

Depressive Symptoms, Dementia and Glycemic Control in Egyptian Elderly Patients with Type 2 Diabetes Mellitus

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Abstract

Background: Undiagnosed depression and dementia are an important comorbidity in type 2 diabetes (T2DM). Diabetes itself might not be a risk factor but mismanagement and poor control of disease may lead to the problem.

Aim of Study: The aim of the study is to improve elderly health, life satisfaction and to decrease morbidity and mortality. The results of this study may contribute to the design of a program for geriatric health awareness.

Patients and Methods: This is a cross sectional study conducted on 177 elderly patients with T2DM attending both Family Medicine Clinics and Diabetic Clinic at Kasr Al-Ainy Hospital over a period of 7 months starting from February 2019 to August 2019. Each participant was subjected to a comprehensive medical assessment and assessment of depression and dementia using the Arabic version of the MMSE and the Arabic version of the GDS-15.

Results: According to the laboratory results of HBA1C, 59.3% had uncontrolled diabetes. Based on mini-mental state examination (MMSE) cutoff point, the prevalence of cognitive impairment (CI) was 21.5% and based on the cutoff point of GDS the prevalence of depression was 18.1%.

Conclusions: From this study we can conclude that there is significant relation between uncontrolled diabetes, dementia and depression.

Key Words: Diabetes – Dementia – Glycemic control.

Introduction

DEMOGRAPHIC changes consist of reduction in both mortality and fertility therefore, population become healthier, more people will survive to old age and will have the disease patterns of non-communicable diseases at the top of list [1].

Persons aged 60 or older currently comprise 10 percent of the world population and by 2050 it is projected to reach 21 percent (Youssef, 2005). Diabetes is present in 22% to 33% of the geriatrics.

It is expected that the percent of diabetes could double in the next 20 years [2].

Risk of cognitive impairment and dementia increases in diabetes [3]. An inverse correlation has been noted between some cognitive measures and HB A1c levels, also suggesting that worse glycemic control may be associated with greater cognitive decline [4]. In a population aged 65-75 years, cognitive and physical impairment is detected at an earlier age in T2DM patients than in those without [5].

Depression and diabetes are complex diseases with multi-factorial etiologies. The co-existence of depression and diabetes has been associated with poor self-management and two-fold increased risk of cardiovascular events and stroke. Age is a common risk factor for both depression and diabetes. Thus, with increasing life expectancies, major burdens on the healthcare system were caused by these two conditions [6].

Glycemic control variability is associated with more depressive symptoms [7]. Significant associations of depression with several cognitive domains and Overall Cognition even in cognitively normal elderly with T2D, suggest that depression may have a role in impaired cognitive function in T2D, which may be attenuated by antidepressants [8].

Objectives:

To determine the association between depression, dementia and glycemic control among diabetic patients aged 65 years or more.

Patients and Methods

This is a cross-sectional study conducted over a period of 7 months starting from February 2019 to August 2019 on diabetic patients aged 65 years or more attending the Family Medicine and diabetic clinics in Kasr Al-Ainy Hospitals, Cairo University.

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Ethical approval was obtained from The Research & Ethical Committee in Cairo University. A consent was obtained from all study participants before they were enrolled into the study.

Sample size calculation:

Epi-calc 2000 was used to calculate the sample size of this study.

Assuming 80% power, 0.05 level of significance, 32% null hypothesis value and estimated proportion of 42% and sample size calculated to be 177.

A 4 domains-based questionnaire was designed by the researchers after reviewing the literature and Serum HbA1c was measured to assess glycemic control in diabetic patients.

The domains are:

1- *Medical sheet domain, includes:*

- Age.
- Gender.
- Marital status.
- Caregivers.
- Smoking.
- Diabeteshypertension.
- Hepatic disorders.
- Cerebrovascular diseases.
- Renal disireders.
- Personal history of psychiatric disorders.
- Family history of psychiatric disorders.

2- *Second domain:* Standardized mini-mental state examination the original cut-off in which patients with scores 24 were considered normal and <24 were considered cognitively impaired.

3- *Third domain:* Short version geriatric depression scale, includes:

- 1- Are you basically satisfied with your life? No or yes.
- 2- Have you dropped many of your activities and interests? No or yes.
- 3- Do you feel that your life is empty? No or yes.
- 4- Do you often get bored? No or yes.
- 5- Are you in good spirits most of the time? No or yes.
- 6- Are you afraid that something bad is going to happen to you? No or yes.
- 7- Do you feel happy most of the time? No or yes.
- 8- Do you often feel helpless? No or yes.

