ORIGINAL ARTICLE

Changes in the prevalence, treatment, and control of hypercholesterolemia and other dyslipidemias over 10 years in Poland: the WOBASZ study

Andrzej Pająk[1], Krystyna Szafraniec[1], Maciej Polak[1], Maria Polakowska[2], Magdalena Kozela[1], Walerian Piotrowski[2], Magdalena Kwaśniewska[3], Ewa Podolecka[4], Krystyna Kozakiewicz[4], Andrzej Tykarski[5], Tomasz Zdrojewski[6], Wojciech Drygas[2,3]; on behalf of WOBASZ II investigators*

1 Department of Epidemiology and Population Studies, Institute of Public Health, Faculty of Health Sciences, Jagiellonian University Medical College, Kraków, Poland
2 Department of Epidemiology, Cardiovascular Disease Prevention, and Health Promotion, Institute of Cardiology, Warsaw, Poland
3 Department of Preventive and Social Medicine, Medical University of Lodz, Łódź, Poland
4 Cardiac Hospital, 3rd Department of Cardiology, Medical University of Silesia, Katowice, Poland
5 Department of Hypertension, Angiology and Internal Medicine, Institute of Cardiology, Poznan University of Medical Sciences, Poznań, Poland
6 Department of Prevention and Education, Department of Hypertension and Diabetology, Medical University of Gdansk, Gdańsk, Poland

KEY WORDS

epidemiology, hypercholesterolemia, hypertriglyceridemia, low high-density lipoprotein cholesterol levels, statins

Correspondence to:
Magdalena Kozela, PhD, Zakład Epidemiologii i Badań Populacyjnych Instytut Zdrowia Publicznego, Wydział Nauk o Zdrowiu, Uniwersytet Jagielloński, Collegium Medicum, ul. Grzegórzecka 20, 31-532 Kraków, Poland, phone: +48 12 433 28 38, e-mail: mkozela@cm-uj.krakow.pl
Received: April 29, 2016.
Revision accepted: July 6, 2016.
Published online: July 19, 2016.
Conflict of interest: AP received honoraria for consultations from Amgen (not directly related to the present paper).
Pol Arch Med Wewn. 2016; 126 (9): 642-652
doi:10.20452/pamw.3464

* The full list of WOBASZ and WOBASZ II investigators can be found in Drygas et al.[1]

ABSTRACT

INTRODUCTION Lowering exposure to dyslipidemias is one of the biggest challenges in cardiovascular disease prevention.

OBJECTIVES The aim of the study was to describe the prevalence of dyslipidemias and treatment of hypercholesterolemia in Poland, and to assess changes since the period of 2003–2005.

PATIENTS AND METHODS Two cross-sectional surveys of the random samples of the Polish population were performed in the years 2003–2005 (WOBASZ) and 2013–2014 (WOBASZ II). Interviews were carried out according to a standard questionnaire. Blood lipid levels were determined in a single laboratory in frozen samples using the enzymatic colorimetric method.

RESULTS The analysis included 14151 participants aged 20–74 years (WOBASZ) and 5947 participants aged 20–99 years (WOBASZ II). In the 2013–2014 survey, hypercholesterolemia was found in 70.3% of men and 64.3% of women. Isolated hypertriglyceridemia was found in 5.6% of men and 2.4% of women. Isolated low levels of high-density lipoprotein cholesterol (HDL-C) were found in 5.1% of men and in 7.3% of women. The prevalence of hypercholesterolemia did not change significantly with regards to the 2003–2005 survey. An increase in the prevalence of hypertriglyceridemia was found in men (relative ratio [RR], 1.26; 95% confidence interval [CI], 1.03–1.55), and an increase in the prevalence of low HDL-C levels was observed in both sexes (men: RR, 2.26; 95% CI, 1.77–2.88; women: RR, 1.94; 95% CI, 1.61–2.33). There was an increase in the proportion of persons receiving high- or moderate-intensity statin therapy. However, 60,6% of persons with hypercholesterolemia were not aware of their condition, and only 6% were treated and achieved the treatment target.

CONCLUSIONS There is an urgent need for more effective strategies for the prevention and management of dyslipidemias.

INTRODUCTION The relationship between blood lipids and the risk of cardiovascular disease (CVD) has been known for over 60 years. The evidence has become so strong that governments and national and international organizations have started to issue recommendations and to call for action

on the population level. The first comprehensive national strategy was adopted in the United States via the introduction in 1985 of the National Cholesterol Education Program.[2] In Europe, 5 international scientific societies under the leadership of the European Society of Cardiology issued the first version of the guidelines for the prevention of CVD in clinical practice in 1994, and this was followed by updated versions in 1998, 2003, 2007, and 2012.[3,4] In Poland, the first comprehensive set of recommendations was issued in 2000 by a group of experts collaborating with the Commission for Prevention of the Polish Cardiac Society.[5] Later, each version of the European guidelines was translated into Polish and published in the official journal of the Polish Cardiac Society.[4] Also, the idea of CVD prevention, including the principles of hypercholesterolemia treatment, is being continuously promoted by other specialists.[6]

There is solid evidence that increased concentrations of total cholesterol (TC), and low-density lipoprotein cholesterol (LDL-C) in particular, are one of the main CVD risk factors and that hypertriglyceridemia and low high-density lipoprotein cholesterol (HDL-C) levels are regarded as independent risk factors for CVD. However, the recommended concentration of blood cholesterol depends on the level of 10-year risk of CVD death. For patients at low or moderate CVD risk (<5%), the recommended concentrations are below 5 mmol/l for TC and below 3 mmol/l for LDL-C. In patients at high CVD risk (5%–10%), the recommended LDL-C concentration is below 2.5 mmol/l. For persons at very high risk (>10%), the recommended LDC-C concentration is below 1.8 mmol/l, or at least a 50% reduction in LDL-C concentrations should be achieved when the above target level cannot be reached. In contrast to European societies, the American Heart Association (AHA) does not endorse using the specific TC or non-HDL-C treatment targets, but recommends "high-intensity" or "moderate-intensity" statin therapy, depending on the concentration of blood lipids and overall cardiovascular risk. Both European and American societies agree that lipid-lowering medication should be considered in persons at low CVD risk if LDL-C levels exceed 4.9 mmol/l and in persons at moderate CVD risk if LDL-C levels exceed 2.5 mmol/l, or if LDL-C levels remain uncontrolled after lifestyle intervention. In patients at high and very high risk, immediate drug intervention is recommended if LDL-C levels are 2.5 mmol/l or higher and 1.8 mmol/l or higher, respectively.[3,4,7]

In 2003, a cross-sectional examination of a large sample selected from the population of Poland, aged 20–74 years, was organized (WOBASZ study) to assess the prevalence of risk factors and their control. The analysis, which focused on blood lipids, showed that dyslipidemias were the most prevalent risk factor, with hypercholesterolemia present in over 60% of the population. Furthermore, the control of hypercholesterolemia was very poor. Only 10% of the population was treated and only 2% to 3% reached the treatment target.[8] In the years from 2013 to 2014, the WOBASZ II study was organized, which used the same sampling strategy and the same or comparable methods as in the WOBASZ study. The aim of the present paper was to describe the prevalence of dyslipidemias and treatment of hypercholesterolemia in Poland in the years from 2013 to 2014, and to assess changes since the period of 2003 to 2005 years.

