

RATIO OF DEPRESSIVE SYMPTOMS AND RELATED RISK FACTORS AMONG
SAMPLE OF ADOLESCENT PATIENTS WITH DIABETES MELLITUS TYPE (I) IN
BAGHDAD HOSPITALS DURING 2025¹*Rawnack M. Raif Abdulrahman, ²Jamal Rashid Abdulhameed¹AL-Azzawi, Baghdad Health Directorate-Al-Karkh, Baghdad, Iraq.²Al-Rusafa Health Directorate, Baghdad, Iraq.

Article Received: 01 July 2026

Article Revised: 23 July 2026

Article Published: 01 Aug. 2026



*Corresponding Author: Rawnack M. Raif Abdulrahman

AL-Azzawi, Baghdad Health Directorate-Al-Karkh, Baghdad, Iraq.

DOI: <https://doi.org/10.5281/zenodo.21713628>

How to cite this Article: ¹*Rawnack M. Raif Abdulrahman, ²Jamal Rashid Abdulhameed. (2026). Ratio of Depressive Symptoms And Related Risk Factors Among Sample of Adolescent Patients with Diabetes Mellitus Type (I) In Baghdad Hospitals During 2025. World Journal of Advance Healthcare Research, 10(8), 266–274.

This work is licensed under [Creative Commons Attribution 4.0 International license](https://creativecommons.org/licenses/by/4.0/).

ABSTRACT

Background: Depression is a major cause of disability worldwide and is particularly common among adolescents with chronic illnesses such as type 1 diabetes mellitus (T1DM). The psychological burden of T1DM may adversely affect self-care, glycemic control, and overall quality of life. **Objective:** To estimate the prevalence of depressive symptoms among adolescents with T1DM attending Baghdad hospitals and identify sociodemographic, clinical, and family-related factors associated with depression severity. **Methods:** A descriptive cross-sectional study was conducted between February and July 2025 in four tertiary hospitals in Baghdad. A total of 152 adolescents aged 10–19 years with confirmed T1DM were enrolled using convenience sampling. Data were collected through structured interviews using demographic and clinical questionnaires and the Hamilton Depression Rating Scale. Associations between depression severity and independent variables were analyzed using the Chi-square test, with statistical significance set at $p < 0.05$. **Results:** Depressive symptoms were highly prevalent, with only 21.1% of participants classified as normal, while 53.3%, 13.8%, and 11.8% had mild, moderate, and severe depression, respectively. Depression severity was significantly associated with parental age, education, and occupation, family circumstances, residence, income, psychiatric history, patient age, education, academic performance, diabetes duration, treatment adherence, hospitalization, insulin dosing frequency, diabetes-related complications, and comorbid chronic diseases (all $p < 0.05$). Adolescents with diabetes complications and poor treatment adherence had substantially higher rates of severe depression. **Conclusion:** Depression is highly prevalent among Iraqi adolescents with T1DM and is strongly influenced by sociodemographic, clinical, and family-related factors. Routine mental health screening and integrated psychological support should be incorporated into diabetes care to improve patient outcomes.

KEYWORDS: Depressive, Symptoms, Related, Adolescent, Diabetes Mellitus.

INTRODUCTION

Depression is one of the leading causes of disability worldwide and represents a major public health concern, particularly among adolescents. It is characterized by persistent sadness, loss of interest, impaired concentration, fatigue, and reduced ability to perform daily activities. During adolescence, rapid biological, psychological, and social changes increase susceptibility to emotional disorders, making this age group especially vulnerable to depression. Unlike adults, adolescents may present with irritability, poor academic performance,

social withdrawal, and somatic complaints, which often delay recognition and treatment.^[1,2] Type 1 diabetes mellitus (T1DM) is a chronic autoimmune disease resulting from destruction of pancreatic β -cells, leading to lifelong insulin deficiency and dependence on exogenous insulin. The disease commonly develops during childhood or adolescence, a critical period for emotional and social development. Effective diabetes management requires continuous blood glucose monitoring, insulin administration, dietary regulation, and lifestyle modifications. The constant demands of

