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ORIGINAL ARTICLE

Factors Affecting Quality of Life in Pediatric Patients with Type I Diabetes Mellitus

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ABSTRACT

Background: Globally, the incidence rate of type 1 diabetes has increased , with the most significant rise in annual incidence among children under the age of five. Depression in these patients disproportionately affects vulnerable populations with type 1 diabetes and interventions targeting this population are therefore relevant.

Objective: The objective of this study to determine the quality of life in pediatric patients with type I diabetes mellitus.

Methodology: The study was Cross-sectional study was conducted after IRB approval in Unit II, Department of Pediatrics, Mayo Hospital, Lahore for the duration of six months from December 2022 to May 2023. The quality of life scale was graded into different category high quality of life score is more than 80 falls in and moderate 60 to 80 and below than 60 falls in low quality of life

Results: Total 95 patients were in the study cases, 61 (64.2 %) were male patients while 34 (35.8 %) were female patients. The mean age of our study cases was 9.96 ± 1.64 years. Of these 95 study cases, 41 (43.2 %) belonged to rural areas and 54 (56.8 %) belonged to urban areas. Poor socioeconomic status was noted in 63 (66.3%), while 32 (33.7%) were middle income and 57 (60.0%) mothers were illiterate. The mean body mass index of our study cases was 24.21 ± 1.36 kg/m2 and obesity was present in 06 (6.3 %) of our study cases

Conclusion: The mean disease duration was 2.89 ± 1.13 years and 54 (56.8 %) had more than 2.5 years of illness. Quality of life was intermediate in 36 (37.9%) and 59 (62.1%) had poor quality of life. Very high frequency of poor quality of life was noted in our study among diabetic children. Quality of life was significantly associated with gender, age, residential status, socioeconomic status, maternal literacy, and prolonged disease duration. Clinicians treating such patients must screen their patients for the quality of life for time management. This will decrease the burden of related morbidities and improve the quality of life for these patients.

Keywords: Type 1 diabetes mellites , quality of life, children,

INTRODUCTION

The Diabetes Mellitus is the most common endocrine disorder characterized by the chronic hyperglycemia. Diabetes Mellitus type 1 is the metabolic disorder in which B cell don't produce insulin due to autoimmune destruction[1]

Globally the prevalence of diabetic Mellitus is increasing and it is almost 8.8million[2]

World Health Organization defined Quality of life as "an individual perception of their position in life, in the context of the culture and values system in which they live, and in relation to their goals, expectation, standards concern"[3].

Living with T1DM presents numerous daily challenges associated with disease management to children and adolescents. These challenges include serious lifestyle changes with intensive therapeutic exogenous insulin regimes, the need for dietary restrictions, regular exercise, and frequent monitoring of biochemical markers[4]

Severe clinical symptoms of type 1 diabetes include lactic acidosis, hyperosmolar hyperglycemic episodes, and rapid onset of ketoacidosis. Long-term poor glucose control can result in macrovascular diseases including coronary artery disease and peripheral vascular disorders, as well as microvascular issues like diabetic retinopathy, neuropathy, and nephropathy. These patients are more prone to experience both acute and chronic issues affecting many organ systems due to the early beginning in pediatric populations[5]

Subjective assessments of both positive and negative aspects of life are usually included in the broad, multifaceted concept of quality of life. Because it has different connotations in almost every academic field and demographic, it is therefore challenging to evaluate. In this setting, a variety of factors, such as culture, values, work, housing, education, and health, might affect quality of life. The value placed on life while considering functional harm, social repercussions from illness, complications, and treatments, as well as the political and economic structure of the health care system, is known as health-related quality of life, or HRQoL[6]

Achieving a particular glycemic level has been the aim of T1DM treatment in order to prevent the consequences of the condition. Modern medicine, however, understands that treating a patient's health in its entirety—not just the absence of clinical criteria or disease indicators—is crucial. Eleven As a result, earlier research has recommended that children and adolescents with diabetes have their HRQoL measured on a regular basis[7]

