters D, Brown WV. et al. Aggressive lipid-lowering therapy compared with angioplasty in stable coronary artery disease. *N Engl J Med.* 1999; 341: 70–76.
21. Grundy SM, Pasternak R, Greenland P, Smith S. Jr., Fuster V. Assessment of cardiovascular Risk by Use of multiple - Risk-Factor Assessment Equations. *Circulation.* 1999; 100: 1481-1492.
22. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanus F, McQueen M, Budaj A, Pais P, Varigos J, Lisheng L. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet.* 2005; 365(9454): 118;
23. Sebastian JZ, Mc Kinney WP, Young MJ. Epidemiology and interaction of risk factors in cardiovascular disease. *Prim Care.* 1989; 6, 31-47.
24. Pearson TA, Blair SN, Daniels SR, Eckel RH, Fair JM, Fortmann SP, Franklin BA, Goldstein LB, Greenland P, Grundy SM, Hong Y, Houston Miller N, Lauer RM, Ockene IS, Sacco RL, Sallis JF Jr, Smith SC Jr, Stone NJ, Taubert KA. AHA guidelines for primary prevention of cardiovascular disease and stroke: 2002 update: consensus panel guide to comprehensive risk reduction for adult patients without coronary or other atherosclerotic vascular diseases. *Circulation.* 2002; 106: 388-391.
25. Stamler J. Epidemiology, established major risk factors, and the primary prevention of coronary heart disease. *Cardiology an illustrated text/reference cardiovascular disease.* 1991; 2: 2-34.
26. Smith S, Jr, Jackson R, Pearson TA, Fuster V, Yusuf S, Faergeman O., Wood DA, Morgan J, Home P, Hunn M, Grundy SM. Principles for National and Regional Guidelines on Cardiovascular Disease Prevention *Circulation.* 2004; 109: 3112-3121.
27. Nissen SE, Tuzcu EM, Libby p, Thompson RD, et al. Effect of anti-hypertensive agents on cardiovascular events in patients with coronary disease and normal blood pressure: the CAMELOT study: a randomized controlled trial. *JAMA.* 2004: 292: 2217-2226.
28. Lenfant C, Chobanian A, Jones D, et al. Seventh report of the Joint

- National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7): resetting the hypertension sails. *Hypertension*. 2003; 41: 1178-1179.
29. The ACCORD trial: a multidisciplinary approach to control cardiovascular risk in type 2 Diabetes mellitus. *Pract Diabetol*. 2004; 23: 6-11.
 30. Lewington S, Clarke R, Qizilbash N, Peto R, Collins R; Prospective Studies Collaboration. Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies *Lancet*. 2002; 360: 1903-1913.
 31. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report *JAMA*. 2003; 289: 2560-72.
 32. Ramachandran S, French JM, Vanderpump J, Croft P, Nearly RH. Using the Framingham model to predict heart disease in United Kingdom: retrospective study. *BMJ*. 200; 320: 676-677.
 33. ALLHAT Officers and Coordinators for the ALLHAT Collaborative Research Group. The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial. Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic: The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *JAMA*. 2002; 288: 2981-97.
 34. Rocchini AP. Insulin resistance, obesity and hypertension. *J Nutr*. 1995; 125: 1718-24.
 35. Chen Z, Peto R, Collins R, MacMahon S, Lu J, Li W. Serum cholesterol concentration and coronary heart disease in population with low cholesterol concentrations. *BMJ*. 1991; 303: 276-82
 36. Pedersen TR, Kjekshus J, Pyorala K et al. Effects of simvastatin on ischemic signs and symptoms in the Scandinavian Simvastatin Survival Study (4S). *Am J Cardiol*. 1998; 81: 333-5.
 37. Colhoun H, Betteridge DJ. Primary prevention of cardiovascular disease with atorvastatin in type 2 diabetes in the Collaborative Atorvastatin Diabetes Study (CARD): multicentre randomized placebo - controlled trial. *Lancet*. 2004; 364: 685-696.
 38. Leys D, Deplanque D. Statins and stroke. *Therapie*. 2003; 58: 49-58.
 39. Dwyer JH. Exposure to environmental tobacco smoke and coronary risk. *Circulation*. 1997; 96: 1430-7
 40. Edwards R. The problem of tobacco smoking *BMJ*. 2004; 328: 217-219.
 41. Berlin J, Colditz G. A meta-analysis of physical activity in the prevention of coronary heart disease. *Am J Epidemiol*. 1990; 132: 612-628.
 42. Buse JB, Ginsberg HN, Bakris GL, Clark NG, Costa F, Eckel R, Fonseca V, Gerstein HC, Grundy S, Nesto RW, Pignone MP, Plutzky J, Porte D, Redberg R, Stitzel KF, Stone NJ. Primary Prevention of Cardiovascular Diseases in People With Diabetes Mellitus *Circulation*. 2007; 115: 114-126.
 43. Fox CS, Coady S, Sorlie PD, Levy D, Meigs JB, D'Agostino RB Sr, Wilson PW, Savage PJ. Trends in cardiovascular complications of diabetes. *JAMA*. 2004; 292: 2495-2499.
 44. Fox CS, Coady S, Sorlie PD, Levy D, Meigs JB, D'Agostino RB Sr, Wilson PW, Savage PJ. Trends in cardiovascular complications of diabetes. *JAMA*. 2004; 292: 2495-2499.
