ORIGINAL ARTICLE

Incidence of diabetes in the Polish population

Results of the Multicenter Polish Population Health Status Study – WOBASZ

Maria Polakowska, Walerian Piotrowski

Department of Epidemiology, Cardiovascular Diseases Prevention and Promotion of Health, Institute of Cardiology, Warszawa, Poland

KEY WORDS

diabetes, impaired fasting glucose, Polish population

ABSTRACT

INTRODUCTION Incidence of diabetes is increasing at an alarming rate worldwide. It has been estimated that 2.2 to 2.5 million of Poles will be affected by this disease by 2030.

OBJECTIVES The aim of the study was to conduct an epidemiological analysis of the incidence of diabetes and impaired fasting glucose (IFG) in the Polish population.

PATIENTS AND METHODS A sample of 21,600 individuals (men and women) aged 20–74 years was randomly selected from the general Polish population. A total of 14,769 individuals took part in the study (6977 men and 7792 women). Diabetes was identified in individuals with fasting glucose equal to or exceeding 7 mmol/l and in those with previously diagnosed diabetes. IFG was identified in nontreated individuals with fasting glucose between 5.6 and 6.9 mmol/l.

RESULTS Diabetes was diagnosed in 1000 individuals (6.8%), including 518 men (7.4%) and 482 women (6.2%). IFG was detected in 1401 individuals (9.5%), including 864 men (12.4%) and 537 women (6.9%). Incidence of diabetes increases with age: in men from 0.7% in those aged 20–29 years to 16.3% in those aged >60 years; in women from 0.5% in the youngest age group to 17.8% in the oldest group. Incidence of diabetes in Poland varies between the provinces – from 5.3% to 9% among men and from 4.2% to 7.5% among women. There was no significant correlation between the incidence of diabetes and the size of a particular local district (commune; *gmina*). Similar territorial differences were observed for IFG, i.e., from 5.8% to 20.8% among men and from 2.8% to 11.7% among women. As with diabetes, the incidence of IFG was not associated with the size of a commune.

CONCLUSIONS Incidence of diabetes and IFG in the study population varies depending on age, sex, and region. Incidence of diabetes in Poland is comparable to the average values observed worldwide.

INTRODUCTION Lifestyle changes, such as increased calorie intake, lower physical activity, and higher prevalence of overweight and obesity, contribute to the development of numerous diseases. Incidence of diabetes is increasing worldwide at an alarming rate. Experts estimate that diabetic population will grow from 195 to 360 million by 2030 (4.5% of the global population). According to the World Health Organization (WHO), the number of diabetics in Poland will increase to 2.2–2.5 million by 2030.[1]

Type 2 diabetes constitutes the majority of cases of diabetes and accounts for 85% to 90% of all carbohydrate metabolism disorders. In its initial stages, diabetes often remains low-symptomatic and therefore undiagnosed, only to be detected when serious complications occur such as heart attack, stroke, renal failure, or vision deterioration.[2,3]

The aim of our study was to perform an epidemiological analysis of the incidence of diabetes and impaired fasting glucose (IFG) in the Polish population aged 20–74 years, as well as the analysis of territorial differences in the incidence, depending on a province (*województwo*) or a commune (*gmina*).

Patients and methods The Multicenter Polish Population Health Status Study (Wieloośrodkowe Ogólnopolskie Badanie Stanu Zdrowia Ludności

Correspondence to:
Maria Polakowska, MD, PhD, Zakład Epidemiologii, Prewencji Chorób Układu Krążenia i Promocji Zdrowia, Instytut Kardiologii, ul. Alpejska 42, 04-628 Warszawa, Poland, phone: +48-22-815-65-56, fax: +48-22-812-55-86, e-mail: mpolakowska@ikard.pl
Received: December 13, 2010.
Revision accepted: April 4, 2011.
Conflict of interest: none declared.
Pol Arch Med Wewn. 2011; 121 (5): 156-163
Translated by Anna Kalińska, MD

TABLE 1 Incidence of diabetes and impaired fasting glucose in the Polish population aged 20–74 years according to the WOBASZ study

Disorder	Men	Women	Total
diabetes, % (n)	7.4 (518)	6.2 (482)	6.8 (1000)
IFG, % (n)	12.4 (864)	6.9 (537)	9.5 (1401)
no disorders, % (n)	80.2 (5595)	86.9 (6773)	83.7 (12368)

Abbreviations: IFG – impaired fasting glucose

– WOBASZ) was conducted from 2003 to 2005.[4] It has been approved by the Bioethics Committee of the Institute of Cardiology, Warsaw, Poland. The sample of 21,600 individuals, men and women, was randomly selected from a larger pool of 26,360 people aged 20–74 years. From each of the 16 Polish provinces, we randomly selected 2 small (up to 8000 inhabitants), 2 medium (8000–40,000), and 2 large communes (above 40,000). A separate study group included the inhabitants of the capital city of each province. From each commune, we randomly selected 100 men and 100 women. Altogether, 14,769 individuals (6977 men and 7792 women) agreed to take part in the study. Each individual was informed about the screening procedures and signed the agreement form. A standard questionnaire was designed, based on the objectives of the study, and used for data collection. Respondents answered questions about social, demographic, and economic status, physical activity, any detrimental habits, cardiovascular disease, diabetes, health awareness, health care, and any ongoing medical treatments. As for diabetes, we asked whether it had been previously diagnosed; if yes – at what age and what treatment had been administered. A separate questionnaire was used to collect data about prescribed medications, their dosage and use.