PATIENTS AND METHODS The aims, studied samples, and methods used in the WOBASZ and WOBASZ II projects were described earlier.[1,8-10] Brief information relevant for the present analysis is given below. In both studies, sample selection was aimed to be representative for the total population of permanent residents of Poland. In WOBASZ, age was restricted to 20–74 years. In WOBASZ II, there was no upper limit for age, so the studied population was aged 20 years or older. Out of the 21 600 persons selected in WOBASZ, 9680 men and 10 128 women were eligible for the study, and out of these, 6977 men and 7792 women participated in the examination (participation rate, 72.1% and 76.9%, respectively). In WOBASZ II, out of 7558 men and 7562 women selected, 6657 men and 6906 women were eligible for the study and 2760 men and 3410 participated in the examinations (participation rate, 41.5% and 49.4%, respectively).[1]

Hypercholesterolemia was diagnosed if TC levels were 5 mmol/l or higher or LDL-C levels were 3 mmol/l or higher or the participant was taking a lipid-lowering medication. Low HDL-C levels were diagnosed if HDL-C levels were lower than 1 mmol/l in men or lower than 1.2 mmol/l in women. Hypertriglyceridemia was diagnosed if triglyceride levels were higher than 1.7 mmol/l. For lipid level measurements, blood was collected from the cubital vein from participants in a sitting position and after at least 12 hours fasting, using unified vacuum tubes. The use of a tourniquet was limited to 1 minute. Blood was stored at the temperature of +4°C and centrifuged within 4 hours after the venipuncture. Then serum samples were frozen and stored at a temperature of –20°C until analysis. Concentrations of blood lipids were determined in the central laboratory (Institute of Cardiology, Warsaw) that participated in the external quality control programs. Biochemical methods used in WOBASZ and WOBASZ II are described in Supplementary material online, *Table S1*.

Data on being informed about having hypercholesterolemia and on treatment (pharmacological or dietary) were obtained by interview according to a standard questionnaire. Participants receiving treatment for 14 days and taking drugs within the last 3 days prior to the examination were classified as treated. The effectiveness of treatment was assessed in relation to the level of CVD risk according to the European guidelines for CVD prevention in clinical practice (version

TABLE 1 Classification of statin treatment according to American College of Cardiology / American Heart Association guidelines[7]

High-intensity stain therapy lowers LDL-C levels by approximately ≥50%:
• atorvastatin, 40–80 mg qd (if unable to tolerate atorvastatin 80 mg, down titrate to 40 mg);
• rosuvastatin, 20 mg qd (40 mg qd);
• simvastatin, 80 mg qd[a].
Moderate-intensity statin therapy lowers LDL-C levels by approximately 30% to 50%:
• atorvastatin, 10–20 mg qd;
• rosuvastatin, 5–10 mg qd;
• simvastatin, 20–40 mg qd[a];
• pravastatin, 40–80 mg qd;
• lovastatin, 40 mg qd;
• fluvastatin XL, 80 mg qd;
• fluvastatin, 40 mg bid;
• pitavastatin, 2–4 mg qd.

a dose not recommended

Abbreviations: bid, twice daily; LDL-C, low-density lipoprotein cholesterol; qd, once daily

2012), adopting the following treatment targets: LDL-C <1.8 mmol/l for very high-risk persons; LDL-C <2.5 mmol/l, for high-risk persons; and TC <5 mmol/l and LDL-C <3 mmol/l for moderate-risk and low-risk persons.[3] Information on lipid-lowering drugs and the dosage was obtained from interviews and presentation of original packages (participants were asked to bring these for examination). Classification of statin therapy to the "high-intensity statin therapy" and "moderate-intensity statin therapy" groups was done according to the 2013 AHA / American College of Cardiology guidelines (ACC) (TABLE 1).[7] Persons who were taking statins at lower doses were included in the "low-dose statin therapy" group. Cases of combined treatment of a statin with another lipid-lowering agent (7 in WOBASZ and 34 in WOBASZ II) were classified according to the type and dose of statin. Another few cases (6 in WOBASZ and 4 in WOBASZ II) of combined treatment with 2 different statins were classified by adding their doses.

Results were presented as age-adjusted rates per 100 (percentages) with 95% confidence intervals (CIs) calculated by the Poisson approximation.[11] Age adjustment was done by direct standardization using weights, according to the age distribution of the total Polish population at the end of the year 2013. The differences between WOBASZ and WOBASZ II were calculated for the age group of 20 to 74 years (age limit in WOBASZ), applying to the WOBASZ population weights over the truncated age-range of 20 to 74 years. The results were given as rate ratios with 95% CIs calculated according to the approximate formula given by Smith.[12] The relationship between the participation rate and prevalence of hypercholesterolemia was tested using the Pearson's correlation coefficient. Calculations were done using SPSS ver. 22 (IBM Corp, Armonk, New York, United States) and Excel (Microsoft Corp., Seattle, Washington, United States).

RESULTS A total of 6679 men and 7472 women aged from 20 to 74 years from WOBASZ and 2652 men and 3295 women aged from 20 to 99 years from WOBASZ II were included in the present analysis. For WOBASZ II participants, 2481 (94%) and 3023 (92%) were aged from 20 to 74 years. Overall, 386 persons (2.7%) from WOBASZ and 217 persons (3.5%) from WOBASZ II were excluded due to missing data on blood lipids or on dyslipidemia treatment.

In the years 2013–2014 (WOBASZ II), hypercholesterolemia was found in 70.3% of men and in 64.3% of women older than 20 years of age. In addition, hypertriglyceridemia with normal cholesterol concentrations was found in 5.6% of men and in 2.4% of women. Low HDL-C levels with the normal concentration of total TC and triglycerides were found in 5.1% of men and 7.3% of women. Overall, at least 1 type of dyslipidemia was found in 81.0% of men and 74.0% of women. The rates were from 2% to 10% lower in the age group of 20 to 74 years (TABLE 2).

The relationship between age and the prevalence of hypercholesterolemia differed between men and women. In men, the rates were below 50% in the youngest age group (20–34 years) and reached 70% in the age group of 35 to 44 years, and then were similar in the older groups. In women, there was a gradual increase until the age of 55 to 64 years (peak values), and there was a decrease with age in the older groups. For the age group of 20 to 74 years, this pattern was confirmed in both WOBASZ surveys (FIGURE 1).

There was a large variation in the prevalence of hypercholesterolemia by voivodship (province). In men, the lowest prevalence was found in the Lubelskie voivodship (49%) and the highest—in the Zachodniopomorskie voivodship (78%). In women, the lowest prevalence was found in the Łódzkie voivodship (47%) and the highest—in the Opolskie voivodship (76%) (FIGURES 2 and 3). For the age group of 20 to 74 years, the prevalence

TABLE 2 Age-adjusted prevalence of dyslipidemias in the years from 2013 to 2014 (WOBASZ II)

