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Mental Health Comorbidities in Adolescents and Young Adults with Type 2 Diabetes

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Abstract

Background: Screening for mental health comorbidities is recommended in adolescents and young adults (AYAs) with diabetes. There is a paucity of data on mental health comorbidities in AYAs with type 2 diabetes (T2D).

Objective: To assess rates of depression, suicidal ideation, and diabetes distress (DD) in AYAs with T2D overall and by sociodemographic and clinical factors.

Methods: AYAs with T2D ages 13-21 years seen in a pediatric diabetes clinic between March 2018 and June 2019 completed the Patient Health Questionnaire-9 (PHQ-9) for depression screening and the Problem Areas in Diabetes – teen version (PAID-T) survey to assess DD. Chi-square tests were used to assess whether rates of depression and DD were associated with participant characteristics.

Results: The sample consisted of 64 AYAs with T2D (58% female, mean age 15.8 ± 2.0 years, mean HbA1c 8.3% ± 2.6%, mean BMI z-score 2.2 ± 0.6, 59% on insulin). Overall, 31% of participants had high depression and/or DD. Twenty-two percent of participants reported high depressive symptoms and 9% endorsed suicidal ideation on the PHQ-9. There were no differences in rates of depression by sociodemographic factors. Twenty-three percent of participants reported high DD. Rates of DD were higher among those on insulin (p=0.014) and on public health insurance (p=0.014).

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Author Contributions:

A.J.R. conceptualized and designed the study, coordinated and supervised data collection, and drafted the initial manuscript. H.B. and Q.P. contributed to data acquisition and analysis plan and interpretation. J.Y.F., G.K. and C.P. conceptualized and designed the study. F.M. conceptualized and designed the study and contributed to data interpretation. A.M. contributed to data interpretation. All authors reviewed, revised, and approved the final manuscript. All authors agree to be accountable for all aspects of the work.

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Conclusions: Almost 1 in 3 AYAs with T2D endorsed depression and/or DD. Our findings support the importance of mental health screening in AYAs with T2D, as well as the need for strategies to address psychological comorbidities in this population.

Keywords

depression; type 2 diabetes; adolescents

Introduction:

Adolescents and young adults (AYAs) are vulnerable to mental health problems, and those with chronic illnesses such as diabetes are no exception (Jones et al., 2017). As the prevalence and burden of mental health comorbidities has been increasingly recognized, consensus guidelines recommend screening and providing support for mental health conditions in AYAs with diabetes (Delamater et al., 2018; Young-Hyman et al., 2016). Depression in adolescence can result in significant morbidity and mortality such as increased suicide risk, social and educational difficulties, as well as other poor health outcomes (Thapar et al., 2012). In youth with type 2 diabetes (T2D), depressive symptoms are common (Van Buren et al., 2018; Wong et al., 2020). However, there are no published studies examining the prevalence of suicidal ideation in the T2D AYA population.

There is similarly little data on prevalence and sociodemographic factors associated with diabetes distress (DD), the emotional distress caused by living with diabetes, in AYAs with T2D. In adults with T2D, DD is prevalent and is associated with worse glycemic control and sub-optimal self-care (Perrin et al., 2017). Clinical outcome associations with depression and DD in adults with T2D mirror what is seen with adults and youth with type 1 diabetes (T1D), in that both depression and DD are significant mental health comorbidities, but DD in particular is associated with worse glycemic control (Hagger et al., 2018; van Bastelaar et al., 2010). Given these associations seen in comparable populations, exploring the prevalence and impact of DD in AYAs with T2D is warranted.

Therefore, the primary aim of this study is to describe rates of mental health comorbidities, specifically depressive symptoms, suicidal ideation, and DD, in AYAs with T2D. The secondary aim is to assess associations between high depressive symptoms and DD with clinical and sociodemographic characteristics in AYAs with T2D.

Methods:

Procedures and Sample

The current study drew data from a larger quality improvement project designed to improve screening for depression and DD for AYAs with diabetes aged 13-21 years in the outpatient setting (Roberts et al., 2021). As part of standard of care in a tertiary pediatric diabetes center, AYAs with diabetes aged 13-21 years complete a psychosocial assessment during the electronic intake process. Participants complete their assessment on an iPad electronic tablet using the Tonic for Health application, a web-based Health Insurance Portability and Accountability Act compliant platform used to collect patient-reported data.

This study examines data from these routine assessments for all AYAs with T2D who were screened during the study period from March 2018 to June 2019. A waiver of consent was obtained by the Seattle Children's Research Institute Institutional Review Board (IRB); all research procedures were approved by this IRB.

Measures

To evaluate depressive symptoms, the PHQ-9 (Patient Health Questionnaire-9) was administered. This 9-item assessment has been validated in adolescents (age 13+) and adults in detecting major depression and includes 9 items on a 4-point Likert scale (0-3), asking about frequency of symptoms in the prior two weeks. Response options range from 0 (not at all) to 3 (nearly every day). Summary scores are created by summing item responses with a possible range of 0 to 27. In adolescents, a value of 11 or greater has been found to optimize sensitivity and specificity and is used to define high depressive symptoms (Richardson et al., 2010).