- 9- Do you prefer to stay at home, rather than going out and doing new things? No or yes.
- 10- Do you feel you have more problems with memory than most? No or yes.
- 11- Do you think it is wonderful to be alive now? No or yes.
12. Do you feel pretty worthless the way you are now? No or yes.
- 13- Do you feel full of energy? No or yes.
- 14- Do you feel that your situation is hopeless? No or yes.
- 15- Do you think that most people are better off than you are No or yes.

Answers in bold indicate depression. Score 1 point for each bolded answer. A score >5 points is suggestive of depression. A score 10 points is almost always indicative of depression. A score >5 points should warrant a follow-up comprehensive assessment.

4- *Fourth domain ADL and IADL (Katz's and Lawton scales):*

ADL index of independence in activities of daily living (bathing, dressing, toileting, transferring, continence and feeding).

Scoring 6 indicates patient is highly independent and scoring 0 is very dependent.

LAWTON index of independence in activities of daily living (Ability to use telephone, shopping, food preparation, housekeeping, laundry, mode of transportation, responsibility of own medication, ability to handle finances).

Scoring 8 indicates patient is highly independent and scoring 0 is very dependent.

Results

The present study is a cross sectional descriptive study that was conducted in the family medicine and diabetes outpatient clinics, in Kasr Al-Ainy Faculty of Medicine, Cairo University.

The study included (177) patients seeking medical advice for different complaints.

NB: All *p*-values are two sided (*p*-value <0.05) are significant.

Table (1) shows the socio-demographic characteristics of the participants). Most of the participants were males (51.4%), were married (67.8%) and living alone (52%).

Table (1): Socio-demographic profile of the studied participants

| | | | |
|------------------------|-----|--|-------|
| Sex: | | | |
| Male | 91 | | 51.4% |
| Female | 86 | | 48.6% |
| Age: | | | |
| 65-69 years | 111 | | 62.7% |
| 70-74 years | 27 | | 15.3% |
| 75-79 years | 29 | | 16.4% |
| 80-84 years | 10 | | 5.6% |
| Marital status: | | | |
| Single | 6 | | 3.4% |
| Married | 120 | | 67.8% |
| Widow | 44 | | 24.9% |
| Divorced | 7 | | 4.0% |
| Caregivers: | | | |
| Alone | 91 | | 52.0% |
| With others | 84 | | 48.0% |

Table (2) shows that personal history of psychiatric disorders was reported by (10.2%) of the participants. Family history of psychiatric disorders was reported by (10.7%) of the participants.

Table (2): Distribution of the psychiatric data of the studied participants.

| | | | |
|---|-----|--|-------|
| Personal history of psychiatric disorders: | | | |
| Positive | 18 | | 10.2% |
| Negative | 159 | | 89.8% |
| Family history of psychiatric disorders: | | | |
| Positive | 19 | | 10.7% |
| Negative | 158 | | 89.3% |

From the above figure 18.1 % of the participants were depressed and 13% probable to be depressed and should follow-up.

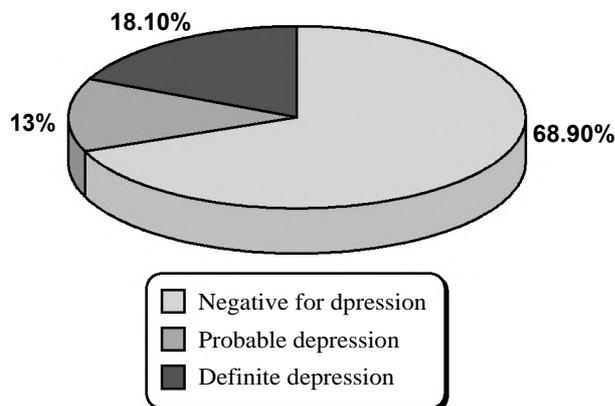


Fig. (1): Percentage of depression among participants.

The above figure shows that 21.5% had cognitive impairment where 16.9% had mild impairment 2.8% had moderate and 1.7% had severe degree according to MMSE score.