self-management, fear of hypoglycemia and long-term complications, and concerns regarding peer relationships and independence place adolescents with T1DM at increased risk of psychological distress and depression.^[3] Previous studies have shown that adolescents with T1DM experience depressive symptoms more frequently than their healthy peers, highlighting the close relationship between chronic illness and mental health.^[4] The coexistence of depression and T1DM creates a substantial clinical challenge because each condition adversely influences the other. Depression may reduce adherence to insulin therapy, blood glucose monitoring, dietary recommendations, and clinic attendance, resulting in poor glycemic control and increased risk of acute and chronic diabetes-related complications. Conversely, recurrent complications and prolonged disease burden may worsen depressive symptoms, creating a vicious cycle that negatively affects physical health, quality of life, academic achievement, and social functioning. Despite these consequences, depression frequently remains underdiagnosed in adolescents with T1DM because many psychological symptoms overlap with manifestations of diabetes itself.^[5] Given the increasing incidence of T1DM worldwide, integrating mental health assessment into routine diabetes care has become a priority in pediatric endocrinology and public health. Early identification of depressive symptoms and associated risk factors can facilitate timely psychological interventions, improve treatment adherence, and reduce diabetes-related complications and healthcare utilization.^[6,7] Although previous studies have demonstrated an increased prevalence of depression among adolescents with T1DM, evidence from Iraq and the Middle East remains limited. Therefore, this study aimed to estimate the prevalence of depressive symptoms among adolescents aged 10–19 years with T1DM and identify the sociodemographic and clinical factors associated with depression severity, providing evidence to support integrated diabetes and mental health care services.

METHODS

A descriptive cross-sectional study with an analytical component was conducted between 1 February and 31 July 2025 in four tertiary teaching hospitals in Baghdad, Iraq: Al-Yarmouk Teaching Hospital, Central Teaching Hospital of Pediatrics, Children's Welfare Teaching Hospital, and Baghdad Teaching Hospital. These hospitals were selected because they provide specialized pediatric endocrinology services and receive referrals from different regions of Iraq. The study included 152 adolescents aged 10–19 years with a confirmed diagnosis of type 1 diabetes mellitus (T1DM) attending pediatric wards or endocrinology outpatient clinics. Participants were recruited using a convenience sampling technique. Adolescents with type 2 diabetes mellitus, severe chronic illnesses (e.g., malignancy or renal failure), diagnosed psychiatric disorders, or those who declined participation were excluded. Data were collected through face-to-face

interviews using a structured questionnaire developed after an extensive literature review. The questionnaire included sociodemographic characteristics (age, sex, residence, family income, educational status, academic performance, number of siblings, and birth order), parental characteristics (age, education, and occupation), and clinical information (duration of diabetes, insulin dosing frequency, treatment adherence, hospitalization history, diabetes-related complications, family history of T1DM, comorbid chronic diseases, medication history, and psychiatric history). Depressive symptoms were assessed using the 17-item Hamilton Depression Rating Scale (HDRS), Arabic and English validated versions, administered by the principal researcher after training under the supervision of psychiatry, pediatric endocrinology, and family medicine specialists. Depression severity was classified as normal (0–6), mild (7–13), moderate (14–18), severe (19–22), and very severe (≥ 23). Each interview required approximately 15–20 minutes. Content validity of the questionnaire was established through expert review, while pilot testing on 20 adolescents demonstrated good internal consistency (Cronbach's $\alpha = 0.82$). Data were coded and analyzed using SPSS version 25. Descriptive statistics were expressed as frequencies, percentages, means, and standard deviations. Associations between depression severity and independent variables were evaluated using the Chi-square test, with $p < 0.05$ considered statistically significant. Ethical approval was obtained from the Scientific Committee of the Arab Board of Health Specializations and the participating hospitals. Written informed consent was obtained from parents or guardians, with assent from adolescents. Confidentiality and anonymity were maintained throughout the study, and participation was voluntary.

RESULTS

Among the 152 adolescents with type 1 diabetes mellitus, males (54.6%) slightly outnumbered females (45.4%), and most participants were aged 14–17 years (54.6%). More than half resided in urban areas (55.3%) and the majority lived with both parents (87.5%). Most participants had more than three siblings (52.0%), were middle-born children (40.1%), and belonged to families with a monthly income below one million IQD (90.1%). Fathers were predominantly aged 30–39 years (49.3%), worked mainly as laborers (71.7%), and most had secondary education (55.3%), while mothers were generally ≥ 35 years (65.8%), predominantly housewives (93.4%), and had primary or secondary education (75.0%). All participants were enrolled in school, with most attending intermediate (47.4%) or primary school (46.1%). Academic performance was generally poor, with 60.5% reporting weak performance, whereas 38.8% demonstrated good performance, as shown in Tables (1).

Table 1: Patient demographics, parental characteristics, education, school performance, family income, residence, family situation.

