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Quality of Life in Children with Type I Diabetes Mellitus (T1D) in Minia Governorate: Relationship with Mood and Family Attitudes

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Abstract

Introduction: Children with T1D experience behavioral difficulties and lower social competency compared with healthy children. Quality of life is considered to be a significant indicator of disease prognosis.

Aim: To evaluate the health related quality of life of children with T1D, and how much it could be affected by their mood and family attitudes and to study the relationship between these variables and the metabolic control of the diabetic children.

Methods: 72 children with T1D were included and subjected to; history taking, clinical examination, application of Peds QL (Diabetes Module, Version 3), Childhood Depression inventory Scale (CDI),Parent Stress Index(PSI) questionnaire and HbA1c%. Another 72 children apparently healthy, non-diabetic, age and sex matched and siblings of the diabetic patients were included as a control group. They were subjected to Childhood Depression inventory Scale (CDI), Parent Stress Index (PSI) questionnaire.

Results: Diabetic patients had significant higher CDI Score and total PSI score than the control group. There were significant positive fair correlations between the age, weight and BMI of diabetic children with the child PedsQL, the parent PedsQL and CDI total scores. Concerning glycemic control, there were significant positive fair correlations between CDI total score with frequency of DKA attacks and HbA1c%. Using the PSI domains, poorly controlled diabetic patients had significant higher parental distress, parent/child dysfunctional interactions and higher PSI total score compared to good controlled patients. Using CDI domains, poorly controlled diabetic patients had significantly more negative self- esteem than good controlled patients. There was a significant positive moderate relationship between CDI total score and PSI score. Finally, there were significant negative weak correlations between PSI score and PedsQL (child and parental) i.e. the higher the parental stress, the lower the quality of life of the diabetic child (reported by both child and parent).

Conclusion: diabetic children, especially the poorly controlled ones, are significantly suffering from symptoms of depression which causing stress for their parents and this has significant impact on their quality of life and glycemic control.

Keywords: Quality of life; Type 1 diabetes Mellitus; Childhood depression; Glycemic control; Parental stress

Introduction

Type 1 diabetes mellitus (T1DM) is one of the most common chronic diseases, affecting 1 in every 400-600 children and adolescents [1]. DM is believed to cause psychological, social not only physical problems [2] and children with this illness have higher rates of behavioral difficulties and lower social competency compared with healthy ones [3].

Health-related quality of life indicates magnitude of impact exerted by a disease or medical condition upon everyday physical, emotional, mental and contextual well-being of a person [4]. Thus, it stands for the subjective perception of health4. This concept is therefore progressively viewed as a significant 'patient reported outcome' [5].

Considering this, it is beneficial to improve the quality of life and well-being to guard against disease complications and achieve good control of blood glucose in the course of proper diabetes management. It is important to consider that quality of life is a significant indicator of illness prognosis [6].

Aim of the Study

To evaluate the health related quality of life of children with T1D, and how much it could be affected by their mood and family attitudes. The second aim was to study the relationship between these variables and the metabolic control of the diabetic children.

Patients and Methods

This study included 72 children with T1D (Group I) diagnosed according to standard American Diabetes Association criteria (ADA, 2012) [7]. They were under regular follow up in the Pediatric Endocrinology Outpatient's Clinic, Minia University Children's Hospital during the period from January the 1st 2015 to the end of September 2015. According to diabetic control including HbA1c% level they were divided into two subgroups: Group Ia (good controlled): 22 children

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with an age range between 7 and 18 years, they were 11 males (15.27%) and 11 females (15.27%), their HbA1c% levels were up to 7%.

Group Ib (poorly controlled): 50 children with an age range between 7 and 18 years, they were 13 males (18.05%) and 37 females (51.38%), their HbA1c% levels were more than 7%.

Another 72 apparently healthy children, free of DM were recruited to be the control group of the study. They were age and sex matched and chosen from the siblings of the diabetic children because they share the same family circumstances. They were classified as Group II.

Inclusion criteria of the patients' group included: an age range between 7 and 18 years, both gender types, duration of illness of at least 1 year, clear level of consciousness at time of the interview and reasonable cooperation to participate in the study.