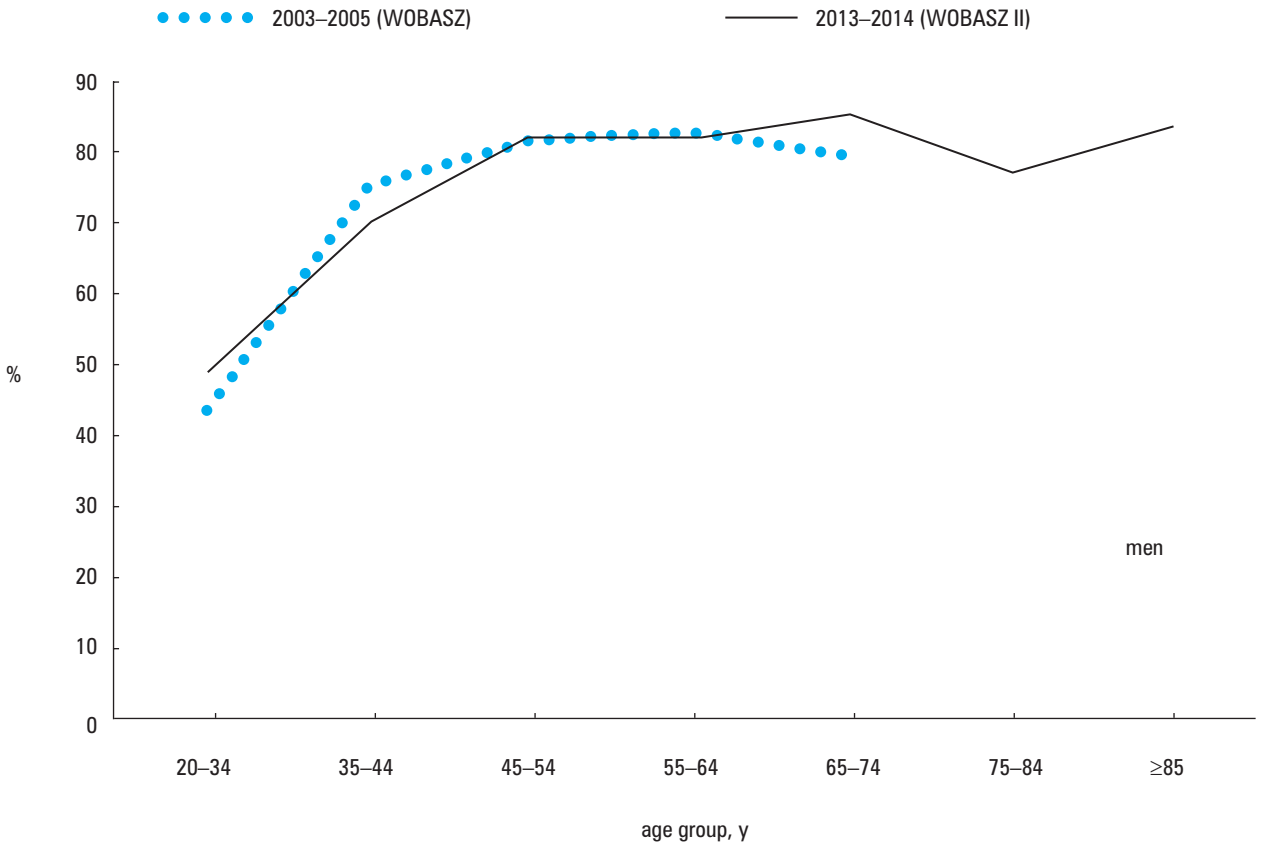
Age group, y	Type of dyslipidemia	All			Men			Women		
		n	%	95% CI	n	%	95% CI	n	%	95% CI
≥20	all dyslipidemias	4739	77.2	75.0–79.5	2191	81.0	77.6–84.5	2548	74.0	71.0–76.9
	including:									
	hypercholesterolemia	4165	67.1	65.0–69.2	1916	70.3	67.1–73.5	2249	64.3	61.6–67.0
	including:									
	normal TC or BLLT	616	9.5	8.7–10.3	289	10.3	9.1–11.5	327	8.9	7.9–9.8
	hypertriglyceridemia and normal TC	219	3.9	3.4–4.4	142	5.6	4.7–6.6	77	2.4	1.8–2.9
	low HDL-C and normal TC and normal TG	355	6.3	5.6–6.9	133	5.1	4.2–6.0	222	7.3	6.3–8.3
20–74	all dyslipidemias	4359	69.9	67.8–72.0	2045	73.6	70.4–76.9	2314	66.6	63.8–69.4
	including:									
	hypercholesterolemia	3824	60.5	58.5–62.4	1782	63.5	60.6–66.5	2042	57.8	55.2–60.3
	including:									
	normal TC or BLLT	498	7.2	6.6–7.8	243	8.0	7.0–9.0	255	6.6	5.8–7.4
	hypertriglyceridemia and normal TC	208	3.7	3.2–4.2	139	5.5	4.6–6.4	69	2.1	1.6–2.7
	low HDL-C and normal TC and normal TG	327	5.7	5.1–6.3	124	4.6	3.8–5.4	203	6.7	5.7–7.6

Abbreviations: BLLT, blood lipid-lowering treatment; CI, confidence interval; TC, total cholesterol; TG, triglycerides; others, see **TABLE 1**

of hypercholesterolemia is presented in Supplementary material online (*Table S2*). The regional differences in the prevalence of hypercholesterolemia were related to the participation rate (0.4% increase in the percentage of persons with hypercholesterolemia per 1% increase in the participation rate), although only 25% of the variation in the prevalence could be explained by the variation in the participation rate (Supplementary material online, *Figure S1*).

In men, the change overtime in the prevalence of hypercholesterolemia was not statistically significant in any of the voivodships. In women, there was a significant increase in the Dolnośląskie voivodship and a significant decrease in the Łódzkie and Pomorskie voivodships (**FIGURE 4**; Supplementary material online, *Table S2*). In general, the prevalence of hypercholesterolemia did not change significantly overtime. However, there was a significant increase (25%) in the prevalence of isolated hypertriglyceridemia in men (relative ratio [RR], 1.26; 95% CI, 1.03–1.55) and about a 2-fold increase in the prevalence of low HDL-C levels (men: RR, 2.26; 95% CI, 1.77–2.88; women: RR, 1.94; 95% CI, 1.61–2.33). In consequence, there was a small but significant increase in all types of dyslipidemia combined in men (RR, 1.07; 95% CI,= 1.02–1.13), but not in women.

In total, 60.6% of persons with hypercholesterolemia were not aware of the condition, and there was no significant difference between men and women. Another 17% were aware of the condition but were not being treated by either diet or lipid-lowering agents; the additional 15% were treated but did not reach the treatment target. Only 6% of persons with hypercholesterolemia were treated successfully, that is, they achieved the treatment target as indicated for the appropriate category of CVD risk (Supplementary material online, *Table S3*). However, the 2013–2014 figures look better if compared with the results of the 2003–2005 WOBASZ study. There was an increase in the percentage of treated persons, and particularly in the percentage of those effectively treated, together with a decrease in the proportion of persons who were not aware of having hypercholesterolemia (**FIGURE 5**; Supplementary material online, *Table S4*). This was found at all levels of cardiovascular risk. Furthermore, in WOBASZ II, the largest proportion of treated persons was found in persons at very high CVD risk. Changes in the effectiveness of treatment coincided with changes in the types of treatment. At all levels of CVD risk, there was an increase in the proportion of persons taking high-intensity or moderate-intensity statin therapy, as well as a decrease in the proportion of persons receiving low-dose statin therapy and in the proportion of persons on diet only. Furthermore, the most pronounced change occurred in persons at very high CVD risk, in whom 18% were taking high--intensity statin therapy, another 49% were on moderate-intensity statin therapy and only 10% were on diet alone (**FIGURE 6**; Supplementary material online, *Table S5*). In general, 30% of patients receiving high-intensity statin therapy and 33% of patients on moderate-intensity statin therapy achieved treatment targets. The results were slightly worse for low-dose statin therapy (25%)