Physical examination included basic biometrics, blood pressure, and pulse rate and rhythm; glucose and lipid levels were measured in venous blood after 12-hour fast. A hexokinase enzymatic method was used to determine serum glucose levels. Diabetes was identified if fasting glucose levels were equal to or exceeded 7 mmol/l, or if there was a previous diagnosis or use of antidiabetic medications. IFG was diagnosed in nontreated individuals with fasting glucose levels between 5.6 and 6.9 mmol/l.

Results are presented separately for men and women, as well as for each of the 16 provinces, communes, and capital cities.

Statistical analysis The results of our study were analyzed using descriptive statistics, including mean values, standard deviations, frequencies, and graphic interpretation such as histograms and distribution functions. The mean values were compared using either parametric or nonparametric tests, depending on the distribution of the variables. The χ^2 test and Fisher exact test were used to compare frequencies of analyzed events. $P < 0.05$ was considered statistically significant.

RESULTS Diabetes was diagnosed in 6.8% of the study population. We observed a slightly higher incidence in men than in women (518 [7.4%] vs. 482 [6.2%]; TABLE 1).

In the diabetes group, elevated fasting glucose levels were detected for the first time in 33.4% of men and 22% of women (FIGURE 1). Incidence of diabetes increased with age both in men and women (TABLE 2). Among men, the average incidence of diabetes increased from 0.7% in those aged 20–29 years to 16.3% in those aged >60 years, with a marked increase in patients aged >50 years. Among women, the average incidence increased from 0.5% in the youngest age group to 17.8% in the oldest group, with a marked increase in patients aged >60 years.

IFG was detected in 9.5% of the population – 864 men (12.4%) and 537 women (6.9%) as shown in TABLE 1. As in diabetes, we observed age-related increase in the incidence of IFG – from 3.3% to 17% among men and from 1.3% to 12.1% among women (TABLE 2). A significant increase in the incidence of IFG was observed both for men and women aged ≥40 years. Interestingly, it was several-fold higher than the incidence of diabetes in the group of men aged ≤50 years, while in the older group these differences were less pronounced. A similar tendency was observed among women, but the differences were smaller and the incidence of diabetes was higher than that of IFG in the age group >60 years. Mean body mass index (BMI) for each age group is presented in TABLE 2. A statistically significant linear trend observed for diabetes and IFG with regard to age was also identified for BMI, which confirms a strong correlation

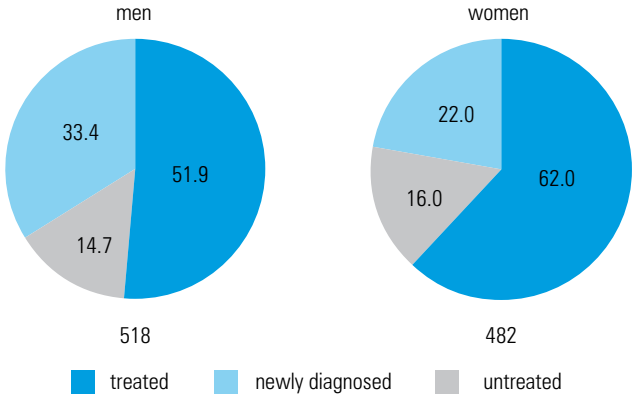

FIGURE 1 Incidence of diabetes in the Polish population

TABLE 2 Incidence of diabetes and impaired fasting glucose, as well as mean body mass index in different age groups according to the WOBASZ study

Age groups	Men			Women		
	diabetes, %	IFG, %	mean BMI	diabetes, %	IFG, %	mean BMI
20–29	0.7	3.3	24.1	0.5	1.3	22.2
30–39	1.9	8.8	26.3	1.7	2.4	24.0
40–49	4.9	14.9	27.1	3.2	6.9	26.4
50–59	11.9	16.5	27.7	7.7	11.2	28.4
≥60	16.3	17.0	27.8	17.8	12.1	29.2
P	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001

Abbreviations: BMI – body mass index, others – see TABLE 1

between these parameters. Diabetes is most often diagnosed in men aged 40–49 years and in women aged 50–59 years (FIGURE 2).

Distribution of diabetes in Poland is characterized by territorial variance – from 5.3% to 9% among men and from 4.2% to 7.5% among women (TABLE 3). The highest number of men diagnosed with diabetes was observed in the Wielkopolska and West Pomerania Provinces, while the highest number of women with diabetes was identified in the Lubuskie and Wielkopolska Provinces. The lowest number of men diagnosed with diabetes was observed in the Podlasie and Lower Silesia Provinces, and the lowest number of women in the Małopolska and Świętokrzyskie Provinces.