Exclusion criteria of the patients group included: Age below 7 and above 18 years, the presence of chronic illness other than diabetes mellitus, presence of fever or disturbed level of consciousness at time of the interview.

A clear informed consent was taken from all patients' parents for approval of the inclusion of their children in the study, after explaining the study's aim and procedures to them.

The studied groups were subjected to the following: thorough history taking (first part included demographic data of the patients and second part included data related to parents or care givers), general and systemic examinations including weight (in kg), height (in cm) and BMI (kg/m^2). Laboratory investigations were done including fasting and postprandial blood glucose levels (Colorimetric, Human, Germany) and HbA1c% by using resin column chromatography (Kit content was supplied by TECO DIAGNOSTICS, California, USA).

Psychiatric Assessment of the diabetic group of children was done by the Arabic translated version of the Pediatric Quality of life Inventory 3.0 Diabetes (Peds QL 3.0, DM Module) which assesses the broad age range of 7-18 years with both diabetic child and parent proxy-reports [8]. It encompassed five scales: 1) diabetes symptoms (11 items); 2) treatment barriers (4 items); 3) treatment adherence (7 items); 4) worry (3 items) and 5) communication (3 items). A five point Likert response scale was used (0=never a problem, 4= almost always a problem). Items are reversed-scored and linearly transformed to a 0-100 scale, with higher scores indicating better HRQOL. Scale scores are computed as the sum of items divided by the number of items answered (accounting for missing data). It was obtained from Mapi Institute Website after receiving official permission of use of the module in this study.

In addition, both diabetic and control groups were examined by the Childhood Depression Inventory (CDI) which was developed by the American clinical psychologist Maria Kovacs, and was first-published in 19799. The CDI is a widely used and accepted assessment for the severity of depressive symptoms in children and youth, with high reliability. It refers to cognitive, affective and behavioral depressive symptoms. The CDI is a 27-items scale that is self-rated and symptom-oriented. The 27 items on the assessment are grouped into five major factor areas: Negative Mood, Negative Self-Esteem, Interpersonal Problems, Anhedonia and Ineffectiveness. Total score range from 0 to 54 and a cut off score of 19 was indicative for clinical depression. The average time to complete this questionnaire is 15 minutes.

Finally, parents of children of the study groups were interviewed using the Parenting Stress Index, Short Form (PSI/SF) which has 36 items from the original 120-items PSI. The version was developed in accordance with clinicians' and researchers' need for a shorter measure of parenting stress and was based on Castaldi's (1990) 10 factor analysis of the original PSI. The presence of three subclasses was suggested: 1) Parental Distress, 2) Parent-Child Dysfunctional Interaction, and 3) Difficult Child. Similar to the full PSI, it also has a validity scale. In this study, this tool took about 15 minutes to be completed for each parent.

Statistical Methodology

Data entry and analysis were all done with an IBM compatible computer using software of SPSS for windows version [7-13]. The data were coded and verified prior to data entry. Quantitative data were presented by mean and standard deviation, while qualitative data were presented by frequency distribution. Chi square test was used to compare between two proportions or more. Independent t-test was used to compare two means. A statistically significant level was considered when p-value was less than 0.05.

Correlation tests were used to study the relationship between two numerical variables. Pearson correlation analysis was used to assess the strength of association between two variables. The correlation coefficient, denoted symbolically (r), defines the strength and direction of the linear relationship between two variables. Multiple logistic regression analyses were done.

Results

The diabetic patients had significant higher CDI Scores and total PSI than the control group (P<0.001 for each) (Table 2) showed that there were significant positive fair correlations between age with the child PedsQL total score, the parent PedsQL total score and CDI total Score (P=0.001, P=0.008 and P=0.004 respectively). Concerning gender, there was only a significant positive fair correlation between gender and CDI total score(r=0.0255, P=0.000). Regarding weight, there were significant positive fair correlations between it with child PedsQL total score and parent PedsQL total score (r=0.303, P=0.010 and r=0.254, P=0.031 respectively). Concerning BMI, it had a significant positive fair correlation with the child PedsQL total score (r=0.298, P=0.011) (Table 3) showed that there were significant positive fair correlations between CDI total score with frequency of DKA attacks and HbA1c % (r=0.468, P<0.001 and r=0.252; p=0.033). By using the PSI domains, poorly controlled diabetic patients had significant higher parental distress, parent/child dysfunctional interactions and higher PSI total score compared to good controlled patients (P 0.005, 0.004 and 0.044 respectively) (Table 4).

