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PREVALENCE AND KNOWLEDGE OF CLASSICAL CARDIOVASCULAR DISEASE RISK FACTORS AMONG PATIENTS WITH DIABETES

Józefa Dąbek[1 A,E,G]

Joanna Piotrkowicz[1 C–E]
• ORCID: 0000-0003-0996-7691

Sonia Leśniewska[1 A,B,D]

Dariusz Korzeń[2,3 D,F,G]

Grażyna Bonek-Wytrych[4 B,C,F]

[1] Chair and Department of Cardiology, School of Health Sciences in Katowice, Medical University of Silesia in Katowice, Poland

[2] Department of Anaesthesiology and Intensive Care with Cardiac Monitoring, Leszek Giec Upper-Silesian Medical Center of the Silesian Medical University in Katowice, Poland

[3] Department of Anaesthesiology and Intensive Care, The Municipal Hospital in Ruda Śląska, Poland

[4] Department for Health Care Supervision, Silesian Voivodeship Office in Katowice, Poland

A – study design, **B** – data collection, **C** – statistical analysis, **D** – interpretation of data, **E** – manuscript preparation, **F** – literature review, **G** – sourcing of funding

ABSTRACT

Background: The prevalence of diabetes is increasing annually, and diabetes is associated with an increased risk of developing cardiovascular disease. Diabetes can significantly increase the risk of developing coronary heart disease, stroke, hypertension or ischemia of the lower limbs. Furthermore, the presence of other risk factors including; being overweight or obesity, having hypertension, having excessive stress or having low levels of physical activity also contribute to this risk as well as contributing to disease progression and mortality among patients.

Aim of the study: The aim of this study was to evaluate the prevalence of risk factors for cardiovascular disease among patients with diabetes, and to assess their knowledge in this regard.

Material and methods: In total, 202 patients (121 females, 81 males) aged 25–74 (mean age = 58.7) were assessed in this study, from a Polish primary care setting. Inclusion criteria included a confirmed diagnosis of diabetes and that patients had given informed consent to participate in the study. We utilized a questionnaire to assess knowledge in areas related to cardiovascular disease prevention including; physical activity, diet and lifestyle. For statistical analysis Statistica v.10.0 was used.

Results: The most common cardiovascular disease risk factors included; diabetes (n = 202, 100%), obesity (n = 107; 53.0%) and stress (n = 116; 57.4%). Other contributing factors included; low physical activity (n = 179; 88.6%) and being overweight (n = 176; 87.1%). There were statistically significant differences between the number of risk factors and variables including; sex ($p < 0.001$), age ($p < 0.001$), the level of knowledge ($p < 0.001$) and the duration of the disease.

Conclusions: Patients with diabetes had many risk factors for the development of cardiovascular disease and their knowledge of their disease was shown to be incomplete. The results indicate the need for more extensive health education in this area in order to reduce the number of risk factors and disease development.

KEYWORDS: diabetes, cardiovascular diseases, risk factors

Background

Diabetes is a systemic disease characterized by elevated blood glucose levels due to impaired insulin secretion and / or action. Chronic metabolic disorders and hyperglycemia causes damage to many organs including: eyes, kidneys, nerves, heart and blood vessels [1]. A diagnosis is made by meeting at least one of the following criteria: blood glucose concentration at the level of 200mg/dL or more 120 minutes after the oral glucose tolerance test, a random blood glucose equal to or greater than 200mg/dL with symptoms of hyperlipidemia or a double increase in fasting glucose to a level of 126mg/dL or more [2]. The World Health Organization (WHO) and the American Association of Diabetes

(ADA) have developed a classification system for diabetes, in which we distinguish four types of diabetes: type 1, type 2, other specific types of diabetes and gestational diabetes [3–5].

Both in Poland and in the rest of the world, there has been a steady increase in the incidence of diabetes, which is associated with an increase in the incidence of cardiovascular diseases, cardiovascular disease being a complication of diabetes [6]. It is estimated that in 2011, 360 million people suffered from diabetes, 95% of whom had type 2 diabetes. This number is said to increase to 522 million by 2030, of which more than half will not be aware of their diagnosis [7].