There was no significant correlation between the incidence of diabetes and the size of the analyzed region. A similar territorial variation was observed for IFG, from 5.8% to 20.8% among men and from 2.8% to 11.7% among women (TABLE 3). The highest number of men with IFG was observed for the Łódź, Kujawy-Pomerania, West Pomerania, and Wielkopolska Provinces. The majority of women with IFG lived in the Łódź, Pomerania, and West Pomerania Provinces. The lowest number of men with IFG was observed in the Małopolska, Lublin, and Świętokrzyskie Provinces, and the lowest number of women – in the Małopolska, Świętokrzyskie, Warmia-Masuria, and Lublin Provinces.

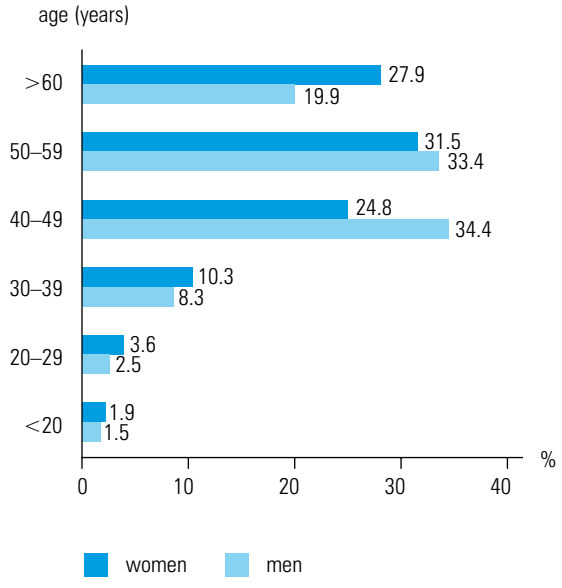

FIGURE 2 Age at diagnosis of diabetes

Mean values of age, BMI, diabetes, and IFG are presented in TABLE 3 to illustrate correlations between these parameters. Due to a large number of provinces and low variation between mean age and BMI, we did not observe a significant correlation between the incidence of diabetes or IFG and mean BMI and age.

As in the case of diabetes, there was no significant correlation between the incidence of IFG and the size of a commune (FIGURE 3).

DISCUSSION In a representative sample of the Polish population aged 20–74 years, 6.8% of individuals had diabetes and 9.5% had IFG. Altogether, 16.3% of the Polish population are affected by various carbohydrate metabolism disorders, and epidemiological significance of this fact cannot be underestimated. It is difficult to compare the results of various epidemiological studies because they differ in duration, use different parameters to evaluate carbohydrate metabolism disorders and different laboratory methods to measure glucose levels. In some studies, diabetes is diagnosed on the basis of 1 or 2 fasting glucose measurements; in others, it is diagnosed only on the basis of glucose tolerance test; yet others use glucose tolerance test in addition to fasting glucose measurement as a secondary verification method in some patients. Each method of measurement is limited and prone to errors. Fasting glucose measurement is simple, quick, and inexpensive; however, this type of test is characterized by large hour-to-hour and biological variations. Glucose tolerance test is highly specific in the detection of IFG.[5] A comparison between various studies is even more complicated because patients often belong to different age groups.

Early diagnosis of diabetes in population studies is particularly challenging because it usually involves a single visit and a single measurement of glycemia. Therefore, the results may differ from those obtained during ambulatory testing in a routine health care setting. Nevertheless, according to the WHO experts' report, diagnosis of diabetes on the basis of 1 fasting glucose measurement is acceptable. However, in the WET-Diab

TABLE 3 Incidence of diabetes and impaired fasting glucose, as well as mean body mass index and age in Polish provinces according to the WOBASZ study

Province	Men				Women			
	diabetes, %	IFG, %	mean age, y	mean BMI, kg/m^2	diabetes, %	IFG, %	mean age, y	mean BMI, kg/m^2
Lower Silesia	5.8	9.8	44.9	26.7	5.9	4.8	46.3	26.1
Kujawy-Pomerania	8.2	16.5	45.1	26.7	7.3	8.7	44.7	26.2
Lublin	7.0	7.2	46.8	26.3	6.2	4.8	46.3	26.4
Lubuskie	8.2	9.5	46.1	26.8	7.4	6.1	45.5	26.2
Łódź	7.1	20.8	44.6	26.5	6.1	11.7	44.5	25.8
Małopolska	6.1	5.8	44.9	26.3	4.2	2.8	43.3	25.9
Mazovia	6.9	15.2	45.7	27.1	7.0	7.2	45.7	26.9
Opole	8.3	10.0	44.6	26.6	7.2	5.8	44.1	26.7
Podkarpacie	5.3	8.0	45.5	26.2	5.7	5.5	45.2	25.9
Podlaskie	7.6	15.7	47.4	27.1	6.2	5.6	47.1	26.4
Pomerania	7.8	19.4	45.1	26.3	6.6	11.0	44.9	26.3
Silesia	8.1	11.6	43.8	26.6	5.7	7.3	42.5	25.6
Świętokrzyskie	6.5	7.4	46.1	26.6	4.5	4.5	45.0	25.5
Warmia-Masuria	7.7	9.2	45.7	26.5	5.5	4.7	46.1	25.8
Wielkopolska	9.0	14.1	46.7	27.3	7.5	8.1	46.0	25.9
West Pomerania	8.9	14.3	46.0	26.3	5.9	10.5	45.1	26.6
Poland	**7.4**	**12.4**	**45.6**	**26.6**	**6.2**	**6.9**	**45.2**	**26.1**