Variable	Category	No.	%
Sex	Female	69	45.4
	Male	83	54.6
Age (years)	10–13	66	43.4
	14–17	83	54.6
	18–19	3	2.0
Residence	Urban (centre)	84	55.3
	Rural (countryside)	68	44.7
Living situation	Lives with father or mother	19	12.5
	Lives together (parents)	133	87.5
	Lives with relatives	0	0.0
Number of siblings	<3	73	48.0
	≥3	79	52.0
Birth order	Oldest	53	34.9
	Middle	61	40.1
	Youngest	38	25.0
Family income	<1 million IQD	137	90.1
	1–2 million IQD	3	2.0
	≥2 million IQD	12	7.9
Father's age	30–39	75	49.3
	40–49	41	27.0
	50–59	36	23.7
Father's occupation	Accountant	1	0.7
	Employee	18	11.8
	Farmer	11	7.2
	Police officer	12	7.9
	Teacher	1	0.7
	Worker	109	71.7
Father's education	Illiterate	19	12.5
	Primary	45	29.6
	Secondary	84	55.3
	Bachelor degree	4	2.6
Mother's age	<35	52	34.2
	≥35	100	65.8
Mother's occupation	Community police	1	0.7
	Dentist	1	0.7
	Housewife	142	93.4
	Lawyer	1	0.7
	Teacher	7	4.6
Mother's education	Illiterate	25	16.4
	Primary	58	38.2
	Secondary	56	36.8
	Bachelor degree	13	8.6
School enrollment	Yes	152	100.0
	No	0	0.0
Education level	Primary	70	46.1
	Intermediate	72	47.4
	Secondary	10	6.6
Academic performance	Good	59	38.8
	Intermediate	1	0.7
	Weak	92	60.5
Total		152	100

Most participants had been diagnosed with type 1 diabetes mellitus for 1–5 years (38.2%), while 53.3% received three insulin doses daily and all insulin

regimens were prescribed by physicians. Good treatment adherence was reported by 65.1% of participants, although 92.1% had experienced diabetes-related

hospitalization. Diabetes complications were present in 20.4% of adolescents, and 21.7% had a family history of T1DM, while none used medications other than insulin. Only 3.3% of participants were employed, with the remainder not working. Most adolescents (87.5%) had no psychological problems, although anxiety was reported

in 11.8% and delayed speech in 0.7%. Family history of psychological disorders was uncommon (91.4% negative), whereas celiac disease (21.1%) and short stature (8.6%) were the most frequent comorbid chronic conditions, with the majority (69.1%) reporting no additional chronic disease, as shown in Tables (2).

Table 2: Duration of diabetes, insulin doses/day, adherence, hospitalization, complications, family history, chronic diseases, psychological history, behavioral variables.

Variable	Category	No.	%
Employment status	Employed	5	3.3
	Not employed	147	96.7
Psychological issues	Anxiety	18	11.8
	Delayed speech	1	0.7
	ADHD	1	0.7
	No	133	87.5
Family history of psychological issues	Anxiety	6	3.9
	Autism	7	4.6
	No	138	90.8
Other chronic diseases	Celiac disease	32	21.1
	Hypothyroidism	1	0.7
	Short stature	13	8.6
	No	106	69.8
Total		152	100

As in fig 1, Normal: A minority of children were classified as normal (32; 21.1%). Mild Depression: This was the most common category, affecting more than half

of the children (81; 53.3%). Moderate Depression: Reported in 21 children (13.8%). Severe Depression: Observed in 18 children (11.8%).

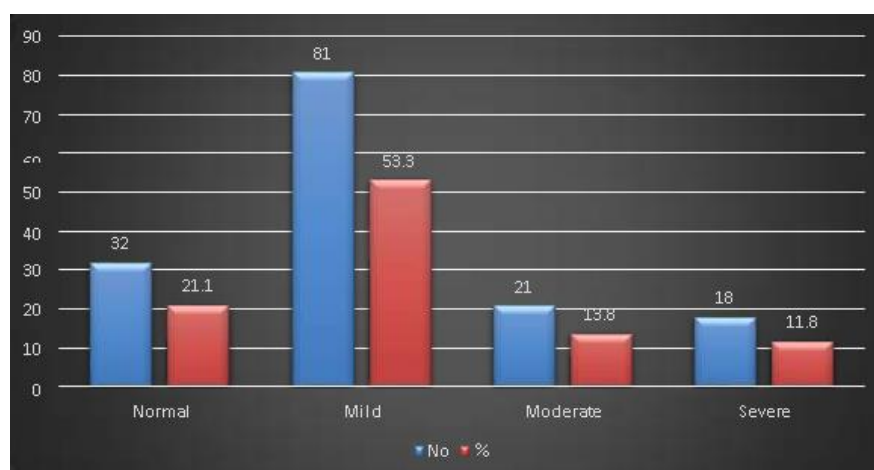


Figure 1: Distribution of patients according to depression classification.

Depression severity was significantly associated with several demographic and parental characteristics. Females predominantly experienced mild depression, whereas males showed a broader distribution across mild, moderate, and severe depression ($p=0.0001$). Although adolescents aged 14–17 years tended to have more moderate and severe depression, the association between age and depression was not statistically significant ($p=0.8$). Paternal age was significantly associated with depression severity, with moderate depression more common among children of fathers aged 40–49 years and mild depression predominating among those aged 50–59 years ($p=0.0001$). Father's occupation

also showed a significant association, with children of employees exhibiting exclusively severe depression and workers' children demonstrating the widest distribution of depression severity ($p=0.0001$). Maternal age was another significant factor, as children of mothers aged ≥ 35 years experienced higher rates of moderate and severe depression compared with those of younger mothers ($p=0.0001$). Overall, these findings suggest that parental characteristics, particularly age and occupation, have an important influence on depression severity among adolescents with type 1 diabetes mellitus. As in table 3.

