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Maternal Diabetes Distress is Linked to Maternal Depressive Symptoms and Adolescents' Glycemic Control

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Abstract

Objective—Mothers of youth with type 1 diabetes experience increased levels of stress and depression related to the burden of diabetes management, but the concept of diabetes distress, or distress linked specifically to diabetes and its management, has not been applied to mothers. The current study examined diabetes distress in relation to maternal depressive symptoms and adolescents' glycemic control.

Research Design and Methods—Mothers of youth with type 1 diabetes (age 10–16) completed a measure of depressive symptoms and diabetes distress as part of a screening questionnaire. Adolescents' HbA1c was obtained from medical records.

Results—Mothers' diabetes distress was strongly related to maternal depressive symptoms, and relationship-related diabetes distress was significantly associated adolescents' HbA1c. In multivariate analyses, maternal depression was the only significant predictor of glycemic control.

Conclusions—Given the links between mothers' diabetes distress, maternal depressive symptoms, and adolescents' glycemic control, diabetes distress may be important to consider when targeting both maternal and adolescent adjustment to type 1 diabetes.

Keywords

adolescents; type 1 diabetes; parenting; family functioning; diabetes distress

Introduction

Parents play an integral role in monitoring and managing their adolescent children's complex treatment regimen (1), which often leads to family conflict and distress, particularly

in mothers (2). Maternal stress and depression are known to have a negative impact on youth's self-management and glycemic control (3, 4), yet diabetes-related distress has not been evaluated in mothers.

Diabetes distress is defined as "significant negative emotional reactions to the diagnosis of diabetes, threat of complications, self-management demands, unresponsive providers, and/or unsupportive interpersonal relationships" (5). Diabetes distress is more specific than related constructs such as pediatric parenting stress because it only refers to diabetes-related distress, and more broad than the construct of parental diabetes burden, as it includes key areas of interest, such as patients' feelings about their health care provider and relationship with teen (6). Further, diabetes distress is distinct from depression; in a sample of adults with type 2 diabetes, diabetes distress had a greater association with glycemic control than clinical depression or depressive symptoms (7). However, this concept, has not yet been applied to mothers of youth with type 1 diabetes.

Thus, the aim of the current study was to examine how mothers' diabetes distress, was related to maternal depressive symptoms and adolescents' glycemic control (HbA1c). We hypothesized that higher levels of maternal diabetes distress would be related to greater symptoms of maternal depression and poorer glycemic control in adolescents. In addition, we conducted exploratory analyses to determine if there were differences in these associations related to child age, given that this age group is at risk for worse glycemic control (8), or to child sex, as parents of girls report greater parenting distress than parents of boys (9).

Methods

Participants (n = 81) were mothers of youth ages 10 to 16 child with a diagnosis of type 1 diabetes for at least one year, recruited from a pediatric diabetes clinic through procedures approved by the Institutional Review Board. We chose to focus on this age range to capture the transition from parent to child in responsibility for diabetes management. Mothers were eligible if they could speak and read English. The screening questionnaire, administered by research staff before the child's regular clinic visit, determined eligibility for a pilot study of an intervention aimed at improving coping diabetes-related communication between mothers and their adolescent children. 101 mothers were approached, and of those, 20 declined to participate (the most common reason cited was having good support systems).

Measures

Diabetes distress was measured using the Parent Diabetes Distress Scale (P-DDS,10) consisting of 20 items. Factor analysis supported four factors of parental distress: distress about *self* (8 items, e.g., feeling unappreciated for all the ways I try to help my teen manage diabetes), distress about *teen* (6 items, e.g., worrying about my teens low blood sugars when he/she is away from home), distress about *relationship with teen* (4 items, e.g., feeling that trying to help my teen with his/her diabetes is always a battle) and distress about teen's *healthcare team* (2 items, e.g., worrying that my teen doesn't have the right doctors for him/her) (10). Following recommendations for the original diabetes distress scale (6), mean scores for the total scale and each subscale were calculated, with a mean score of 2–3

indicating moderate distress and a mean score 3 or higher indicating high distress (10). Internal consistency of the scales has been established, ranging from .75–.96. In our sample, reliability was as follows: Cronbach's alpha for the overall scale was .94, distress about self = .88, distress about teen = .76, distress about relationship = .92 and distress about healthcare team = .71.