Abbreviations: see TABLES 1 and 2

study, diabetes was diagnosed in 10% of the population when this measurement was taken twice, and even in 21% when glucose tolerance test was also used.[6] A meta-analysis performed by the DECODE Study Group (Diabetes Epidemiology: Collaborative analysis of Diagnostic criteria in Europe) revealed that the outcome depends on whether we use fasting glucose or tolerance test to diagnose diabetes.[7] Additionally, as published in the Third National Health and Nutrition Examination Survey (NHANES III), 4.4% of the study population was diagnosed with diabetes when only fasting glucose was measured, while 6.4% was positive when tolerance test was used alone or together with fasting glucose.[8]

Several recent studies conducted in the Polish population either on a local or national level have revealed different aspects of diabetes, asked different questions, and used different methodology. Examples include epidemiological studies: WOBASZ (described here), WBEC (Polish Multicenter Study on the Epidemiology of Diabetes), Pol-MONICA Bis, and WET-Diab, as well as screening studies based on the data from primary health care/diabetes clinics: Polish Project 400 Cities, Screen-Pol, Primary Prevention of Atherosclerosis, Type 2 Diabetes and Hypertension, or ARETAEUS.[9-13]

Incidence of diabetes in the Polish population is in line with the average values reported worldwide and is characterized by territorial variation. According to the 2002 study by Nowakowski et al.,[14] 2% to 7% of adult Polish population had diabetes: it was 4% to 7% in the inhabitants of large cities and 2% to 4% in the remaining population.[14] WBEC, an international study conducted between 1998 and 2000, identified diabetes in 5.2% of individuals aged ≥35 years.[15] In the Pol-Monica Bis study, which was conducted in Poland in 2001 on the population aged

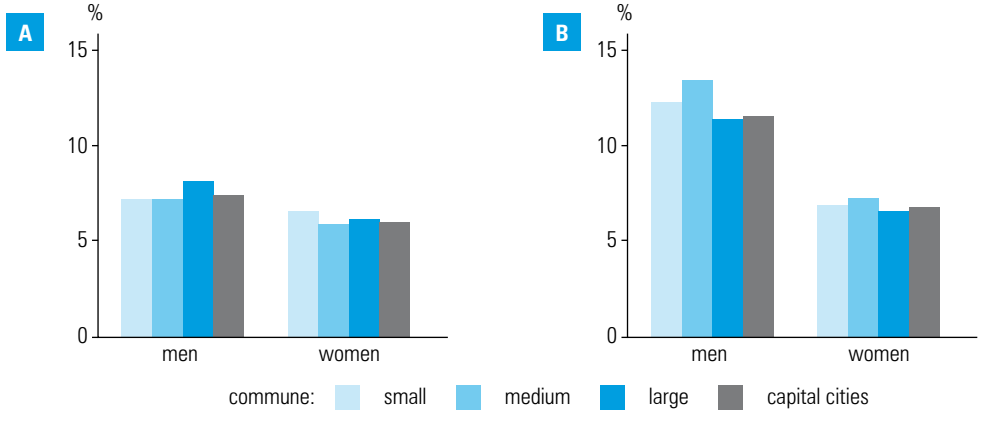

FIGURE 3 Incidence of diabetes (A) and impaired fasting glucose (B) in various communes; *P* – nonsignificant

20–74 years, diabetes was diagnosed in 8.7% of men and 6.4% of women.[9] As reported in the WET-Diab study in 2002, 4.8% of the population aged 55–75 years and living in the city of Wrocław had previously diagnosed diabetes, while 6.1% of this population had newly diagnosed diabetes.[6] Primary care physicians conducted a study in another large Polish city, Szczecin. It involved individuals aged 0–98 years. Diabetes was identified in 3.6% of the study population (3.1% of men and 3.9% of women).[16] A similar study was performed by primary care centers in Kraków in the years 2004 and 2005; diabetes was identified in 4.1% of women and 5.4% of men.[11] The 1998 Screen-Pol study was also based on the primary care data. It included patients aged ≥45 years and diabetes was detected in 5.4% of the study population.[10] In NATPOL PLUS, a study conducted in 2002, diabetes was identified in 5.6% of the population (4.7% previously diagnosed and 0.9% newly diagnosed).[17]

