

# A Modern Pathway to the Prevention of Cardiovascular Diseases

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Original Article

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Source: *Clinical Social Work and Health Intervention*  
Pages: 24 – 31

Volume: 14  
Cited references: 9

Issue: 4

## Reviewers:

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## Keywords:

Prevention. Cardiovascular Diseases. Nutrition. Patient.

## Publisher:

International Society of Applied Preventive Medicine i-gap

CSWHI 2023; 14(4): 24 – 31; DOI: 10.22359/cswhi\_14\_4\_04 © Clinical Social Work and Health Intervention

## Abstract:

**Introduction:** Nutrition is an essential lifestyle factor for maintaining good health. The correct composition of food is an essential part of the prevention of cardiovascular diseases. Proper nutrition is a basic prerequisite for healthy human development and the main condition for the prevention of cardiovascular diseases. Therefore, in our research, we focused on the modern prevention of cardiovascular diseases.

**Research sample group and research objective:** We approached 240 cardiology clinic patients who came for a check-up cardiology examination with various cardiology diagnoses. The goal of the research was to map the level of awareness of

the adult population in the context of modern prevention of cardiovascular diseases.

**Methods:** To verify the hypotheses, we used the tools of inductive statistics, Chi-square test. We made the decision about the significance of the differences based on the calculated value and a significance level of 0.05.

**Results:** Through a deeper analysis, we found that the awareness about modern prevention of cardiovascular diseases, i.e., the consumption of black coffee, red wine 0.2 dl per day, 70% dark chocolate, and Omega 3 fatty acids is unsatisfactory among our selected sample of respondents. We also found a statistically significant relationship between cardiology diagnoses and BMI in a selected sample of respondents. The frequency of cardiology examinations has an effect on respondents' awareness of modern prevention of cardiovascular diseases.

**Conclusion:** The role of the prevention and reduction of risk factors in society is not only a small part necessary to prevent the occurrence and spread of cardiovascular diseases, it is an important element needed to improve the overall health of the population. Such prevention can be achieved mainly by providing sufficient information and supporting and motivating individuals to have a better lifestyle, as well as by creating greater interest and responsibility for their own health.

## Introduction

The unfavourable state of the environment in combination with the way of life leads to the emergence of cardiovascular diseases, which, due to their importance, constitute one of the biggest problems of our population. Diet largely contributes to an unhealthy lifestyle. Nutrition contributes 20-60 percent to the development of cardiovascular diseases. A healthy diet reduces the risk through several mechanisms - through a decrease in body weight, a decrease in blood pressure, an improvement in the levels of fatty substances and glucose in the blood, and others. Biologically valuable food should contain all the substances that the body needs in the necessary quantity and in the optimal ratio and should not contain substances that can harm the body. In order for a person to be able to regulate their own nutrition and change their eating habits, they must have basic information about nutrition and the composition of food.

Interest in a healthy lifestyle (healthy eating, stress prevention, active participation in screening programs, common physical activities) is a good starting point for creating a community. Community activities represent

a flexible and at the same time effective way of implementing primary prevention in its everyday form (1).

## Healthy foods - prevention of cardiovascular diseases

Nutrition is an essential lifestyle factor for maintaining good health. The correct composition of food is an essential part of the prevention of cardiovascular diseases, and above all, atherosclerosis. Proper nutrition is a basic prerequisite for healthy human development and the main condition for the prevention of cardiovascular diseases (2).

**Flavonoids** (vitamin P) – These phenolic substances occur naturally in plants and help protect against harmful influences. Together with vitamins C and E and enzymes with antioxidant effects, they help create and strengthen the body's overall defence system. Several studies have demonstrated a direct effect of flavonoids on reducing the incidence of coronary heart disease and myocardial infarction. From apples to onions, almost all fruits and vegetables are rich in bioactive plant substances, including flavonoids. Flavonoids are abundant in red cabbage,

broccoli, red grapes, green tea, and dark chocolate with 70% cocoa content.

**Black chokeberry – (proanthocyanidins)** - They represent a group of condensed flavonoids. Aronia reduces high blood pressure and eye pressure, has a beneficial effect on the flexibility and strength of blood vessels, helps with varicose veins, has an anti-sclerotic and anti-inflammatory effect.