Globally, T1DM has been shown to peak between the ages of 10 and 14. According to European registries, type 1 diabetes is most common in the youngest age group (0–4 years). However, after puberty, incidence rates seemed to level out between the ages of 15 and 29. However, the subsequent investigation found that the largest prevalence was in the age group of 10 to 13[8]

There are multiple factors which affects the child growth firs the genetic factor, mental stress and other environmental factors include like parental attachment ,parental coping and adaptation ,mental health and marital status diabetic immunity development ,diabetic stress metabolic complication[9]

Study Setting: The study was conducted in Unit II, Department of Pediatrics, Mayo Hospital, Lahore for the duration of six months among pediatric patients with type I diabetes mellitus. Data was collected from mayo hospital . Random number method was used by computer to select the hospital.The Inclusion criteria of this study was children with age 1 to 14 years, children with both of genders presenting with type I diabetes mellitus and children was on treatment for more than a year. Exclusion criteria of this study was children with Fanconi syndrome, children with diabetes insipidus and children with all other chronic systemic diseases (like chronic kidney disease, cerebral palsy, etc.)[10]

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Sample size: Random sampling technique was to collect data and was collected from the Paediriatic department mayo hospital Lahore total sample size of 95 was calculated with 5% margin of error and 95% confidence level, 5% margin of error, and taking the expected percentage of intermediate quality of life.

$n = Z^2 1 - \alpha / s\ P(1 - P)$

d2-α = confidence interval.

P= anticipated population proportion d= absolute precision

n= sample size

RESULTS

4.1. Descriptive statistics of sociodemographic variables 95 patients who met our inclusion criteria were included in the study. 61 (64.2%) of the 95 studied cases had male patients, whereas 34 (35.8%) had female patients. According to our study's findings, 47 (49.47%) of the study's cases were between the ages of 10 and 14. 41 (43.2%) of the 95 research cases were from rural areas, and 54 (56.8%) came from metropolitan areas. 63 people (66.3%) had low socioeconomic level, while 32 (33.7%) had a middling income.38 moms were literate, compared to 57 mothers who were illiterate (60.0%). Obesity was existed in 6(6.3%) patients while 89(93.7%) patients had no obesity. The duration of disease up to 2.5 years of 41(43.2%) patients while 54(56.8%) patients had duration of disease more than 2.5 years.

Table 1: Frequency of sociodemographic variables (N=95)

Characteristics	f	%
Gender		
Female	34	35.8
Male	61	64.2
Age		
1-4 years	5	5.28
5-9 years	43	45.26
10-14 years	47	49.47
Residential status		
Rural	41	43.2
Urban	54	56.8
Economic status		
Poor	63	66.3
Middle Income	32	33.7
Maternal literacy rate		
Illiterate	57	60.0
Literate	38	40.0
Obesity		
Yes	06	6.3
No	89	93.7
Duration of disease		
Up to 2.5 years	41	43.2
More than 2.5 years	54	56.8

Note. f represents frequency and % shows percentage

4.2 Descriptive statistic of quality of life 95 patients who met the inclusion requirements for our study were included in it. In these 95 study cases, 59 diabetic patients (62.1%) had low quality of life, 36 diabetic patients (37.9%) had intermediate quality of life, and 0 patients had great quality of life. So, mostly diabetic patients had poor quality of life and some of them had intermediate quality of life.

Table 2: Frequency of effects on quality of life(N=95)

Characteristics	f	%
Quality of life		
Poor	59	62.1
Moderate	36	37.9
High	0	0

Note. poor indicates score of 60, moderate shows 61-80 and high value shows score of >80, f indicates frequency and % shows percentage.