Table 3: Association between Depression Severity and Selected Demographic Factors.

Variable	Category	Normal n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Total n (%)	P-value
Gender	Female	13 (18.8)	50 (72.5)	0 (0.0)	6 (8.7)	69 (100.0)	0.0001
	Male	19 (22.9)	31 (37.3)	21 (25.3)	12 (14.5)	83 (100.0)	
Age (years)	10–13	16 (50.0)	32 (39.5)	10 (47.6)	8 (44.4)	66 (43.4)	0.800
	14–17	15 (46.9)	47 (58.0)	11 (52.4)	10 (55.6)	83 (54.6)	
	18–19	1 (3.1)	2 (2.5)	0 (0.0)	0 (0.0)	3 (2.0)	
Father's age (years)	30–39	26 (34.7)	37 (49.3)	0 (0.0)	12 (16.0)	75 (100.0)	0.0001
	40–49	0 (0.0)	15 (36.6)	20 (48.8)	6 (14.6)	41 (100.0)	
	50–59	6 (16.7)	29 (80.6)	1 (2.8)	0 (0.0)	36 (100.0)	
Father's occupation	Accountant	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	1 (100.0)	0.0001
	Employee	0 (0.0)	0 (0.0)	0 (0.0)	18 (100.0)	18 (100.0)	
	Farmer	0 (0.0)	11 (100.0)	0 (0.0)	0 (0.0)	11 (100.0)	
	Police officer	0 (0.0)	11 (91.7)	1 (8.3)	0 (0.0)	12 (100.0)	
	Teacher	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	1 (100.0)	
	Worker	32 (29.4)	58 (53.2)	19 (17.4)	0 (0.0)	109 (100.0)	
Mother's age (years)	<35	26 (50.0)	26 (50.0)	0 (0.0)	0 (0.0)	52 (100.0)	0.0001
	≥35	6 (6.0)	55 (55.0)	21 (21.0)	18 (18.0)	100 (100.0)	

Maternal occupation showed a significant association with depression severity, with children of housewives displaying the widest range of depression, while children of teachers had the highest proportion of severe depression ($p=0.0001$). Family income was not significantly associated with depression severity ($p=0.14$), although mild depression predominated across all income groups. Family structure significantly influenced depression, as adolescents living with one parent had no normal cases and a higher proportion of severe depression compared with those living with both parents ($p=0.001$). Residence was also significantly associated with depression, with rural adolescents exhibiting more severe depression, whereas urban participants mainly had mild or moderate depression

($p=0.0001$). Maternal education demonstrated a significant relationship with depression severity, with children of mothers having secondary education showing the highest proportions of moderate and severe depression ($p=0.0001$). Similarly, paternal education was significantly associated with depression severity, as children of fathers with secondary education showed the broadest distribution of depressive symptoms, while those whose fathers had primary education predominantly experienced mild depression ($p=0.0001$). Overall, parental socioeconomic and educational characteristics, together with family structure and place of residence, were important determinants of depression severity among adolescents with type 1 diabetes mellitus. As in table 4.

Table 4: Association between Depression Severity and Family and Parental Characteristics.

Variable	Category	Normal n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Total n (%)	P-value
Mother's occupation	Community police	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	1 (100.0)	0.0001
	Dentist	0	1 (100.0)	0	0	1 (100.0)	
	Housewife	32 (22.5)	79 (55.6)	19 (13.4)	12 (8.5)	142 (100.0)	
	Lawyer	0	1 (100.0)	0	0	1 (100.0)	
	Teacher	0	0	1 (14.3)	6 (85.7)	7 (100.0)	
Family income	<1 million IQD	32 (23.4)	68 (49.6)	19 (13.9)	18 (13.1)	137 (100.0)	0.14
	1–2 million IQD	0	10 (83.3)	2 (16.7)	0	12 (100.0)	
	>2 million IQD	0	3 (100.0)	0	0	3 (100.0)	
Family situation	Lives with father (divorce)	0	13 (68.4)	0	6 (31.6)	19 (100.0)	0.001
	Lives with relatives	0	0	0	0	0	
	Together	32 (24.1)	68 (51.1)	21 (15.8)	12 (9.0)	133 (100.0)	
Residence	Urban	13 (15.5)	50 (59.5)	21 (25.0)	0	84 (100.0)	0.0001
	Rural	19 (27.9)	31 (45.6)	0	18 (26.5)	68 (100.0)	
Mother's education	Illiterate	13 (52.0)	12 (48.0)	0	0	25 (100.0)	0.0001
	Primary	19 (32.8)	39 (67.2)	0	0	58 (100.0)	
	Secondary	0	19 (33.9)	19 (33.9)	18 (32.1)	56 (100.0)	
	Bachelor	0	11 (84.6)	2 (15.4)	0	13 (100.0)	
Father's	Illiterate	6 (31.6)	13 (68.4)	0	0	19 (100.0)	0.0001