**Sea buckthorn fruits and oils** – It contains omega-7 fatty acid, which is rarely found in nature, and has a high antioxidant effect. It stimulates the work of the heart muscle, supports the elasticity of veins and arteries, reduces blood clotting and the formation of blood clots. They reduce total cholesterol, LDL cholesterol and increase HDL cholesterol.

**Garlic** – Its essential oils reduce elevated cholesterol levels, it has antioxidant properties, it is a natural aspirin. It helps regulate high blood pressure.

**Almonds** - Monounsaturated fatty acids, which make up 90% of almond fat, reduce LDL cholesterol and lower blood pressure.

**Salmon** – Salmon and other fatty fish like sardines, tuna, cod and mackerel are among the superstars of heart-healthy foods. They contain a huge amount of omega-3 fatty acids (DHA and EPA).

**Soy** – Soy products, including tofu, soy butter and soy milk, are a good way to add protein to our diet without unhealthy fats and cholesterol. They contain a high amount of polyunsaturated fats, fibre, vitamins and minerals. It lowers blood pressure and LDL cholesterol.

**Avocado** – Rich in unsaturated omega-3 fatty acids, it reduces the level of dangerous fats in the blood. It supplies vitamin B, protecting the heart.

Other healthy foods for the heart and blood circulation: flax seeds, potatoes, broccoli, pineapple, eggplant, berries, tomato, buckwheat, Brussels sprouts, spinach and others (3).

**Black coffee and tea** - Caffeinated coffee is an important source of natural antioxidants, of which there are even more in coffee than in tea when carefully prepared. Xanthines themselves, including caffeine, also have antioxidant effects. It should be remembered that roasting creates not only the wonderful aroma of coffee, but also some antioxidants. In medical records, drinking

black coffee is still registered as abuse, among harmful habits. Compared to black tea, green tea has a higher concentration of antioxidants by only 0.9 mmol/l. Black tea has a wider range of antioxidants compared to green tea. The concentration of caffeine in both types of tea is the same, approximately 2x higher than in coffee. Caffeine has a beneficial effect on blood vessels, improves blood circulation in the brain, kidneys and heart, and also has proven antioxidant effects. If we want to achieve a beneficial protective effect on health, e.g. on the vascular wall, you need to drink 5-6 cups of tea during a day.

**Cocoa and chocolate** - The overall effects of chocolate on human health are currently evaluated mostly negatively. 70% real chocolate, which is rich in antioxidants, minerals, vitamin D, causes vasodilation modified by flow, reduces the adhesion of blood platelets, which prevents the formation of blood clots that causes a heart attack or stroke. Real chocolate even reduces insulin resistance, thus improving the utilization of glucose (4).

**Alcohol – red wine** - Red wine is produced by maceration of grape skins, which leaches into the wine substances belonging to effective antioxidants, these are various polyphenols such as flavonoids, procyanidins and proanthocyanidins. Resveratrol is produced by some plants when they are attacked by pathogenic microorganisms such as bacteria or fungi. It is found in the skin of red grapes, in some types of berries (black currants, blueberries, pomegranate, etc.). Eating foods with a high content of resveratrol has a significant beneficial effect on our health, especially on the function of the heart and blood vessels. Resveratrol is one of the most important antioxidants, it prevents chronic inflammation, prevents the formation of blood clots, reduces fibrillation and improves blood vessel function (3).

### **Medicinal plants that regulate blood pressure values:**

**White mistletoe** (*Viscum album*) - regulates blood pressure. It lowers high blood pressure, adjusts low blood pressure. It slows down the accelerated heart rate.

**One-seeded hawthorn** (*Crataegus monogyna*) - expands the blood vessels supplying the heart and increases the performance of the heart muscle, expands the peripheral blood vessels.

**Rosemary** (*Rosmarinus officinalis*) - strengthens the heart, improves blood circulation.

**Ginkgo biloba** - improves blood flow to the brain, adjusts irregular activity of the heart. It dilates blood vessels and improves cerebral blood flow and coronary flow.

**Garlic** (*Alium sativum*) - is used in the treatment of cardiovascular diseases, after strokes, atherosclerosis and other vascular diseases.

**Black chokeberry** (*Aronia melanocarpa*) - increases the speed of blood flow, which is suitable for the treatment of hypertension, and has a positive effect on the flexibility and strength of blood vessels (2).