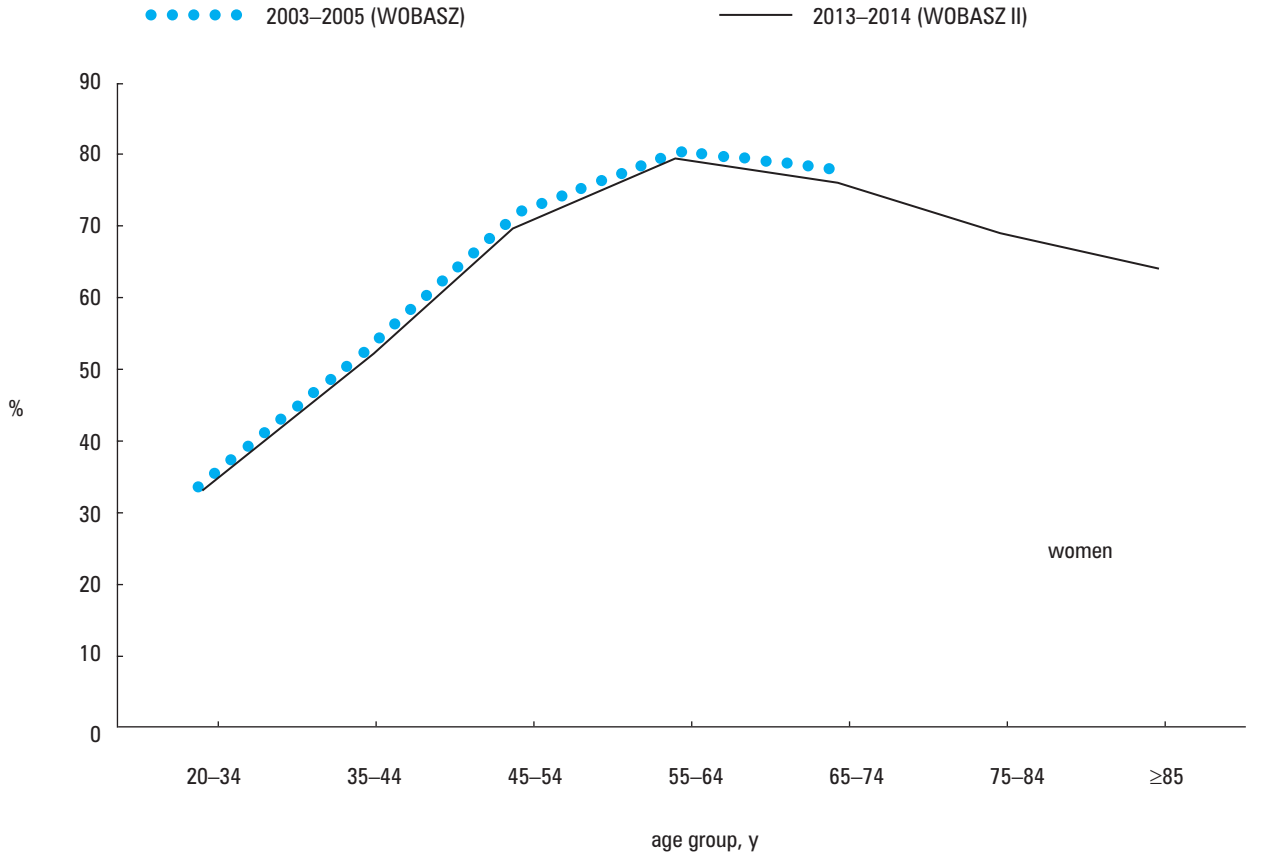


FIGURE 1 Prevalence of hypercholesterolemia by sex and age (hypercholesterolemia: TC levels ≥5 mmol/l or LDL-C levels ≥3 mmol/l or use of lipid-lowering medication). Abbreviations: see **TABLES 1** and **2**

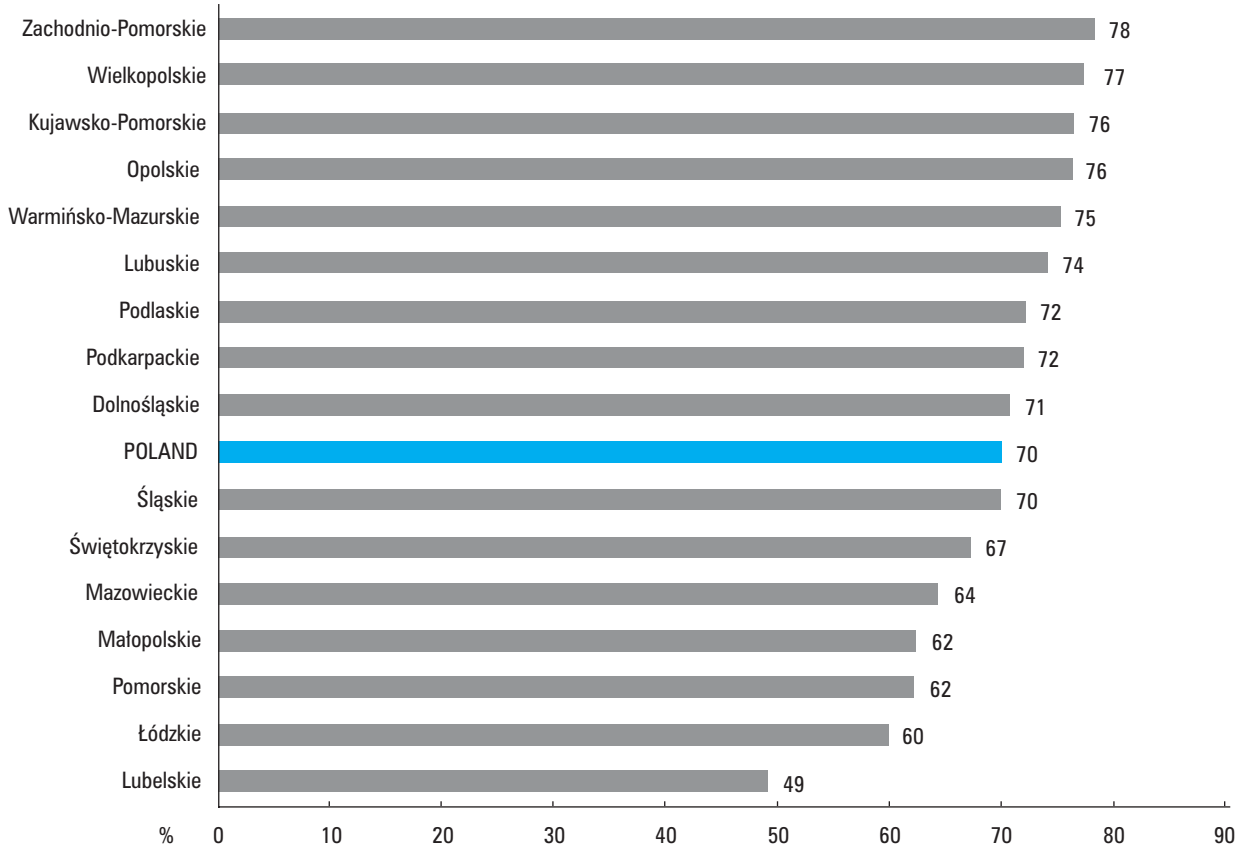


FIGURE 2 Age-adjusted prevalence of hypercholesterolemia in men aged 20 years or older by voivodship in the years 2013–2014 (WOBASZ II)