According to the International Federation of diabetes (IDF), all patients with diabetes who are over 40 years old should be considered as being at high risk of developing cardiovascular disease. It has been shown that diabetes also significantly increases the risk of developing other related conditions including; ischemic heart disease, stroke, hypertension or lower limb ischemia. These conditions are caused secondary to direct damage to blood vessels due to uncontrolled glucose levels. In addition, studies have shown that the relative risk of developing ischemic stroke is 2–3 times more common among patients with diabetes than among patients without the disease. This can be due to the tendency of blood to clot as well as reduced vessel patency. A similar mechanism of disease is suggested in lower limb ischemia. In the case of patients with diabetes, this condition is particularly dangerous due to the impairment of collateral circulation [8]. In coronary heart disease, the coronary arteries become narrower, which makes the myocardial function difficult and can result in myocardial infarction.

Diseases of the circulatory system are the most common causes of death in Poland and in the world, being ahead of even those resulting from cancer [9–10]. According to the data published by the Central Statistical Office (GUS), deaths from cardiovascular disease in Poland in 2013 accounted to as much as 45.8% of total deaths. This has remained at a similar percentage for over the last 20 years. It is predicted that in 2050 the number of deaths will increase by over 40,000, as compared to 2013 and will amount to 428,300 [8].

Lifestyle has the greatest impact on the development of cardiovascular diseases and its associated mortality [11]. Studies have shown that a healthy lifestyle reduces the risk of cardiovascular diseases by 50 to 70% [12]. Lifestyle factors that contribute to cardiovascular disease include: inadequate physical activity, smoking, being overweight or obese, having hypertension, abusing alcohol, having increased levels of stress, having a poor diet and having diabetes [13]. Conducting health education initiatives targeting these preventative risk factors would contribute to the elimination of these risk factors and, consequently, to reducing the development of cardiovascular diseases and its respective mortality.

Aim of the study

The aim of the study was to assess the occurrence of risk factors for cardiovascular diseases in patients with diabetes and their knowledge in this respect.

Material and methods

240 questionnaires were distributed, although for final analysis 202 patients were enrolled in the study, including 121 women and 81 men aged from 25 to 94 years (mean 58.7) diagnosed with diabetes in this: 186 (92.1%) with diabetes type 2 and 16 (7.9%) with diabetes type 1. Studies were carried out from March to May 2016. The inclusion criteria included a diagnosis of diabetes and that patients had given their informed consent to participate in the study. The study was carried out in a diabetes, cardiology, primary care clinic and at a physiotherapy department in a medical facility in Katowice. Research was approved by the Bioethics Committee of the Medical University of Silesia in Katowice (KNW/0022/KBI/98/15). We utilized a questionnaire consisting of a questions about the health of the subjects, their knowledge about preventative measures, physical activity, eating habits, risk factors and other behaviors important in the prevention of cardiovascular disease. The type of questions contained in the questionnaire were closed. Points were awarded for the responses of the subjects: 1 point for a correct response and 0 points for a wrong response or "I do not know". Results were given on a scale of 0–10. The questionnaire was anonymous and participation in the study was voluntary. The data was subjected to statistical analysis using the Statistica v.10.0 program. For general characteristics of the studied group of patients, mean, standard deviation, median, minimal and maximal values were calculated. Due to the normal distribution of results for the evaluation of the relationship between selected variables parametric tests were used. The significance level was considered as $p \leq 0.05$.

Results

The characteristics of the studied group of patients with diabetes including age, weight, body height, BMI and the period for which they had been diagnosed with diabetes are presented in tab. 1.

Table 1. General characteristics of the studied group of patients with diabetes.

Study group n = 202					
Variable	**x**	**SD**	**Median**	**Min**	**Max**
Age [year]	58.7	16.39	59	25	94
Body weight [kg]	80.1	15.18	78	46	120
Body height [m]	1.67	9.53	1.68	1.38	1.93
BMI [kg/m^2]	28.41	4.02	28.26	20.72	40.09
Disease duration [year]	9.21	8.63	6.5	1	41

The mean BMI of patients with diabetes would be classified as being overweight at 28.41 kg/m^2. The subjects had been diagnosed with diabetes for an average of 9.21 years with the shortest time being 1 year and the longest being 41 years.

The characteristics of the studied group of patients with diabetes, taking into account the occurrence of cardiovascular diseases are presented in tab. 2.

Table 2. Characteristics of the studied group of patients with diabetes including the occurrence of cardiovascular diseases.

