SHORT COMMUNICATION

Emergency department accesses for diabetes-related complications during COVID-19 pandemic in people with type 2 diabetes and depression

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Introduction

Mental disorders are leading causes of the global health-related burden [1]. In 2020, COVID -19 pandemic has created an environment where many determinants of poor mental health exacerbated [2]. Scientific literature has highlighted that people with diabetes are at higher risk of developing depression than the general population [3] and that depression interferes with the course of diabetes. In fact, depression in type 2 diabetes mellitus (T2DM) increases the risk of developing acute and long-term complications [4].

The aim is to evaluate whether depression in people with type 2 diabetes increases the number of Emergency Department (ED) accesses for acute and long-term diabetes-related complications during COVID-19 pandemic.

Methods

In this **observational cohort study,** data were **retrospectively** retrieved from the health administrative databases of the Local Health Authority of Romagna (about 1.1

million residents), in particular we used: Hospital Discharge Records and Pharmaceutical Prescriptions databases to identify T2DM patients; Mental Health Information System, Residential Mental Health care, HDR and PP databases to identify patients with depression.

Prevalent cases of T2DM at 15/02/2020 were identified among individuals aged 18 years or older, residing in the LHA of Romagna, if they had in the preceding year at least one HDR claim with a primary or secondary diagnosis of diabetes (ICD-9-CM code: 250.xx), or at least two distinct prescriptions of Glucose-Lowering Medication (GLM) (ATC code: A10).

The presence of depression was defined as at least one prescription of antidepressant drugs (ATC code: N06A), or at least one hospitalization/outpatients service with a primary or secondary diagnosis of depression (ICD-9-CM code: 296.2x, 296.3x, 296.9x, 300.4x, 309.0x, 309.1x, 311. xx) in the 10 preceding years. Therefore, patients were distinguished between T2DM with depression (T2DM-Dep) and without depression (T2DM-NoDep).

The cohort was followed up over the next 12 months (until death or 15/02/2021, whichever came first) and the number of ED accesses for acute and long-term complications related to diabetes were investigated.

With the same criteria, a prevalent cohort of T2DM at 15/02/2019 was identified to assess what was the impact of depression in a pre-pandemic period.

The study was conducted according to the guidelines of the Declaration of Helsinki; the Ethics Committee of the Romagna Local Health Authority (C.E.R.O.M.) approved the study procedures (registration number: 9502/2020, 14.12.2020). This retrospective study was carried out in conformity with the regulations on data management with

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Table 1 Characteristics of the prevalent cases of T2DM at 15/02/2020 and results of the multiple negative binomial regression model to estimate the incidence rate ratio of ED accesses for acute and long-term complications

	T2DM 2020 cohort (n = 61,887)				
	n (%)	IRR	p value	95% CI	
Type of patient					
T2DM-No	44,380 (71.7%)	*Ref. cat*			
T2DM-Dep	17,506 (28.3%)	1.47	< 0.001	1.18	1.83
Gender					
Female	28,677 (46.3%)	*Ref. cat*			
Male	33,209 (53.7%)	1.06	0.576	0.86	1.32
Age groups (years)					
18–39	1,438 (2.3%)	2.38	0.004	1.32	4.27
40–59	10,150 (16.4%)	1.77	0.001	1.26	2.50
60–74	23,910 (38.6%)	*Ref. cat*			
> 74	26,388 (42.6%)	1.66	< 0.001	1.29	2.15
Duration of T2DM (years)					
< 1	4,416 (7.1%)	0.40	0.006	0.21	0.77
1–4	13,729 (22.2%)	0.66	0.011	0.48	0.91
5–9	14,491 (23.4%)	0.68	0.015	0.49	0.93
> 9	29,250 (47.3%)	*Ref. cat*			
Drug therapy of the last 5 years					
1 oral GLM	24,261 (39.2%)	*Ref. cat*			
2 or more oral GLM	19,252 (31.1%)	2.38	< 0.001	1.66	3.42
Insulin	3,992 (6.5%)	5.57	< 0.001	3.40	9.13
Oral GLM and insulin	14,381 (23.2%)	4.14	< 0.001	2.87	5.98
N. of comorbidities					
None	47,164 (76.2%)	*Ref. cat*			
1	6,232 (10.1%)	1.31	0.119	0.93	1.82
2 or more	8,490 (13.7%)	2.66	< 0.001	2.04	3.48

T2DM—type 2 diabetes mellitus. T2DM-No—type 2 diabetes mellitus without history of depression. T2DM-Dep—type 2 diabetes mellitus with history of depression. IRR—incidence rate ratio. 95%CI—95% confidence interval. Ref. cat. —reference category. GLM: Glucose—Lowering Medication

the Italian law on privacy (Legislation Decree 196/2003 amended by Legislation Decree 101/2018).

Statistical analysis

Demographic and clinical characteristics of T2DM-Dep and T2DM-NoDep 2020 prevalent cases were summarized using absolute frequencies and percentages.

The impact of depression on the number of ED accesses was estimated with a multiple negative binomial regression model to calculate the incidence rate ratio (IRR) and its 95% confidence interval. The multiple model was adjusted for gender, age groups (18–39, 40–59, 60–74, > 74 years), drug therapy of the last 5 years (1 oral GLM, 2 or more oral GLM, insulin, insulin and oral GLM), number of comorbidities detected in the two previous years from prevalence date (0, 1, 2 or more comorbidities) and duration of diabetes (< 1, 1–4, 5–9, > 9 years). The number of comorbid

conditions was determined for each patient using the Elixhauser algorithm.

The significance level was set at $p < 0.05$. Statistical analyses were performed using IBM SPSS version 25.0 and Stata 15.

Results

At 15/02/2020 we found 61,887 prevalent cases of T2DM, 28.3% patients were in the T2DM-Dep group and 71.7% in the T2DM-NoDep group. During COVID-19 period 541 ED accesses were observed.

As shown in Table 1, T2DM-Dep patients had a higher rate of ED accesses for acute and long-term complications related to diabetes during COVID-19 pandemic compared to T2DM-NoDep patients (IRR = 1.47; 95% CI [1.18—1.83]), adjusted for gender, age groups, duration of T2DM, drug therapy of the last 5 years, and number of comorbidities.

This significantly different rate of ED accesses was also observed in the prevalent cases of non-pandemic period (n = 60,618; total ED accesses = 659), in which T2DM-Dep patients had an IRR of 1.43 (95% CI [1.18–1.73]) compared to T2DM-NoDep patients, adjusted for clinical and demographic factors.

The higher rate of ED accesses in T2DM-Dep group compared to T2DM-NoDep group was similar between COVID-19 period and the pre-pandemic period (group-period interaction term: IRR = 1.01; 95% CI [0.76–1.34]).

Discussion

The diagnosis of depression in type 2 diabetes is associated with a higher rate of ED accesses for acute and long-term complications, both during the COVID-19 pandemic and in the pre-pandemic period.

Despite the overall decrease in ED access rate during the COVID-19 pandemic (− 19.6% percentage variation compared to the preceding year) due to the restrictions, a clear difference in ED accesses was observed in patients with T2DM and depression compared to patients with T2DM without depression. This is consistent with evidence on the impact of depression on short-term complications [4] in people with type 2 diabetes and depression. Since COVID-19 is associated with poor mental health [5], the special health needs of patients with diabetes and depression should be taken into account.

Declarations

References

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