	Diabetic group (n=72)	Control group (n=72)	P value
CDI Total Score Range Mean ± SD	 (5-48) 16.68 ± 13.99	 (2-33) 7.92 ± 8.02	<0.001*
PSI Range Mean ± SD	 (77-172) 111.49 ± 20.44	 (44-116) 85.28 ± 15.11	<0.001*

Table 1: Comparison between the diabetic and the control groups regarding psychiatric assessments.

	Child total score of PedsQL		Parent total score of PedsQL		CDI total Score		PSI total score	
	r	P	r	P	R	P	r	P
Age**	0.368	0.001*	0.313	0.008*	0.333	0.004*	0.083	0.488
Gender	0.315	0.2	0.268	0.316	0.255	0.000*	0.022	0.122
Weight**	0.303	0.010*	0.254	0.031*	0.194	0.103	0.029	0.811
BMI**	0.298	0.011*	0.213	0.073	0.203	0.086	0.027	0.82
(*) Significant correlation (**) Pearson's correlation Grades of r: 0.00 to 0.24 (weak or no association), 0.25 to 0.49 (fair association), 0.50 to 0.74 (moderate association), ≥ 0.75 (strong association).								

Table 2: Correlations between quality of life, psychiatric assessment and clinical characters of the diabetic group.

	Child total score of PedsQL		Parent total score of PedsQL		CDI Total Score		PSI total score	
	r	P	r	P	R	P	r	P
Frequency of DKA***	-0.199	0.094	-0.227	0.055	0.468	<0.001*	0.23	0.052
HbA1c %**	-0.058	0.63	-0.039	0.742	0.252	0.033*	0.086	0.473
(*) Significant correlation (**) Pearson's correlation (***) Spearman's rho correlation.								

Table 3: Correlations between quality of life, psychiatric assessments and different parameters of glycemic control in diabetic patients.

Particulars	Good controlled	Poor controlled	P-value
	(n=22)	(n=50)	
	Mean ± SD	Mean ± SD	
PSI scores			
Parental distress	27.25 ± 4.03	7.25 ± 10.68	0.005*
Parent/Child dysfunctional interactions	25.50 ± 0.57	28.50 ± 5.54	0.004*
Difficult child	41.00 ± 3.56	46.78 ± 6.60	0.236
Total score	93.75 ± 4.92	112.53 ± 20.54	0.044*
CDI scores			
Anhedonia/Asthenia	3.25 ± 2.22	4.75 ± 4.21	0.07
Negative self esteem	4.00 ± 0.816	4.87 ± 3.24	0.044*
Social withdrawal	2.50 ± 2.65	4.78 ± 4.43	0.102
Incompetence/Maladjustment	1.25 ± 2.50	3.04 ± 3.44	0.368
Total score	11.00 ± 7.87	17.01 ± 14.24	0.065
PedsQL scores			
a) Child scores			
Symptoms	48.86 ± 4.35	45.35 ± 11.94	0.121
Treatment barriers	62.50 ± 19.76	49.02 ± 26.33	0.488
Treatment adherence	37.50 ± 12.20	38.70 ± 20.20	0.196
Worry	25.00 ± 20.41	18.38 ± 15.61	0.859
Communication	77.08 ± 15.78	66.30 ± 20.33	0.124
Total	48.43 ± 8.82	43.50 ± 14.14	0.494
b) Parent scores			
Symptoms	42.04 ± 5.72	42.97 ± 11.47	0.156
Treatment barriers	51.56 ± 26.21	45.68 ± 25.51	0.678
Treatment adherence	27.68 ± 17.01	37.02 ± 18.97	0.648
Worry	12.50 ± 14.43	11.89 ± 13.22	0.91
Communication	79.17 ± 14.44	71.57 ± 11.89	0.528
Total	40.62 ± 10.35	41.47 ± 11.78	0.854
* significant			

Table 4: Comparison between good and poor controlled diabetic patients regarding psychiatric and quality of life assessments.

