ORIGINAL ARTICLE

Depression, urinary cortisol and social demographics characteristics in subjects with type 2 diabetes mellitus

DEPRESSÃO, CORTISOL URINÁRIO E PERFIL SÓCIO-DEMOGRÁFICO DE PORTADORES DE DIABETES MELLITUS TIPO 2

DEPRESION, EL CORTISOL URINARIO Y PERFIL SOCIODEMOGRAFICO EM PORTADORES DE DIABETES MELLITUS TIPO 2

Alexandra Bulgarelli do Nascimento[1], Eliane Corrêa Chaves[2], Sonia Aurora Alves Grossi[3]

ABSTRACT

The objective this study was investigate the relationship between depression indicators and social-demographics characteristics in subjects with Type 2 Diabetes Mellitus (DM2). The socio-demographic evaluation was conducted in a sample composed of 40 patients with DM2 from Diabetes League (HCFM-USP).Depression indicators were evaluated through the Beck Depression Inventory (BDI) in addition to urinary cortisol (CORT).The results showed that individuals with high education level,poor individual and familiar economic status in addition to history of broken stable relationship are more likely to depressive symptoms.

KEY WORDS

Diabetes mellitus type 2.
Depression.
Nursing.
Neuroendocrinology.

RESUMO

O objetivo deste estudo foi investigar a relação entre indicadores de depressão e perfil sócio-demográfico de portadores de Diabetes Mellitus tipo 2 (DM2).A avaliação sócio-demográfica foi conduzida em amostra composta por 40 pacientes na Liga de Diabetes (HC-FMUSP).Os indicadores de depressão foram investigados a partir do Inventário de Depressão de Beck (IBD) em associação com cortisol urinário (CORT).Os resultados mostraram que indivíduos portadores de DM2 com alta escolaridade, baixo poder aquisitivo individual e familiar e com história de rompimento de relação conjugal estável estão mais propensos a sintomas de depressão.

DESCRITORES

Diabetes mellitus tipo 2.
Depressão.
Enfermagem.
Neuroendocrinologia.

RESUMEN

Lo objective deste estudo fue investigar la relación entre la depresión y los indicadores de perfil socio-demográfico de los pacientes con diabetes mellitus tipo 2 (DM2). Evaluación socio-demográficos se llevó a cabo en una muestra de 40 pacientes en la Liga de la Diabetes (HC-FMUSP). Indicadores de la depresión se han investigado en el Beck Depression Inventory (BDI),en asociación con el cortisol urinario (CORT).Resultados muestraron que los pacientes con DM2 con alto nivel de educación,las personas de bajos ingresos y familias con historia de interrupción de los matrimonios estables son más propensos a tener síntomas de la depresión.

DESCRIPTORES

Diabetes mellitus tipo 2.
Depresión.
Enfermería.
Neuroendocrinología.

[1] Nurse. Graduated from School of Nursing, University of São Paulo. São Paulo, SP, Brazil. abnascimento@usp.br [2] Ph.D. Professor. Medical-Surgical Nursing Department at School of Nursing, University of São Paulo. São Paulo, SP, Brazil. ecchaves@usp.br [3] Ph.D. Professor. Medical-Surgical Nursing Department at School of Nursing, University of São Paulo. São Paulo, SP, Brazil. sogrossi@usp.br

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INTRODUCTION

According to the *International Diabetes Federation*, nearly 140 million people in the world have the disease and statistics suggest that these figures will increase to 300 million by 2025[1]. In Brazil, the prevalence of Diabetes Mellitus in the population aged 30 to 69 years is 7.6%, which represents nearly 10 million people. Of these, 90% have Diabetes Mellitus type 2 (DM2)[2].

The World Health Organization warns that the depressive disorders, which are ranked fourth in the world ranking of death and disability, might hold the second place by 2020, second only to heart diseases[3].

Some studies have shown a higher prevalence of depression in people with DM2[4-5]. One of them reviewed the MEDLINE and LILACS databases systematically, focusing on the period between 1990 and 2001, showing that symptoms of depression are related to glycemic decompensation, increased and higher gravity of complications of DM2 and the high impact in the daily lives of people with DM2[4].

Another study, with the objective of identifying symptoms of depression using Beck Depression Inventory (BDI) in people with DM2, showed that 68.12% of a sample of 59 DM2 patients had depression scores that were higher the threshold scores established by the instrument, being related to being female (p=0.002), old age (p < 0.002) and low education (p=0.024)[5].

These data suggest that the inclusion of monitoring symptoms of depression in DM2 patients may facilitate the control of this disease.

Symptoms of depression are related to glycemic decompensation, increased and higher gravity of complications of Diabetes Mellitus type 2.

OBJETIVE

To investigate the relationship between indicators of depression (urinary cortisol and BDI) and the socio-demographic profile of DM2 patients.