Maternal depressive symptoms were measured with the Patient Health Questionnaire (PHQ-9, 12), a 9-item self-report questionnaire based on the DSM-IV criteria for major depression. A total score of 5–9 indicates mild depression, 10–14 moderate depression, 15–19 moderately severe depression, and 20–27 suggest severe depression. In our sample, Cronbach's alpha was .92.

Glycosylated hemoglobin (HbA1c), an objective measure of glycemic control over the previous 8–12 weeks, from the clinic visit was obtained from adolescents' medical records on the same day that other data was collected using the Bayer Diagnostics DCA2000® machine. A target HbA1c < 7.5% is recommended for youth (1).

Mothers also provided information on demographic and clinical variables, including adolescents' date of birth, gender, date of diagnosis, and treatment type (insulin pump or injections) and their own psychiatric history.

Using IBM SPSS 23 Statistics program, descriptive analyses and bivariate correlations were conducted to describe the sample, test for outliers, and examine associations between variables. Additional analyses were conducted to explore associations between variables for mothers of males and females, and mothers of 10–12 year olds vs. 13–16 year olds. Finally, a step-wise linear regression analysis was used to determine significant predictors of adolescents' HbA1c.

Results

In our sample, 26% of mothers were above the clinical cutoff for diabetes distress ($M=1.44$, $SD=0.83$), and 49% were above the clinical cutoff for mild depressive symptoms, 25% were above the cutoff for moderate depressive symptoms ($M=6.49$, $SD=6.61$). Additionally, 37% of the mothers reported a psychological disorder (most common diagnosis was depression, and 26% of the sample reported taking medication for psychological problems at the time of the screening. In our sample, the average HbA1c was 8.8%. Eighty-five percent of participants were above the clinical cutoff for HbA1c (7.5%), indicating that only 15% met the recommended target.

As seen in Table 1, bivariate correlations revealed that mothers' overall diabetes distress was strongly related to maternal depressive symptoms ($r = .65$, $P < .001$), and all of the subscales (other than distress about healthcare team) were significantly associated with maternal depressive symptoms (all $P < .001$). Although the total score for DDS-P was not significantly related to HbA1c, the association between relationship distress and HbA1c was significant ($r = .24$, $P = .028$). Maternal depressive symptoms were also significantly associated with adolescents' HbA1c ($r = .35$, $p = .001$). Child age was significantly associated with maternal distress about teen ($r = .24$), but not with any other variables.

Additional exploratory analyses revealed that, for mothers of younger adolescents (age 10–12, $n = 32$), relationship distress was significantly associated with HbA1c ($r = .38$, $P = .033$) but this association was not significant for older adolescents (13–16 year olds, $n = 49$), $r = .20$, $P = .170$. Maternal depressive symptoms were also significantly related to HbA1c for 10–12 year olds ($r = .54$, $P = .002$) but not for 13–16 year olds ($r = .18$, $p = .220$). For mothers of girls ($n = 40$), higher levels of maternal depressive symptoms were related to higher HbA1c ($r = .54$, $P < .001$) but this relationship was not significant for boys ($n = 41$, $r = .19$, $P = .254$).

Finally, as seen in Table 2, in multivariate analyses adjusting for child age and gender, relationship distress was a significant predictor of HbA1c ($\beta = .25$, $P = .026$); however, in the final model, maternal depressive symptoms were the only significant predictor of adolescents' glycemic control ($\beta = .30$, $P = .025$).