According to the Diabetic Atlas published in 2000, the incidence of diabetes varies throughout the world and throughout the regions of a particular country.[18] The average incidence of diabetes in Europe is 8.5%, with the lowest number of cases in Iceland – 2.1% and the highest in Germany – 12%. However, in most European countries incidence of diabetes is below 10%. For example, Mokan et al.[19] reported that 7% of the Slovakian population had diabetes (6.4% of men and 7.7% of women).[19] In a 2002 study conducted in Scotland, diabetes was reported in 5.4% of men and 4.8% of women.[20] Vamos et al.[21] detected diabetes in 6.2% of the population aged ≥18 years. Slightly lower numbers were observed in Sweden, where different centers reported the incidence of diabetes between 1.7% and 3.6% for the population aged 35–64 years.[22] The DECODE study performed a meta-analysis of the data on the population aged 35–74 years from 8 European countries. Diabetes without prior medical history was detected on average in 8% of men (from 3.2% in the Italy Cremona Study to 23.5% in the Oulu Study) and 5.5% of women (from 2.5% in the Italy Cremona Study to 13.4% in the Oulu Study). A meta-analysis of the Polish population included in this study provided similar results – 8.4% of men and 5.9% of women had diabetes according to the Pol-MONICA Kraków study.[7]

The incidence of diabetes in North America is 11.7% as published in the Diabetic Atlas in 2001.[18] The incidence of diabetes in the United States is slightly lower – 7.8% in a population aged 20–74 years, as reported by NHANES III.[8]

The average incidence of diabetes in Asia is between 5% and 7%, depending on the region.[18] There is a marked discrepancy between rural and urban areas. Some Asian countries, such as Micronesia and Philippines, have a particularly high incidence of diabetes (e.g., the Philippines – 28%),[23] while others have low (e.g., Mongolia – 3.7% in the population aged ≥20 years [3.9% of men and 3.5% of women].[24] Mohan et al.[25] reported that 4.5% of the Indian population aged 15–64 years had diabetes (1.5%–9.2% depending on the region).[25] Similarly to Indians, the Chinese constitute a substantial percentage of the Asian population, which significantly affects the overall incidence. Diabetes was detected in 9.5% of the inhabitants of industrialized regions (8.3% of men and 10.5% of women).[26] However, the International Collaborative Study of Cardiovascular Disease in Asia from 2001 reported that 5.5% of the Chinese population aged 35–74 years had diabetes.[27]

In the Middle East, 7.7% of the population have been reported to have diabetes[18] and, again, the distribution depends on the region. Due to socio-economic changes, lifestyle modifications, and population aging, some of the Middle East countries have the highest incidence of diabetes in the world. It is 25.7% in Bahrain, 23.7% in Saudi Arabia, 17% in the United Arab Emirates, and 16.1% in Kuwait and Oman.[28,29]

Not surprisingly, the incidence of diabetes is not as high in Africa. It is estimated at 3.2% and the highest values are observed in Tanzania and South Africa.[18] Christensen et al.[30] reported that 4.2% of the population of Kenya aged 17–68 years had diabetes. A considerably higher number of cases was detected in the urban areas.[30] Nevertheless, approximately 70% to 85% of cases remain undiagnosed, mainly in the rural areas.

It is estimated that the number of people with diabetes is probably two-fold higher, and approximately half of the cases remain undiagnosed. Patients are unaware of their condition, which if left untreated leads to serious complications that finally force them to seek medical assistance.

Apart from diabetic patients, there is a large group of people with so called prediabetes, diagnosed as IFG or impaired glucose tolerance. In both Polish and international population studies, it is much less common to monitor IFG. Earlier Polish reports indicated that the incidence of IFG was highly variable and remained at the level of a few percent. For example, IFG was detected in 6% of the residents of Wrocław who participated in the 2002 WET-Diab study.[6] Among the residents of Kraków who took part in the international DE-PLAN-IFG study, IFG was observed in 5.7% of men and 4.6% of women.[11] In the 1998 Screen-Pol study, which was based on the data from primary care patients aged ≥45 years, only 1.7% of the population had IFG.[10] Identical data was reported by NATPOL PLUS in 2002.[17]

Studies show that the incidence of IFG varies throughout Europe. Mokan et al.[19] reported that 12.5% of the Slovakian population had IFG (14.8% of men and 10.4% of women). In Germany, KORA Survey 2000 revealed that 16.8% of the population aged 55–74 years had IFG,[31] while in Spain only 2.8%.[32] DECODE was a large European study which analyzed the data for a population aged 35–74 years from 8 countries. It showed that the average incidence of IFG was 19.4% in men (from 6.4% in Italy Cremona

to 39.7% in the Goodinge Study) and 11.6% in women (from 3% in Italy Cremona to 27.9% in the Oulu Study). The analysis of the Polish population within this study demonstrated that 19.8% of men and 8.6% of women had IFG.[7]

The 1999–2004 NHANES III studied the population of the United States aged 20–74 years and found that 16% had IFG.[8] In contrast, when DIASCAN analyzed the Canadian population aged ≥40 years, only 2.5% of individuals were positive.[33]