education	Primary	0	45 (100.0)	0	0	45 (100.0)	
	Secondary	26 (31.0)	21 (25.0)	19 (22.6)	18 (21.4)	84 (100.0)	
	Bachelor	0	2 (50.0)	2 (50.0)	0	4 (100.0)	

Depression severity was significantly associated with most patient-related characteristics. Higher educational level was linked to greater depression severity, with secondary school students showing the highest proportion of severe depression ($p=0.0001$). Poor academic performance was also significantly associated with more severe depressive symptoms ($p=0.0001$). Employment status showed no significant relationship with depression severity ($p=0.849$). The number of siblings significantly influenced depression, with adolescents from smaller families more frequently experiencing moderate depression, whereas those from larger families demonstrated a wider distribution of

severity ($p=0.0001$). Birth order was another significant determinant, with middle-born adolescents exhibiting the highest proportions of moderate and severe depression ($p=0.0001$). Duration of illness was strongly associated with depression severity, as adolescents diagnosed within the first year showed the greatest burden of moderate and severe depression, while those with a disease duration exceeding five years had predominantly normal or mild depression ($p=0.0001$). These findings indicate that educational, family, and disease-related characteristics play important roles in the psychological well-being of adolescents with type 1 diabetes mellitus. As in table 5.

Table 5: Association between Depression Severity and Patient-related Characteristics.

Variable	Category	Normal n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Total n (%)	P-value
Patient education	Primary	32 (45.7)	38 (54.3)	0	0	70 (100.0)	0.0001
	Intermediate	0	39 (54.0)	21 (29.2)	12 (16.7)	72 (100.0)	
	Secondary	0	4 (40.0)	0	6 (60.0)	10 (100.0)	
Academic performance	Good	0	52 (88.1)	1 (1.7)	6 (10.2)	59 (100.0)	0.0001
	Intermediate	0	1 (100.0)	0	0	1 (100.0)	
	Weak	32 (34.8)	28 (30.4)	20 (21.7)	12 (13.0)	92 (100.0)	
Employment	Employed	1 (20.0)	3 (60.0)	1 (20.0)	0	5 (100.0)	0.849
	Not employed	31 (21.1)	78 (53.1)	20 (13.6)	18 (12.2)	147 (100.0)	
No. of siblings	≤ 3	0	46 (63.0)	21 (28.8)	6 (8.2)	73 (100.0)	0.0001
	> 3	32 (40.5)	35 (44.3)	0	12 (15.2)	79 (100.0)	
Birth order	Oldest	32 (60.4)	19 (35.8)	2 (3.8)	0	53 (100.0)	0.0001
	Middle	0	24 (39.3)	19 (31.1)	18 (29.5)	61 (100.0)	
	Youngest	0	38 (100.0)	0	0	38 (100.0)	
Duration of illness	< 1 year	6 (12.2)	12 (24.5)	19 (38.8)	12 (24.5)	49 (100.0)	0.0001
	1–5 years	0	52 (89.7)	0	6 (10.3)	58 (100.0)	
	> 5 years	26 (57.8)	17 (37.8)	2 (4.4)	0	45 (100.0)	

Depression severity was significantly associated with most clinical characteristics. Higher insulin dosing frequency, poor treatment adherence, hospitalization, diabetes complications, psychological comorbidities, and chronic diseases were all significantly related to depression severity ($p<0.05$). Adolescents with poor adherence and those without hospitalization exhibited higher proportions of severe depression. Patients with

diabetes complications and celiac disease showed greater moderate or severe depressive symptoms. Family history of T1DM and family psychological history were not significantly associated with depression severity ($p=0.290$ and $p=0.091$, respectively). Overall, clinical status and comorbid conditions were major determinants of depressive symptom severity among adolescents with type 1 diabetes mellitus. As in table 6.

Table 6: Association between Depression Severity and Clinical Characteristics.

