Depression in Tunisian type 2 diabetic patients: prevalence and association to glycemic control and to treatment compliance

Dépression chez les patients tunisiens diabétiques type 2 : prévalence et association au contrôle glycémique et à la compliance thérapeutique

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RÉSUMÉ

Introduction : l'association dépression et diabète est fréquente, l'objectif de ce travail a été de déterminer la prévalence de la dépression chez les patients diabétiques de type 2 et de rechercher une association entre l'équilibre glycémique et l'observance thérapeutique.
Méthodes : Etude transversale, concernant 100 patients diabétiques de type 2 suivis dans le service des consultations externes de l'Institut de Nutrition. Pour chacun de ces patients nous avons mené un questionnaire relevant les différentes données sociodémographiques, cliniques et thérapeutiques et passé l'échelle HAD afin de rechercher une éventuelle dépression, une caractérisation diagnostique a été réalisée avec le recours au MINI.
Résultats : la prévalence de la dépression était de 38% selon l'échelle HAD et la prévalence de l'anxiété était de 31%. Dans 18% des cas les deux troubles étaient comorbides. Selon le MINI, 31% des patients diabétiques avaient un trouble de l'humeur, une dysthymie dans 14% des cas et un épisode dépressif isolé dans 6% des cas. Un mauvais équilibre glycémique était plus souvent constaté chez les patients déprimés (86,8% versus 35,5%, p<0,001), avec une mauvaise observance des traitements antidiabétiques (p<0,001) et du suivi du diabète (p=0,029). On a objectivé aussi un lien significatif entre dépression et complications macro-vasculaires (p=0,002).
Conclusion : Etant donné l'impact de la dépression sur le diabète, le dépistage et la prise en charge des sujets déprimés s'avèrent importants pour un meilleur pronostic de la maladie diabétique.

Mots-clés
Dépression, Diabète, Prévalence, Pronostic.

SUMMARY

Backgroud: the comorbidity depression-diabetes was important. Ours objectives were to study the prevalence of depression in type 2 diabetes and to seek for a relationship of depression with glycemic control and treatment adherence.
Methods: This cross-sectional study was carried out at the outpatient department of the Tunis nutrition institute. A total of 100 diabetic patients followed for Type 2 diabetes were randomly recruited. We used a structured questionnaire to collect patients' socio-demographic, clinical and therapeutic data. The treatment adherence was assessed by using MAS, Glycemic control according to blood glucose and glycated hemoglobin (HbA1c) levels and depression and anxiety by administering a dialectal Arabic validated version of Hospital Anxiety and Depression Scale (HAD). Finaly we also used the modules on mood disorders of the mini international neuropsychiatric interview (MINI)
Results: The prevalence of depression in T2DP was 38% according to the HAD scale with severe forms in 18%. The anxiety prevalence was 31%. However, 18% of T2DP had anxious-depressive co morbidity. According to the MINI, 31% of T2DP had a mood disorder. Dysthymia was noted in 14% of cases, an isolated depressive episode in 6%. Depressed T2DP have a poor glycemic control than those no depressed. Macro-angiopathy, irregular followed-up, poor treatment adherence and unbalanced diet were associated with depression
Conclusion: The detection of depression related to somatic pathology in particular diabetes, seems essential. As a result, depression treatment may improve the overall prognosis of the associated somatic diseases.

Key-words
Depression, Diabetes, Prevalence, Prognosis.

Diabetes is regarded as a universal health problem. In 2010, according to the international diabetes federation, 285 million adults are diabetics around the world(1).The World Health Organization estimated that this number will rise to 300 million by 2025 (1).The Arab world (North Africa, Middle Eastand Gulf area) will have second highest increase in percentage of people with Diabetes Mellitus in 2030 compared to other parts of the world (2).In Tunisia, diabetes also represents a real epidemic. Its prevalence in 2009 was estimated at 15% in a representative sample of the population of great Tunis (3).

As in other chronic somatic diseases, in diabetes there is an increased prevalence of depression, often called «evil of the century». Depression is also a major public health problem. Approximately, 340 million people worldwide suffer from depression at some point in their lives (4).

The relation between depression and diabetes is complex and especially bidirectional (5,6). In fact, diabetic patients had a higher prevalence of depression than the general population (7).On the other hand, depressed patients exhibit a greater risk of diabetes (5, 6). As a result, the prognosis of these two diseases (severity, complications, treatment resistance and mortality) (8) turns out to be more severe in case of co morbidity,especially intype 2 diabetes (9,10).

The available data regarding the prevalence of depression in type 2 diabeticpatients (T2DP) in Tunisia are limited.

