Assessment of Depression and Anxiety in Adolescents with Type 1 Diabetes Mellitus

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ABSTRACT:

BACKGROUND:
Adolescents with type 1 diabetes (T1DM) suffer from the lifestyle that is imposed on them for the purpose of controlling blood sugar within its natural limits and the accompanying treatment with insulin injections, daily blood sugar measurement, irregular blood sugar levels, and hospitalization, all of which lead to the deterioration of their mental health.

OBJECTIVE:
To screen for anxiety and the degree of depression in adolescents with T1DM.

PATIENTS AND METHODS:
The study was conducted at Al-Imam Al-Hasan Center for Endocrinology and Diabetes, Karbala, Iraq, from May 21st, 2023 to September 21st, 2023. It was a cross-sectional study. ThePatient Health Questionnaire-9 (PHQ9) and Generalized Anxiety Disorder-7 (GAD7) questionnaire were used to screen for symptoms of depression and anxiety in adolescents with T1D.

RESULTS:
The frequency of anxiety in the participants who had scored ≥ 10 was 102(40.63%), and the frequency of depression in the participants who had scored ≥ 10 was 116(46%), and 15(6%) had really committed suicide attempts.

CONCLUSION:
Adolescents with type 1 diabetes mellitus have significant depression and anxiety symptoms. Poor diabetic control is a major predictor of these symptoms.

KEYWORDS: Adolescent, Anxiety, Depression, Diabetes Mellitus.

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INTRODUCTION:

Adolescence is a critical period for children, as it transitions from the lifestyle and body of a child to the lifestyle and body of an adult.This period is characterized by severe physiological and psychological changes that may lead to mental illnesses and psychological complexes. It may lead to the emergence of symptoms of depression and anxiety in the adolescent, such as lack or difficulty sleeping, poor appetite or increased appetite, obesity, and constant anxiety about the future.When the teenager has a chronic disease such as T1D, it increases the chance of having anxiety and depression.[1,2]

Cases of insulin-dependent T1D are increasing among children globally, as well as in our country, Iraq, after new lifestyles have entered it. The incidence rate among children globally increased to 3%.

Children with T1D suffer from the regimens that are imposed on them for the purpose of controlling blood sugar within its natural limits, all of which lead to the deterioration of the mental health of the affected child.[2-4]

Symptoms of depression and anxiety associated with T1D in adolescents may lead to an increase in irregular blood sugar and increased associated complications.[3,4]

The explanation of the relationship between psychological problems and diabetes complications is not yet established, but long-term glycemic variability could be the common risk factor between both conditions, "as depression and anxiety disorders can lead to fluctuations in treatment patients' compliance and self-care." [5-7]

Mental health problems occur in youth with T1D at a rate two to three times higher than peers without T1D.[8-10]

The study aimed to screen for anxiety and the degree of depression suffered by adolescents with T1D.

PATIENTS AND METHOD:

Two hundred and fifty-one patients with T1DM, aged between 12-18 years, who had diabetes mellitus for more than one year, participated in this study. According to the American Diabetes Association, those who show HbA1c levels of 6.5% and higher are diabtic.[13]

The study was conducted at Al-Imam Al-Hasan Center for Endocrinology and Diabetes, Karbala, Iraq, from May 21st, 2023, to September 21st, 2023. It was a cross-sectional study. The study was carried out using a questionnaire that included three sections. The first section includes demographic information such as gender, age, educational level, and the economic level of the family. The second section includes using the PHQ9 questionnaire to detect symptoms of depression in adolescents.[11,12] The third section includes GAD7 questionnaire. [14, 15]

Exclusion criteria:

Patients with type 2 diabetes mellitus and patients with other chronic diseases or congenital malformations.

If the patient answered positive when answering the PHQ9 questionnaire, question no. 9 on suicidal thoughts and self-harming, and/or scored $\geq$ 10 on the PHQ9questionnaire or GAD-7 questionnaire, the patient was considered to have a positive screen.[16,17]

The research team was participating in a course on cognitive behavioral therapy under the supervision of the College of Medicine, University of Karbala, the Unit of Psychological Counseling when they held a courseon 10-1-2023 for 8 weeks, presented by a psychiatrist and psychotherapist, to provide the required knowledge and skills for doing psychotherapy in a professional way.

Personal and demographic information was taken directly from patients using a questionnaire, and they answered the questions of the PHQ-9 scale for depression and the GAD7scale for anxiety. The clinical profile was taken from the medical records of each patient.

