

## ORIGINAL ARTICLE

## TYPE 2 DIABETES MELLITUS PREVALENCE IN PATIENTS WITH CARDIOVASCULAR DISEASES

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### ABSTRACT

**The aim:** To estimate type 2 diabetes mellitus (T2DM) prevalence in patients who came for a consultation to the private practice cardiologist.

**Materials and methods:** 97 patients with cardiovascular diseases (CVD), visited a cardiologist in private medical center, were included (mean age 49,5 (42,8; 58,3) years, 43 (44.3 %) males) and T2DM prevalence was estimated.

**Results:** 84 (86.6 %) patients had arterial hypertension, 19 patients (19.6 %) had coronary artery disease. Mean body mass index was 29,4 (25,2; 33,4) kg/m<sup>2</sup>. Waist circumference above recommended was observed in 78.4 %. 30 patients (30.9 %) were overweight, 44.3 % had abdominal obesity. Almost all patients had atherogenic dyslipidemia. Total T2DM prevalence was 19.6 %, including cases of first-diagnosed diabetes (17.5 %).

**Conclusions:** T2DM and prediabetes prevalence in our sample of patients with CVD was higher than described for the general population. Patients with cardiovascular diseases require careful assessment of diabetes risk factors for its timely detection and for possibly improving the outcomes.

**KEY WORDS:** type 2 diabetes mellitus, cardiovascular diseases, dyslipidemia, arterial hypertension

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### INTRODUCTION

Type 2 diabetes mellitus (T2DM) is well known risk factors for the development of cardiovascular diseases (CVD) and cardiovascular mortality; in turn, cardiovascular disease is one of the leading causes of death in diabetes. Meta-analysis of 102 prospective studies showed that diabetes mellitus in general confers a two-fold excess risk of vascular outcomes (coronary heart disease, ischaemic stroke, and vascular deaths), independent of other risk factors, especially in those with long-standing diabetes [1]. Patients with diabetes develop atherosclerosis 7-10 years earlier compared with non-diabetic patients, and can be revealed at the stages of impaired glucose tolerance [2]. Type 2 diabetes mellitus can debut directly as vascular complications - myocardial infarction, cerebral stroke. Even prediabetes is already not only an intermediate stage in the T2DM development, but also an independent risk factor for cardiovascular diseases. The elevated risk of coronary artery disease (CAD) starts at glucose levels below the cut-off point for DM (HR=1.11 already for patients with 5.6-6.1 mmol/L), and increases with increasing glucose levels [1]. So it is strongly recommended to identify patients with a high risk of T2DM as early as possible and actively perform the correction of hyperglycemia, dyslipidemia, arterial hypertension and other risk factors for cardiovascular diseases [3].

The presentation of type 2 diabetes is usually less noticeable compared to type 1 and its start may be completely symptomless. As a result, there is often a long pre-diagnos-

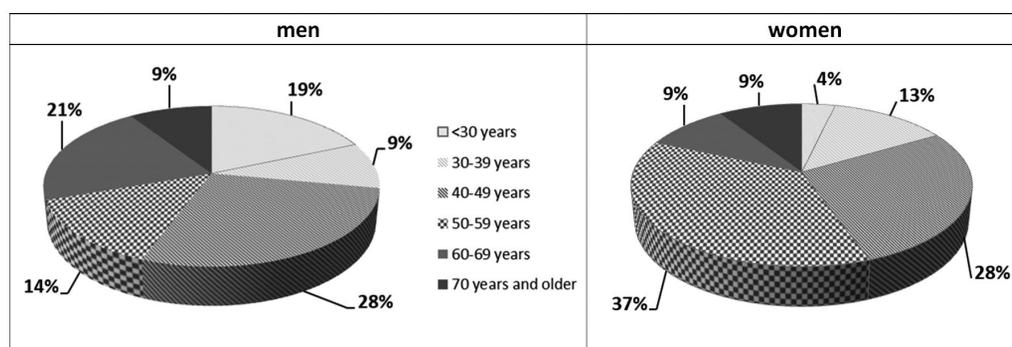
tic period and as many as one-third to one-half of people with type 2 diabetes in the population may be undiagnosed [4]. The causes of T2DM are not completely understood but there is a strong correlation with obesity, increasing age, with ethnicity and family history. Type 2 diabetes is "getting younger" today as a result of an increasing prevalence of obesity. According to the data of International Diabetes Federation (IDF), 40.7% cases of diabetes in Europe are undiagnosed. [4].

