

# Quality of nutrition and health knowledge in subjects with diagnosed cardio-vascular diseases in the Polish population – National Multicentre Health Survey (WOBASZ)

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## Abstract

**Background:** Dietary treatment plays an important role in prevention of cardiovascular diseases (CVD). A significant factor that influences the fulfilment of dietary recommendations is also the knowledge of non-pharmacological methods of CVD prevention.

**Aim:** To evaluate the health knowledge and the dietary behaviours among subjects with established CVD and to assess how many of them meet recommended dietary allowances (RDA) for secondary prevention.

**Methods:** Within the framework of the National Multicentre Health Survey (WOBASZ), a representative sample of 7257 persons of the whole Polish population aged 20-74 was screened in years 2003-2005. A subsample of 803 persons (males – 430, females – 373) with a clinical history of myocardial infarction and/or coronary artery disease and/or heart failure and/or stroke and/or arrhythmia and/or PCI and/or coronary bypass surgery was analysed. Nutrients intake and health knowledge were assessed according to the study protocol.

**Results:** The evaluated group was characterised by a high prevalence of persons with obesity (70%), ex-smokers (49% in males and 22% in females) and smokers (27% and 13%, respectively). The proportion of patients with knowledge of the following CVD prevention methods was very low: weight reduction (33 vs. 35% males vs. females), increase of physical activity (54 vs. 52% respectively), salt reduction (23 vs. 21%), reducing fat intake (37 vs. 36%), and regular consumption of fruits and vegetables (23 vs. 23%). The low level of dietary knowledge was reflected by dietary behaviours. A low fat and low cholesterol diet was reported only by every 5<sup>th</sup> patient and a low calorie diet by every 100<sup>th</sup>. Adding salt to previously seasoned dishes was reported by 25% of males and 19% of females. Respectively, 49 and 32% consumed meat products with visible fat. The prevalence of persons whose diet met RDA was unsatisfactory. The degree of fulfilment of recommendations as to anti-oxidant vitamins (A, C and E), proteins, cholesterol and fruits and vegetables was relatively the best; however, also in this case only 40-80% of respondents followed the recommendations. The intake of fats, fatty acids and carbohydrates was less satisfactory. The correct amount of those nutritional components was consumed only by 20-39% of assessed patients. The worst situation was noted as to the intake of B vitamins, calcium and magnesium. The recommendations for those vitamins and minerals was followed only by 11-37% of evaluated persons.

**Conclusions:** In the Polish population subjects with established CVD are characterised by a low level of knowledge of non-pharmacological methods of preventing heart diseases and low quality of nutrition.

**Key words:** secondary prevention, diet quality, dietary habits, nutrition knowledge, health knowledge

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## Introduction

A well-balanced, low-fat, antioxidant vitamin-rich diet is one of the important elements of secondary prevention of cardiovascular disease (CVD). Case-control studies have demonstrated a strong correlation between quality of diet and the prevalence of CVD [1-3], which has also been shown on the metabolic level. [4]. Dietary habits seem to be easily modifiable; however, tradition and faulty dietary patterns originating from the family home and consolidated for many years are strong habits and even individuals who have undergone severe CV events do not follow dietary recommendations.

The awareness of non-pharmacological methods of CVD treatment is an important element affecting the accomplishment of dietary recommendations. Those individuals who are aware of how important a proper diet, cessation of smoking and physical activity are in the treatment of CVD are more willing to follow the rules of a healthy lifestyle.

It should be emphasised that no studies regarding the quality of nutrition and health-associated behaviours in secondary prevention of CVD that would include a representative group of all adult individuals in our country have been conducted so far.

The results of a National Multicentre Health Survey (WOBASZ) based on standardised methods allowed the evaluation of the discussed issues in the population of Poland.

The aim of the study was:

- the assessment of the awareness of non-pharmacological methods of CVD prevention and dietary behaviours in patients with a history of CV events;
- the evaluation of the prevalence of individuals who meet recommended dietary allowances (RDA) for secondary prevention.