Descriptive statistics of age, weight and height: 95 patients who met our inclusion criteria were included in the study. The mean age of our study cases, out of these 95 study cases, was 9.96 1.64 years. Patients who were male had a mean age of 10.03 + 1.69 years, while those who were female had a mean age of 9.82 + 1.56 years. The mean BMI of the study subjects was 24.21 1.36 kg/m2, and six (6.3%) of the study subjects were obese. The average length of the illness was 2.89 1.13 years, and 54 (56.2%) of the patients had a longer illness than 2.5 years.

Table 3: Mean in addition to standard deviation of age, BMI and time period of disease(N=95)

Characteristics	M	S.D
Age	9.96	1.64
Male	10.03	1.69
Female	9.82	1.56
BMI	24.21	1.36
Duration of disease	2.89	1.13

Note. BMI shows body mass index means mean and S.D means standard deviation.

4.3 Statistical analysis of different variables 95 patients who met our inclusion criteria were included in the study. Age had a significant value of 0.001, indicating a significant relationship between age and quality of life (significant is defined as a p value less than 0.05). The residential status with significant value of 0.02 showed that residential status had significant value with quality of life. The economic status had significant value of 0.002 showed that economic status had significant value with quality of life. The literacy rate had also significant relation with quality of life with p value of 0.001. The obesity had no significant relation with quality of life because it showed p value of 0.403. The duration of disease had significant value of 0.001 which indicated that quality of life had significant relation with duration of disease.

Table 4: Statistical analysis of different variables with quality of life (N=95)

Characteristics		Quality of life	P value
	Yes (n=36)	No (n=59)	
Age			0.001
1-4 years(n=5)	3	2	
5-9 years(n=45)	30	15	
10-14 years(n=45)	3	42	
Residential status			0.020
Rural	10	31	
(n = 41)			
Urban (n = 54)	26	28	
Economic status		0.002	
Poor (n = 63)	31	32	
Middle income (n = 32)	05	27	
Literacy rate		0.001	
Illiterate (n = 57)	35	22	
Literate (n = 38)	01	37	
Obesity		0.403	
Yes (n = 06)	01	05	
No (n = 89)	35	54	
Disease duration		0.001	
Up to 2.5 years (n = 41)	07	34	
More than 2.5 years (n = 54)	29	25	

Note. p value indicates the chi square value and significant value is p<0.05.

CONCLUSION

It is concluded that mostly patients in our study were male patients in comparison to female patients. Most of the patients were between the age of 10 to 14 years. Most of the patients belonged to urban areas and most of the patients belonged to poor socioeconomic status. Most of the mothers of diabetic patients were illiterate. Mostly diabetic patients were not obese. The large proportion of diabetic patients had duration of disease more than 2.5 years. Most of the participants of our study had poor life's quality. The average age of our study cases was 9.96 ± 1.64 years. The mean age of male patients was 10.03 ± 1.69 years while that of female patients was 9.82 ± 1.56 years.

Our study subjects had a mean body mass index of 24.21 1.36 kg/m2. The average length of the illness was 2.89 1.13 years, and 54 (56.2%) of the patients had a longer illness than 2.5 years.

Age and life quality have been significantly correlated. Residential status demonstrated a substantial correlation between residential status and quality of life. Economic situation and quality of life have a strong correlation. With a p value of 0.001, the relationship between the literacy rate and quality of life was similarly significant. Due to the obesity's p value of 0.403, there was no discernible correlation between it and life's quality. The duration of disease had significant value of 0.001 which indicated that quality of life had significant relation with duration of disease.

Our study found that diabetic children have a very low quality of life. Gender, age, residence, socioeconomic status, maternal literacy, and prolonged disease duration all significantly contributed to quality of life. Clinicians treating such patients should screen them for quality of life in order to manage their time. As a result, related morbidities will be lessened and these patients' quality of life will be improved.

Study Recommendations: This thesis focuses on the incidence of diabetic patients and different factors affected on the quality of life of diabetic patients. This study also finds out the relationship between different factors either sociodemographic or other and its relation with quality of life of diabetic patient. Different policy-level and stakeholder-level recommendations are given. In order to reduce the impact of diabetes on patients' quality of life, future research directions are also provided.