 45. Despres J, Moorjani S, Lupien PJ, Tremblay A, Nadeau A, Bouchard C. Regional distribution of body fat, plasma lipoprotein, and cardiovascular disease. *Arteriosclerosis* 1990; 10: 497-511.
 46. Larsson B, Svardsudd K, Welin L, Wilhelmsen L, Bjorntorp P, Tibblin G. Abdominal adipose tissue distribution, obesity and risk of cardiovascular disease and death: 13 year follow up of participants in the study of men born in 1913. *BMJ*. 1984; 288: 1401-1411.
 47. Folsom A, Kushi LH, Anderson KE, Mink PJ, Olson JE, Hong CP, Sellers TA, Lazovich D, Prineas RJ. Associations of general and abdominal obesity with multiple health outcomes in older women: the Iowa Women's Health Study. *Arch Intern Med*. 2000; 160: 2117-2128.
 48. Arthur J, Barsky M, Hochstrasser B, Coles N, Zisfein JO, Donnele C, Eagle KA. Silent Myocardial Ischemia. *JAMA*. 1990; 9: 1132-1135.
 49. Dol R, Peto R, Hall E, Wheatley K, Gray R. Mortality in relation to consumption of alcohol; 13 years observations on male British doctors. *BMJ*. 1994; 309: 911-8.
 50. Mukamal KJ, Jensen MK, Gronbaek M, Stampfer MJ, Manson JE, Pischon T, Rimm EB. Drinking frequency, mediating biomarkers, and risk of myocardial infarction in women and men. *Circulation*. 2005; 112: 1406-1413.
 51. Smith SC, Jr, Jackson R, Pearson TA, Fuster V, Yusuf S, Faergeman O, Wood DA, Alderman M, Horgan J, Home P, Hunn M, Grundy SM. Principles for National and Regional Guidelines on Cardiovascular Disease Prevention: A Scientific Statement From the World Heart and Stroke Forum *Circulation*, 2004.
 52. Everson SA, Kauhanen J, Kaplan GA, et al. Hostility and increased risk of mortality and acute myocardial infarction. The mediating role of behavioural risk factors. *Am J Epidemiol*. 1997; 146: 142-52.
 53. Rosengren A, Hawken S, Ounpuu S, Sliwa K, Zubaid M, Almahmeed WA, Blackett KN, Sithi-amorn C, Sato H, Yusuf S. Association of psychosocial risk factors with risk of acute myocardial infarction in 11119 cases and 13648 controls from 52 countries (the INTERHEART study: case-control study *Lancet*. 2005, 365(9454): 118;
 54. Waxman A. Prevention of chronic diseases: WHO global strategy on diet, physical activity and health. *Food Nutr Bull*. 2003; 24: 281-4.
 55. Malinow MR, Bostom AG, Krauss RM. Homocysteine, diet, and cardiovascular diseases: a statement for healthcare professionals from the Nutrition Committee, American Heart Association. *Circulation*. 1999; 99: 178-182.
 56. Pepys MB, Hirschfield GM. C-reactive protein: a critical update. *J Clin Invest*. 2003; 111: 1805-1812.
 57. van der Meer IM, de Maat MPM, Kiliaan AJ, van der Kuip DAM, Hofman H, Wittman JCM, The Value of C-Reactive protein in cardiovascular Risk Prediction. *Arch Intern Med*. 2003; 163: 1323-1328.
 58. Fortmann SP, Ford E, Criqui MH, Folsom AR, Harris TB, Hong Y, Pearson TA, Siscovick D, Vinicor F, Wilson PF. CDC/AHA workshop on markers of inflammation and cardiovascular disease: application to clinical and public health practice: report from the Population Science Discussion Group. *Circulation*. 2004; 110: e554-e559.
 59. Paul A, Ko KW, Li L, Yeohor V, McCrory MA, Szalai AJ, Chan L. C-reactive protein accelerates the progression of atherosclerosis in apolipoprotein E-deficient mice. *Circulation*. 2004.
 60. Danesh J, Wheeler JG, Hirschfield GM, Eda S, Eiriksdottir G, Rumley A, Lowe GD, Pepys MB, Gudnason V. C-reactive protein and other circulating markers of inflammation in the prediction of coronary heart disease. *N Engl J Med*. 2004.
 61. Assmann Gerd. Calculating global risk: the key to intervention. *European Heart Journal Supplements Volume 7, Suppl F*: 2005.
 62. Cohn JN, Hoke L, Whitwam W, et al. Screening for early detection of cardiovascular disease in asymptomatic individuals. *Am Heart J*. 2003; 146: 679-85.
 63. Pyorala K. De Backer G. Graham I. Poole-Wilson P. Wood D. Prevention of coronary heart disease in clinical practice. Recommendation of the Task Force of the European Society of cardiology, European Atherosclerosis Society and European Society of Hypertension, *Eur Heart J*. 1994; 15: 1300-31.
 64. Loyd-Jones DM, Wilson PW, Larson MG, Beiser A, Leip EP, D'Agostino RB, Levy D. Framingham risk score and prediction of lifetime risk for coronary heart disease. *Am J Cardiol*. 2004 Jul 1; 94(1): 20-4.
 65. Anderson KM, Odell PM, Wilson PWF, Kannel WB. Cardiovascular disease risk profiles. *Am Heart J*. 1991; 121: 293-298.

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