## Methods

Data obtained from the WOBASZ study, conducted in the years 2003-2005 by the Institute of Cardiology in cooperation with Medical Universities in Gdańsk, Katowice, Poznań, Łódź and the Jagiellonian University in Kraków constituted the material for the analysis. The study included a representative random sample of Polish inhabitants aged 20-74 years. The objectives and methods of the WOBASZ study, as well as the methods of sample collection and the study design, have been described in the previous reports [5, 6].

In brief, the random selection process involved two steps and was stratified according to province and commune type. In each province of Poland 6 communities were selected for the study (2 small communities, 2 medium-size communities, and 2 large communities), and additionally, 12 major cities, which were not included in the primary study were also examined. In each of the communities and each major city the personal

identification numbers of 100 males and 100 females were randomly selected from the database. In all responders a wide range of classical risk factors was evaluated based on questionnaire data and laboratory as well as anthropometric findings, including their knowledge of the prevention of CVD. The history of current or past illnesses, including diabetes, hypertension and angina was also taken. Additionally, in 50% of all responders dietary habits were assessed.

A total of 6977 males and 7792 females were examined, among whom in 3418 males and 3839 females dietary habits were assessed.

For the purpose of the study a group of individuals who had a history of hospitalisation for myocardial infarction and/or coronary artery disease and/or heart failure and/or stroke and/or arrhythmia and/or PCI and/or coronary bypass surgery was selected from the responders participating in the WOBASZ study. Based on the questionnaire, level of knowledge of non-pharmacological methods of heart disease prevention was assessed.

Daily food consumption was estimated based on an interview. Responders were asked to list all meals and drinks consumed within the last 24 hours. To help estimate the amount of consumed meals, an album containing over 200 pictures of the most frequently consumed foods was prepared by the Institute of Food and Nutrition. Furthermore, data on dietary habits (special diets, salt use, fat restriction) were collected.

Based on the scale of food consumption, the nutritional value of each patient's diet was calculated using Polish food consumption tables value [7]. According to the guidelines of the Institute of Food and Nutrition the loss of vitamin content associated with technological processes and food preparation was also included [8]. The analysis of consumption of vitamins and minerals included the assessment of the amount of compounds delivered with foods and with dietary supplements.

Based on these data the percentage of individuals fulfilling the recommendations regarding consumption of a single nutrient was estimated as well as the percentage of subjects whose diet was optimised with respect to the content of all the nutrients deemed necessary in the prevention and treatment of heart diseases.

In this report, the nutritional standards (safety level) were used according to the guidelines of the Institute of Food and Nutrition for the Polish population aged 26-60 years, undertaking moderate physical activity [9], as well as according to the recommendations of the World Health Organisation concerning the nutritional principles of secondary prevention of CVD [10].

Finally, the presented analysis was based on the subsample of 430 males and 373 females with a clinical history of CV events, from whom information regarding their dietary habits and level of health knowledge was obtained.

**Table I.** General characteristics of subjects with a history of cardiovascular events. If not mentioned otherwise, the percentage of patients is given

Parameter	Males	Females
Number of individuals	430	373
Mean age [years]	57.7	57.9
Place of live		
small community	27.2	28.2
medium-size community	33.0	32.7
large community	39.8	39.1
Net income per capita in the family/month		
<700 PLN	65.2	70.9
700-1500 PLN	31.5	27.6
>1500 PLN	3.3	1.5
Education		
primary	63.4	63.0
secondary	28.0	28.2
university	8.6	8.8
Marital status		
married	84.6	67.0
single	15.4	33.0
Ex-smokers	49.0	21.8
Smokers	27.1	12.7
Overweight or obese subjects <sup>1</sup>	68.6	74.3
Positive self-assessment of general health <sup>2</sup>	32.6	23.3

<sup>1</sup> BMI  $\geq 25.0$  kg/m<sup>2</sup><sup>2</sup> General health self-assessed as good or very good

PLN – Polish currency (1 euro = 3,4 PLN)

## Results

The characteristics of individuals subjected to the final analysis are presented in Table I. Patients with a history of CV events had a mean age of 58 years and came from large communities, inhabited by more than 40,000 people. Their incomes were found to be definitely low, as 65-70% of them had a net income of <700 PLN per person in the family, and only 2-3% of >1500 PLN. Regardless of gender, the majority of examined subjects had a primary education (63%) and were married (76%). General health was self-assessed as good or very good by only 32% of males and 23% of females.