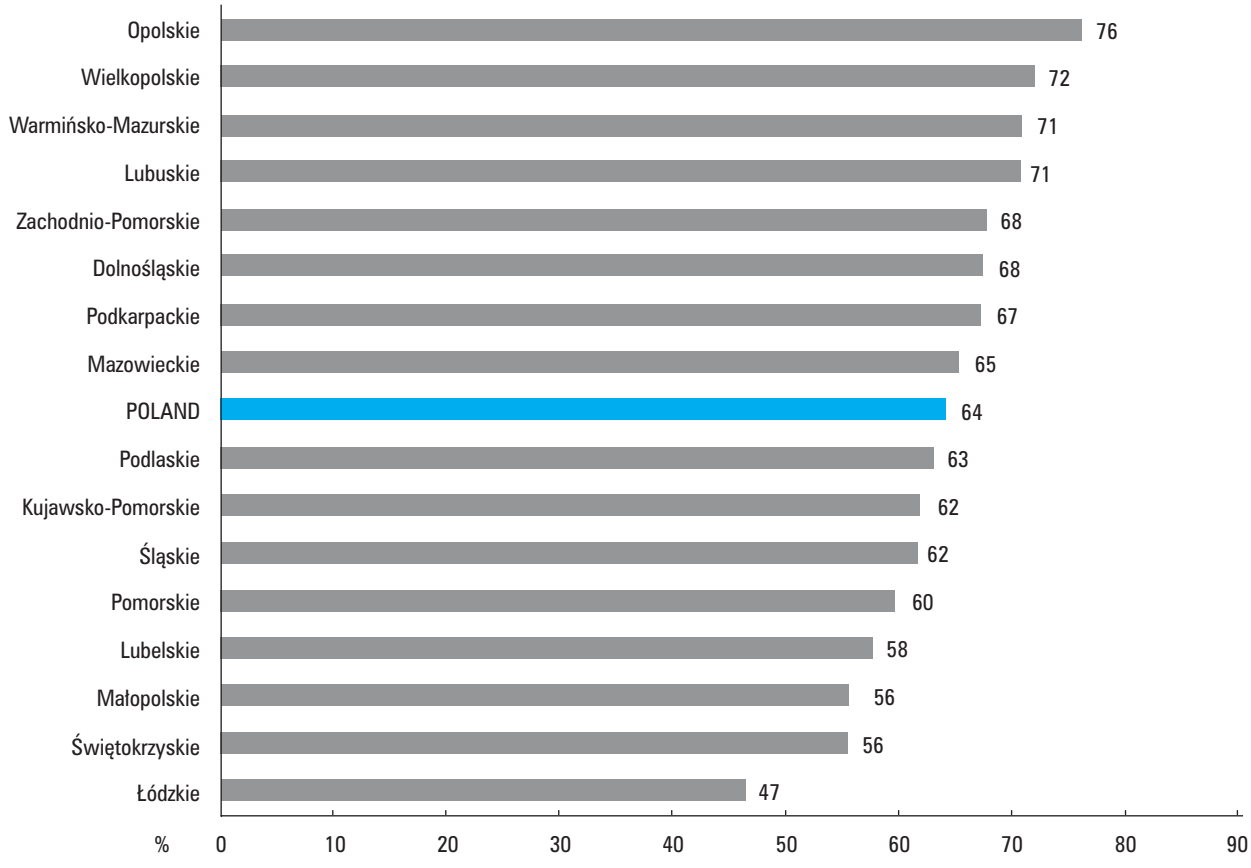


FIGURE 3 Age-adjusted prevalence of hypercholesterolemia in women aged 20 years or older by voivodship in the years 2013–2014 (WOBASZ II)

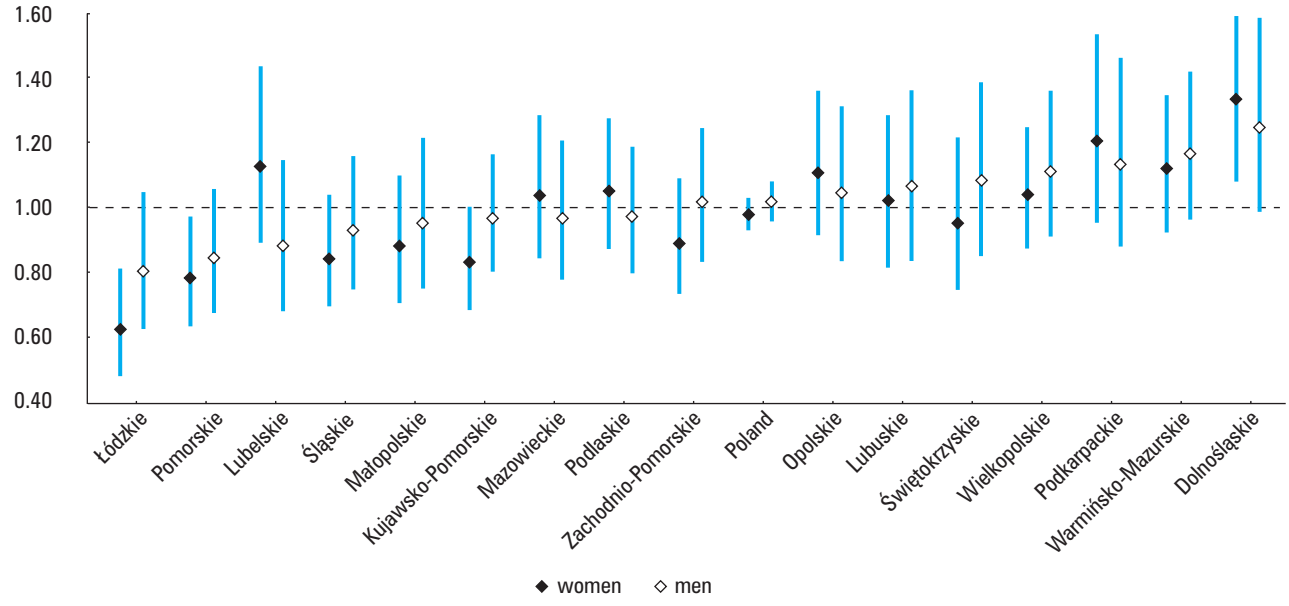


FIGURE 4 Change in the prevalence of hypercholesterolemia in men and women aged from 20 to 74 years between the years 2003–2005 and 2013–2014 by voivodship (relative rates)

and for fibrates and other types of lipid-lowering agents (23%). However, it is interesting that 13% of patients who were treated with diet only also reached treatment targets.

DISCUSSION For the first time in Poland, the prevalence of hypercholesterolemia was assessed in a larger population in the 1970s, and later, the assessment of overtime changes and their determinants were an important part of the POL-MONICA studies.[13-15] As a result, it is known that more than half of the adult population is at increased risk due to high concentrations of blood cholesterol. The WOBASZ study, conducted in the years from 2003 to 2005 with the aim to assess the prevalence of CVD risk factors, including dyslipidemias, in a sample representative for the total Polish adult population, was an essential step in planning CVD prevention at the national level in Poland.[9,10] Observations obtained using the same methods that are partially reported in the present paper provide the opportunity to discover how effective the prevention programs were, and in particular, to assess to what extent their direct goal of decreasing the exposure to risk factors was achieved.

The present findings show that the prevalence of increased concentrations of blood cholesterol has not changed overtime. Furthermore, the prevalence of hypertriglyceridemia and low HDL-C levels increased, which might reflect unfavorable changes in dietary habits and a decrease in physical activity in the Polish population.[16,17] One positive outcome, however, is that the management of hypercholesterolemia has improved, resulting in an increase in the identification of the condition, an increase in the proportion of patients treated for hypercholesterolemia, the use of more effective lipid-lowering agents, and finally, the increase in the proportion of hypercholesterolemic persons who have desirable concentrations of blood lipids. Also, 30% rates of controlled hypercholesterolemia among persons who receive the recommended type of treatment, that is, high-intensity or moderate-intensity statin therapy, seem to be more comparable with the results of clinical trials. In the AHA/ACC guidelines, the expected rate of persons reaching treatment targets is 50% for high-intensity statin therapy and 30% for moderate-intensity statin therapy.[7] Nevertheless, the rates for controlled hypercholesterolemia are far below these expectations, especially as they occur over 2 decades after the introduction of the European recommendations for cardiac prevention and their intensive promotion.