Occurrence of cardiovascular diseases in study group		
Variable Number of group (n; % of group)	**Number of group n = 202**	**% of group 100%**
Hypertension	115	56.9%
Coronary artery diseases	63	31.2%
Arrhythmia	54	26.7%
Dyslipidemia	50	24.8%
Peripheral atherosclerosis	20	9.9%
Myocardial infarction	20	9.9%
Venous insufficiency	15	7.4%
Others	15	7.4%
Heart failure	7	3.5%
Stroke	6	2.9%

Cardiovascular diseases was found in all patients with diabetes. The most frequent were: hypertension n = 115 (56.9%). coronary artery diseases n = 63 (31.2%) arrhythmia n = 54 (26.7%) and dyslipidemia n = 50 (24.8 %).

Tab. 3 presents the characteristics of the studied group of patients taking into account the presence of risk factors for cardiovascular diseases and their knowledge in this regard.

In the study group, the most common risk factors for cardiovascular diseases were: diabetes (n = 202; 100%), being overweight or obese (n = 107; 53.0%) and having increased stress levels (n = 116; 57.4%). In the opinion of the respondents, factors contributing to their cardiovascular disease were: low level of physical activity (n = 179; 88.6%), being overweight or obese (n = 176; 87.1%) and their diabetes (n = 154; 76.2 %).

Fig. 1 presents an analysis of the results taking into account the behaviors that the respondents consider necessary in the prevention of cardiovascular disease.

The most important preventative measures, according to the respondents included: controlling blood pressure (n = 186; 92.1%), using recommended medication (n = 165; 81.70%), optimal cholesterol and glucose control (n = 156; 77.20%), visits to doctor's surgery (n = 152; 75.20%), good nutrition (n = 152; 75.20%) and weight reduction (n = 125; 61.90%). Only every second subject considered physical exercise to be important in the prevention of cardiovascular disease (n = 112; 55.40%).

Knowledge about the risk factors for the development of cardiovascular disease was examined on the basis of patient knowledge of nine basic modifiable risk factors. It was assumed that the patients who knew more than 7 of them had a good knowledge of their disease. Patients who knew 4–6 factors had sufficient knowledge and people who knew 3 or less risk factors had insufficient knowledge. The data is presented in fig. 2.

Table 3. Characteristics of the studied group of patients with diabetes in terms of risk factors for cardiovascular disease and their knowledge in this regard.

Variable Number of group; n. % of group	**Cardiovascular risk factors**			
	factors which the respondents mention as contributing to the occurrence of cardiovascular disease		**risk factors of cardiovascular disease occurring in the studied group**	
	n = 202	**100%**	**n = 202**	**100%**
Low level of physical activity	179	88.6%	30	14.9%
Overweight/obesity	176	87.1%	107	53.0%
Diabetes mellitus	154	76.2%	202	100%
Chronic stress	146	72.3%	116	57.4%
Hypertension	127	62.9%	104	51.5%
Tobacco	118	58.4%	32	15.8%
Improper nutrition	118	58.4%	31	15.3%
Dyslipidemia	111	55.0%	45	22.3%
Alcohol abuse	109	54.0%	16	7.9%
Age	75	37.1%	64	31.7%
Early-family occurrence of cardiovascular diseases	70	34.7%	34	16.8%
Gender	45	22.4%	39	19.3%