There was a high percentage of overweight or obese subjects (about 70%), former smokers (49% of males and 22% of females) and current smokers (respectively 27% and 13%) in the examined group.

The level of knowledge regarding the issue of CVD prevention in examined subjects was surprisingly low (Table II). The majority of correct answers (about 53%) referred to physical activity as a method necessary to prevent CVD, as well as to the necessity of cessation or reduction of cigarette smoking and a regular lifestyle (about 35-45%). The lowest level of knowledge was associated

**Table II.** The level of awareness of non-pharmacological methods of heart disease prevention among subjects with a history of cardiovascular events (percentage of correct answers to questions from the study questionnaire)

Health knowledge	Males	Females
Weight reduction in overweight subjects	33	35
More intense physical activity	54	52
Cessation or reduction of cigarette smoking	44	35
Reduction of alcohol consumption	47	40
Reduction of salt in consumed food	23	21
Regular lifestyle, proper rest, avoiding hyperanxiety	41	45
Reduction of fat consumption	37	36
Regular vegetable and fruit consumption	23	23
Proper awareness of all indicated issues	2.6	3.0

**Table III.** Dietary habits of subjects with a history of cardiovascular events (percentage of individuals)

Dietary behaviour	Males	Females
Additional portion of salt used for food	25	19
Consumption of visible fat in meat, meat products and poultry skin	49	32
Low-fat, low-cholesterol or diabetes diet	19	20
Weight-reducing diet	1	1
Considering the dietary habits correct	58	46

with dietary behaviours. Only about 20-25% of examined subjects were aware of the fact that the reduction of salt consumption and regular fruit and vegetable consumption are necessary to prevent heart diseases, and only 37% acknowledged the necessity of fat consumption reduction. Only 3% of examined individuals were aware of all 8 methods of CVD prevention.

Dietary behaviour reflected the low level of knowledge about nutritional principles (Table III). A low-fat and low-cholesterol diet was reported by only one in five individuals and a weight-reducing diet by only one in a hundred. About 25% of males and 19% of females reported use of additional salt for already salted meals, and 49% and 32% of individuals admitted eating meat or meat products with visible fat or poultry with fatty skin, respectively. At the same time 58% of examined males and 46% of examined females considered their dietary habits appropriate.

The percentage of individuals whose diet fulfilled the nutritional recommendations for the amount of nutrients essential in the prevention and treatment of CVD was unsatisfactory (Table IV). The recommendations for antioxidant vitamins (A, C and E), proteins, cholesterol,

**Table IV.** Percentage of subjects following the recommendations of daily intake of selected nutrients among individuals with a history of cardiovascular events

Nutritional compounds	Recommended dietary allowances (RDA)*	Percentage of males following the recommendations	Percentage of females following the recommendations
Total fat [% of energy]	<30	23.0	36.2
Saturated fatty acids [% of energy]	<10	24.2	30.8
	<7	6.1	8.9
Polyunsaturated fatty acids [% of energy]	6-10	24.2	20.6
Carbohydrates [% of energy]	55-75	26.3	38.9
Protein [% of energy]	10-15	49.5	48.5
Cholesterol [mg]	<300	65.6	80.7
Vegetables and fruits [g]	≥400	40.7	43.2
Vitamin A [µg]	M >700 F >600	52.1	51.7
Vitamin C [mg]	>60	42.1	44.8
Vitamin E [mg]	>8	56.1	41.0
Vitamin B1 [mg]	M >1.8, F >1.7	16.0	6.7
Vitamin B2 [mg]	M >2.4, F >1.6	8.1	15.0
Vitamin B6 [mg]	M >2.2, F >1.8	31.9	25.7
Folic acid [µg]	M >280, F >240	40.0	32.7
Magnesium [mg]	M >350, F >280	18.1	17.2
Calcium [mg]	>800	16.7	9.9
All compounds mentioned in the Table		0	0