There are certain limitations for the interpretation of these results. First, although the method of random sampling in WOBASZ, and 10 years later in WOBASZ II, aimed to produce study samples that were representative for the residents of Poland, the investigators were less successful in the recruitment of participants, reaching the prevalence of about 70% in WOBASZ and slightly less than 50% in WOBASZ II. Low participation rates are a problem of many studies aimed at observations in population-based samples,[18] as study participants tend to have better health. However, in one Polish study, the difference in the prevalence of CVD risk factors, including hypercholesterolemia, was similar in respondents and nonrespondents despite nonparticipants having higher mortality rates.[19] Nevertheless, estimates of the prevalence of risk factors could be underestimated. Indeed, the relationship between the prevalence of hypercholesterolemia and the participation rate was significant but not very strong, and the participation rate explained only 25% of the variation in the prevalence. Another important limitation

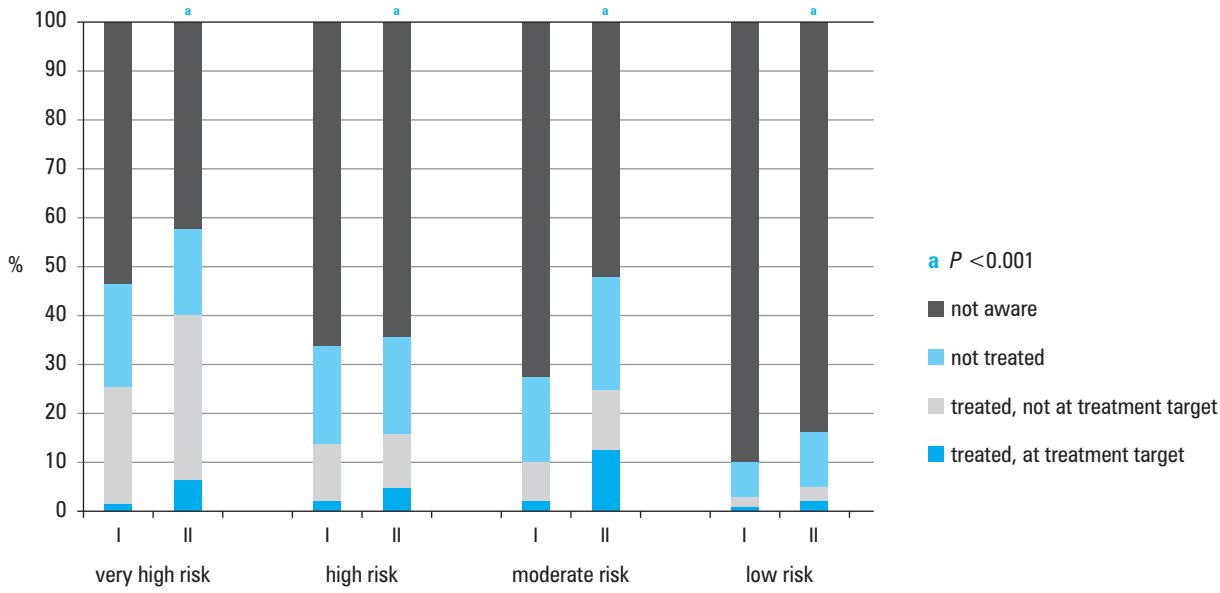


FIGURE 5 Change in the effectiveness of hypercholesterolemia management in men and women aged from 20 to 74 years between the years 2003–2005 (I) and 2013–2014 (II) by category of cardiovascular risk

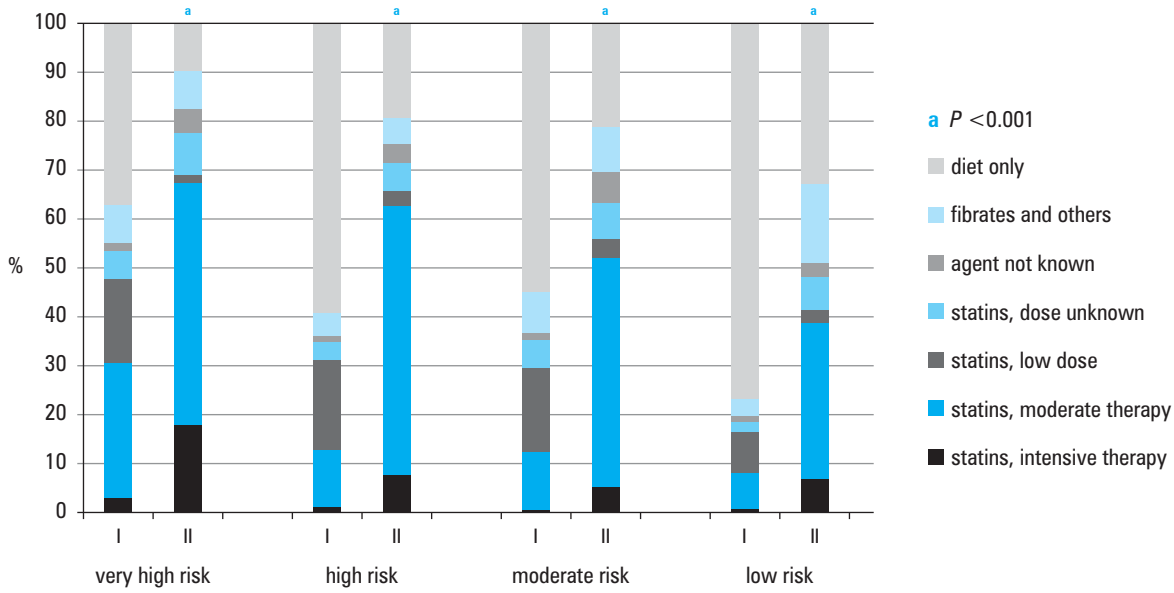


FIGURE 6 Change in the use of lipid-lowering drugs in men and women aged from 20 to 74 years between the years 2003–2005 (I) and 2013–2014 (II) by category of cardiovascular risk

is that, as a result of the use of the age limit in the WOBASZ study, we were not able to analyze changes for the entire adult population, so this was done only for the age group of 20 to 74 years who had an approximately 10% lower prevalence of dyslipidemias. Third, we adopted the CVD risk classification and assigned the treatment goals according to the European guidelines. This involved an individual risk assessment. In persons who are not automatically classified to high-risk categories, the risk assessment is also based on TC concentrations. As a result, some persons could be classified to the lower-risk group because they were taking lipid-lowering medication, which shifted the distribution of the effectiveness of treatment in a more favorable direction. The magnitude of this shift cannot be estimated precisely, but should not be large as the overall rates of treated persons are not high. Also, there are some reservations about the observations on treatment. Frequently, detailed information on the names of the drugs used, and their dosage in particular, was missing. This had an effect on the underestimation of the rates of statin use at the recommended doses. On the other hand, it could be anticipated that possible underreporting of information on hypercholesterolemia could lead to an overestimation of this unawareness and bias the treatment rates. Concerning the diet, it is well known that people to whom a dietary treatment is advised tend not to adhere to

the recommendations rigorously. This could lead to an underestimation of the proportion of persons treated with diet only and could mean that the potentials of diet in treating hypercholesterolemia is larger than observed. In our opinion, less important were some differences in the laboratory methods for lipid determinations, including the use of different types of autoanalyzers in the WOBASZ and WOBASZ II studies. The lipid laboratory participated in the external quality control programs during both surveys to assure data comparability. Further, we compared LDL-C concentrations in WOBASZ II samples measured with 2 methods (direct method vs combination of the Friedewald formula and direct method) and found a high correlation ($r = 0.98$; $P < 0.001$). Also, there was a very high agreement in classification according to the treatment target cut-off points (weighted κ, 0.93; 95% CI, 0.929–0.939; data not presented in the results section).