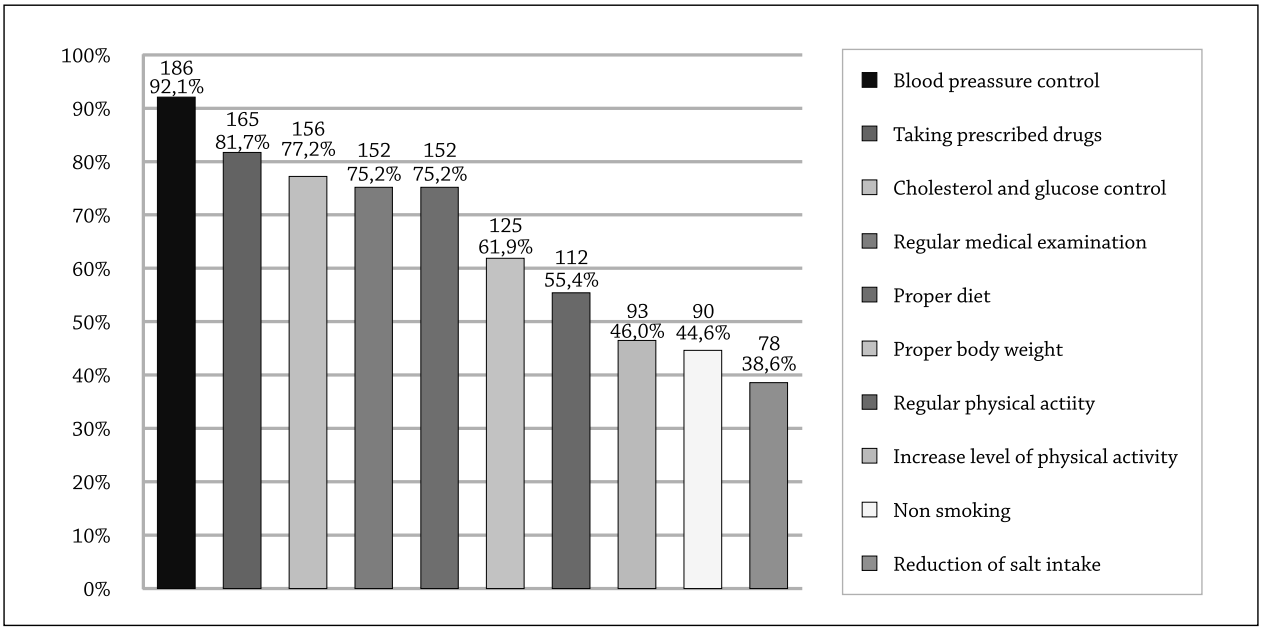

Figure 1. Characteristics of the study group with respect to behaviors considered to be necessary in the prevention of cardiovascular diseases.

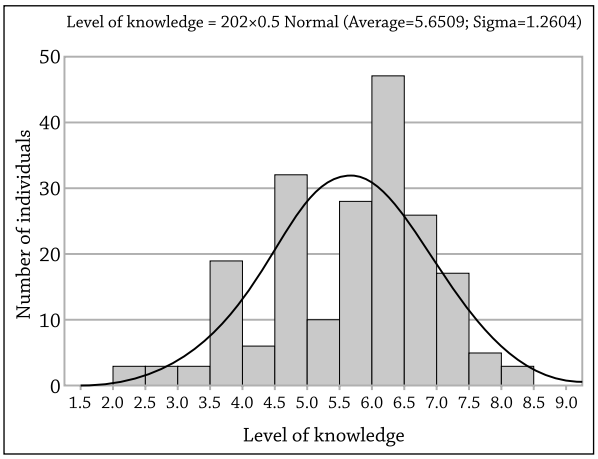

Figure 2. Distribution of results including the knowledge of risk factors for systemic cardiovascular diseases in the study group of patients with diabetes.

Analysis of the knowledge of risk factors for cardiovascular diseases in the study group of patients with diabetes showed that 126 subjects (62%) listed at least 5 risk factors for cardiovascular disease.

Tab. 4 shows the relationship between the number of risk factors present in the examined group of patients with diabetes and such parameters as sex, age, place of residence and the level of the knowledge of the subjects.

Statistical analysis showed a significant relationship between the number of risk factors present and such parameters as: gender ($p < 0.05$), age ($p < 0.05$), the level of the knowledge ($p < 0.05$) and the duration of the disease ($p < 0.05$).

Discussion

Diabetes worsens cardiovascular disease outcomes both in patients with significant disease morbidity and in those who are not burdened with cardiovascular disease [14]. What is more, numerous studies show that the vast majority of diabetic patients die from cardiovascular disease [15–18]. In the majority of cases, diabetes develops as a result of an unhealthy lifestyle, including a high-fat diet and low physical activity which lead to obesity, insulin resistance, hyperinsulinemia and the

Tab. 4. Relationship between the number of risk factors present in the examined group of patients with diabetes and such parameters as sex, age, place of residence and the level of the knowledge of the subjects.

Variable	N-significant Group 1	N-significant Group 2	Average group 1	Average group 2	t	df	*p*
Number of risk factors vs. Gender	202	202	9.282781	5.650	5.816	402	0.001
Number of risk factors vs. Age	202	202	9.213	58.70297	38.063	402	0.001
Number of risk factors vs. Place of residence	202	202	1.05000	1.030	0.358	402	0.721
Number of risk factors vs. Level of knowledge	202	202	9.21871	5.650	5.801	402	0.001
Number of risk factors vs. Disease duration	202	202	5.347	9.218	-6.165	402	0.001

development of type 2 diabetes. These conditions have been described together as metabolic syndrome and it has been shown that cardiovascular disease develops earlier due to this condition. Even before the onset of diabetes, particular attention is paid to hyperglycemia, given the risk of small vessel diseases such as retinopathy, nephropathy or neuropathy.