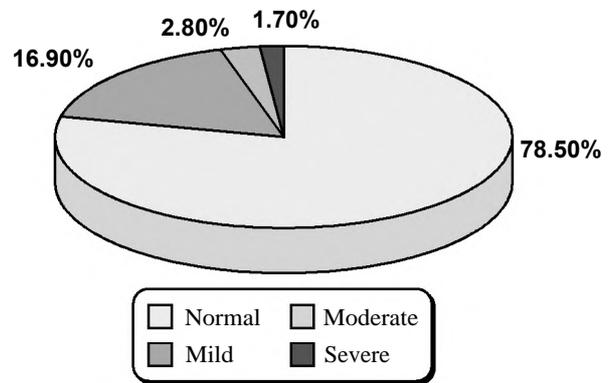


Fig. (2): Total MMSE among participants.

The above figure shows that 59.3% of the participant had uncontrolled diabetes.

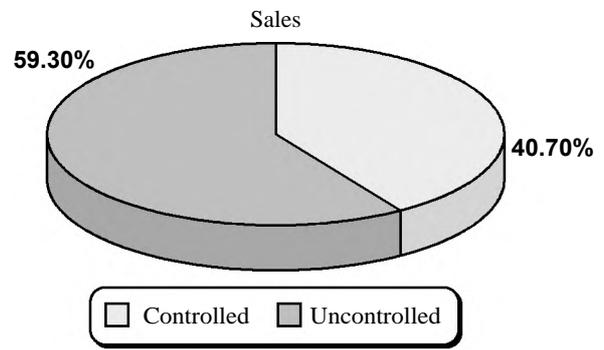


Fig. (3): Glycemic control among study group.

Table (3) shows that the relation between HBA1c and MMSE score is statistically significant (p -value <0.05) and there is negative weak correlation between them with r -value -0.276 .

Table (3): Relations and Correlations between HBA1C, total MMSE and GDS.

| | Total MMSE score | GDS score |
|--------------------------|------------------|---------------|
| HBA1 C: | | |
| r -value | -0.276^{**} | 0.232^{**} |
| p -value | 0 | 0.002 |
| N | 177 | 177 |
| Total MMSE score: | | |
| r -value | | -0.201^{**} |
| p -value | | 0.007 |
| N | | 177 |

And the relation between HBA1C and GDS score is significant with (p -value 0.05) and there is weak positive correlation between them with r -value 0.232.

The relation between MMSE score and GDS score is statistically significant (p -value <0.05).

And there is negative weak correlation between them with r -value 0.201.

Table (4) shows the relation between glycemic control and total MMSE scoring is statistically significant (p -value <0.05) and the relation between glycemic control and GDS is statistically insignificant with (p -value >0.05).

Table (4): The correlation between glycemic control and MMSE and GDS.

| | HbA 1 c_ categories | N | Mean | Std. Deviation | p -value |
|------------------|---------------------|-----|-------|----------------|------------|
| Total MMSE score | Controlled | 72 | 27.03 | 3.267 | 0.005 |
| | Uncontrolled | 105 | 25.38 | 4.522 | |
| GDS score | Controlled | 72 | 4.31 | 3.418 | 0.1 |
| | Uncontrolled | 105 | 5.25 | 4.139 | |

Table (5) shows insignificant relation between total MMSE score and sex (p -value >0.05).

There is insignificant relation between GDS score and sex with (p -value >0.05).

Table (5): The correlation between total MMSE and GDS score with sex.

| | Sex | N | Mean | Std. Deviation | p -value |
|------------------|--------|----|-------|----------------|------------|
| Total MMSE score | Male | 91 | 25.64 | 4.741 | 0.171 |
| | Female | 86 | 26.49 | 3.335 | |
| | | | | | |
| GDS score | Male | 91 | 4.71 | 3.778 | 0.598 |
| | Female | 86 | 5.02 | 4 | |
| | | | | | |

Table (6) shows insignificant relation between total mms score and caregivers (p -value >0.05).

There is insignificant relation between GDS score and caregivers (p -value >0.05).

Table (6): The correlation between total MMSE scoring and GDS and caregivers.

| | Caregivers | N | Mean | Std. Deviation | p -value |
|------------------|-------------|----|-------|----------------|------------|
| Total MMSE score | Alone | 91 | 25.89 | 4.233 | 0.554 |
| | With others | 84 | 26.26 | 4.054 | |
| GDS score | Alone | 91 | 4.91 | 4.119 | 0.1 |
| | With others | 84 | 4.85 | 3.662 | |

Table (7) show that the daily activities of the participant were impaired mostly in bathing 9.6%, and dressing 7.9%.