Variable	Category	Normal n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Total n (%)	P-value
Insulin doses/day	2/day	19 (26.8)	40 (56.3)	0 (0.0)	12 (16.9)	71 (100.0)	0.0001
	3/day	13 (16.0)	41 (50.6)	21 (25.9)	6 (7.4)	81 (100.0)	
Treatment adherence	Bad	19 (35.8)	21 (39.6)	1 (1.9)	12 (22.6)	53 (100.0)	0.0001
	Good	13 (13.1)	60 (60.6)	20 (20.2)	6 (6.1)	99 (100.0)	
Hospitalization	Hospitalized	32 (22.9)	75 (53.6)	20 (14.3)	13 (9.3)	140 (100.0)	0.033
	Not hospitalized	0 (0.0)	6 (50.0)	1 (8.3)	5 (41.7)	12 (100.0)	
Diabetes complications	Yes	32 (26.4)	62 (51.2)	21 (17.4)	6 (5.0)	121 (100.0)	0.0001
	No	0 (0.0)	19 (61.3)	0 (0.0)	12 (38.7)	31 (100.0)	
Family history	Yes	0 (0.0)	13 (39.4)	19 (57.6)	1 (3.0)	33 (100.0)	0.290

of T1DM	No	32 (26.9)	68 (57.1)	2 (1.7)	17 (14.3)	119 (100.0)	
Psychological issues	Anxiety	0	18 (100.0)	0	0	18 (100.0)	0.0001
	Delayed speech	0	1 (100.0)	0	0	1 (100.0)	
	None	32 (24.2)	62 (46.6)	21 (15.9)	18 (13.6)	133 (100.0)	
Family psychological history	ADHD	0	1 (100.0)	0	0	1 (100.0)	0.091
	Anxiety	0	0	0	6 (100.0)	6 (100.0)	
	Autism	0	7 (100.0)	0	0	7 (100.0)	
	None	31 (22.4)	74 (53.2)	21 (15.1)	12 (8.6)	138 (100.0)	
Other chronic diseases	Celiac	13 (40.6)	0	19 (59.4)	0	32 (100.0)	0.0001
	Hypothyroidism	0	1 (100.0)	0	0	1 (100.0)	
	None	6 (5.7)	80 (75.5)	2 (1.9)	18 (17.0)	106 (100.0)	
	Short stature	13 (100.0)	0	0	0	13 (100.0)	

DISCUSSION

The present study demonstrated a high prevalence of depressive symptoms among adolescents with type 1 diabetes mellitus (T1DM), with more than three-quarters of participants experiencing at least mild depression. This finding supports previous evidence that adolescents with T1DM are particularly vulnerable to psychological disorders because of the continuous burden of insulin therapy, glucose monitoring, dietary restrictions, and fear of acute and chronic complications.^[8,9] The predominance of mild depression suggests that psychological distress is common even among clinically stable patients and may adversely affect long-term diabetes self-management. Several demographic and family-related factors significantly influenced depression severity. Female participants were more likely to experience mild depression, whereas males exhibited a broader distribution of moderate and severe depression, consistent with previous reports describing gender differences in emotional coping and psychosocial adaptation among adolescents with T1DM.^[9,10] Although patient age was not significantly associated with depression severity, older adolescents tended to demonstrate more severe depressive symptoms, probably reflecting increasing self-management responsibilities and academic pressures during adolescence.^[9,11,12] Likewise, older parental age, particularly maternal age, was significantly associated with greater depression severity, emphasizing the influence of parental stress and caregiving capacity on adolescent psychological well-being.^[11,12] Parental socioeconomic characteristics also played an important role. Father's occupation, maternal occupation, parental educational level, family structure, and place of residence were all significantly associated with depression severity. Adolescents living with one parent or residing in rural areas experienced more severe depression than those living with both parents or in urban settings, findings that agree with previous studies demonstrating the adverse effects of family disruption and reduced healthcare accessibility on mental health outcomes.^[13,14] In contrast, family income showed no statistically significant association, although severe depression was more frequent among lower-income families, suggesting that financial hardship may contribute indirectly to psychological distress.^[15,16] The significant associations observed with parental education further emphasize the importance of health literacy and

parental support in promoting effective diabetes management and emotional adjustment.^[17,18] Educational characteristics of the adolescents were also closely related to depression severity. Higher educational level and poor academic performance were significantly associated with more severe depressive symptoms. These findings support earlier studies indicating that increasing academic demands, peer relationships, and disease-related responsibilities during adolescence contribute to psychological stress and impaired school performance.^[19,20] The bidirectional relationship between depression and academic achievement suggests that poor psychological health may impair learning, while academic difficulties further exacerbate emotional distress. Clinical factors demonstrated particularly strong associations with depression severity. Adolescents diagnosed within the first year of illness experienced the highest proportions of moderate and severe depression, whereas those with longer disease duration showed better psychological adjustment, supporting previous evidence that coping strategies improve over time.^[21,22] Insulin dosing frequency, treatment adherence, hospitalization, diabetes complications, psychological comorbidities, and chronic diseases were all significantly associated with depression severity. Poor treatment adherence and diabetes-related complications were strongly linked to severe depression, consistent with studies showing that depression negatively affects self-care behaviors, metabolic control, and clinical outcomes.^[23,24] Conversely, family history of T1DM and family psychological history were not significantly associated with depression severity, suggesting that current clinical status may exert a greater influence than inherited susceptibility in this population.^[25,26] Finally, the presence of additional chronic diseases, particularly celiac disease, was significantly associated with greater depression severity, reflecting the cumulative psychological burden of multiple chronic conditions.^[27-29] Overall, these findings emphasize that depression among adolescents with T1DM is multifactorial, involving demographic, family, educational, and clinical determinants. Routine mental health screening, multidisciplinary diabetes care, family-centered education, and early psychological interventions should therefore be integrated into pediatric diabetes services to improve both psychological well-being and long-term metabolic outcomes.