The Problem Areas in Diabetes – teen version (PAID-T) was used to evaluate DD (Shapiro et al., 2018). This tool aims to assess diabetes-specific emotional distress surrounding diabetes areas most distressing to teens. This version has demonstrated construct validity in adolescents and includes 14 items on a 6-point Likert scale with a possible range of 14 to 84. A severity score of ≥ 44 maximizes sensitivity and specificity for differentiating teens with greater negative emotional symptoms, and is thus used to categorize individuals with high levels of distress (Shapiro et al., 2018).

For patients with PHQ-9 and PAID-T data from multiple visits during the study period, data from the first screening is used. A retrospective chart review was performed to confirm T2D diagnosis and obtain demographic and clinical variables, including HbA1C and use of insulin as a part of their diabetes management.

Data Analysis

Descriptive statistics were used to summarize patient characteristics. Patients were also categorized as high or low depressive symptoms using a PHQ-9 cutoff score of 11. Suicide ideation was determined by a response to the SI item on the PHQ-9, with the question: "Over the last 2 weeks, how often have you been bothered by... thoughts that you would be better off dead or of hurting yourself in some way." with a response of "several days, more than half the days, or nearly every day" (i.e., any response other than "not at all").

Patients were categorized by their DD scores into high or low DD using a PAID cutoff score of 44. Chi-square (or Fisher's exact) tests and two-sample t-tests were used to evaluate associations between these groups (low vs. high depressive symptoms and low vs. high DD) and patient demographic/clinical characteristics.

Results:

The sample consisted of 64 AYAs with T2D (58% female, mean age 15.8 ± 2.0 years, mean HbA1c $8.3\% \pm 2.6\%$, mean BMI z-score 2.2 ± 0.6 , 59% on insulin). Demographic and clinical characteristics are presented in Table 1.

Fourteen percent of participants had high scores on both the PHQ-9 and PAID-T. Thirty-one percent of participants had high DD and/or depressive symptoms.

Twenty-two percent of participants reported high depressive symptoms and 9% endorsed suicidal ideation on the PHQ-9. There were no differences in rates of depression by sociodemographic or clinical factors (Table 2). Of the 6 patients who endorsed suicidal ideation, 1 had high depressive symptomatology and 4 had high DD and depressive symptomatology. One did not have high scores on either screen.

Twenty-three percent of participants reported high DD. Rates of DD were higher among those on insulin ($p=0.014$) and on public health insurance ($p=0.014$) (Table 2).

Discussion:

In this study of AYAs with T2D, we found mental health comorbidities to be prevalent. High depressive symptoms are present in almost a quarter of AYAs with T2D and 9% of AYAs with T2D endorse suicidal ideation. Similarly, approximately 1 in 4 AYAs with T2D have high DD. Overall, almost 1 in 3 AYAs with T2D endorse depression and/or DD.

We found a higher rate of depressive symptoms than has been reported in the TODAY study (14.8%) of youth with T2D (Anderson et al., 2011). One possible explanation for the higher rate is that our study may have increased external validity. Unlike the TODAY study, which was a clinical trial and enrolled a subset of eligible patients, our study included all AYAs who received care at a diabetes clinic during the study period. Therefore, our higher rate of depressive symptoms may be more representative of true rates of depression in AYAs with T2D. Further, we identified a high rate of endorsement of self-harm in this population that is identical to the SI rate in AYAs with T1D (9%) (Butwicka et al., 2015; Majidi et al., 2020). Together, these findings reinforce the importance of depression and SI screening in AYAs with T2D in the clinical setting and further intervention where needed, as current national and international consensus guidelines support having psychosocial care providers embedded in diabetes care settings to address these needs (Delamater et al., 2018; Young-Hyman et al., 2016).

High DD was also prevalent in nearly a quarter of AYAs with T2D. While the rate of DD is lower than reported DD rates in youth with T1D (36%) as well as adults with T2D (also 36%) (Hagger et al., 2018; Perrin et al., 2017), this is still a significant proportion of AYAs. In our study, higher DD was observed in those using insulin. This is similar to data in adults with T2D where insulin use is associated with greater odds of DD (Nanayakkara et al., 2018). This finding highlights that, though insulin is often a necessary element of treatment of youth with T2D not meeting glycemic targets, clinicians must keep in mind the psychological impact of insulin initiation and preemptively offer support or interventions to prevent or mitigate DD in this group. Problem-oriented intervention and cognitive behavioral therapy, for example, have been successful in reducing DD and HbA1c in adults with T2D (Kuniss et al., 2018; Tunsuchart et al., 2020).

In addition, we found that youth with T2D on public health insurance had higher rates of DD compared to those who were privately insured. This suggests that the psychological burden

of diabetes management may be disproportionately impacting those of lower socioeconomic status (SES) and that future work to reduce DD in this population should prioritize AYAs with T2D on public health insurance. Limitations of this study include reliance on self-report screening data of depressive symptoms and DD, a small sample size, and a cross-sectional study design.