M – males, F – females

\* RDA – the amount of energy and necessary nutrient intake per person a day

vegetable and fruit consumption were relatively well met, but only 40-80% of responders followed the recommendations. Fat, fatty acids and carbohydrates consumption was found to be inappropriate. Only 20-39% of examined patients received proper amounts of these compounds in their diet. With respect to more strict recommendations for the amount of saturated fatty acids in a diet (less than 7% of total energy), the percentage of patients adhering was found to be less than 6% in the group of male subjects and 9% in females. Similarly, vitamins B as well as calcium and magnesium consumption was also too low. Only 11-37% of examined subjects followed the recommendations for their consumption.

It would be interesting to identify a group of individuals whose diet contained all the nutrients necessary to prevent and treat CVD. Unfortunately, such individuals were not found in the group of adult inhabitants of Poland with a history of CV events.

## Discussion

Rationalisation of dietary habits in the secondary prevention of CVD constitutes a key element of actions reducing the risk of disease progression and future CV events. A proper diet in subjects with CVD might improve the parameters of lipid metabolism, obesity or hypertension and reduce progression of the disease. Also the guidelines

of the European Society of Cardiology [11] and *Promoting Heart Health, a European Consensus* [12] stress that secondary prevention of CVD should involve general lifestyle modification, including changes to dietary habits, smoking cessation, exercise and stress management.

The results of our analysis show that the Polish population of adult individuals with a history of CV events can be characterised by a low level of awareness of non-pharmacological methods of heart disease, prevention and an irrational and unbalanced diet.

In the study population about 20-35% of individuals were aware of any nutritional risk factor of CVD and only 3% were aware of all of them. The study of Sipaka et al. conducted in Krzyż Wielkopolski in Wielkopolska revealed that eating habits of individuals treated for hypertension were unsatisfactory [13]. Only 50% of patients reported reduction of salt and fat consumption as well as eating vegetables and fruits regularly. Similarly, only 41% of males and 44% of females in the adult population of Łódź showed good awareness of CVD dietary risk factors (consumption of fat products, irregular meals, excessive amounts of consumed carbohydrates, obesity) [14]. Such a low level of awareness of non-pharmacological methods of CVD prevention, particularly in secondary prevention, is highly worrying as it may lead to exacerbation of already present CVD risk factors. In the examined population, in which a high

percentage of overweight or obese subjects (about 70%) was found, a very low percentage of patients reported being on a weight-reducing diet (only 1%). At the same time, a high discrepancy between dietary habits and the opinion on dietary correctness was found. Despite unfavourable dietary habits (overuse of salt, fat consumption, not a low-fat and low-cholesterol diet), about 50% of examined subjects considered their eating behaviours appropriate. The fact that a relatively low percentage of current smokers and high percentage of ex-smokers was demonstrated in the examined group suggests that at least some patients stopped smoking after a CV event, which would definitively be a positive finding of the study.

The main nutrients playing an important role in the development and treatment of heart disease are dietary fats (proper quantity and quality) and cholesterol. Inappropriate consumption of these compounds results in abnormal carbohydrate and lipid metabolism, coagulation system dysfunction, as well as obesity and hypertension development [15, 16]. In secondary prevention of CVD it is important to reduce fat consumption to less than 30% of total energy intake. The amount of saturated fats is advised not to exceed 10% of energy (according to the European Guidelines on CVD Prevention [11] and WHO [10]) or 7% according to other sources (NCEP- AHA III [17]).

Regarding the dietary habits in the Polish population (13-14% of energy from saturated fatty acids) the authors of the report decided to estimate the percentage of subjects following the dietary recommendations of saturated fatty acids consumption both for 10% and 7% of energy intake. Unfortunately, in the examined population the percentage of subjects fulfilling the recommendations for total fat and polyunsaturated fatty acids consumption was as low as 20-30%. Similar results were observed regarding the consumption of saturated fats if less strict recommendations were used and much worse results were seen after applying more strict criteria.