Diabetes is itself a risk factor that contributes significantly to the development of cardiovascular disease. What is important, is that the burden with other factors, such as being overweight or obese, having hypertension, excessive stress or too little physical activity increases the risk of developing cardiovascular disease, as well as disease progression and mortality. Stamler et al. showed that the risk of cardiovascular diseases in diabetic patients was three times higher than in healthy people. What is more, the mortality rate increased in patients with diabetes along with an increase in the number of risk factors for cardiovascular diseases [19].

Polkowska et al. showed that patients with diabetes were more likely to have excessive body weight and live in families burdened with ischemic heart disease and other risk factors [20–21].

Epidemiological studies show that abnormal body weight is the greatest risk factor for the development of diabetes. This is important due to the fact that as many as to 107 people (53%) were overweight or obese in the study and that 176 people (87.1%) indicated this factor as contributing to the development of cardiovascular disease. Excessive carbohydrate and sugar intake contribute not only to weight gain, but also to impaired glucose control, reduced fructose metabolism, inflammation, insulin resistance, beta-cell dysfunction, increased blood pressure, visceral obesity and atherogenic dyslipidemia [22].

A study by Wing et al. showed that weight loss by 5 to 10% in people with cardiovascular disease and diabetes significantly reduced other risk factors. It was also shown that the greater the weight loss, the lower the risk factor burden. Weight loss affected such risk factors as: blood glucose, arterial pressure, triglycerides, and increased HDL cholesterol without changes in LDL cholesterol [23].

Juultilanen et al. showed a strong relationship between the occurrence of diabetes and the risk of cardiovascular disease in patients. What is more, it was shown that this relationship is stronger among women as compared to men who were burdened with the presence of a greater number of risk factors including hypertension and dyslipidemia. The results are consistent with the results of our study where a significant relationship between the occurrence of risk factors and the gender of the respondents was also demonstrated [24].

The Look AHEAD Research Group study showed that conducting healthy education and introducing an intensive lifestyle change in patients with type 2 diabetes in a four-year follow-up had a beneficial influence in controlling glucose and blood pressure, lowering the body weight of the subjects and improving overall physical condition. The burden of these risk factors was also significantly reduced [25].

The results of our study indicates the need to conduct health education among patients at every stage of their disease in order to eliminate risk factors prevent the development and progression of the disease and reduce the risk of mortality in patients.

Conclusions

1. The most frequent risk factors for cardiovascular disease in the study group of patients with diabetes included: excessive stress and an increased body weight.
2. The knowledge of the studied patients with diabetes with respect to risk factors was not associated with a decrease in their occurrence, because the burden was high both in the patients with newly diagnosed diabetes and those with long-standing diabetes.

The results of the study indicate the need to conduct extensive health education among healthy people in order to eliminate risk factors contributing to the prevalence of diabetes and cardiovascular disease.

References

1. American Diabetes Association, et al. Diagnosis and classification of diabetes mellitus. Diabetes Care 2012; 35(1): 64–71.
2. Czupryniak L, Strojek A. Diabetologia 2015. Gdańsk: Via Medica; 2015. (in Polish).
3. WHO Consultation. Definition. Diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus. Geneva: World Health Organization; 1999. Report no. 99.2. Available from URL: http://whqlibdoc.who.int/hq/1999/who_ncd_ncs_99.2.pdf.
4. Genuth S, Alberti KG, Bennett P, Buse J, Defronzo R, et al. Follow-up report on the diagnosis of diabetes mellitus. Diabetes Care 2003; 26: 3160–3167.
5. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care 2012; 35(1): 64–71.
6. Kara I, Nowicka TM, Bryl W. Zachowania kardioprotekcyjne u chorych na cukrzycę typu II. Forum Zaburzeń Metabolicznych 2012; 3(2): 80–84. (in Polish).
7. Rydén L, Grant PJ, Anker SD, Berne C, Cosentino F, et al. ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD. Eur Heart J 2013; 34(39): 3035–3087.
8. Cierniak-Piotrowska M, Marciniak G, Stańczak J. Statystyka zgonów i umieralności z powodu chorób układu krążenia. In: Strzelecki Z, Szymborski J. Zachorowalność i umieralność na choroby układu krążenia a sytuacja demograficzna Polski. Warszawa: Zakład Wydawnictw Statystycznych; 2015. (in Polish).
9. Santulli G. Epidemiology of cardiovascular disease in the 21st century: updated numbers and updated facts. JCvD 2013; 1(1): 1–2.