Discussion

The concept of diabetes distress has been gaining traction in the field as a correlate of psychosocial and health-related outcomes (6, 7, 13), but the current study is one of the first to examine diabetes distress in mothers. We found that diabetes distress, or distress linked specifically to diabetes and its management, was strongly related to maternal symptoms of depression. Further, results indicate that the relationship distress subscale was most strongly linked with maternal depressive symptoms and adolescents' glycemic control, particularly for younger adolescents, highlighting the stress experienced by mothers in this domain.

Findings from this study offer further support that maternal depressive symptoms are associated with poor glycemic control in adolescents. The gender differences we observed suggest that mothers of daughters may experience more distress than mothers of sons (9), or that daughters are more affected by their mothers' depressive symptoms, as reflected by their higher HbA1c. Additionally, the age-related differences in the associations between maternal depressive symptoms and relationship distress with adolescents' glycemic control may be explained by a higher level of maternal involvement in younger children's diabetes management (2). Alternatively, poorer glycemic control in adolescents may be contributing to maternal depressive symptoms and distress.

Limitations include a relatively small sample size, as this was an exploratory study. While the percentage of adolescents meeting the target for glycemic control (15%) is similar to national findings (8), the rates of clinically significant maternal depressive symptoms were quite high (49% reported at least mild symptoms of depression). Because these data come from a screener determining eligibility for a larger study, the sample may reflect mothers who were interested in improving diabetes-related communication and coping. Finally, we did not include fathers in this study, as mothers typically report higher levels of distress, but future work is needed to determine if diabetes distress in fathers (or other caregivers) has different relationships with diabetes management.

Although longitudinal studies and randomized controlled trials are needed to determine the causal nature of this relationship, findings suggest that measuring diabetes distress in mothers may help us better understand maternal depression in this population. Further,

studies in adults with diabetes support that diabetes distress is malleable and potentially responsive to intervention (14). Thus, our findings provide initial support for maternal diabetes distress as an important and novel factor to consider in research and clinical care.

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Table 1

Descriptive Statistics and Bivariate Correlations for Key Variables (n = 81)

	1	2	3	4	5	6	7	8
1. Child Age <i>M</i> = 13.33 (1.96)	--							
2. DDS-P Score <i>M</i> = 1.44 (0.83)	.12	--						
3. Self-Distress <i>M</i> = 1.20 (1.02)	.08	.91***	--					
4. Teen Distress <i>M</i> = 2.12 (1.02)	.24*	.75***	.56***	--				
5. Relationship Distress <i>M</i> = 1.62 (1.04)	.05	.93***	.77***	.56***	--			
6. Healthcare Team Distress <i>M</i> = 0.10 (0.25)	.07	.24*	.24*	.14	.18	--		
7. PHQ-9 Score <i>M</i> = 6.49 (6.61)	-.07	.65***	.66***	.48***	.56***	.11	--	
8. HbA1c <i>M</i> = 8.81 (1.41)	-.12	.16	.12	-.04	.24*	-.01	.35**	--

Note. DDS-P=Parent Diabetes Distress Scale. PHQ-9=Patient Health Questionnaire-9. HbA1c= Glycosylated Hemoglobin

* $P < .05$.

** $P < .01$.

*** $P < .001$.

Table 2

Regression Analyses Testing Maternal Distress and Depressive Symptoms as Predictors of HbA1c

	β	<i>P</i> value
Block 1 $R^2 = .014$		
Child Age	-.112	.324
Child Sex	.031	.784
Block 2 $R^2 = .062^*$		
Child Age	-.129	.249
Child Sex	-.004	.968
Distress about Relationship with Teen	.251	.026
Block 3 $R^2 = .059^*$		
Child Age	-.101	.354
Child Sex	-.013	.904
Distress about Relationship with Teen	.087	.505
Depressive Symptoms	.295	.025
Model $R^2 = .135^*$		

* $P < .05$.** $P < .01$.*** $P < .001$.