Using CDI domains, poorly controlled diabetic patients had significantly more negative self-esteem than good controlled patients (P=0.044). On the other hand, PedsQL domains showed no significant differences between good controlled patients and poor controlled diabetic patients (P>0.05 for all domains). There were significant negative weak correlations between CDI scores and total PedsQL scores for both child and parent (r=-0.280 and p=0.017 and r=-o.238 and p=0.045) (Table 5).

Datum	Good controlled	Poor controlled	P value
		CDI total score	
		r	P
Peds QL	Child total	-0.28	0.017*
	Parent total	-0.238	0.045*
* significant			

Table 5: Correlations between CDI score and quality of life.

There was a significant positive moderate relationship between CDI total score and PSI score where (r=0.499 and P=0.000) i.e. the higher the parental distress, the higher the depression severity of their diabetic children (Table 6). Finally, there were significant negative weak correlations between PSI score and PedsQL (child and parental) where (r=-0.374 and P=0.001 and r=-0.247 & P=0.036) i.e. the higher the parental stress, the lower the quality of life of the diabetic child (reported by both child and parent). Table 1 Comparison between the diabetic and the control groups regarding psychiatric assessments.

Discussion

The incidence of T1D is increasing worldwide where it rises approximately by 3% per year, and this draws the attention to the seriousness sand public health consequences of the disease [11,12]. In the follow up clinical visits, the clinical parameters only are measured, such as the body composition, metabolic control and disease complications. Hardly any attention is paid to the quality of life assessment [12]. Childhood diabetes adversely affects health related quality of life (HRQOL) of the patients and the well-being of their families.

This study hypothesized that there was a mutual relationship between low quality of life, depression of the diabetic child and negative family attitudes toward the child with T1D on one hand and impaired medical control of T1D on the other. Therefore, the objectives of this study were to evaluate the QoL of children and adolescents with T1DM and to identify risk factors associated with poor QoL scores and their effects on metabolic control.

Comparison between the diabetic and the control groups regarding psychiatric assessments revealed that diabetic patients had

		PSI	
		R	P
CDI total score		0.499	0.000*
Peds QL	Child total	-0.374	0.001*
	Parent total	-0.247	0.036*
*Significant			

Table 6: Correlations between parental stress and severity of depression and quality of life of diabetic children.

significantly higher CDI scores and total PSI than the control group (P<0.001 and P<0.001 respectively). This could be explained by the concept that living with the requirements related to glycemic control, insulin therapy, diet plan and physical activity may have a significant influence on the psychological functioning of the diabetic patients and their families too [11]. So, children with T1D may be seriously affected regarding their quality of life, emotional well-being, cognitive performance and behavior [13,14]. The association between these results is understandable, since levels of parenting stress rise with increased rates of internalizing problems [15] and depressive symptoms in the child with DM [16].

The increased rate of depressive symptoms in diabetic children compared to the control children was in agreement with Van Tilburg et al. [17]. Who found that children with diabetes experienced somewhat elevated levels of depression, anxiety, and psychological distress. In contrast, another study among Dutch adolescents with T1D did not reveal an elevated level of the prevalence of depression compared to control subjects [18].

Results of our study revealed that age had significant positive fair correlations with child PedsQL total score, the parent PedsQL total score and CDI total score, where older patients had significant higher total scores of PedsQL. This was similar to the results of Abdul-Rasoul et al. [19] and Boo et al. [20]. Concerning gender, female gender was associated with higher CDI score. The same was reported in the results of a study carried out by Kakleas et al. [14] but contradictory to that reported by Hood et al. [21]. Concerning BMI in our study, it had a significant positive correlation with the child PedsQL total score (r=0.298, P=0.011). This result was similar to a Saudi study performed by Al-Hayek et al. [22] but in contrast to the Swedish study carried out by Jonsson et al. [23] who found no such positive correlation.