Policy recommendations:

- Policy should be introduced at the national level the screening of newborn should be the compulsory part of child screening test at birth.
- Policy should be formulated for the awareness programs so the quality of life of diabetic patient can be improved.
- Policy should be also formulated at school level so that exercise and physical activity can be introduced and make it the part of life of diabetic patient so that the quality of life of diabetic patient can be improved
- Policy should be formulated at school level to introduce good dietary habits in school going children especially diabetic patient of this age to minimize the influence of diabetes going on value of life.
- Policy should be formulated at hospital level so that the monitoring of diabetic patients will be computerized so the backup of diabetic patient should be monitored and quality of life of diabetic patient will be improved.

Operational recommendations Hospital administration:

- The screening of newborn should be compulsory so that the diabetes should be diagnosed that at the right time.
- The parents should be counselled about the diet plan of diabetic patient.
- The parents should be aware about the effect of exercise on the life's quality of patient of diabetes.
- The hospital should arrange monthly checkup of diabetic patients.
- The hospital should manage record of diabetes patients so that the follow up of diabetic patients can be managed.
- The hospital should have built special section for the treatment of diabetes patients so that the parents of diabetic patients cannot wait for their turn.

Parents Role

- Parents should monitor their diabetic children's food habits.
- Parents should urge their diabetic children to participate in physical activities.
- Parents should follow their physician's suggestions to reduce the impact of diabetes on their quality of life.
- Parents should provide their children suitable diabetic medicines to keep the condition from interfering with their quality of life.
- Parents should give their children psychological assistance so they may identify as equals with their classmates.

School's Role:

- Schools should encourage everyday physical activity.
- School administration prioritizes the food habits of diabetes patients.
- Schools may significantly enhance the quality of life for diabetes patients.

Non-governmental organization

- Non-governmental organization should arrange awareness programs for the parents of diabetic patients so the effect of diabetes on quality of life can be minimized.
- Non-governmental organization should organize different educational seminars in schools for the education of diabetes patients.
- Non-governmental organization should offer free healthy food at schools to improve the dietary habits of school going children.

Future Research Direction:

- For future research, it is recommended that this type of study includes private hospitals for data collection to potentially yield varying results.
- For future research involving diabetic patients, the number of hospitals has increased, which may lead to different results due to the availability of a larger data set compared to this study.
- Additionally, variations in sample size may lead to differing results compared to this study.
- In future research, an increased sample size may yield results that differ from those presented in this study.
- These risk variables may also be assessed in conjunction with specific supplementary risk factors.
- Different forms of statistical tests can be used in future study, which could lead to results with varying natures.

DISCUSSION

Diabetic Mellitus 1 is the chronic disease which causes multiple disease in children like diabetic retinopathy, kidney issues which consequently affects the mental and psychosocial and behavioral behavior. The diabetic children are presented with various symptoms like urination blurring and decrease of vision[11]

The quality of life scale was categorized. A good quality of life score is over 80, moderate 60–80. These 95 research cases included 61 (64.2%) male and 34 (35.6%) female patients. Our research patients had a mean age of 9.96 ± 1.64 years. Out of 95 research cases, 41 (43.2%) were rural and 54 (56.7%) urban. 63 (66.3%) women were poor, 32 (33.7%) were medium class, and 57 (60.0%) were illiterate. We found obesity in 6.3% of our research subjects, with a mean body mass index of 24.21 ± 1.36 kg/m2.