The present study was therefore undertaken with the objectives to study the prevalence of depression in T2DP and to evaluate the relationship of depression with glycemic control and treatment adherence.

METHODS

Patients

This was cross-sectional study, 100 T2DP were randomly recruited from the outpatient department of the Tunis Nutrition Institute over three months. Patients aged over then 18 years, with a least one year of type 2 diabetes history were included. Patients with a personal history of psychiatric treatment, pregnant women, patients hospitalized at the time of the study or during the previous month and those with an infection or another condition (liver or pancreas disease), that can cause a diabetic imbalance were excluded.Patients whose medical files were incomplete were not included.All patients were interviewed by the same interviewer after their diabetology consultation. Informed consent was obtained from all the participants. The study protocol was approved by the Razi Hospital's Ethics Committee.

Depressed T2DP, according to the MINI werere ferred to the psychiatric outpatient clinic.

Instruments

We used a semi-*structured questionnaire* to collect patients' socio-demographic data (age, sex, marital status, educational level, occupation and lifestyle).Further, clinical and therapeutic variables (age of onset, duration of diabetes evolution, existence of micro and macro angiopathic complications,rhythm of consultation) were also assessed. Stressful life events during the fifteen days preceding the survey were assessed by direct closed questions. Fifteen days are the minimum period required to define depression according to the the diagnostic and statistical manual of mental disorders, 4^{th} edition (DSM IV).

Glycemic control was assessed according to blood glucose and glycated hemoglobin (*HbA1c*) levels. HbA1c <7% and /or fasting glucose ≤ 6mmol / l were used to define good glycemic control.

The treatment adherence was assessed by using a standardized questionnaire:the Medication

Adherence Scale (*MAS*) (11).MAS is a scale composed by four questions. A positive response to eitchof them indicates an adherence problem. The total score ranged from one to four.

Depression and anxiety were assessed using a*dialectal Arabic validated* version of Hospital Anxiety and Depression Scale (HAD) (12).This self-reported questionnaire consists of two subscales each having 7 items, one for anxiety and the other for depression. The thresholds were those proposed by Lepine and al (13), for both subscales: anxiety and depression (≥ 10 for each).The depression score ranges from 0-21 to determine possible degrees of depression symptoms. There were three groups of scores classified as the following: moderate 8-10, mild 11-14 and severe 15-21.

The HAD is an appropriate instrument for patients with a medical condition. It identifies depressive or anxious symptoms and assesses their severity without considering somatic symptoms of depression or anxiety, which may distort the assessment in this type of patients.

We also used the modules relative to among mood disorders of a validated Arabic version of the *Mini International Neuropsychiatric Interview*(MINI) (14).

The MINI is a structured questionnaire for diagnostic purposes, done in a brief handover period, exploring in a standardized way, major psychiatric disorders of axis I according to the DSM IV, namely mood disorders, anxiety disorders, addictive behavior and psychotic disorders. It has the advantage of making a quick inventory of psychiatric disorders, based on objective evaluation.

The depressive disorders contain Major Depressive Disorder (an Isolated Major Depressive episode and Recurrent Major Depressive disorder), Dysthymia and Bipolar Disorders. Recurrent Major Depressive disorder is characterized by the presence of two or more Major Depressive Episodes. The essential feature of dysthymia is a depressed mood that occurs for most of the day, for more days than not, for at least 2 years (at least 1 year for children and adolescents). Type 2 Bipolar Disorder is

characterized by at least one hypomanic episode. In addition, Type 2 bipolar disorder is characterized by one or more major depressive episodes.

Statistical analysis

Data were analyzed using the software statistical package for social sciences (SPSS) statistics version 11.Means and standard deviations for quantitative variables were calculated. For qualitative variables, comparisons were performed using Pearson Chi2 test or Fisher's exact test. Means were compared with the Student t test for independent groups. Statistical significance was set at a *p*-value≤0.05.

Sample size

We calculated the sample size based on the prevalence of depressive symptoms in patients with diabetes reported in a similar Tunisian study (40.3%) with a desired precision of 0.1 and a confidence interval of 95%.

RESULTS

*1.Socio demographicdataof Type 2Diabeteic*patients*:*

Sixty women and 40 men with a gender ratio of 0. 66 were included in the study. The mean age of patients was 58 ± 10.3 years.The majority of T2DP was married (83%) and educated (73%).Two-thirdsT2DP had an average socioeconomic level (66%). More than the Half of our patients had no occupation (52%), 22% were retired, 17%were manual workers and 9% were employees.Forty one per cent of T2DP mentioned stressful events in the past two weeks. Family problems were the most cited stress factors (42%). More than half of T2DP(59%) did not report any stressful events in the past two weeks.