METHOD

This is a cross-section, descriptive study, and the data were collected with DM2 patients in the outpatient clinic in the Diabetes Control League of the Endocrinology Course of University of São Paulo Faculty of Medicine Clinics Hospital.

The inclusion criteria were: being a DM2 patient at any stage of evolution of the disease; being 18 years old or older, due to the characteristics of DM2 and depression, and also to guarantee the ethics of the study; not having used antidepressant or anxiolytic medication during a minimum one-month period before taking part in the study, in order to avoid possible interferences in mood and in neurochemical and hormonal processes; and accepting to participate in the study by providing written consent (register number 468/2005 of the Review Board of School of Nursing, University of São Paulo).

Data collection occurred from 09/28/2005 to 03/08/2006, in places that could guarantee the privacy of each participant.

The number of subjects in the study group was defined by sample calculation, admitting an alpha risk lower or equal to 5% and beta risk lower or equal to 20% of a type 1 error or first type error. The 40-DM2-patient sample was considered for a bicaudate hypothesis, for an independent, non-parametric test.

The urinary cortisol (CORT) dose was measured with a 24-hour biochemical urine exam, obtained with electroimmune assays[6].

The following questionnaires and instruments were applied:

- Socio-Demographic Data Collection Questionnaire: characterized the study subjects regarding gender, age, marital status, origin, presence and practice of religion/faith, education, individual income, family income, *per capita* income and people who are responsible for the family income.

- DM2 Data Collection Questionnaire: provided information about how long the patient had been diagnosed with DM2, self-assessment of the impact of DM2 (assessed with an alphanumeric scale ranging from 0 to 10, where 0 (zero) means no impact and 10 (ten) means maximum impact), lifestyle (physical activity and diet), anthropometric data (weight, height, body mass index (BMI), waist circumference (WC) and waist-to-hip ratio (WHR)), drug therapy, biochemical control of the disease (glycated hemoglobin (A1c)).

The reference values of the Brazilian Association for the study of Obesity and Metabolic Syndrome – *Associação Brasileira para o Estudo da Obesidade e da Síndrome Metabólica* (ABESO) were used for the anthropometric data analysis[7].

For the analysis of A1c, the *High Performance Liquid Chromatography* (HPLC) method was used, recommended by the Interdisciplinary Standardization Group of the National Federation of Diabetes Associations and Groups – *Federação Nacional das Associações e Entidades de Diabetes* (FENAD), which considers that values over 7% show alterations[8].

Beck Depression Inventory (BDI)[9]: subjective indicator of symptoms of depression, which, according to its description, refers to a

> […]self-assessment measurement of depression, without a diagnostic purpose […], made up of 21 categories of symptoms and behaviors that are characteristic of de-

pression. Each category consists of a series of different levels of intensity, so that it reflects the intensity of the symptom (from neutrality to maximum severity), in an increasing numeric scale from 0 to 3 points. The categories include humor, vegetative, social, cognitive and irritability manifestations. The symptoms of depression involve the following categories, according to the order they appear in the instrument: sadness, pessimism, feelings of failure, lack of satisfaction, feelings of guilt, feelings of punishment, self-depreciation, self-accusation, suicidal ideas, crying spells, irritability, social retraction, indecision, body image distortion, inhibition for work, sleep disorders, fatigue, loss of appetite, weight loss, somatic concerns and reduced sexual drive. In order to evaluate the scores obtained in the application of the inventory, the scores of all categories should be added up to reach a final score [...] some studies recommend that the results should be classified in three different scoring levels: 0 to 15 points indicate lack of symptoms of depression; scores between 15 and 20 points indicate a state of dysphoria, and scores abobe 20 points indicate a suggestive diagnostic of depression [...][10-11].

Crombach's Alpha was used to evaluate BDI's internal consistency, resulting in 0.920, which indicates an excellent level of reliability. It was maintained even when one of its domains was removed, resulting minimally in a coefficient of 0.915. It is worth noting that the *Suicidal Ideas* domain was removed from the analysis, since it had a variance of zero.

RESULTS

The sample was made up of 60% women, 45% seniors (aged 60 years or older); the age median was 56.5, with the minimum and maximum values being 21 and 90 years, respectively. Average age was 59.8 years, with a standard deviation of ± 13.6 years.

Among the study participants, 52.5% had stable unions, 22.5% were widowed, 15% were single and 10% were divorced; 37.5% were from the countryside of the state of São Paulo, 32.5% from the metropolitan area of the city of São Paulo and 30% from other states.

The whole sample (100%) mentioned having a religion/faith, and 77.5% reported practicing it actively. The educational median was 8 years of study, with the minimum and maximum values being 0 and 20 years, respectively. The average education time was 7.6 years, with a standard deviation of ± 4.8 years. In the sample, 2.5% admitted to being illiterate.