### Research objective:

The main goal of the research was to map the level of awareness of the adult population in the context of modern prevention of cardiovascular diseases. Another goal was to find out whether the duration of cardiovascular diseases has an impact on the awareness of modern prevention of cardiovascular diseases. A third aim was to assess whether the annual interval of cardiology examinations has an impact on awareness in connection with modern prevention of cardiovascular diseases. We were also interested in whether BMI is related to the type of cardiovascular diseases of the respondents.

### Research sample group and methodology

Our research was carried out on a selected set of patients of a cardiology outpatient clinic who came for a follow-up cardiology examination with various cardiology diagnoses. 240 re-

spondents were included in the research. Their age range was from 21 to 82, there were both females and males, and they had different levels of education. We verified the hypotheses with inductive statistics, statistical tests, and the Chi-square test. We used a significance level of 0.05.

### Results

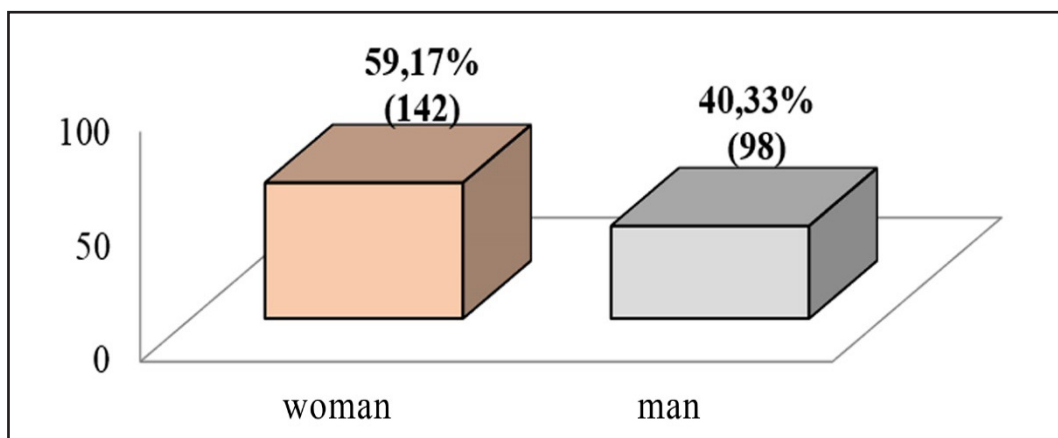
In the first categorization question, we found out the gender of the respondents.

A total of 240 (100%) respondents took part in the research. Of the total 240 respondents, there were 142 women (59.16%) and 98 men (40.83%).

The second categorization question was aimed at calculating their body mass index (BMI).

By asking a question about height and weight, we wanted to find out the body mass index (BMI). Of the total number, 48 (20%) respondents had a normal weight. 92 respondents, i.e., 38.33% were overweight. 54 (22.50%) respondents were suffering from class 1 obesity. According to the body mass indexes, 34 (14.16%) respondents had class 2 obesity and 12 respondents, or 5%, had the most severe type of obesity. The individual body weight index was given according to the gender of the respondents, and 8 (16.32%) men and 16 (22.56%) women had a normal weight. 22 respondents, i.e., 44.89% of men and 24 women (33.80%) were overweight. Both men and women suffer from class 1 obesity. 4 (8.16%) men and 17 (14.16%) women were class 2 obese. 4 men, i.e., 8.16%, and 2 women, i.e., 2.81%, were suffering from the most severe, class 3 obesity.

**Graph 1** Gender of respondents



**Graph 2** BMI of respondents



**Hypothesis testing**

**H1** BMI is related to the type of cardiovascular disease of the respondents

The chi-square value is 19.64208545 and the degree of freedom (df) is 8. The Pearson chi-square critical value for 8 degrees of freedom and 5% significance level is 15.51. The chi-square value is greater than the critical value, and the p value of 0.011778388 is less than the significance level of 0.05, so we can say that there is a statistically significant relationship (significance) between cardiology diagnoses and BMI in the selected sample of respondents. Respondents who survived a heart attack (52.38%) are overweight. Respondents with high blood

pressure are the most obese (41.14%). Respondents with heart rhythm disorders are overweight (86.36%). Respondents with heart failure are obese (60%). Valve defects are not affected by weight according to data analysis.