Implications for Clinical Practice:

This study provides evidence of the need for screening of mental health comorbidities in AYAs with T2D in the clinical setting. Previous quality improvement work has highlighted how mental health screening can be successfully integrated into the diabetes clinic outpatient setting (Roberts et al., 2021). The International Society for Pediatric and Adolescent Diabetes recommends that diabetes care is best delivered by a multidisciplinary team that includes a diabetes nurse specialist or diabetes nurse educator (Pihoker et al., 2018). Given the critical role pediatric nurses play on the diabetes care team, diabetes nurses should be aware of the prevalence of depression, suicidal ideation, and DD that may impact diabetes management and the overall health of AYAs with T2D. Similarly, school nurses can play an important role in supporting the identification of mental health comorbidities and can connect AYAs with T2D endorsing depression and suicidal ideation to appropriate mental health resources. Finally, diabetes nurses and school nurses should serve as advocates for supporting mental health screening in the clinical environments in which they provide care.

Conclusion:

Our findings support the importance of mental health screening in AYAs with T2D, as well as the need for effective strategies to address psychological comorbidities in this population, particularly for AYAs with T2D with public insurance or on insulin therapy.

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Highlights

-Depression is prevalent in youth with type 2 diabetes, but prevalence of other mental health comorbidities such as suicidal ideation and diabetes distress are not well known in this population.

-Mental health comorbidities such as depression, suicidal ideation, and diabetes distress are prevalent in adolescents with type 2 diabetes.

-Future research should be aimed at interventions to address these mental health comorbidities and reduce depression, suicidal ideation, and/or diabetes distress in adolescents with type 2 diabetes.

Table 1:

Patient Characteristics

	Total (n=64)
Age at screening (years), Mean (SD)	15.8 (2.0)
Diabetes duration[*] (years), Mean (SD)	2.6 (3.5)
Sex, n (%)	
Female	37 (57.8%)
Male	27 (42.2%)
Race/Ethnicity[*], n (%)	
Non-Hispanic White	11 (17.7%)
Non-Hispanic Black	2 (3.3%)
Hispanic	33 (53.2%)
Other	16 (25.8%)
BMI z-score[*], Mean (SD)	2.22 (0.59)
Insurance, n (%)	
Private	55 (85.9%)
Medicaid/Medicare	9 (14.1%)
Insulin Use, n(%)	
Yes	38 (59.4%)
No	26 (40.6%)
A1c[*], Mean (SD)	8.3 (2.6)

* Data not available for all subjects. Missing values: Duration of diagnosis = 24, A1c = 4, BMI z-score = 3, Race = 2

Table 2:

Clinical and Sociodemographic Characteristics by Depressive Symptoms and Diabetes Distress

	High Depressive Symptoms (PHQ-9 11) n=14	Low Depressive Symptoms (PHQ-9>11) n=50	P-value	High Diabetes Distress (PAID-T 44) n=15	Low Diabetes Distress (PAID- T <44) n=49	P-value
Age at screening (years), Mean (SD)	15.9 (2.0)	15.8 (2.0)	0.872	16.3 (2.0)	15.6 (1.9)	0.218
Duration of diagnosis (years), Mean (SD)	2.1 (2.4)	2.7 (3.7)	0.664	3.8 (4.9)	2.3 (3.0)	0.235
Sex, n (%)			0.503			0.845
Female	7 (50.0%)	30 (60.0%)		9 (60.0%)	28 (57.1%)	
Male	7 (50.0%)	20 (40.0%)		6 (40.0%)	21 (42.9%)	
Race/Ethnicity, n (%)			0.784			0.314
Non-Hispanic	2 (14.3%)	9 (18.7%)		1 (6.7%)	10 (21.3%)	
White	1 (7.1%)	1 (2.1%)		0 (0.0%)	2 (4.2%)	
Non-Hispanic	7 (50.0%)	26 (54.2%)		8 (53.3%)	25 (53.2%)	
Black	4 (28.6%)	12 (25.0%)		6 (40.0%)	10 (21.3%)	
Hispanic						
Other						
BMI z-score, Mean (SD)	2.43 (0.40)	2.17 (0.62)	0.147	2.33 (0.43)	2.19 (0.62)	0.448
Insurance, n (%)			0.370			0.014
Private	11 (78.6%)	44 (88.0%)		10 (66.7%)	45 (91.8%)	
Medicaid/Medicare	3 (21.4%)	6 (12.0%)		5 (33.3%)	4 (8.2%)	
Insulin Use, n (%)			0.672			0.014
Yes	9 (64.2%)	29 (58.0%)		13 (86.7%)	25 (51.0%)	
No	5 (35.7%)	21 (42.0%)		2 (13.3%)	24 (49.0%)	
A1c, Mean (SD)	8.2 (2.2)	8.3 (2.7)	0.832	9.0 (2.6)	8.1 (2.6)	0.250