Average income varied from 1 to 20 times the minimum wage in 85% of the sample, with the others having no personal income, and 34% of the samples were the sole providers for their families. Family income varied from 1 to 15 times the minimum wage and *per capita* income from 0.3 to 5 times, with a median value of 1.6 times the minimum wage.

The table below characterizes the sample according to the many clinical aspects of DM2 (Table 1).

Table 1 - Characterization of the study group, according to clinical aspects - São Paulo - 2007

Variables and Categories	N	%
Time since DM2 was diagnosed (Average / ± SD / Median. in years)	13.7 / ± 9.9 / 11.0	
Number of complications due to DM2		
3 or more	16	42.5
1 or 2	14	37.8
None	7	18.9
Self-assessment of the impact of dm2 on daily life (Average / ± SD / Median)	5.8 / ± 2.5 / 6.0	
Physical activities		
No	28	70.0
Yes	12	30.0
Frequency of physical activity		
5 times a week	7	58.3
3 times a week	4	33.3
7 times a week	1	8.3
Follows nutritional orientation		
No	22	55.0
Yes	18	45.0
Use of medication		
Yes	40	100.0
Number of drugs in use		
5 or more drugs a day	35	87.5
4 drugs a day	4	10.0
3 drugs a day	1	2.5
Use of exogenous insulin		
No	21	52.5
Yes	19	47.5
BMI (Average / ± SD / Median. in kg/m^2)	28.3 / ± 4.3 / 28.3	
Altered WC		
Females	19	78.0
Males	10	77.0
RCQ alterada		
Females	24	100.0
Males	16	100.0
A1c (Average / ± SD / Median. in percent)	9.1 / ± 2.2 / 9.2	

Spearman's correlational test between the CORT dose and the BDI score yields a statistically significant and positive correlation between both variables (Spearman, r=0.523, p<0.001). As the BDI score increases, the CORT dose is higher, and vice-versa.

The correlation between the BDI score and the variables: gender, marital status and education was statistically significant and positive. The variables age, individual income, family income and being the sole provider for the family showed a statistically significant and negative correlation with the BDI score. There was no correlation with the variable *per capita* income (Table 2).

The correlation between the CORT and the variables: marital status, education, age, *per capita* income and being the sole provider for the family was statistically significant and positive. With the variables: individual and family income, the statistical significance was negative. There was no correlation with the variable gender (Table 2).

Table 2 - Comparison between the indicators of depression, according to their correlation with the socio-demographic variables - São Paulo - 2007

Variables and Categories	Depression Indicators			
	BDI (score)		CORT (micrograms/24 hours)	
	r (coef)	p (prob)	r (coef)	p (prob)
Gender 0 = Female 1 = Male	0.156*	< 0.001*	0.023*	0.268*
Marital status 1 = Single 2 =Stable Union 3 = Divorced 4 = Widowed	0.153*	< 0.001*	0.114*	< 0.001*
Education (years in school)	0.070*	< 0.001*	0.046*	0.024*
Age (in years)	-0.143*	< 0.001*	0.088*	< 0.001*
Individual income (multiplied by the minimum wage)	-0.083*	< 0.001*	-0.062*	< 0.001*
Family income (multiplied by the minimum wage)	-0.270*	< 0.001*	-0.166*	< 0.001*
Per capita income (multiplied by the minimum wage)	-0.202*	0.211*	0.523*	< 0.001*
Sole provider for the family 0 = No 1 = Yes	-0.028*	0.174*	0.052*	0.011*

Positive statistical significance. Negative statistical significance. No statistical significance.

(*) Spearman

DISCUSSION

Some studies indicate that the DM2 patient is predisposed to depression[4-5]. The *International Diabetes Federation* and the World Health Organization issued warnings about the pressures that these conditions will cause in society in about 20 years[1,3].

As such, it is necessary to know the profile of DM2 patients who are vulnerable to developing symptoms of depression.

By assuming that vulnerability precedes risk, it is fundamental for the healthcare professional to know this approach in order to be able to identify which type of vulnerability the individual is exposed to[12].

In this study, depression was measured with objective (CORT) and subjective (BDI) indicators, showing a statistically significant correlation between these indicators. As such, the socio-demographic profile of the DM2 patient who may present symptoms of depression over his or her lifetime was identified.

When both indicators (CORT and BDI) were assessed together, the DM2 patients who were verified to have had a stable relationship in the past, which is now over; higher education; and low family and individual income have an increased predisposition to depression.

These results oppose the findings of a study performed with DM2 patients, which showed that 68.12% of the sample of 59 DM2 patients had threshold scores above those established by the BDI, with a statistically significant and negative correlation for the variables gender and education, and a statistically significant and positive correlation for the variable age[5].