Better results were demonstrated with respect to the consumption of cholesterol – about 75% of the examined population did not exceed 300 mg of daily consumption. The latest WHO recommendations do not suggest any changes in the amount of dietary cholesterol and the safe level of daily consumption remains 300 mg, not 200 mg as in the past. Dietary cholesterol, when consumed without saturated fatty acids, seems to insignificantly increase serum concentration of cholesterol.

Moreover, appropriate amounts of vitamins A, C, E [18, 19] and polyphenols in diet are necessary for secondary prevention of CVD. These compounds are used in the defence systems of cells and tissues in humans (the so-called exogenous antioxidant system). They inhibit the peroxidation of unsaturated fatty acids, counteracting the injury of arterial intima caused by products of lipid peroxidation, and also prevent the oxidative modification of low density lipoproteins (LDL).

The cardioprotective effects of vegetable and fruit polyphenols might be explained by their antioxidant properties including free radicals removal, inhibition of free radical reactions, and binding metals acting as catalysers of oxidant reactions and inhibition of oxidative enzymes (oxidases). Our results show that the total dietary consumption of antioxidant vitamins from food and diet supplements is insufficient. Similarly, about 40% of examined subjects consumed 400 g or more of vegetables and fruits daily. Dietary recommendations also include polyphenols consumption, but their dietary intake was not assessed in our study due to methodological restrictions.

Daily intake of vitamins A, C, and E, as well as of vegetables and fruits, was not satisfactory, though much better than the intake of other analysed nutrients.

The worst results were observed with respect to the consumption of vitamins B, calcium and magnesium. Deficiency of some of these compounds was noted in up to 80% of subjects.

Insufficient amounts of vitamins B<sub>6</sub> and B<sub>12</sub> as well as of folic acid might result in an increase of homocysteine concentration, which has been considered an independent risk factor of ischaemic heart disease. Subjects with increased concentrations of homocysteine are at higher risk of atherosclerosis development, as it induces injury of the arterial endothelium, facilitates the migration of LDL, increases the tendency of platelets to aggregate and leads to LDL modifications [20, 21].

Low calcium consumption might be considered a dietary risk factor for osteoporosis and hypertension, while magnesium deficiency might increase the risk of CVD, including angina, myocardial infarction and sudden deaths.

The definitely unfavourable results observed in our study with respect to the level of health awareness and dietary habits in subjects with a history of CV events indicate the urgent need for action. It is unlikely that introducing a single recommendation may significantly improve dietary habits. In subjects with a history of CV events the advantages of a complex intervention of introducing a low-fat diet enriched in fish or fish oils, vegetable, fruit, pulses, nuts and plant oils have been documented in many case – control studies such as the Diet and Reinfarction Trial (DART) [1], the Lyon Diet Heart Study [2], the GISSI Prevention Trial [22] and Dietary Approaches to Stop Hypertension (DASH) [3]. High-risk individuals should be encouraged to introduce appropriate lifestyle modifications. It seems reasonable that health care institutions should play an important role in the secondary prevention of CVD, since not only pharmacotherapy but also modifications of patients' lifestyle should be introduced and thus dedicated prevention programmes are needed. The results of such activities so far should be considered poor. For instance Ciok et al. [23] demonstrated in their study that primary care physicians adhere to the current recommendations of CVD prevention only partially and only in some patients. In the

medical records of 98% of patients with ischaemic heart disease, data on dietary habits were missing, and only in 2% of subjects was a high calorie diet, rich in saturated fats and cholesterol, documented.

## Conclusions

The results of presented study show that in the Polish population secondary prevention measures fulfillment is far from being sufficiently achieved. A poor awareness of non-pharmacological methods of heart disease prevention and inappropriate dietary habits are observed. Complex actions should be undertaken by primary care physicians, cardiovascular specialists as well as health care authorities to improve the current situation by introducing reasonable educational and interventional programmes.