Our findings on the prevalence of hypercholesterolemia correspond with the results of the earlier NATPOL 11 study (61%).[20] However, in NATPOL 11, the sample was smaller, with age restricted to 18–79 years. In contrast to our findings, no significant differences between men and women in terms of the prevalence of hypercholesterolemia were found, but there were small sex-related differences in the effectiveness of treatment.[20,21] The similarity of the results on the prevalence of hypercholesterolemia strengthens the message that the effectiveness of prevention methods in Poland are far below expectations. It is worth underlining that the findings of NATPOL and of our study refer to the general population. In secondary prevention, that is, in patients after hospitalization due to coronary heart disease, observations are more optimistic. In the Polish part of the EUROASPIRE IV study, over 80% of patients were taking lipid-lowering medication (36% statins at high dose).[22,23] Nevertheless, overall, only about 25% were at treatment target of LDL-C of less than 1.8 mmol/l, which is, in any case, a 2-fold difference from the very high-risk group in the general population.[22,23] The use of moderate-intensity and high-intensity statin therapy in WOBASZ II seems to be more frequent than that found in the 3ST-POL study of nearly 50 000 ambulatory patients in Poland before 2010, in which almost 71% of patients received the daily statin dose of less than 20 mg.[24]

In the World Health Organization (WHO) Global Health Observatory (GHO) data, the global prevalence of elevated TC levels among adults (≥5.0 mmol/l) in 2008 was 39% (37% for men and 40% for women), and there was a small fall in the mean TC level between 1980 and 2008 (by less than 0.1 mmol/l per decade in men and women). The prevalence of elevated TC levels was the highest in the WHO Region of Europe (54% for both sexes), followed by the WHO Region of the Americas (48% for both sexes). The lowest percentages were in the WHO African Region and the WHO South East Asian Region (22.6% and 29.0%, respectively).[25] The results of the United States National Health and Nutrition Examination Survey indicate that there has been a decline in the percentage of Americans with high TC levels (>240 mg/dl) since 1999 and low HDL-C (<40 mg/dl) since 2007.[26] Furthermore, during the years from 2003 to 2012, the percentage of adults aged over 40 years using cholesterol-lowering medication increased from 20% to 28%, and the use of statins increased from 18% to 26%. In the years from 2011 to 2012, 71% of adults with CVD and 54% of adults with hypercholesterolemia used cholesterol-lowering medication and 93% of adults using cholesterol-lowering medication used a statin.[27] Also, secular trends in England and the United States demonstrate a decline in the proportion of men and women with undiagnosed high serum TC levels during the past 2 decades.[28]

With respect to current knowledge on dyslipidemias as CVD risk factors and taking into account the results presented, the following conclusions should inform the national strategy for CVD prevention:

1 The prevalence of hypercholesterolemia has been high and stable for 10 years in the general Polish adult population, which may reflect the ineffectiveness of prevention campaigns.

2 About 80% of men and 75% of women have dyslipidemia that would increase CVD risk and require either behavioral, dietary, or pharmacological treatment and regular check-ups at least once a year.

3 There is an urgent need for a more intensive high-risk strategy to identify persons with hypercholesterolemia and other dyslipidemias, and for a more effective population strategy to modify unfavorable health behaviors.

4 In about 10% to 15% of persons with hypercholesterolemia, the condition could be controlled by diet.

5 The remaining 85% to 90% of persons with hypercholesterolemia would require serious consideration of pharmacological treatment—lifelong in most cases.

6 There is a need for strengthening the motivation of doctors and patients to use the recommended types of lipid-lowering drugs in their effective doses, especially in patients at very high and high CVD risk.

7 About 10% to 15% of the adult population have isolated hypertriglyceridemia, which can mostly be controlled by diet and by increasing physical activity; however, if not effective, lipid--lowering treatment is recommended.

8 About 20% of men and 25% of women do not require intervention, apart from a regular check-up every 5 years.

Acknowledgments The authors express special thanks to all the research team and collaborating persons from the field centers in 16 voivodships, and to all participants of the WOBASZ and WOBASZ II studies.

The WOBASZ II project was funded from the financial resources at the disposal of the Minister of Health within the framework of the health program entitled: National Program of Equalization the Accessibility to Cardiovascular Disease Prevention and Treatment for 2010–2012 POLKARD – goal: Analyses and epidemiology – "Monitoring of the epidemiological situation in Poland in the field of cardiovascular diseases".

Contribution statement AP contributed to study conception and design, data analysis and interpretation, as well as drafted the manuscript. KS and M. Polak contributed to data analysis and interpretation, as well as critically revised the manuscript. M. Kozela helped to draft the manuscript. M. Polakowska, EP, WP, and MK contributed to data interpretation and critically revised the manuscript. KK, AT, TZ, and WD contributed to study conception and critically revised the manuscript. All authors gave their final approval of the manuscript.

Supplementary material online Supplementary material is available with the online version of the article at www.pamw.pl.

REFERENCES

1 Drygas W, Niklas A, Piwońska A, et al. Multi-center National Population Health Examination Survey (WOBASZ II study): assumptions, methods and implementation. Kardiol Pol. 2015; doi:10.5603/KP.a2015.0235.

2 National Heart, Blood and Lung Institute. National Cholesterol Education Program. http://www.nhlbi.nih.gov/. Accessed January 20, 2016.

3 The Fifth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice. European Guidelines on cardiovascular disease prevention in clinical practice (version 2012). Eur Heart J. 2012; 33: 1635-1701.

4 [The Fifth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice. European Guidelines on cardiovascular disease prevention in clinical practice]. Kardiol Pol. 2012; 70; Supl 1: S1-S100. Polish.

5 Cybulska B, Adamus J, Bejnarowicz J, et al. [Prevention of coronary heart disease]. Kardiol Pol. 2000; 53; Supl. 1: 4-48. Polish.

6 Niewada M, Członkowska A. Prevention of ischemic stroke in clinical practice: a role of internists and general practitioners. Pol Arch Med Wewn. 2014; 124: 540-548.

7 Stone NJ, Robinson J, Lichtenstein AH, et al. 2013 ACC/AHA guideline on the treatment of blood cholesterol to reduce atherosclerotic cardiovascular disease risk in adults. J Am Coll Cardiol. 2014; 63: 3024-3025.

8 Pająk A, Wiercińska E, Polakowska M, et al. [The prevalence of dyslipidemia in men and women aged 20-74 years in Poland]. Kardiol Pol. 2005; 63; Supl. 4: 620-625. Polish.

9 Rywik S, Kupść W, Piotrowski W, et al. [Multicenter nationwide study of health of the population – project WOBASZ. Methodological assumptions and logistics]. Kardiol Pol. 2005; 63 Supl. 4: S5-S9. Polish.

10 Broda G, Rywik S. [Multicenter nationwide study of health of the population – project WOBASZ. Defining the problem and research objectives]. Kardiol Pol. 2005; 63 Supl.4: S2-S4. Polish.

11 Morris JA, Gardner MJ. Calculating confidence intervals for relative risks (odds ratios) and standardized ratios and rates. BMJ. 1988; 296: 1313-1316.

12 Smith P. Comparison between registries: age-standardized rates. In: Muir, et al. Cancer Incidence in Five Continents. Lyon, IARC Scientific Publications. 1987; 88: 790-795.

13 Charzewska J, Sznajd J, Rywik S, et al. [The level of risk factors and regional differences in the population covered by the of coronary heart disease prevention program]. Przegl Lek. 1979; 36: 715-722. Polish.

14 Pająk A, Williams OD, Broda G, et al. Changes over time in blood lipids and their correlates in Polish rural and urban populations: the Poland-United States Collaborative Study in cardiopulmonary disease epidemiology. Ann Epidemiol. 1997; 7: 115-124.

15 Pająk A. [Myocardial infarction – a threat and management. Long-term observation of 280,000 men and women – Project POL-MONICA Krakow. Part II: Risk factors and mortality from coronary heart disease (CHD) in men aged 35-64 years]. Przegl Lek. 1996; 53: 707-712. Polish.

16 Waśkiewicz A, Szcześniewska D, Szostak-Węgierek D, et al. [Are dietary habits of the Polish population consistent with the recommendations for prevention of cardiovascular disease? WOBASZ II Project]. Kardiol Pol. 2016. doi:10.5603/KP.a2016.0003. [Epub ahead of print]. Polish.