The results of another study on DM2 patients receiving care in a Mexican outpatient clinic showed that women with a stable partner, low education and poor glycemic control were more predisposed to depression[13].

It is worth noting that both studies used BDI as the only indicator of symptoms of depression, which seems to be an important tool to track symptoms of depression by healthcare professionals who are not specialized in mental care, as shown. However, no full consonance was observed when both indicators of symptoms were correlated with socio-demographic variables.

It is believed that the following characteristics can contribute for the possible character of vulnerability for developing symptoms of depression in the study group. People who have had DM2 for 14 years on average, and only 18.9% of these had no complications from DM2; the average impact of DM2 in daily life was above 5 (five) and only 30% of the sample did some kind of physical activity, and, of these, 1/3 do it only three times a week (Table 1).

Furthermore, although 45% of the sample stated that they followed nutritional orientation, it is made up by overweight people and risk for the development and complications of cardiovascular diseases and DM2 (Table 1).

The whole sample uses medication to control DM2, with 87.5% using more than five different drugs; 47.5%

uses exogenous insulin, being people with important glycemic metabolic decompensation (Table 1).

Due to all these considerations, care for the DM2 patient, in addition to considering the socio-demographic profile, which was shown to be peculiar in this context, must also include the monitoring of symptoms of depression to facilitate the control of the disease.

CONCLUSIONS

The objective and subjective indicators of depression, evaluated together, showed that the DM2 patients who had a stable relationship in the past, which is now over; higher education; and low family and individual income are more predisposed to symptoms of depression.

REFERENCES

1. Gruber W, Lander T, Leese B. The economics of diabetes and diabetes care. Brussels: Belgium/ International Diabetes Federation; 1998.

2. Malerbi DA, Franco IJ. Multicenter study of the prevalence of diabetes mellitus and impaired glucose tolerance in the urban brazilian population age 30-69 years. The Brazilian Cooperative Group on the Study of Diabetes Prevalence. Diabetes Care. 1992;15(11):1509-16.

3. Hornstein L. Las depresiones: afectos y humores del vivir. Buenos Aires: Paidós; 2006.

4. Leite IC, Schramm JMA, Gadelha AMJ, Valente JG, Campos MR, Portela MC, et AL. Comparação das informações sobre as prevalências de doenças crônicas obtidas pelo suplemento saúde da PNAD/98 e as estimativas pelo estudo carga de doença no Brasil. Ciênc Saúde Coletiva. 2002;7(4):733-41.

5. Ricco RC, Miyazaki MCOS, Silva RCMA. Depressão em pacientes adultos portadores de doenças crônicas: diabetes mellitus e hepatites virais. Arq Ciênc Saúde. 2004;7(9):156-60.

6. Fréjaville JP, Kamoun P. Manual de exames de laboratório. São Paulo: Atheneu; 1989.

7. Associação Brasileira para o Estudo da Obesidade e da Síndrome Metabólica (ABESO). Dados Antropométricos [texto na Internet]. [citado 2009 jul. 20]. Disponível em: http://www.abeso.org.br/revista/revista11/metodos.htm

8. Grupo Interdisciplinar de Padronização da Hemoglobina Glicada A1c. A importância da hemoglobina glicada (A1c) para a avaliação do controle glicêmico em pacientes com diabetes mellitus: aspectos clínicos e laboratoriais. São Paulo: Federação Nacional das Associações e Entidades de Diabetes (FENAD); 2004.

9. Gorenstein C, Andrade LHSG, Zuardi AW. Escalas de avaliação clínica em psiquiatria e psicofarmacologia. São Paulo: Lemos; 2000. p. 89-95.

10. Costa ALS. Processos de enfrentamento do estresse e sintomas depressivos em pacientes portadores de retocolite ulcerativa idiopática. São Paulo: A. L. S. Costa; 2003. p. 46-8.

11. Costa ALS, Chaves EC. Processos de enfrentamento do estresse e sintomas depressivos em pacientes portadores de retocolite ulcerativa idiopática. Rev Esc Enferm USP. 2006;40(4):507-14.

12. Ayres JRCM, França Júnior I, Calazans GI. O conceito de vulnerabilidade e as práticas de saúde: novas perspectivas e desafios. In: Czeresnia D, Freitas CM, organizadores. Promoção da saúde: conceitos, reflexões, tendências. Rio de Janeiro: FIOCRUZ; 2003. p. 117-39.

13. Téllez-Zenteno JF, Cardiel MH. Risk factors associated with depression in patients with type 2 diabetes mellitus. Arch Med Res. 2002;33(1):53-60.

Correspondence addressed to: Sonia Aurora Alves Grossi
Av. Dr. Enéas de Carvalho Aguiar, 419 - Cerqueira César
CEP 05403-000 - São Paulo, SP, Brazil