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# Jakość żywienia i wiedza zdrowotna osób po przebytych incydentach sercowo-naczyniowych w populacji polskiej – Wieloośrodkowe Ogólnopolskie Badanie Stanu Zdrowia Ludności WOBASZ

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## Streszczenie

**Wstęp:** Racjonalny sposób żywienia jest jednym z ważnych elementów prewencji wtórnej chorób sercowo-naczyniowych (CVD). Istotnym czynnikiem, który wpływa na realizację zaleceń dietetycznych, jest wiedza na temat niefarmakologicznych metod zapobiegania chorobom serca.

**Cel:** Ocena poziomu wiedzy zdrowotnej i zachowań żywieniowych osób po przebytych incydentach sercowo-naczyniowych oraz ustalenie, jaką część badanej grupy stanowią osoby, które realizują zalecenia dietetyczne, odgrywające istotną rolę w profilaktyce i leczeniu chorób serca.

**Metody:** W ramach badania WOBASZ, zrealizowanego w latach 2003–2005 na reprezentatywnej próbie dorosłych mieszkańców całej Polski, oceniono sposób żywienia oraz poziom wiedzy zdrowotnej u 7257 osób w wieku 20–74 lat. W analizach uwzględniono subpopulację (430 mężczyzn i 373 kobiet) osób po incydentach sercowo-naczyniowych, takich jak: zawał serca, choroba wieńcowa, niewydolność serca, udar mózgu, wady serca, wykonanie angioplastyki naczyń wieńcowych lub wieńcowego pomostu aortalno-wieńcowego (CABG).

**Wyniki:** Badana grupa charakteryzowała się dużym udziałem osób z nadwagą i otyłością (ok. 70%), byłych palaczy (49% mężczyzn i 22% kobiet) oraz palaczy (odpowiednio 27 i 13%). Odsetki osób, które miały wiedzę na temat poszczególnych niefarmakologicznych metod zapobiegania CVD, były następujące: zmniejszenie ciężaru ciała u osób z nadwagą (33% mężczyzn, 35% kobiet), zwiększenie aktywności fizycznej (odpowiednio 54 vs 52%), ograniczenie spożycia soli i tłuszczów (odpowiednio 23 vs 21% oraz 37 vs 36%), regularna konsumpcja warzyw i owoców (23 vs 23%). Niski poziom wiedzy znalazł odzwierciedlenie w zachowaniach żywieniowych. Dietę o niskiej zawartości tłuszczu i cholesterolu stosował zaledwie co piąty, a odchudzającą – jedynie co setny chory. Dosalenie przy stole wcześniej już doprawionych potraw deklarowało 25% mężczyzn i 19% kobiet, a odpowiednio 49 i 32% spożywało mięso, drób i wędliny z widocznym tłuszczem. W omawianej populacji udział osób, których dieta pokrywała zapotrzebowanie na istotne w profilaktyce i leczeniu CVD składniki odżywcze, był niezadowalający. Stosunkowo najlepiej były realizowane zalecenia dotyczące witamin antyoksydacyjnych (A, C i E), białka, cholesterolu oraz warzyw i owoców, ale i w tych przypadkach tylko ok. 40–80% respondentów przestrzegało rekomendacji. Gorszą sytuację notowano w odniesieniu do spożycia tłuszczu, kwasów tłuszczowych oraz węglowodanów. Zawartość w diecie tych składników odżywczych była prawidłowa jedynie u 20–39% badanych osób. Najgorszą sytuację stwierdzono w przypadku witamin z grupy B oraz wapnia i magnezu – normy realizowało zaledwie ok. 11–37% badanych osób.

**Wnioski:** W populacji Polski osoby po przebytych incydentach sercowo-naczyniowych charakteryzuje niska wiedza na temat niefarmakologicznych metod zapobiegania chorobom serca oraz nieprawidłowa jakość żywienia.

**Słowa kluczowe:** prewencja wtórna, jakość diety, sposób żywienia, wiedza żywieniowa, wiedza zdrowotna

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