Surprisingly, in the Arab countries, the frequency of IFG was not as high as the incidence of diabetes: only 1.3% of the population of Qatar aged >20 years had IFG,[29] while in a similar age group within the population of Oman, IFG was diagnosed in 7.1% of men and 5.1% of women.[34]

The incidence of IFG in Asia is high, even in the countries that have low incidence of diabetes. For example, Soria et al.[23] have recently reported that 17.5% of the population in the Phillippines has IFG. In Mongolia, 18.5% of individuals aged >20 years has IFG (17.7% of men and 19% of women).[24] Zargar et al.[35] have reported that 25.2% of the population aged 20–40 years and living in the Kashmir Valley in northern India has IFG.[35] The incidence of IFG in the industrialized regions of China is 14% (13.7% of men and 14.3% of women). However, the overall number is lower – 7.3% as reported by the InterASIA study, which analyzed the population aged 35–74 years and inhabiting the areas of various degrees of industrial development.[27]

Incidence of diabetes is growing at an alarming rate. It is important to develop strategies that will allow to diagnose diabetes and prediabetes early enough to administer treatment or prevention.

Early introduction of preventive measures in individuals with prediabetes may delay the development of diabetes. Healthy diet, physical activity, and proper body weight are particularly important. Overweight and obesity remain the key factors responsible for the development of diabetes and prediabetes and continue to be a major challenge in many countries including Poland. Diabetics usually have abnormal body weight, as demonstrated by WOBASZ (mean BMI >26 kg/m^2) and ARETAEUS (BMI = 30.6 kg/m^2).[13]

Several studies underline the association between lifestyle and diabetes and show that lifestyle changes reduce the number of newly diagnosed cases. Such changes contribute to a significant reduction in diabetes incidence as shown by the Diabetes Prevention Program in the United States and the Finnish Diabetes Prevention Study in Finland, which achieved a 58% reduction of the risk of developing diabetes during the trial duration of 3 to 4 years.[36,37]

In patients who have already been diagnosed with diabetes, lifestyle changes are not sufficient and the introduction of proper therapeutic regimen is necessary. However, although normalization of glycemia can generally delay and reduce the number of late organ complications, it has to be applied with caution, especially in individuals with high risk of cardiovascular events, as described recently in the ACCORD study (Action to Control Cardiovascular Risk in Diabetes Trial).[38]

The results of the WOBASZ study were presented to the authorities of each Polish province to familiarize them with the residents' health status. It is necessary to introduce various educational programs for the general public, patients and their families, health care professionals and administrative officials. Hopefully, it will encourage health care providers to improve the current situation.

In summary, we can say that the incidence of diabetes and IFG in the Polish population aged 20–74 years varies depending on age, sex, and place of residence. Incidence of diabetes in Poland is comparable to the mean values reported worldwide.

Acknowledgmements We would like to thank all contributors to the Multicenter Polish Population Health Status Study – WOBASZ from the following academic centers: Medical University of Lodz, Medical University of Gdańsk, Poznan University of Medical Sciences, Medical University of Silesia, Jagiellonian University Medical College.

REFERENCES

1 Wild S, Roglic G, Green A, et al. Global prevalence of diabetes: estimates for year 2000 and projections for 2030. Diabetes Care. 2004; 27: 1047-1053.

2 Tatoń J, Czech A, Bernas M. [Epidemiology and classification of diabetes]. In: Tatoń J, Czech A, Bernas M, eds. [Clinical diabetology]. Vol 2. Warszawa, Poland: Wydawnictwo Lekarskie PZWL; 2008: 53-76. Polish.

3 Polish Diabetes Society. [Clinical guidelines for patients with diabetes]. 2010. Diabetol Prakt. 2010; 11: suppl. A. Polish.

4 Rywik S, Kupść W, Piotrowski W, et al. [Multicenter national Polish population health status tests – WOBASZ project. Establishment of methods and logistics]. Kardiol Pol. 2005; 63 (6 suppl 4): S605-613. Polish.

5 Drzewoski J, Drozdowska A. Could glycated hemoglobin be used as a diagnostic tool in diabetes mellitus? Pol Arch Med Wewn. 2011; 120: 109-114.

6 Adamiec R, Zdrojowy K, Sutkowska E, et al. [WET-Diab – population study of residents of Wroclaw with respect to diabetes morbidity – a preliminary report]. Diabetol Prakt. 2004; 5, 4:189-194. Polish.

7 Zhang L, Qiao Q, Tuomilehto J, et al.; DECODE Study Group. Blood lipid levels in relation to glucose status in European men and women without a prior history of diabetes: The DECODE Study. Diabetes Res Clin Pract. 2008; 82: 364-377.

8 Ong KL, Cheung B, Wong L, et al. Prevalence, treatment, and control of diagnosed diabetes in the U.S. National Health and Nutrition Examination Survey 1999-2004. Ann Epidemiol. 2008; 18: 222-229.