Table (8) shows the most impairment of daily activity regarding using instruments was in shopping 16.4%, and handling finance 15.3%.

Table (7): The daily activity of the participant according to Katz questionnaire [9].

| | | | |
|----------------------|-----|--------|--|
| <i>Bathing:</i> | | | |
| Dependence | 17 | 9.60% | |
| Independence | 160 | 90.40% | |
| <i>Dressing:</i> | | | |
| Dependence | 14 | 7.90% | |
| Independence | 163 | 92.10% | |
| <i>Toileting:</i> | | | |
| Dependence | 6 | 3.40% | |
| Independence | 171 | 96.60% | |
| <i>Transferring:</i> | | | |
| Dependence | 7 | 4.00% | |
| Independence | 170 | 96.00% | |
| <i>Continence:</i> | | | |
| Dependence | 12 | 6.80% | |
| Independence | 165 | 93.20% | |
| <i>Feeding:</i> | | | |
| Dependence | 4 | 2.30% | |
| Independence | 173 | 97.70% | |

Table (8): The instrumental daily activities according to Lawton questionnaire.

| | | | |
|---|--|-----|--------|
| Ability telephone | If doesnot use it at all | 8 | 4.50% |
| | Other wise | 169 | 95.50% |
| Shopping take care of all | Other wise | 29 | 16.40% |
| | Take care of all independnt | 148 | 83.60% |
| Food preparation plans, prepare and serves adequate meals | Otherwise | 11 | 6.20% |
| | Plans, prepare and serves adequate meals independently | 166 | 93.80% |
| House keeping | If doesnot participate in any tasks | 14 | 7.90% |
| | Other wise | 163 | 92.10% |
| Laundry | If all must be done by others | 26 | 14.80% |
| | Otherwise | 150 | 85.20% |
| Mode of transportation | Doesnot travel at all or travel limited to taxi or automobile with assistance of another | 3 | 1.70% |
| | Otherwise | 174 | 98.30% |
| Responsibility for own medication | Take it if prepared inadvance or not capable at all | 22 | 12.40% |
| | Take his medication in correct dose and time | 155 | 87.60% |
| Ability to handle finance | If incapable of handling money | 27 | 15.30% |
| | Manage independent or day to day purchase but need help with banking | 149 | 84.70% |

Discussion

The prevalence of type 2 diabetes continues to increase steadily as more people live longer and grow heavier [10]. T2DM is a metabolic condition associated with poor clinical and cognitive outcomes including vascular disease, depressive symptoms, cognitive impairment, and dementia. In the general elderly population, depression has been consistently identified as a risk factor for cognitive impairment [8].

Late life depression is an important public health problem. It is associated with increased risk of morbidity, increased risk of suicide, decreased physical, cognitive and social functioning, and greater self-neglect, all of which are in turn associated with increased mortality [11].

Dementia is among the top 10 most burdensome conditions among older people worldwide (World Alzheimer Report, 2015). The objective of this study was to determine the association between depression, dementia and glycemic control among diabetic patients aged 65 years or more.

Our study revealed that most of the patients had poor glycemic control (59.3%) according to the cutoff point 7.5 of the HbA1c and this percent is considered higher in comparison with [6] and much lower than [12].

Fung and his colleagues [6] reported that 47% were poorly controlled while Yan and his colleagues [12] reported that 77% were poorly controlled using the cutoff point 7 of HbA1c.

Our study revealed that 18.1% had depression according to GDS score. This percent was slightly higher than that recorded by [6,13], but slightly lower than that recorded by [14]. Fung and his colleagues in 2018 [6] reported that 13% had depression reported by using GDS-15 on diabetic elderly Chinese in Hong Kong.

In Egypt in 2010 shehata [13] and his colleagues in Ain Shams University, used the Beck Depression Inventory II (BDI-II) as a self reporting instrument that assesses the severity of depression and depression detected in 17.5% of type 2 diabetic participants compared with 5.7% in non-diabetic participants ($p < 0.0001$).

On the other hand, Malekian and his colleagues in 2018 [14] in Iran reported that 50.9% of the diabetic participants were depressed and this is much higher than the non diabetic group in the same study which is 38.7%.

Our study revealed that 21.5% of the study group had cognitive impairment according to MMSE score where 16.9% was having mild impairment and 2.8% had moderate impairment and only 1.7% had severe degree.