2.Clinical and therapeutic data of Type 2Diabetic population:

The clinical and therapeutic features of T2DP were summarized in Table 1.

3.Prevalence of depression and anxiety in diabetic type 2patients:

In our study, the prevalence of depression in T2DP was 38% according to the HAD scale. The prevalence of severe depression was18%.The prevalenceof anxiety was 31%. However, 18% of T2DP had anxious-depressiveco morbidity.Depressed T2DP were more likely to be anxious than non-depressed T2DP (47.3% versus 20.9%; p = 0.006). According to the MINI, 31% of T2DP had a mood disorder :dysthymiawas found in 14% of cases, an isolated depressive episode in 6%, a recurrent major depressive disorder in 8% and finally a type 2 bipolar disorder in 3% of cases.

4. Association between depression and clinical and therapeutic characteristics among Type 2 diabetic patients:

We found an association between depression and a *poor* glycemic control. The association between depression and the clinical and therapeutic data were summarized in Table 2.

Table 1: Clinical and therapeutic features of the study population

Characteristics	
Age of onset (years)	46.9 ± 10.9
Duration of diabetes (years)	11.1 ± 7.4
Good glycemic control	45 (45)
Complications	
Macroangiopathy	25 (25)
Rétinopathy	37(37)
Néphropathy	21 (21)
Erectile dysfunction	21(21)
Neuropathy	49 (49)
Somatic comorbidity	
Cardiopathy	21 (21)
Dyslipidemie	61 (61)
HTA	59 (59)
Obesity	43 (43)
Dysthyroidy	6 (6)
Regularly followed-up at the outpatient clinic	88 (88)
Good treatment adherence	64 (64)
Subjects on Insulin	12(12)
Subjects on OHD	43 (43)
Subjets on insulin+ OHD	42 (42)
Diabetic diet	3(3)
Balanceddiet	33 (33)
Smoking	11 (11)
Alcohol	3(3)
Physical activity	28 (28)

Table 2: Association between depression and clinical and therapeutic characteristics

	Depression (+)	**Depression (-)**	**P**
Age of onset (years)	46,9+/-10,9	46,7+/-9,4	0,9
Diabetes duration (years)	11,3+/-8,2	11+/-6,9	
Good glycemic control	5 (13.1)	40 (64.5)	0,8
Poor glycemic control	33 (86.8)	22 (35.4)	
Macro angiopathy(+)	16 (42.1)	9(14.5)	0.001
Macro angiopathy(-)	22 (57.9)	53(85.5.)	
Rétinopathy(+)	15(39.5)	22(35.5)	0,002
Rétinopathy(-)	23(60.5)	40(64.5)	
Néphropathy(+)	8(21.1)	13(21)	0.688
Néphropathy(-)	30(78.9)	49(79)	
Erectile dysfunction (+)	7(18.4)	14(22.6)	0.992
Erectile dysfunction (−)	31(81.6)	48(77.4)	
Neuropathy(+)	20(52.6)	29(46.8)	0.62
Neuropathy(-)	18(47.4)	33(53.2)	
Regularly follow-up at the outpatient clinic	30 (78.9)	58 (93.5)	0.57
Irregular follow-up at the outpatient clinic	8 (21)	4 (6.4)	
Good treatment compliance	14 (36.8)	50 (80.6)	0.029
Poor treatment compliance	24 (63.1)	12 (19.3)	
Subjects on OHD/ diet	20 (52,6)	26 (41.9)	0.001
Subjets on insulin+ OHD/ Insulin	18 (47.4)	36 (58.1)	
Balanced diet	8 (21.1)	25 (40.3)	0.298
Unbalanced diet	30 (78.9)	37 (59.7)	
Smoking (+)	4 (10.5)	7 (11.3)	0.047
Smoking (-)	34 (89.5)	55 (88.7)	
Alcohol (+)	1(2.6)	2 (3.2)	0,59
Alcohol (-)	37 (97.4)	60 (96.7)	
Physical activity (+)	8 (21.1)	20 (32.3)	0,67
Physical activity (-)	30 (78.9)	42 (67.7)	0,22

No significant association was found between depression and the following factors: age of onset (p=0.9), diabetes duration (p=0.8), and somatic co morbidities (p=0.5).