9 A collective study. Pol-MONICA Bis Program, Warszawa. [Health status of the population of Warsaw in 2001, part 1. Background results of cross-sectional study]. Cardiology Library, Institute for Cardiology, 2002: 87-91. Polish.

10 Wójcikowski C, Grzeszczak W, Sieradzki J, et al. [Screen-Pol II: diagnosing diabetes according to the WHO and ADA criteria in Screen-Pol study]. Diabetol Pol. 1999; (6 suppl 2): S178-S186. Polish.

11 Szurkowska M, Szafraniec K, Gilis-Januszewska A, et al. [Incidence of carbohydrate tolerance disorders among adult residents of Krakow – a screening study]. Przegl Lek. 2006; 63: 728-732. Polish.

12 Wierucki Ł, Zdrojewski T, Mogilnaya, et al. [Polish Project 400 Cities – results of a pilot study]. Arterial Hypertension. 2004; 8: 307-317. Polish.

13 Bała MM, Płaczkiewicz-Jankowska E, Topór-Mądry R, et al. Characteristics of patients with type 2 diabetes of short duration in Poland. Pol Arch Med Wewn. 2009; 119: 533-540.

14 Nowakowski A. [Epidemiology of diabetes]. Diabetol Prakt. 2002; 3: 181-185. Polish.

15 Szybiński Z. [Polish Multicenter Study on Diabetes Epidemiology (PMSDE) – 1998–2002]. Pol Arch Med Wewn. 2001; 106: 751-765. Polish.

16 Fabian W, Majkowska L, Stefański A, Moleda P. [Prevalence of diabetes, antidiabetic treatment and chronic diabetic complications reported by general practitioners]. Przegl Lek. 2005; 62: 201-205. Polish.

17 Zdrojewski T, Bandosz P, Szpakowski P, et al. [Prevalence of main risk factors of cardiovascular system diseases in Poland. Results of the NATPOL PLUS study]. Kardiol Pol. 2004; 61 (suppl 4): 1-26. Polish.

18 International Diabetes Federation, Diabetes Atlas 2000. Committee 2001.

19 Mokán M, Galajda P, Prídavková D, et al. Prevalence of diabetes mellitus and metabolic syndrome in Slovakia. Diabetes Res Clin Pract. 2008; 81: 238-242.

20 Hart CL, Hole DJ, Lawlor DA, Davey Smith G. How many cases of type 2 diabetes mellitus are due to being overweight in middle age? Evidence from the Midspan prospective cohort studies using mention of diabetes mellitus on hospital discharge or death records. Diabet Med. 2007; 24: 73-80.

21 Vamos EP, Koopp MS, Keszei A, et al. Prevalence of diabetes in a large, nationally representative population sample in Hungary. Diabetes Res Clin Pract. 2008; 81: e5-e8.

22 Wändell PE, Gåfvels C. Patients with type 2 diabetes aged 35–64 years at four primary health care centers in Stockholm County, Sweden. Prevalence and complications in relation to gender and socioeconomic status. Diabetes Res Clin Pract. 2004; 63: 195-203.

23 Soria ML, Sy RG, Vega BS, et al. The incidence of type 2 diabetes mellitus in the Philippines: a 9-year cohort study. Diabetes Res Clin Pract. 2009; 86: 130-133.

24 Zhang S, Tong W, Xu T et al. Diabetes and impaired fasting glucose in Mongolian population, Inner Mongolia, China. Diabetes Res Clin Pract. 2009; 86: 124-129.

25 Mohan V, Mathur P, Deepa R, et al. Urban rural differences in prevalence of self-reported diabetes in India – the WHO-ICMR Indian NCD risk factor surveillance. Diabetes Res Clin Pract. 2008; 80: 159-168.

26 Tian H, Song G, Xie H, et al. Prevalence of diabetes and impaired fasting glucose among 769 792 rural Chinese adults. Diabetes. 2009; 84: 273-278.

27 Hu D, Fu P, Xie J, et al. Increasing prevalence and low awareness, treatment and control of diabetes mellitus among Chinese adults: the InterASIA study. Diabetes Res Clin Pract. 2008; 81: 250-257.

28 Mansour AA, Wanoose HL, Hani I, et al. Diabetes screening in Basrah, Iraq: a population-based cross-sectional study. Diabetes Res Clin Pract. 2008; 79: 147-150.

29 Bener A, Zirie M, Janahi IM, et al. Prevalence of diagnosed and undiagnosed diabetes mellitus and its risk factors in a population-based study of Qatar. Diabetes Res Clin Pract. 2009; 84: 99-106.

30 Christensen DL, Friis H, Mwaniki DL, et al. Prevalence of glucose intolerance and associated risk factors in rural and urban populations of different ethnic groups in Kenya. Diabetes Res Clin Pract. 2009; 84: 303-310.

31 Rathmann W, Hasstert B, Icks A, et al. High prevalence of undiagnosed diabetes mellitus in Southern Germany: target populations for efficient screening. The Kora Survey 2000. Diabetologia. 2003; 46: 182-189.