CONCLUSION

This study demonstrated that depression is highly prevalent among children and adolescents with type 1 diabetes mellitus, with mild depression being the most common presentation, although moderate and severe forms were also frequent. Depression severity was significantly associated with demographic, familial, educational, and clinical factors. Male sex, older age, advanced educational level, adverse parental characteristics, rural residence, and disrupted family structure were associated with poorer psychological outcomes. Clinical factors, including shorter disease duration, insulin regimen, poor treatment adherence, hospitalization, diabetes complications, and comorbid chronic or psychological conditions, further increased depression severity, emphasizing the need for integrated psychosocial assessment and multidisciplinary diabetes care.

REFERENCES

1. World Health Organization. Depression and other common mental disorders: global health estimates. Geneva: World Health Organization, 2017.
2. Dabravolskaj J, Marozoff S, Maximova K, Campbell S, Veugelers PJ. Relationship between fruit and vegetables intake and common mental disorders in youth: a systematic review. *Public Health Rev.*, 2022; 43: 1604686. doi:10.3389/phrs.2022.1604686.
3. ElSayed NA, Aleppo G, Aroda VR, Bannuru RR, Brown FM, Bruemmer D, et al. Children and adolescents: Standards of Care in Diabetes—2023. *Diabetes Care*, 2023; 46(1): S230-S253. doi:10.2337/dc23-S014.
4. Alassaf A, Gharaibeh L, Zurikat RO, Farkouh A, Ibrahim S, Zayed AA, et al. Prevalence of depression in patients with type 1 diabetes between 10 and 17 years of age in Jordan. *J Diabetes Res.*, 2023; 2023: 3542780. doi:10.1155/2023/3542780.
5. Rechenberg K, Whittemore R, Grey M. Anxiety in youth with type 1 diabetes. *J Pediatr Nurs.*, 2017; 32: 64-71. doi:10.1016/j.pedn.2016.08.007.
6. de Wit M, Gajewska KA, Goethals ER, et al. ISPAD Clinical Practice Consensus Guidelines 2022: Psychological care of children, adolescents and young adults with diabetes. *Pediatr Diabetes*, 2022; 23(8): 1373-1389. doi:10.1111/pedi.13428.
7. Viner RM, Allen NB, Patton GC. Puberty, developmental processes, and health interventions. In: Bundy DAP, Silva N, Horton S, et al., editors. *Child and adolescent health and development*. 3rd ed. Washington (DC): World Bank, 2017. Chapter 9. doi:10.1596/978-1-4648-0423-6_ch9.
8. Kristensen LJ, Birkebaek NH, Mose AH, Hohwü L, Thastum M. Symptoms of emotional, behavioral, and social difficulties in the Danish population of children and adolescents with type 1 diabetes: results of a national survey. *PLoS One*, 2014; 9(5): e97543. doi:10.1371/journal.pone.0097543.
9. Mars B, Collishaw S, Smith D, et al. Offspring of parents with recurrent depression: which features of parent depression index risk for offspring psychopathology? *J Affect Disord*, 2012; 136(1-2): 44-53. doi:10.1016/j.jad.2011.09.002.
10. Kiernan KE, Mensah FK. Poverty, family resources and children's early educational attainment: the mediating role of parenting. *Psychol Med.*, 2008; 38(3): 343-353. doi:10.1017/S003329170700215X.
11. Mahfouz EM, Kamal NN, Mohammed ES, Refaei SA. Effects of mothers' knowledge and coping strategies on the glycemic control of their diabetic children in Egypt. *Int J Prev Med.*, 2018; 9: 26. doi:10.4103/ijpvm.IJPVM_336_17.
12. Ferreira T, Cadima J, Matias M, et al. Trajectories of parental engagement in early childhood among dual-earner families: effects on child self-control. *Dev Psychol*, 2018; 54(4): 731-743. doi:10.1037/dev0000458.
13. Narayan A, Cicchetti D, Rogosch FA, Toth SL. Interrelations of maternal expressed emotion, maltreatment, and separation/divorce and links to family conflict and children's externalizing behavior. *J Abnorm Child Psychol*, 2015; 43(2): 217-228. doi:10.1007/s10802-014-9911-8.
14. Chung AH, Gevirtz RN, Gharbo RS, Thiam MA, Ginsberg JPJ. Pilot study on reducing symptoms of anxiety with a heart rate variability biofeedback wearable and remote stress management coach. *Appl Psychophysiol Biofeedback*, 2021; 46(4): 347-358. doi:10.1007/s10484-021-09519-1.
15. Repetti R, Wang SW. Effects of job stress on family relationships. *Curr Opin Psychol*, 2017; 13: 15-18. doi:10.1016/j.copsyc.2016.03.010.
16. Voursora E, Verdeli H, Warner V, Wickramaratne P, Baily CDR. Parental divorce, familial risk for depression, and psychopathology in offspring: a three-generation study. *J Child Fam Stud.*, 2012; 21(5): 718-725. doi:10.1007/s10826-011-9523-7.
17. Hanna KM, Weaver MT, Stump TE, Guthrie D, Oruche UM. Emerging adults with type 1 diabetes during the first year post-high school: perceptions of parental behaviors. *Emerg Adulthood*, 2014; 2(2): 128-137. doi:10.1177/2167696813512621.
18. King PS, Berg CA, Butner J, Butler JM, Wiebe DJ. Longitudinal trajectories of parental involvement in type 1 diabetes and adolescents' adherence. *Health Psychol*, 2014; 33(5): 424-432. doi:10.1037/a0032804.
19. Northam EA, Lin A, Finch S, Werther GA, Cameron FJ. Psychosocial well-being and functional outcomes in youth with type 1 diabetes 12 years after disease onset. *Diabetes Care.*, 2010; 33(7): 1430-1437. doi:10.2337/dc09-2232.
20. Flouri E, Mavroveli S. Adverse life events and emotional and behavioural problems in adolescence: the role of coping and emotion regulation. *Stress Health*, 2013; 29(5): 360-368. doi:10.1002/smi.2478.