DISCUSSION

Prevalence of depression and anxiety in type 2 diabetic patients

The present study investigated the prevalence of depression and anxiety among Tunisian T2DP and identified the association between depression and glycemic control and treatment adherence.In our study, the prevalence of depression and anxiety in T2DP were respectively 38% and 31%. In a previous Tunisian study, anxiety and depressive symptoms were present in 22.6%and 40.3% respectively of 62 type 2 diabetic elderly outpatients (15). The depression prevalence of T2DP in our sample is in accordance with other studies conducted in low- and middle-income countries (16). A Palestinian study showed that 40% of 294 T2DP were potential cases of depression. A study in Guinea found that anxiety and depression symptoms were present in 58.7% and 34.4%, respectively, of the 491 patients with Type 2 diabetes (17). However,the prevalence of depression in our sample population was higher than the previously observed prevalencesinothers studies (2, 18, 19). A study in Jordan found that the prevalencerate of undiagnosed depression among Jordanian diabetic patients was 19.7% (20). Results seem to be discrepant for several reasons. One reason may be the use of different assessment scales. Indeed, the prevalence of depression appears to be higher when using self-assessment scales(21). In fact, in our study an assessment using the self-administered questionnaire HADS showed that 38 patients had a score classifying them as depressed at the time of the study, while based on a hetero-assessment using the MINI, this rate was 31**%**.This higher prevalence of depression when using self-assessment compared to hetero-assessment tools was also reported by the study of talon on 41 T2DP, which showed a prevalence of 12.2% in hetero-assessment against 53.6% in self-assessment (21). Similarly the meta-analysis of Gavardet al, showed that the prevalence of depression using hetero-assessment was below the figure obtained by self-assessment tools (14% Vs 32%) (22).

Anxiety and depression co morbidity was found among 18% of T2DP. Depressed T2DPwere more likely to display symptoms of anxiety (47.4% versus 21%) compared to non-depressed patients with a statistically significant difference (p = 0.006).

Other previous studies confirmed the high prevalence of anxiety in T2DP and its frequent association with depressive disorders (17, 20-24). Anxiety among D2TP may be related to the stress of the daily diabetes management such as insulin self injections, self-monitoring of blood sugar level. The fear of possible diabetes complications could be alsobe another trigger of anxiety.

*2. Depression, diabetes, clinical and therapeutic features***:**

In our study, treatment adherence was significantly lower in depressed patients (p <0.001). Also, we found an association between irregular follow-up and depression (p = 0.029). Similarly, Jackson and al found that 50% of depressed patients were not adherent to their oral diabetes treatments(25). A systematic review of treatment adherence among individuals with diabetes and depression indicated that there was a significant relationship between depression and treatment non adherence (19).This can be explained by the fact that during depression, pessimism, cognitive distortions and psychomotor retardation are factors that hinder the acquisition of the conditions for good adherence to treatment such as wanting to be treated , being convinced to receive quality care and knowing the characteristics of the prescribed treatment.

In our study, depressed T2DP had poorer glycemic control compared to non-depressed ones (p <0.001). Several studies have already shown this association [2,17]. In a meta-analysis by Lustman (27), the depression was significantly associated with hyperglycemia in 24 among 30 studies. It was also confirmed by a prospective study of Katon (28) including 4117 diabetic patients followed over 5 years.

Indeed, depression may compromise the glycemic control because of its negative effects on diabetes self-management including less respect for lifestyle and dietary rules, poor compliamce to blood glucose self-monitoring, decreased physical activity, increased smoking and alcohol consumption, poor adherence to diabetes care and monitoring (34).

In our study, degenerative complications of diabetes were found in 62% of cases. We have found a significant link between depression and macro-vascular complications. A meta-analysis of Groot (29) of 27 studies of patients with type 1 and 2 diabetes noted a high frequency of micro and macro vascular complications in cases of depression associated with diabetes.

Finally, in contrast with some other studies (30,31), our study did not show any association between somatic co-morbidities and depression among T2DP.

Our present study has several intrinsic limitations. First, as symptoms of depression and anxiety were only measured at one time point, this study cannot directly evaluate the long-termimpact of diabetes on the incidence of anxiety/depression. Thus,the cross-sectional design of the study allows no conclusions to bedrawn on the causality of the link between depression and poor glycemic control or treatment adherence. Second, the studied population (recruited among patients of the outpatient department of the Tunis Nutrition Institute) are likely to have a severe form of diabetes, and may not thus be representative of the whole population of T2DP.

CONCLUSION

Our study showed that T2DP are at risk of anxiety and depression. It also highlighted the **relationship of depression with poor glycemic control and poor adherence to treatment** among T2DP.

These findings also suggest that the healthcare infrastructure in Tunisia needs to evolve to take better account of the psychological burden associated with diabetes.Depression in T2DP in Tunisia needs to be screened for and taken into consideration in the routine medical care. Indeed, the screening and monitoring of psychiatric disordersis an essential step in any chronic disease management, regardless of its origin. The detection of depression related to somatic conditions in particular diabetes, seems essential.As a result, treatment of depression may improve the overall prognosis of the associated somatic diseases.

Conflict of interest: None.

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