Regarding correlations between parent total scores of PedsQL and total PSI score quality of life with different parameters of glycemic control in diabetic patients, there were significant negative correlations between Score and frequency of DKA episodes and HbA1c%. A possible explanation may be that poor metabolic control could further impair the psychological status, thus propitiating a vicious cycle, with progressive worsening of clinical and psychological situation, and even lesser chance to control disease. This was in agreement with the results by Hilliard et al. [24], Varni et al. [25] and Boo et al. [20] who reported that parents who experience a lot of parenting or diabetes-related stress may have difficulties in maintaining an optimal level of control concerning their children's disease management or, more generally, disciplining their children in daily life. In addition, increased behavior problems in children with diabetes have been associated with higher levels of parenting stress, especially in mothers [26].

Patients and caregivers have to adapt to a new lifestyle while the developing child or adolescent strives to achieve autonomy. Studies have shown that enhancing the QoL and well-being of children with diabetes is as important as metabolic control in preventing secondary morbidity [27]. Therefore, the main aim of modern diabetes care in children and adolescents has changed from a purely medical approach to psychological and behavioral interventions where they have a beneficial effect on children and adolescents with diabetes evidenced in terms of better compliance to therapy, glycemic control as well as normal psychological development and maximum QoL [28,29,13].

Comparison between good and poor controlled diabetic patients showed that by using the PSI domains, poorly controlled diabetic patients had significant parental distress, parent/child dysfunctional interactions and higher PSI total score than good controlled patients. Nienke et al. [30] suggested that parents of adolescents with poorly controlled diabetes would report more parenting stress because of daily stress concerning acute health issues (hypo- and hyperglycemia), as well as chronic concerns about long-term complications.

On the other hand by using PedsQL domains, there were insignificant differences between good and poor controlled diabetic patients regarding quality of life. The apparent discrepancy in these findings could be explained on the ground that correlations between child and parent-proxy report were modest, suggesting that perceptions regarding quality of life may differ substantially between children and their parents, underscoring the importance of measuring both reporters. This may indicate that children are more apt to perceive their well-being in a more global manner; while parents may be more able to differentiate between well-being across various domains. Greater correlations within-reporter may also be attributable to shared-method variance; potentially accounting to some degree for the greater correlation of depression, a child-report measure, with child report of QOL than with parent report of QOL [31]. Table 5 showed that there was a significant negative weak correlation between CDI scores and total PedsQL scores for both parent and child.

Regarding PSI, (Table 6) showed that there was a significant positive fair relationship between CDI total score and PSI score where (r=0.49 and P=0.000) i.e. the higher the parental distress, the higher the depression severity of their diabetic children. On the other hand, there were significant negative relationships between PSI score and PedsQL (child and parental) where (r=0.37 and P=0.001 and r=0.247 and P=0.036) i.e. the higher the parental stress the lower the quality of life reported for both child and parent.

The previous results could be explained by that stress in parents of children with T1D is multifaceted and related to different aspects of the child's functioning. Higher levels of parenting stress are associated with increased rates of internalizing problems and depressive symptoms in the child15 and 16. Studies suggest that problems like parental anxiety or depression have a direct or indirect (e.g., through parental involvement) negative impact on both metabolic control and psychosocial adjustment of adolescents with T1D [32,33]. These data suggest that parenting stress is related to both physiological and psychological functioning of adolescents with T1D. Parents who experience a lot of parenting or diabetes-related stress may have difficulties in maintaining an optimal level of control concerning their children's disease management or, more generally, disciplining their children in daily life. Their children may feel that they are being overly controlled by their parents or, on the other hand,

Overwhelmed with responsibility for their disease management, in response to their parents' feelings and behavior. As a result, adolescents may develop behavior or emotional problems or difficulties in disease management. On the other hand, parents may experience stress in

response to their children's behavior and emotional problems or metabolic functioning. Indeed, increased behavior problems in children with diabetes have been associated with higher levels of parenting stress [34,15,16,26,24].

Conclusion

Diabetic children, especially the poorly controlled ones, are significantly suffering from symptoms of depression which causing stress for their parents and this has significant impact on their quality of life and glycemic control**.**

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