**H2** The annual interval of cardiology examinations has an impact on respondents' awareness of modern prevention of cardiovascular diseases

The chi-square value is 17.42431 and the degree of freedom (df) is 3. The Pearson chi-square critical value for a degree of freedom of 3 and a significance level of 5% is equal to 7.82. The chi-square value is greater than the critical value. We confirmed the statistical significance between

**Table 1** Contingency table for processing hypothesis H1

observed frequencies	I overcame a heart attack	I am being treated for high BP	I am being treated for heart rhythm disorders	heart failure	I am being monitored for valve defects	Total
Normal weight	4	16	12	4	12	48
overweight	22	24	18	16	12	92
obesity	16	28	14	30	12	100
Total	42	68	44	50	36	240
Df	8			15,51		
p value	0,011778388					
chi test	19,64208545					

**Table 2** Contingency table for processing hypothesis H2

observed frequencies	informed	uninformed	total
every 3-4 months	76	46	122
semiannually	24	42	66
once in a year	12	20	32
only as needed	6	14	20
Total	118	122	240
Df	3	7,82	
chi test	17,42431		
p value	0,000578019		

**Table 3** Contingency table for processing hypothesis H3

observed frequencies	informed	uninformed	total
less than 1 year	18	12	30
1 to 5 years	36	24	60
6 to 10 years	32	46	78
11 to 15 years	8	12	20
more than 15 years	24	28	52
Total	118	122	240
Df	4	9,49	
chi test	7,155834		
p value	0,127879		

visits to the cardiology outpatient clinic and patient awareness based on the chi-square and p value of 0.000578019, which is lower than the significance level of 0.05. It follows that there is a statistically significant dependence (significance) between respondents' awareness and the annual interval of cardiology examinations.

**H3** The duration of cardiovascular diseases has an effect on the respondents awareness of modern prevention of cardiovascular diseases.

The chi-square value is 7.155834 and the degree of freedom (df) is 4. The Pearson chi-square critical value for a degree of freedom of 4 and a significance level of 5% is 9.49. The chi-square value is lower than the critical value. Statistical dependence between the items was not confirmed. We can therefore claim that there is no statistically significant dependence (significance) between the length of the cardiology disease and the respondents' awareness.

Respondents who have been treated for less than 1 year or up to 5 years are better informed about modern prevention of cardiovascular diseases than respondents who have been treated for more than 5 years.

## Discussion

Cardiovascular diseases are the main cause of death for more than 4 million people in Europe every year. Therefore, the prevention of cardiovascular diseases, whether in the general population or at the individual level in patients with high cardiovascular risk or documented ischemic heart disease, represents one of the most important tasks in reducing mortality from cardiovascular diseases (5).

Due to this fact, our research focused on the awareness of the adult population in the context of modern prevention of cardiovascular diseases. We investigated whether the length of treat-

ment for cardiovascular disease has an impact on the awareness of modern prevention of cardiovascular diseases. We were also interested in whether the annual interval of cardiology examinations has an impact on awareness in connection with modern prevention of cardiovascular diseases and whether BMI is related to the type of cardiovascular disease of the respondents. We ascertained awareness of modern prevention of cardiovascular diseases using respondents' opinion on the consumption of black coffee, red wine (0.2 dl per day), 70% dark chocolate, and omega-3 fatty acids.

Our research was carried out on a set of patients of a cardiology outpatient clinic who came for a check-up cardiology examination with various cardiology diagnoses. 240 respondents were included in the research. The age range of the respondents was from 21 to 82 years and 142 (59.16%) were female and 98 (40.83%) were male. When measuring the body mass index (BMI), we found that 48 (20%) of the respondents had a normal weight. 92 respondents, or 38.33%, were overweight. 54 (22.50%) respondents were suffering from class 1 obesity. According to the body mass index, 34 (14.16%) respondents had class 2 obesity, and 12 respondents, or 5%, have the most severe obesity. We verified the hypotheses with inductive statistics, statistical tests, and a chi-square test. We used a significance level of 0.05. With the first hypothesis, we determined a statistically significant dependence between cardiology diagnoses and BMI in a selected sample of respondents. The relationship between cardiology diagnoses and BMI was confirmed. According to WHO global data, more than 1.4 billion people (aged  $\geq 20$  years) are found to be overweight. Of these people, more than 200 million were men and almost 300 million were women. Due to this fact, experts rightly consider obesity an epidemic of the 3rd millennium (6). With another hypothesis, we found that the annual interval of cardiology examinations has an impact on the awareness of modern prevention of cardiovascular diseases. In the last hypothesis, we found that the duration of cardiovascular diseases has no influence on the awareness of modern prevention of cardiovascular diseases. We were also interested in the respondents' opinion on the consumption of black coffee. We found that only 76 (31.66%) respondents indicated that