21. Whittemore R, Jaser S, Chao A, Jang M, Grey M. Psychological experience of parents of children with type 1 diabetes: a systematic mixed-studies review. *Diabetes Educ*, 2012; 38(4): 562-579. doi:10.1177/0145721712445216.
22. Diabetes Control and Complications Trial (DCCT)/Epidemiology of Diabetes Interventions and Complications (EDIC) Study Research Group. Intensive diabetes treatment and cardiovascular outcomes in type 1 diabetes: the DCCT/EDIC study 30-year follow-up. *Diabetes Care*, 2016; 39(5): 686-693. doi:10.2337/dc15-1990.
23. Gandhi K, Vu BK, Eshtehardi SS, Wasserman RM, Hilliard ME. Adherence in adolescents with type 1 diabetes: strategies and considerations for assessment in research and practice. *Diabetes Manag (Lond)*, 2015; 5(6): 485-498. doi:10.2217/dmt.15.41.
24. Al-Jabi SW. Emerging global interest: unraveling the link between diabetes mellitus and depression. *World J Psychiatry*, 2024; 14(7): 1127-1139. doi:10.5498/wjp.v14.i7.1127.
25. Wiebe DJ, Berg CA, Korbel C, et al. Children's appraisals of maternal involvement in coping with diabetes: enhancing our understanding of adherence, metabolic control, and quality of life across adolescence. *J Pediatr Psychol*, 2005; 30(2): 167-178. doi:10.1093/jpepsy/jsi004.
26. Couper JJ, Haller MJ, Greenbaum CJ, et al. ISPAD Clinical Practice Consensus Guidelines 2018: stages of type 1 diabetes in children and adolescents. *Pediatr Diabetes*, 2018; 19(27): 20-27. doi:10.1111/pedi.12734.
27. Meijer C, Shamir R, Szajewska H, Mearin L. Celiac disease prevention. *Front Pediatr*, 2018; 6: 368. doi:10.3389/fped.2018.00368.
28. Habib KD, Jaber ZA, Abbas MH, Alawadi AQH. Assessment of depression and anxiety in adolescents with type 1 diabetes mellitus. *Iraqi Postgrad Med J.*, 2024; 23(1): 106-112. doi:10.52573/ipmj.2024.144584.
29. Alqahtani YA, Shati AA, Alhawyan FS, Alhanshani AA, Al-Garni AM, Al-Qahtani SM, Alshehri MA. Assessment of depression in children and adolescents with Type 1 diabetes mellitus: Impact and intervention strategies. *Medicine (Baltimore)*, Jul. 19, 2024; 103(29): e38868. doi: 10.1097/MD.00000000000038868. PMID: 39029074; PMCID: PMC11398734.