### THE AIM

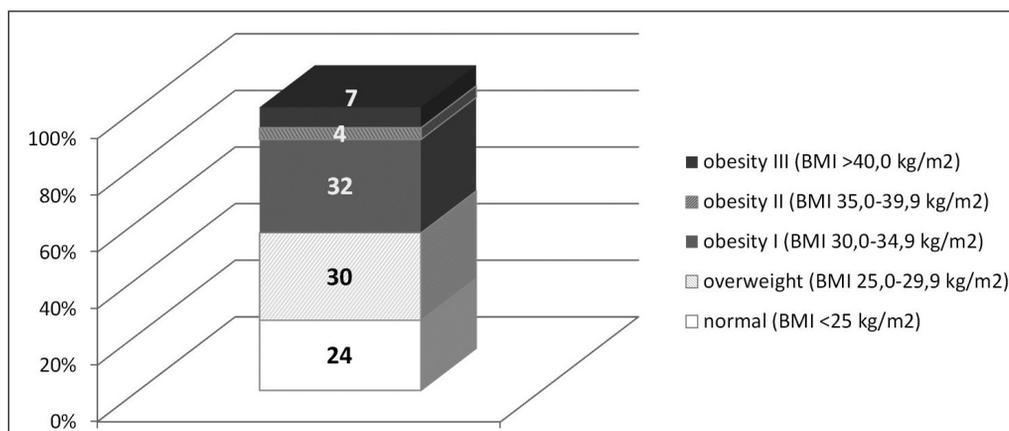
To estimate T2DM prevalence in patients who came for a consultation to the private practice cardiologist.

### MATERIALS AND METHODS

The results of the examination of patients, who went to a private medical center to a cardiologist were analyzed. 97 consecutive patients were included (mean age 49,5 (42,8; 58,3) years, 43 (44.3 %) males). 37 (38.1%) patients were observed by a family doctor and applied for consultation and correction of therapy, 60 (61.9 %) applied independently, as a private practice does not require prior referral. Arterial hypertension (AH), CAD and disorders of glucose metabolism were assessed according to the current recommendations [1,5,6,7]. All patients signed an informed agreement to use their data, patients who didn't



**Fig.1.** Distribution of the examined patients by age groups.



**Fig.2.** Distribution of the examined patients by BMI groups.

agree was excluded. The statistical analysis was performed using Excel v.10.0 (Microsoft) and STATISTICA v.13.3 (Softserve) programs. The numerical values are reported as median (lower and upper quartiles) and as a proportion of the sample size.

## RESULTS

These were mainly young and middle-aged patients (fig.1), which was most likely due to the higher income level of these age categories and, accordingly, the possibility of receiving paid medical services. Mean age was 49,5 (42,8; 58,3) years. Women were slightly older than men (mean age 50.5 (48.0; 57.5) vs 46.5 (40.7; 60.5)), although this was not reliable (p=0.062). This may reflect the later manifestation of cardiac pathology in women.

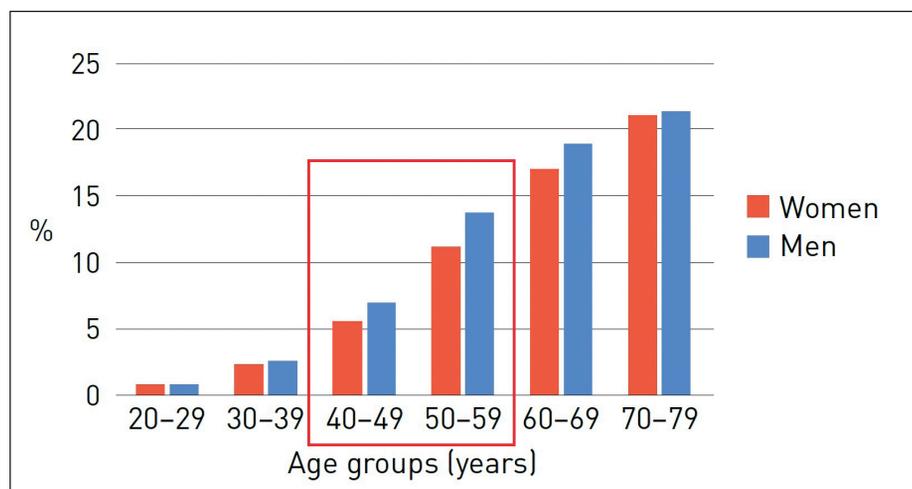
Most of the patients presented with AH (only 5 patients had normal blood pressure (BP), these were young people, the reason for the visit were heart rhythm disturbance - sinus tachycardia and extrasystole). 8 patients (8.2 %) had high normal BP, 84 (86.6 %) had AH (57.2 % of them had grade 1 hypertension, 20.2 and 22.6 % - 2nd and 3d grades respectively). 19 patients (19.6 %) had CAD (5 patients with history of myocardial infarction, 2 patients after percutaneous coronary interventions). 2 patients presented with myocarditis. 22 (22.7 %) patients had heart failure (77.3 and 22.7 % with NYHA FC II and III respectively). 2 patients presented with T2DM. 8.2 % were smokers (all 8 patients were males). It was revealed family history of

cardiac disease in 32 (32.9 %) patients and diabetes family history in 19 (19.6 %) patients.

