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# Prevalence of Cardiovascular Risk Factors in Type 1 Diabetes Mellitus Patients

Type 1 diabetes mellitus (T1DM) patients have a higher risk of premature death compared with that in general population [1, 2]. Excess of mortality in young T1DM patients was mainly caused by acute diabetes complications such as hypoglycemia and ketoacidosis. Whereas the leading cause of death among patients with duration of diabetes of more than 20 years was cardiovascular disease (CVD) [3]. Coronary events in T1DM patients have been reported to occur 10 to 15 years earlier than in people without diabetes [4]. Few trials have been conducted specifically in T1DM and recommendations were essentially extrapolated from those for type 2 diabetes mellitus (T2DM). The aim of this observational study was to assess the prevalence of cardiovascular risk factors in a Tunisian population of T1DM patients.

We conducted a cross-sectional study on Tunisian patients with T1DM followed in the National Institute of Nutrition (NIN) in Tunis. We included 60 patients who have been hospitalized at least once. Data were analyzed using SPSS 21.

The mean age of the patients was  $34.9 \pm 11$  years with a sex ratio of 0.8. The mean duration of diabetes was  $18.6 \pm 10.6$  years. Selected characteristics are presented in Table 1 and show no difference between male and female patients. Microvascular complications were present in 46 (76.6%) patients: 35 (58.3%) had diabetic retinopathy, 31 (51.6%) had diabetic neuropathy and 23 (38.3%) had diabetic nephropathy. Macrovascular complications were present in 12 (20%) patients: two (3.3%) patients had a stroke, 7 (11.7%) had a coronar-

**Table 1. Characteristics of Patients**

	All participants	Male	Female	P
n	60	32	28	
Age [years]	34.9 (11)	36.2 (12.1)	33.7 (10.1)	0.31
Diabetes duration [years]	18.6 (10.6)	18.7 (10.8)	18.6 (10.5)	0.39
BMI [kg/m <sup>2</sup> ]	26.9 (26.2)	22.1 (4.6)	31.2 (35.3)	0.12
Fasting plasma glucose	13.5 (7.3)	14.6 (8.5)	12.5 (5.9)	0.12
HbA1c [%]	9.5 (2.5)	9.7 (2.3)	9.4 (2.7)	0.95
Insulin analog use, n (%)	20 (33.3)	7 (11.6)	13 (21.6)	0.27

Unless otherwise stated values are mean (SD)  
BMI — body mass index; SD — standard deviation

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**Table 2. CVD Risk Factors (as Defined by the ADA)**

Risk factors	All participants	Male	Female	P
Positive family history of CVD, n (%)	17 (28.3)	9 (15)	8 (13.3)	0.54
Poor glyceemic control, n (%)	50 (83.3)	23 (38.3)	27 (45)	0.49
High LDL cholesterol*	40 (66.6)	19 (31.6)	21 (35)	0.53
Low HDL cholesterol**	13 (21.6)	6 (10)	7 (11.6)	1
Triglycerides $\geq$ 1.5 g/L	15 (25)	5 (8.3)	10 (16.6)	0.24
Hypertension	14 (23.3)	9 (15)	5 (8.3)	0.22
Obesity	6 (10)	2 (3.3)	4 (6.6)	0.67
Microalbuminuria/Proteinuria	17 (28.3)	11 (18.3)	6 (10)	0.15
Renal failure	5 (8.3)	3 (5)	2 (3.3)	0.66
Smoking	26 (43.3)	20 (33.3)	6 (10)	< 0.001

\*LDL cholesterol  $\geq$  1g/L; \*\*HDL cholesterol  $\leq$  0.4 g/L in men and  $\leq$  0.5 g/L in women

ADA — American Association of Diabetes; CVD — cardiovascular disease; HDL — high-density lipoprotein ; LDL — low-density lipoprotein

opathy and 8 (13.3%) had a lower extremity occlusive arterial disease. Ninety-six percent of patients had at least one CVD risk factor at the moment of the study. Eighty-six percent of patient had one to four CVD risk factors and ten percent had more than four CVD risk factors as it is shown in the Table 2.

The most common risk factors in our patients were poor glyceemic control, high LDL cholesterol level and smoking. This study shows high prevalence of CVD risk factors among Tunisian patients with T1DM as defined by the American Association of Diabetes (ADA). Ninety-six percent of the patients had at least one CVD risk factor and ten percent had more than four CVD risk factors. The rates in our study were higher than in other studies [5]. The most frequent risk factor observed in our study was poor glyceemic control defined by HbA1c above target level. Increased levels of LDL cholesterol were the second most frequently diagnosed CVD risk factor in our study. There is little information about the prevalence or the effects of smoking among T1DM. Smoking increased CVD risk factors in T1DM patients by deteriorating glucose and lipid metabolism and endothelial function.

In conclusion, there is a high prevalence of CVD risk factors among T1DM patients. The most frequent risk factors were high levels of HbA1c as well as other common CVD risk factors (dyslipidemia, high blood

pressure, microalbuminuria, and smoking). Even with intensive glucose-lowering therapy, statin use and blood pressure control, T1DM patients still have higher risk of cardiovascular events and mortality.

### Conflict of interest

None declared.

### REFERENCES

1. Lind M, Svensson AM, Kosiborod M, et al. Glycemic control and excess mortality in type 1 diabetes. *N Engl J Med*. 2014; 371(21): 1972–1982, doi: [10.1056/NEJMoa1408214](https://doi.org/10.1056/NEJMoa1408214), indexed in Pubmed: [25409370](https://pubmed.ncbi.nlm.nih.gov/25409370/).
2. Harjutsalo V, Forsblom C, Groop PH. Time trends in mortality in patients with type 1 diabetes: nationwide population based cohort study. *BMJ*. 2011; 343: d5364, doi: [10.1136/bmj.d5364](https://doi.org/10.1136/bmj.d5364), indexed in Pubmed: [21903695](https://pubmed.ncbi.nlm.nih.gov/21903695/).
3. Secrest AM, Becker DJ, Kelsey SF, et al. Cause-specific mortality trends in a large population-based cohort with long-standing childhood-onset type 1 diabetes. *Diabetes*. 2010; 59(12): 3216–3222, doi: [10.2337/db10-0862](https://doi.org/10.2337/db10-0862), indexed in Pubmed: [20739685](https://pubmed.ncbi.nlm.nih.gov/20739685/).
4. Soedamah-Muthu SS, Fuller JH, Mulnier HE, et al. High risk of cardiovascular disease in patients with type 1 diabetes in the U.K.: a cohort study using the general practice research database. *Diabetes Care*. 2006; 29(4): 798–804, doi: [10.2337/diabetes.29.04.06.dc05-1433](https://doi.org/10.2337/diabetes.29.04.06.dc05-1433), indexed in Pubmed: [16567818](https://pubmed.ncbi.nlm.nih.gov/16567818/).
5. Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications (DCCT/EDIC) Research Group. Risk Factors for Cardiovascular Disease in Type 1 Diabetes. *Diabetes*. 2016; 65(5): 1370–1379, doi: [10.2337/db15-1517](https://doi.org/10.2337/db15-1517), indexed in Pubmed: [26895792](https://pubmed.ncbi.nlm.nih.gov/26895792/).