17 Drygas W, Bielecki W, Kozakiewicz K, et al. [Multicenter nationwide study of the health of the population – project WOBASZ]. In: Kopeć G, et al. [Epidemiology and prevention of cardiovascular diseases]. Kraków, Poland: Medycyna Praktyczna; 2015: 41-55. Polish.

18 Nohr EA, Frydenberg M, Henriksen TB, Olsen J. Does low participation in cohort studies induce bias? Epidemiology. 2006; 17: 414-418.

19 Topór-Mądry R, Bobak M, Pajak A. 5-year mortality in respondents and nonrespondent for the cohort study of 20 000 randomly selected middle aged men and women. The HAPIEE Project. Eur J Prev Cardiol. 2012; 19: Suppl. 1.

20 Zdrojewski T, Solnica B, Cybulska B, et al. Prevalence of lipid abnormalities in Poland. The NATPOL 2011 survey. Kardiol Pol. 2016; 74: 213-223.

21 Zdrojewski T, Rutkowski M, Bandosz P, et al. Prevalence and control of cardiovascular risk factors in Poland. Assumptions and objectives of the NATPOL 2011 Survey. Kardiol Pol. 2014; 71: 381-392.

22 Jankowski P, Czarnecka D, Wolfshaut-Wolak R, et al. Secondary prevention of coronary artery disease in contemporary clinical practice. Cardiol J. 2015; 22: 219-226.

23 Jankowski P, Czarnecka D, Łukaszewska A, et al. Factors related to the effectiveness of hypercholesterolemia treatment following hospitalization for coronary artery disease. Pol Arch Med Wewn. 2016; 126: 388-394.

24 Śliż D, Mamcarz A, Filipiak KJ, et al. 3ST-POL trial: standards of statin use in Poland in the context of the European Society of Cardiology guidelines, Pol Arch Med Wewn. 2010; 120: 328-333.

25 http://www.who.int/gho/ncd/risk_factors/cholesterol_text/en. Accessed January 25, 2016.

26 Carroll MD, Fryar CD, Brian K, Kit BK. Total and High-density Lipoprotein Cholesterol in Adults: United States, 2011–2014. NCHS Data Brief. 2015; 226.

27 Gu Q, Paulose-Ram R, Burt VL, Kit BK. Prescription cholesterol-lowering medication use in adults aged 40 and over: United States, 2003–2012. NCHS Data Brief. 2014; 177.

28 Roth GA, Fihn SD, Mokdad AH, et al. High total serum cholesterol, medication coverage and therapeutic control: an analysis of national health examination survey data from eight countries. Bulletin of the World Health Organization. 2011; 89: 92-101.

ARTYKUŁ ORYGINALNY

Zmiany w częstości występowania, leczeniu oraz skuteczności postępowania w hipercholesterolemii i innych dyslipidemiach w Polsce w okresie dziesięcioletnim – badanie WOBASZ

Andrzej Pająk[1], Krystyna Szafraniec[1], Maciej Polak[1], Maria Polakowska[2], Magdalena Kozela[1], Walerian Piotrowski[2], Magdalena Kwaśniewska[3], Ewa Podolecka[4], Krystyna Kozakiewicz[4], Andrzej Tykarski[5], Tomasz Zdrojewski[6], Wojciech Drygas[2,3]; w imieniu badaczy WOBASZ II*

1 Zakład Epidemiologii i Badań Populacyjnych, Instytut Zdrowia Publicznego, Wydział Nauk o Zdrowiu, Uniwersytet Jagielloński Collegium Medicum, Kraków
2 Zakład Epidemiologii, Prewencji Chorób Układu Krążenia i Promocji Zdrowia, Instytut Kardiologii, Warszawa
3 Katedra Medycyny Społecznej i Zapobiegawczej, Uniwersytet Medyczny w Łodzi, Łódź
4 Klinika Kardiologii, III Katedra Kardiologii, Śląski Uniwersytet Medyczny w Katowicach, Katowice
5 Klinika Nadciśnienia Tętniczego, Chorób Naczyń i Chorób Wewnętrznych, Instytut Kardiologii, Uniwersytet Medyczny w Poznaniu, Poznań
6 Zakład Prewencji i Dydaktyki, Katedra Nadciśnienia Tętniczego i Diabetologii, Gdański Uniwersytet Medyczny, Gdańsk

SŁOWA KLUCZOWE

epidemiologia, hipercholesterolemia, hipertrójglyceridemia, niskie stężenie cholesterolu HDL, statyny

Adres do korespondencji:
dr Magdalena Kozela, Zakład Epidemiologii i Badań Populacyjnych, Instytut Zdrowia Publicznego, Wydział Nauk o Zdrowiu, Uniwersytet Jagielloński, Collegium Medicum, ul. Grzegórzecka 20, 31-532 Kraków, tel.: 12 433 28 38, e-mail: mkozela@cm-uj.krakow.pl
Praca wpłynęła: 29.04.2016.
Przyjęta do druku: 06.07.2016.
Publikacja *online*: 19.07.2016.
Zgłoszono sprzeczność interesów: AP otrzymywał honoraria za konsultacje od firmy Amgen (bez bezpośredniego związku z niniejszą pracą).
Pol Arch Med Wewn. 2016; 126 (9): 642-652
doi:10.20452/pamw.3464

* Pełną listę badaczy WOBASZ i WOBASZ II można znaleźć w publikacji Drygas et al.[1]

STRESZCZENIE

WPROWADZENIE Obniżenie narażenia na dyslipidemie jest jednym z największych wyzwań w prewencji chorób układu krążenia.

CELE Celem badania było określenie częstości występowania dyslipidemii oraz leczenia hipercholesterolemii w Polsce, a także ocena zmian w tym zakresie od 2003–2005 roku.

PACJENCI I METODY Wykonano dwa badania przekrojowe na losowej próbie populacji polskiej w latach 2003–2005 (WOBASZ) i 2013–2014 (WOBASZ II). Wywiady przeprowadzono na podstawie standardowego kwestionariusza. Stężenia lipidów we krwi oznaczano w jednym laboratorium, w zamrożonych próbkach, za pomocą metody enzymatyczno-kolorymetrycznej.

WYNIKI Do analizy zakwalifikowano 14 151 osób w wieku 20–74 lat (WOBASZ) oraz 5947 osób w wieku 20–99 lat (WOBASZ II). W badaniu wykonanym w latach 2013–2014 hipercholesterolemię stwierdzono u 70,3% mężczyzn i 64,3% kobiet. Izolowaną hipertrójglicerydemię stwierdzono u 5,6% mężczyzn i 2,4% kobiet. Izolowane niskie stężenie cholesterolu we frakcji lipoprotein wysokiej gęstości (*high-density lipoprotein* – HDL) stwierdzono u 5,1% mężczyzn i 7,3% kobiet. Częstość występowania hipercholesterolemii nie zmieniła się istotnie w stosunku do badania w latach 2003–2005. Wzrost częstości występowania hipertrójglicerydemii stwierdzono u mężczyzn (RR 1,26; 95% CI: 1,03–1,55), a wzrost występowania niskiego stężenie cholesterolu HDL u obu płci (u mężczyzn: RR 2,26; 95% CI: 1,77–2,88; u kobiet: RR 1,94; 95% CI: 1,61–2,33). Obserwowano wzrost odsetka osób poddanych wysoko intensywnej i umiarkowanie intensywnej terapii statynami. Mimo to 60,6% osób z hipercholesterolemią nie było świadomych swojego stanu, a tylko 6% było leczonych i osiągało cel leczenia.

WNIOSKI Istnieje pilna potrzeba opracowania bardziej skutecznych strategii zapobiegania i leczenia dyslipidemii.