Thus, most patients in our sample were “non-severe” cardiological patients, many of them were “on the start” of cardiovascular disease, having relatively short duration of AH.

At the same time, mean body mass index (BMI) in our sample was 29,4 (25,2; 33,4) kg/m<sup>2</sup>, so only 24 patients (24.7 %) had normal BMI. Even in the group with normal BMI 3 patients had waist circumference higher than 94 sm for men and 80 sm for women. 30 patients (30.9 %) were overweight (all with waist circumference above the recommended) and all the other (44.3 %) had abdominal obesity (fig.2). Thus, waist circumference above recommended (as one of the components of metabolic syndrome) was observed in 78.4 % of patients. 17 patients had fasting blood glucose (FBG) results at first visit, 8 of them had increased levels (3 patients with FBG > 7.0 mmol/l, 5 patients had FBG from 5.6 to 6.9 mmol/l).

Patients were referred for further examination, including, among other prescription, lipid profile and haemoglobin A1c (HbA1c) and two-hour oral glucose tolerance test for certain patients. Only 40 patients (41.2 %) came for a follow-up visit with the test results. Almost all patients had atherogenic dyslipidemia (total cholesterol level was 6,25 (5,60; 6,42) mmol/l, high-density lipoprotein cholesterol was 1,27 (1,03; 1,60) mmol/l, low-density lipoprotein cholesterol was 3,98 (3,43; 4,32) mmol/l, triglycerides level was (1,71 (1,40; 2,05) mmol/l (only one 19-years old patient



**Fig.3.** Prevalence (%) estimates of diabetes by age and sex, IDF Europe Region, 2019 (adapted from IDF Diabetes Atlas, 9th edition [4])

had normal lipid profile (that was prescribed considering his family history)).

Haemoglobin A1c level over 6.5 % was revealed in 17 (17.5 %) and that were a cases of first-diagnosed diabetes. Taking into account patients that presented with T2DM on first visit, total T2DM prevalence in our middle-aged sample was 19.6 %. 5 patients (5.2 %) had HbA1c level from 5.9 to 6.4 %, meeting the criteria for prediabetes according to ADA 2019 recommendation. Among patients who did not come for a follow-up visit, 4 patients had FBG from 5.6 to 6.9 mmol/l and 1 patients had FBG > 7.0 mmol/l.

## DISCUSSION

Our study was relatively small and thus not entirely representative, but should accent on the need for early diagnosis of diabetes, especially in patients with cardiovascular diseases (CVD), because T2DM and CVD are common comorbidities, mutually aggravating the course of each other. Total T2DM prevalence in our study (19.5 %) was higher than that given in the “Diabetes Atlas 2019” [4] for this age category (fig.3), but, on the one hand, according to the IDF, Europe prevalence of undiagnosed diabetes (20–79 years) was 40.7 % in 2019, and, on the other hand, the prevalence was estimated in patients with CVD, and our patients had high prevalence of abdominal obesity. The results could have been even higher if all patients were completely examined (only a part of patients came for a follow-up visit with the test results). In any case, these results indicate that, if the recommendations are followed (testing for prediabetes and/or type 2 diabetes in asymptomatic people should be considered in adults of any age who are overweight or obese (BMI > 25 kg/m<sup>2</sup> or > 23 kg/m<sup>2</sup> in Asian) and who have one or more additional risk factors for diabetes; for all people, testing should begin at age 45 years [7]), it improves the early diagnosis of diabetes and gives patients a chance to improve their outcomes. It is also very important to reveal cases of prediabetes because this patients have an increased risk of diabetes and already heightened risk of CVD, and their detection “opens the

door to interventions that can lead to the prevention of type 2 diabetes” [4]. In our study patients meeting the criteria for prediabetes were identified (5.2 % of patients with HbA1c level from 5.9 to 6.4 %; and 4 patients had FBG from 5.6 to 6.9 mmol/l on the first visit who did not come for a follow-up visit).

## CONCLUSIONS

1. T2DM and prediabetes prevalence in our sample of patients with CVD was higher than described for the general population.
2. Patients with cardiovascular diseases require careful assessment of diabetes risk factors for its timely detection and for possibly improving the outcomes.

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**Conflict of interest:**

*The Authors declare no conflict of interest.*

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