

Prediabetes and diabetes: main characteristics

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Diabetes mellitus remains a global public health problem, associated with significant morbidity and mortality in many countries. The prevalence of diabetes in adults has increased over the past 40 years. According to the International Diabetes Federation (IDF), the number of patients with diabetes in 2021 was estimated at over half a billion. It is expected to reach 643 million by 2030 and 783 million by 2045.¹ The increase in diabetes prevalence appears more evident in developing low- and middle-income countries.

Today, the knowledge about the epidemiology of diabetes is mostly based on the analysis of data from national databases or regional prevalence estimates. Field studies involving participants representing the general population are scarce; therefore, the value of such research is paramount. In the current issue of *Polish Archives of Internal Medicine*, Zieleniewska et al² present a population-based study that investigated the prevalence and determinants of prediabetes and diabetes in Poland. The authors reported that there were as many cases of undiagnosed diabetes as those of known diabetes (6.8% vs 7.1%, respectively) in the study population. One of the major challenges of diabetes is diagnosing the disease at a stage when the patients are still asymptomatic and before any major micro- and macrovascular complications develop. For this reason, the detection of undiagnosed diabetes requires the introduction of more systematic screening approaches. Various studies conducted in European countries showed that almost a quarter of people with diabetes remain undiagnosed.³ IDF reported that in 2021 approximately 240 million adults worldwide had undiagnosed diabetes, 22 million of whom were European.¹

Prediabetes is a state in which fasting plasma glucose and / or 2-hour plasma glucose after the oral glucose tolerance test (OGTT) and / or glycated hemoglobin (HbA_{1c}) levels are higher than normal but below the threshold values indicating diabetes. This condition is important, as it is associated with a high risk of developing type 2 diabetes (T2DM), as well as cardiovascular and

microvascular complications. Zieleniewska et al² reported that 4 out of 10 Polish adults had prediabetes (impaired fasting glucose [IFG] rate, 22.9%; impaired glucose tolerance [IGT] rate, 16.1%), and most of them were not aware of this problem. The high prevalence of IFG in the study was due to the use of the diagnostic criterion of the American Diabetes Association (ADA). According to this criterion, a fasting plasma glucose level of 5.6 to 6.9 mmol/l (100–125 mg/dl) is sufficient for the diagnosis of IFG.⁴ However, other authorities, including the World Health Organization (WHO) and IDF, accept a lower limit of fasting plasma glucose of 6.1 mmol/l (110 mg/dl).⁵ In a study including 1177 young or middle-aged individuals without known diabetes, both diagnostic criteria were compared.⁶ While the prevalence of IFG according to the WHO criterion was 3.2%, it increased 3-fold (to 9.7%) when the ADA criterion was used. However, lowering the threshold for the diagnosis of IFG increased its concordance with IGT from 16% to 41%. On the other hand, a meta-analysis comparing prospective studies using the IFG criteria proposed by the WHO and ADA reported a similar risk of coronary artery disease.⁷

Individual prediabetes categories identify different groups of people in terms of metabolic and, especially, cardiovascular disease (CVD) risk factors. Therefore, the cohort study by Zieleniewska et al,² investigating both IFG and IGT, and even measuring the HbA_{1c} level in some patients, provided useful data in terms of showing the risk of future CVD. The prevalence of IFG was higher in men than in women, which is consistent with the literature. More importantly, different categories of prediabetes occur with varying frequency in different ethnic groups. Isolated IFG is more common in white people than in Asians. According to a meta-analysis by Yip et al,⁸ in 19 studies using the WHO criterion the rates of isolated IFG, isolated IGT, and combined impairment (IFG and IGT) were 43.9%, 41%, and 13.5%, respectively, in white people and 29.2%, 49.4%, and 18.2%, respectively, in Asians. On the other hand, in 14 studies using the 2003

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ADA criterion, the average proportions of isolated IFG, isolated IGT, and a combination thereof were 58%, 20.3%, and 19.8%, respectively, in white individuals and 48.1%, 27.7%, and 20.5%, respectively, in Asians.

One of the novel findings of Zieleniewska et al² was that the ratio of lean body mass to fat mass differed significantly between the patients with newly diagnosed diabetes and those with intact glucose metabolism. This suggests that susceptibility to diabetes is not only related to increased fat content, but also that decreased muscle mass may be synergistically harmful. In a population-based cohort study by de Ritter et al,⁹ both men and women with T2DM had greater fat and lean body mass as well as greater hip circumference than the healthy participants. However, the role of lean body mass in the development of hyperglycemic states is not fully understood. The risk of diabetes is higher in women with low lean body mass,¹⁰ while men with T2DM have a more pronounced increase in visceral adipose tissue than women. Lean body mass plays a beneficial role in glucose metabolism; on the other hand, it may not be protective against the development of peripheral insulin resistance.¹¹

In the Multicenter Polish Population Health Status Study (WOBASZ), diabetes was detected in 6.8% of the participants between 2003 and 2005,¹² whereas in WOBASZ II (2013–2014) the prevalence of diabetes was 8.8%.¹³ In the study by Zieleniewska et al,² the rate of known diabetes was close to that reported in the WOBASZ studies. The dissimilarity in the proportion of patients with newly diagnosed diabetes may be due to a difference in the diagnostic methods, as the previous studies used self-reported diabetes and fasting plasma glucose values of 7 mmol/l (126 mg/dl) or greater, whereas in the present study the diagnosis of diabetes was based on self-reported diabetes and OGTT. Notably, the high prevalence of IFG and IGT reported by Zieleniewska et al,² especially in men, indicates that the prevalence of diabetes will continue to increase over the next decades if adequate measures are not taken.

In contrast to the above, it has been reported that the rate of increase in diabetes prevalence has decreased all over the world, that the prevalence of diabetes has reached a plateau and remained stable, and even, in some recent studies, that the incidence of diabetes has begun to decrease.^{14,15} Since Zieleniewska et al² conducted a cohort study, changes in diabetes prevalence in the study population that occur in the coming years could provide us with more information on this topic. Nevertheless, even if the prevalence of diabetes remains constant, the population of patients with diabetes (especially the elderly) will continue to impose a significant burden on the public health system in the coming years due to the aging of the society and the prolongation of life expectancy at birth.¹⁶ Therefore, there is an urgent need for a reorganization of care as

well as for the development and implementation of country-specific prevention programs to reduce this burden.

ARTICLE INFORMATION

DISCLAIMER The opinions expressed by the author(s) are not necessarily those of the journal editors, Polish Society of Internal Medicine, or publisher.

CONFLICT OF INTEREST None declared.

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