10. Nichols M, Townsend N, Scarborough P, Rayner M. Cardiovascular disease in Europe 2014: epidemiological update. Eur Heart J 2014; 35: 2929–2933.

11. Townsend N, Wilson L, Bhatnagar P, Wickramasinghe K, Rayner M, et al. Cardiovascular disease in Europe: epidemiological update 2016. Eur Heart J 2016; 34(39): 3028–3034.

12. Chow CK, Redfern J, Hillis GS, Thakkar J, Santo K, et al. Effect of lifestyle-focused text messaging on risk factor modification in patients with coronary heart disease: a randomized clinical trial. Jama 2015; 314(12): 1255–1263.

13. Teo K, Lear S, Islam S, Mony P, Dehghan M, et al. Prevalence of a healthy lifestyle among individuals with cardiovascular disease in high-, middle-and low-income countries: the Prospective Urban Rural Epidemiology (PURE) study. Jama 2013; 309(15): 1613–1621.

14. Kontis V, Mathers CD, Rehm J, Stevens GA, Shield KD, et al. Contribution of six risk factors to achieving the 25×25 non-communicable disease mortality reduction target: a modelling study. Lancet 2014; 384(9941): 427–437.

15. Sarwar N. Gao P. Seshasai SR. Diabetes mellitus. fasting blood glucose concentration. and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. Lancet 2010; 375: 22.

16. Preis SR, Hwang SJ, Coady S, Pencina MJ, D'Agostino RB Sr, et al. Trends in all-cause and cardiovascular disease mortality among women and men with and without diabetes mellitus in the Framingham Heart Study. 1950 to 2005. Circulation 2009; 119: 1728–1735.

17. Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, et al. Heart disease and stroke statistics – 2013 update: a report from the American Heart Association. Circulation 2013; 127(23): e6–e245.

18. Stamler J, Vaccaro O, Neaton JD, Wentworth D. Diabetes, other risk factors, and 12-yr cardiovascular mortality for men screened in the multiple risk factor intervention trial. Diabetes Care 1993; 16(2): 434–444.

19. Sulicka J, Fornal M, Gryglewska B, Wizner B, Grodzicki T. Wybrane czynniki ryzyka chorób sercowo-naczyniowych u pacjentów podstawowej opieki zdrowotnej. Nadciśn Tętn 2006; 10(5): 370–376. (in Polish).

20. Polkowska A, Głowińska-Olszewska B, Tobiaszewska M, Bossowski A. Występowanie czynników ryzyka chorób sercowo-naczyniowych u dzieci z cukrzycą typu 1 w latach 2000–2010 na terenie województwa podlaskiego. Pediatr Endocrinol Diabetes Metab 2014; 20(2): 47–54. (in Polish).

21. Malik VS, Popkin BM, Bray GA, Després JP, Hu FB. Sugar-sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk. Circulation 2010; 121(11): 1356–1364.

22. Wing RR, Lang W, Wadden TA, Safford M, Knowler WC, et al. Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes. Diabetes Care 2011; 34(7): 1481–1486.

23. Juutilainen A, Kortelainen S, Lehto S, Rönnemaa T, Pyörälä K, et al. Gender difference in the impact of type 2 diabetes on coronary heart disease risk. Diabetes Care 2004; 27(12): 2898–2904.

24. Look Ahead Research Group, et al. Long term effects of a lifestyle intervention on weight and cardiovascular risk factors in individuals with type 2 diabetes: four year results of the Look AHEAD trial. Arch Inter Med 2010; 170(17): 1566.

25. Chen L, Magliano DJ, Zimmet PZ. The worldwide epidemiology of type 2 diabetes mellitus – present and future perspectives. Nat Rev Endocrinol 2012; 8(4): 228–236.

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Correspondence address:
Joanna Piotrkowicz
Katedra i Klinika Kardiologii Wydziału Nauk o Zdrowiu w Katowicach
Śląski Uniwersytet Medyczny w Katowicach
Ul. Ziołowa 45/47
40-635 Katowice
E-mail: joanna.piotrkowicz@gmail.com

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