This prevalence rate was higher than that recorded by Malik et al., 2019 [15] and this is slightly lower than (16,17,14).

Malik and his colleagues in 2019 [15] in Pakistan reported that 2.3% of the study group had mild decline in cognition level while none of the respondents had moderate or severe cognitive impairment.

On the other hand, Rodríguez and his colleagues in 2016 [16] reported that 26.1 % of the study group had cognitive impairment according to MMSE and Seven Minute Screen Test.

Sinclair and his colleagues in 2000 [17] reported that 29.9% of the study group had cognitive impairment with mean (SD) scores were 24.5 (5.1) according to MMSE.

Malekian and his colleagues in 2018 [14] in Iran compared the prevalence of cognitive impairment in diabetic and nondiabetic group and the results revealed that the prevalence of cognitive impairment was higher in the diabetic group in which (34.6%) showed impaired cognition according to MMSE cut values including 26% had mild impairment, 7.7% showed moderate impairment and only 0.9% had severe impairment and in the non-diabetic group 28.9%.

In Our study, we found that there is statistically significant relation between glycemic control, depression and dementia with p -value < 0.05 so the patients with uncontrolled diabetes are prone to have depression and dementia.

Also, there is another significant relation between dementia and depression with p -value < 0.05 .

In our study, insignificant correlation between depression and the level of HbA1c was found and this is matched with Shehata et al., 2010 [13] in Ain shams hospitals in type 2 diabetic participants.

Our study recorded that gender and caregivers either alone or with others were not significantly associated with dementia nor depression.

Conclusion: In this large sample of elderly diabetic patients, a significant relationship between depression, dementia and HbA1C was found so we can say that patients with poor control of diabetes are more liable to have depression and dementia.

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العلاقة بين أعراض الأكتئاب والذهان والسيطرة على نسبة السكر في الدم في المرضى المصريين المسنين المصابين بداء السكري من النوع الثانى

طب الشيخوخة هو فرع الطب المعنى بتشخيص وعلاج والوقاية من الأمراض لدى كبار السن والمشاكل الخاصة بالشيخوخة. في المسنين عموماً تم تحديد الاكتئاب كعا مل خطر لضعف الإدراك ومع ذلك فإن العلاقة بين الإكتئاب والوظيفة المعرفية في النوع الثانى من السكر مازالت تحت الدراسة.

الإكتئاب في سن متأخر هو مشكلة صحية عامة مهمة ويرتبط بزيادة خطر الإصابة بالأمراض وزيادة خطر الانتحار وإنخفاض الأداء البدنى والمعرفى والاجتماعى وزيادة إهمال الذات وكلها ترتبط بدورها بزيادة الوفيات.

ويعد في جميع أنحاء العالم يعانى حوالى ٥٠ مليون شخص من الذهان وهناك ما يقرب من ١٠ ملايين حالة جديدة كل عام الذهان من بين أكثر ١٠ أعباء صحية بين كبار السن حول العالم.

أجريت هذه الدراسة لتحديد العلاقة بين الإكتئاب والذهان ودرجة التحكم فى السكر فى الدم بين مرضى السكرى الذين تتراوح أعمارهم بين ٦٥ سنة أو أكثر فى عيادات طب الأسرة والسكر فى مستشفيات قصر العيني جامعة القاهرة.

من المشاركين غير ٥٩.٣٪ كان المشاركون فى هذه الدراسة فوق سن الخامسة والستين ومعظمهم دون السبعين وتبين أنه متحكمين فى نسبة السكر فى الدم و ١٨.١٪ من المشاركين يعانون من الإكتئاب و ١٣٪ يجب أن يتابعوا لأنهم قد يكون لديهم (GDS) الإكتئاب وفقاً لاستبيان المخصص للإكتئاب.

وتشير نتائج هذه الدراسة إلى أن مرضى (MMSE) للذهان و ٥.٢١٪ يعانون من قصور فى الإدراك وفقاً لاستبيان المخصص السكر الذين تزيد أعمارهم عن ٦٥ عاماً والغير متحكمين فى نسبة السكر هم أكثر عرضة للإصابة بالإكتئاب والذهان. ولتأكيد وجود هذا التأثير المحتمل ولمزيد من فهم الطبيعة الدقيقة للعلاقة، يوصى بإجراء أبحاث مماثلة على عينات أكبر من المرضى.