According to qualtrics.com calculating-sample-size: size of the study population: 2167, margin of error (confidence interval)6 ⅟±, The level of confidence is 95%; the z score isZ = 1.96-95%. The ideal sample size was 238.[18]

Family monthly income is classified into low-, middle-, and high-income classes corresponding to less than 500,000 Iraqi Dinar (ID), 500000-1000000 ID, and 1000000- 1,500000 ID.

Glycemic control was measured by HbA1c at the time of the clinic visit and expressed as a percentage.

Statistical analysis: Statistics were done using SPSS version 27 multilingual and Microsoft Excel 2007. An independent sample T test was used for continuous data, while one-way Anova and Chi square were used for categorical data. A $p$value of less than 0.05 was considered significant.

The approval of conducting the research took place with the approval of the administration of Al-Imam Al-Hasan Center for Endocrinology and Diabetes, as well as with the approval of the Training and Human Development Center affiliated with the Karbala Health Department, approval letter number 2023188.

RESULTS:

Two hundred fifty one adolescents with T1DM aged 12-18 years were participated in this study. The mean age and SD was 14.78± 1.811 years, 146 (58.2%) were female, regarding the educational level, 39.0% of patients were at middle school, and 12.4% dropped out of school. Regarding the residential area, 75.7% of them were from urban area. Family income showed that 52.2% of them were from middle class[Table1].

Table1: Demographic Characteristics of Patients.

		Frequency	Percent
Sex	Male	105	41.8
	Female	146	58.2
Education	Elementary	86	34.3
	Middle school	98	39
	High school	35	13.9
	Illiterate	1	0.4
	Drop out	31	12.4
Residential area	Urban	190	75.7
	Rural	61	24.3
Family Income	Poor	100	39.8
	Middle class	131	52.2
	High class	20	8

Regarding the clinical characteristic of the patients, score of GAD mean and St. deviation was 8.61± 4.949, score PHQ9 mean, and St. deviation was 9.71± 5.491, table2.

Table 2: Clinical Characteristics of the Patients.

	Mean	St. deviation	Median
Score of GAD	8.61	4.949	8
Score PHQ9	9.71	5.491	9
Hba1c	11.143	2.2814	11
Duration of DM	4.71	2.890	4
Random blood sugar	282.33	4.05	268
Fasting blood sugar	199.80	87.109	188
BMI	21.0866	4.05810	20.6131

Regarding question no. 9: 63.7% of patients had no "thoughts that they would be better off dead or of hurting themselves in some way" during the last 4 weeks prior to the study; 59 (23.5%) of patients had these thoughts for several days; and 22(8.8%) of patients had these thoughts every day. It was found that 15(6%) of patients had really committed suicide attempts [Table3].

Table 3: Frequency of Patients' Answering the Question no. 9 on PHQ9 and Suicide Attempt during the Last 4 Weeks Prior to Study.

Q. no.9- "Thoughts that you would be better off dead or of hurting yourself in some way"	Frequency	%
"Not at all"	160	63.7
"Several days"	59	23.5
"More than half the days"	10	4
"Nearly every day"	22	8.8
Total	251	100
Suicide attempt	15	6

The study showed that the frequency of anxiety in the patients who had scored ≥ 10 was 102(40.63%), and 72.5% of them were female, and the frequency of depression in the patients who had scored ≥ 10 was 116(46%) and the female percent was 68.96%.

There was asignificant relationship between HbA1C level, duration of DM, rate of hospital admissions, fasting blood sugar, random blood sugar, sex, and PHQ-9 score. There was no relationship between duration of DM, history of hypoglycemia, history of DKA, fasting blood sugar and the GAD-7 score, but there was a significant relationship between HbA1C level, rate of hospital admissions,random blood sugar, sex, and the GAD-7 score[Tables 4, 5].

Table 4: Chi square association between patients' clinical characteristic and PHQ-9 Score and GAD-7 Score.

		PHQ-9 Score		GAD-7 Score	
		≥ 10	P value	≥ 10	P value
Sex	Male	36(31.04%)	0.001*	28(27. 5%)	0.000*
	Female	80(68.96%)		74(72.5%)	
History of DKA	Yes	99	0.125**	86	0.307**
	No	17		16	
History of hypoglycemia	Yes	68	0.410**	61	0.676**
	No	48		41	

*The association was statistically significant (X^2 test $p< 0.05$).
**The association was statistically not significant (X^2 test $p>0.05$)

Table 5: Student T test association between patients' clinical characteristic and PHQ-9 Score and GAD-7 Score.