32 Boronat M, Varillas VF, Saavedra P, et al. Diabetes mellitus and impaired glucose regulation in the Canary Islands (Spain): prevalence and associated factors in the adult population of Telde, Gran Canaria. Diab Med. 2005; 23: 148-155.

33 Leiter LA, Barr A, Bélanger A, et al.; Diabetes Screening in Canada (DIASCAN) Study. Diabetes Screening in Canada (DIASCAN) Study: prevalence of undiagnosed diabetes and glucose intolerance in family physician offices. Diabetes Care. 2001; 24: 1038-1043.

34 Al-Lawati JA, Al Riyami AM, Mohammed AJ, et al. Increasing prevalence of diabetes mellitus in Oman. Diabetic Med. 2002; 19: 954-957.

35 Zargar AH, Wani AA, Laway BA, et al. Prevalence of diabetes mellitus and other abnormalities of glucose tolerance in young adults aged 20––40 years in North India (Kashmir Valley). Diabetes Res Clin Pract. 2008; 82: 276-281.

36 The Diabetes Prevention Program: baseline characteristics of the randomized cohort. The Diabetes Prevention Program Research Group. Diabetes Care. 2000; 23: 1619-1629.

37 Tuomilehto J, Lindström J, Eriksson JG, et al.; Finnish Diabetes Prevention Study Group. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med. 2001; 344: 1343-1350.

38 Klein BE. Progression of retinopathy in persons with type 2 diabetes: new data, same conclusions? Pol Arch Med Wewn. 2010; 120: 413-416.

ARTYKUŁ ORYGINALNY

Częstość występowania cukrzycy w populacji polskiej

Wyniki Wieloośrodkowego Ogólnopolskiego Badania Stanu Zdrowia Ludności – WOBASZ

Maria Polakowska, Walerian Piotrowski

Zakład Epidemiologii, Prewencji Chorób Układu Krążenia i Promocji Zdrowia, Instytut Kardiologii, Warszawa

SŁOWA KLUCZOWE

cukrzyca, nieprawidłowa glikemia na czczo, populacja polska

STRESZCZENIE

WPROWADZENIE Na całym świecie gwałtownie wzrasta zachorowalność na cukrzycę. Przewiduje się, że w 2030 roku chorych na cukrzycę będzie 2,2–2,5 mln Polaków.

CELE Celem badania była ocena epidemiologiczna występowania cukrzycy oraz nieprawidłowej glikemii na czczo (*impaired fasting glucose* – IFG) w polskiej populacji.

PACJENCI I METODY Wylosowano próbę 21 600 osób obu płci w wieku 20–74 lat z ogólnej populacji Polski. Do badań zgłosiło się 14 769 osób (6977 mężczyzn i 7792 kobiet). Cukrzycę stwierdzono u osób, u których stężenie glukozy na czczo wynosiło ≥7 mmol/l lub które miały wcześniej rozpoznaną cukrzycę. IFG rozpoznawano u osób nieleczonych, u których stężenie glukozy na czczo wynosiło 5,6–6,9 mmol/l.

WYNIKI Cukrzycę stwierdzono u 1000 osób (6,8%) – 518 mężczyzn (7,4%) i 482 kobiet (6,2%). IFG miało 1401 osób (9,5%) – 864 mężczyzn (12,4%) i 537 kobiet (6,9%). Częstość występowania cukrzycy zwiększa się z wiekiem – wśród mężczyzn od 0,7% w grupie wiekowej 20–29 lat do 16,3% w grupie powyżej 60 lat; wśród kobiet – odpowiednio od 0,5% w najmłodszej grupie do 17,8% w najstarszej grupie wiekowej. Występowanie cukrzycy w Polsce jest zróżnicowane w zależności od województwa – 5,3%–9% wśród mężczyzn i 4,2%–7,5% wśród kobiet. Nie stwierdza się istotnego zróżnicowania ze względu na wielkość gminy. Podobne zróżnicowanie terytorialne obserwowano w przypadku IFG: 5,8%–20,8% wśród mężczyzn i 2,8%–11,7% wśród kobiet. Tak jak w przypadku cukrzycy nie zaobserwowano istotnego zróżnicowania w zależności od wielkości gminy.

WNIOSKI Częstość cukrzycy i IFG w populacji polskiej jest zróżnicowana ze względu na wiek, płeć i region. Częstość cukrzycy w Polsce kształtuje się na poziomie średnich wartości na świecie.

Adres do korespondencji:
dr med. Maria Polakowska, Zakład Epidemiologii, Prewencji Chorób Układu Krążenia i Promocji Zdrowia, Instytut Kardiologii, ul. Alpejska 42, 04-628 Warszawa, tel.: 22-815-65-56, fax: 22-812-55-86, e-mail: mpolakowska@ikard.pl
Praca wpłynęła: 13.12.2010.
Przyjęta do druku: 04.04.2011.
Nie zgłoszono sprzeczności interesów.
Pol Arch Med Wewn. 2010; 121 (5): 156-163