black coffee has a positive effect on the heart and blood vessels. Despite past concerns that coffee could damage the heart, studies have shown no link to heart diseases. On the contrary, one study of 41,836 healthy women aged 55 to 69 found that one to six cups of coffee a day (both caffeinated and decaffeinated) reduced the risk of death from heart diseases. The most powerful protective effect has 4 to 6 cups per day (7). We were interested in the respondents' opinion on the consumption of red wine (0.2 dl per day). 112 respondents (46.66%) think that it has a good effect on the heart and blood vessels. Only 10 (4.16%) respondents think that it damages the heart muscle. The largest group, 118 (49.16%) respondents, could not answer and chose the option "don't know". The author Horáková (3) deals with the question: Why do men live longer in some areas of Europe? Doctor Roger Corder found the answer to this question. Together with his team, he studied several groups of people who lived to be a hundred years old. Research has provided insight into the types of wines that are best for long-lasting healthy living. He identified a substance in red wine that is responsible for reducing the risk of coronary heart disease and reducing overall mortality with moderate regular consumption of red wine. He proved that it is not resveratrol and quercetin as previously thought, but the procyanidines found in wine that are the most effective. The results of the Cordera team's research showed that even after two weeks of 125 ml of procyanidin-rich wine daily, they set positive health effects on the cardiovascular system. The respondents' opinions of dark chocolate were predominantly positive. 132 (55%) think that 70% dark chocolate has a good effect on the cardiovascular system. 26 (10.83%) respondents reacted very positively. On the other hand 48 (20%) respondents think that dark chocolate does not have a positive effect on the cardiovascular system. The author Horáková (3) states that many studies have confirmed that dark chocolate can be useful for our heart. In fact, one publication published in the Heart Journal in 2012 reported that consuming a small amount of dark chocolate daily reduced the risk of heart attacks and strokes in people at high risk of developing these problems. This finding only applies to dark chocolate, meaning chocolate that contains at least 60 to 70 percent cocoa (2). Next,

we investigated the opinion on omega-3 fatty acids. 146 (60.83%) respondents think that omega 3 fatty acids reduce blood cholesterol. Only 6 (2.50%) respondents answered that it increases blood pressure. Other respondents in the number of 88 (36.66%) answered with the option “I don’t know”. Authors Dudová-Skripová, Pella (8) state that the positive effects of omega 3 polyunsaturated acids (n-3 PUFA) are probably mediated through their antiarrhythmic, lipid-lowering, antithrombotic and anti-inflammatory properties. More and more, treatment with n-3 PUFA holds great promise for primary, but especially for secondary prevention of cardiovascular diseases. Many studies have shown that adequate consumption of fish oil reduces the incidence of cardiovascular events, especially acute myocardial infarction, sudden cardiac death, etc. In the Italian GISSI study, patients after myocardial infarction were given 1 g of omega-3 fatty acids daily in addition to standard treatment. After 3 months, mortality compared to the control group was reduced by 41% and after 4 months by up to 50%. The beneficial effects were also confirmed by studies focusing on cardiac arrhythmias. However, omega-3 fatty acids have many other beneficial effects. They have an anti-inflammatory effect, prevent hypertension (high blood pressure), reduce the risk of blood clots, and suppress autoimmune reactions (8).

## Conclusion

Cardiovascular diseases are an increasingly common problem nowadays, they occur more and more frequently in society, even among younger people. Cardiovascular diseases can be largely prevented. Population-wide measures and improved access to health care can significantly reduce the health and socio-economic burden caused by cardiovascular diseases and reduce the risk factors of the disease. Likewise, in the work environment, management can pay close attention to activities that reduce the stressful environment of employees (Jankelová, Czarneczki, 2021). Addressing cardiovascular disease requires sustained and concrete action in areas that are key components of any global or national strategy: surveillance and monitoring, prevention and reduction of risk factors. The role of prevention and reduction of risk factors in society is not only a small part necessary to

prevent the occurrence and spread of cardiovascular diseases, but it is an important element necessary to improve the overall health of the population, to increase life expectancy and also to increase the productive age. Such prevention can be achieved mainly by providing sufficient information, supporting and motivating individuals to a better lifestyle, but also to greater interest and responsibility for their own health and subsequent regular preventive check-ups with general practitioners and specialists.

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