		PHQ-9 Score		GAD-7 Score	
		≥10	P value	≥10	P value
HbA1C	Mean	11.644	0.001*	11.695	0.001*
	St. deviation	2.1118		2.2613	
Duration of DM	Mean	5.16	0.023*	4.89	0.408**
	St. deviation	2.692		2.636	
Fasting blood sugar	Mean	102.228	0.037*	200.34	0.936**
	St. deviation	115.807		93.623	
Random blood sugar	Mean	306.67	0.001*	306.98	0.003*
	St. deviation	115.807		115.345	
Rate of hospital admissions	Mean	3.68	0.002*	3.65	0.011*
	St. deviation	1.954		2.012	

The difference was statistically significant (Student T test p<0.05).
**The difference was statistically not significant (Student T test p>0.05)*

DISCUSSION:

Insulin-dependent diabetes mellitus affects daily children's activities and might cause psychological problems, which have a negative impact on managing diabetes and result in fewer blood sugar checks, elevated HbA1c, and more emergency room admissions for diabetic ketoacidosis and hypoglycemia.[17,19]

The use of accessible screening scales for the detection of depression and anxiety leads to early diagnosis, reduces the negative impact on controlling diabetes, and improves outcomes.[20] In this study, the PHQ-9 and GAD-7 questionnaires were used because they are free, available, and easily applicable in clinical settings. We found that 46% of patients (68.96% were females) had a significant depressive symptom, which is similar to the results of a Jordanian study that reported a depression prevalence rate of 46.3%.[16] Whereas studies in Egypt and India show a prevalence rate of 52.3% and 36.9%, respectively.[21,22] On the other hand, Jaser et al. and Adel et al. reported a low prevalence rate of depression in their studies (12.3%) and (12.9%), respectively.[6,23]

Nearly 36.3% of adolescents with positive screening for depression in this study had suicidal ideation (thoughts of being better off dead or self-harm), with 6% of them attempting suicide, which mandates immediate support and psychological consultation. A Slovenian study (in a country with a high suicide rate) found that 35.7% of adolescents with type 1 diabetes had suicidal ideation and 8.7% attempted suicide, which is nearly similar to our findings.[24] Other American studies reported suicidal ideation in 7% and 8% of adolescents with type 1 diabetes, respectively.[25,26]

In this study, we notice a significant relationship between high HbA1c (which reflects poor control) and the duration of diabetes with the depressive symptoms in the patients. This result is consistent with that of Alassaf A et al. and Khater D et al., while Adel E et al. mentioned that HbA1c had a weak association with depressive symptoms and that the duration of diabetes had no relation to depressive symptoms.[6,16,21]

Adolescents with recurrent hospital admissions in the current study had significant depressive symptoms, which is similar to the findings reported in previous studies.[16,21]

Regarding anxiety symptoms, we found that 40.63% of adolescents with type 1 diabetes (72.5% were females) had significant anxiety symptoms; furthermore, a high HbA1c and frequent diabetes-related hospital admissions had a significant correlation with these symptoms.

Agrawal J et al. mentioned that the prevalence of psychological problems in children and adolescents with diabetes was 20%, and anxiety represented 10% of it. Also, they reported a considerable association between HbA1c and frequent hospital admissions with psychological problems.[27] Another study revealed that psychological problems were diagnosed in 26.6% of children with type 1 diabetes, and anxiety was the most common in 15.5%.[28]

A recent meta-analysis evaluating the association between diabetes and anxiety disorder reported that the prevalence of anxiety in diabetic patients was 28%, and the risk of developing anxiety in people with diabetes was 41%.[29]

A Norwegian study found no differences between adolescents with type 1 diabetes and those without diabetes regarding the occurrence of psychological problems.[30]

Variable prevalence rates of depression and anxiety between studies could contribute to many

elements, such as the different screening scales used for evaluation, the use of different cutoff points, the fact that studies may involve different age groups, and variability in social and demographic features of the study population.

The results of the current study revealed a high prevalence of depression and anxiety in adolescents with type 1 diabetes, and the most significant risk factor is poor diabetic control. This result highlights the importance of early assessment of adolescents with diabetes for symptoms of depression and anxiety by using a suitable and easily applicable screening scale in crowded unit; moreover, physicians and health care providers should be aware of the risk factors of psychological problems and support the patients and their families to prevent diabetic complications through better diabetic control and encourage physical activities.

CONCLUSION:

Adolescents with type 1 diabetes mellitus have significant depression and anxiety symptoms. Poor diabetic control is a major predictor of these symptoms, which have a negative impact on diabetic control and the patient's life.

RECOMMENDATIONS:

- Improving diabetic control and early screening for symptoms of depression and anxiety are crucial to avoid adverse outcomes.
- PHQ-9 and GAD-7 questionnaires are useful screening tools as they are free, suitable, and easily applicable in clinical settings.
- It is essential to establish a clinic for psychological counseling in diabetic centers.

Conflicts of interest

None declared.

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