The average disease duration was 2.89 ± 1.13 years, with 56% of patients experiencing sickness for over 2.5 years. 36 (37.9%) had moderate quality of life and 59 (62.1%) had low. Our study found significant rates of low quality of life in diabetic youngsters. Gender, age, residential status, socioeconomic position, maternal literacy, and extended illness duration substantially affected quality of life. Clinicians treating such individuals must assess for quality of life for time management. This will reduce linked morbidities and enhance patient quality of life. Another research in Pakistan found a 34.6% quality of life score, lower than ours. This difference in our study is because most children are local and poor[12]

In Saudi Arabia, this study was conducted on patients with type 1 diabetes who had a high glycemic index. The results showed that the distress index was 43.00%, which is lower than the results of our study[13]

Another study found that adults and children had overall QOL ratings of 33.4 ± 7.1 on the Short-Form-12 and 76.2 ± 17.8 on the PedsQL, which is comparable to our study's intermediate score. Adults with moderate/high adherence reported greater quality of life (p-value = 0.007). Similarly, children with higher psychological health scores (0.048) had better glycemic control[14]

The 148 T1D responders were 41.9% adolescents and 58.1% youngsters. Most (94.6%) were Saudis, and 53.4% were

women. Depression affected 27% of kids and teens. Eighty percent of dissatisfied people had mild depression, twelve percent moderate, and seven percent severe. Sadness was linked to female sex (p = 0.014), uncontrolled HbA1c (p = 0.037), and longer diabetes history (p = 0.013). This study indicated more depression in children and adolescents than before. Early depression screening improves diabetes management and life quality[15]

According to the EQ-5D, 13.2% of children experienced significant pain or discomfort, 9.7% struggled with daily tasks, and 17.7% experienced moderate pain or discomfort. The average VAS was 86.1, while the EQ-5D score was 0.95. Mean VAS ratings were 82.8 and 89.2 for HbA1c levels ≥7.5% and <7.5%, respectively, with mean index scores of 0.94 and 0.95. Children with comorbidities had a mean index score of 0.91, whereas those without had 0.96. Thus, the VAS ratings averaged 83.7 and 87.2. The PedsQL instrument assessed HRQOL from 68.1 (ages 2-4) to 73.1 (ages 13-18)[16]

Children and adolescents had an average HRQoL total score of 72.61 ± 15.36. Older age, higher family socioeconomic status, outstanding academic achievement, and higher parental education level, particularly among women, were all strongly associated with improved overall HRQoL[17]

That is 76.5% and 67% Bethlehem, respectively, according to a poll performed in Ethiopia by wondyfraw, which is consistent with the findings of our own research[18]

Studies show that female adolescents with diabetes have a lower quality of life than males with the same problems. Except for diabetic symptoms, we discovered that both sexes had lower overall HRQoL and subdomain ratings. Male sex was also found to be an independent predictor of total HRQoL and diabetic symptoms using regression analysis. Multiple cross-sectional studies revealed that female children and adolescents with T1DM had worse QoL scores than boys[19]

Another study doe in Iran which showed that the quality of life in children 72.6% which is similar to our study .

Acute and chronic difficulties can both have an influence on quality of life, and persons with type 1 diabetes endure chronic stress, which has been connected to multicomponent treatment and its repercussions. Furthermore, QOL can be influenced by a number of psychological concerns that develop from having an illness for a lengthy period of time, as well as disease-related characteristics such as the level of disease management[20]

Glycosylated hemoglobin levels were similar in boys and females. The median was 7.3%, although some values exceeded 11%. Overall, 53.9% of patients used insulin injections to manage high blood glucose levels. When children were separated by age, inconsistencies appeared. Insulin pumps were more commonly used among adults over the age of 12. Diabetic ketoacidosis and hypoglycemia were more prevalent in children aged 5 to 7. An intriguing relationship was discovered between overall quality of life scores and disease features. The absence of hypoglycemic episodes in the previous period was associated with a statistically significant improvement in quality of life across all age groups. This finding complements previous studies revealing that hypoglycemia or its repercussions, such as post-traumatic stress or complications, reduce patients' quality of life regardless of age[21]

This unique statewide study in the Netherlands found that assessed young adults with T1DM had a pleasant social life but fared worse on physical, emotional, and school/work functioning than their healthy peers. Specifically, functioning in school or job was affected. HRQOL of young individuals with T1DM was equivalent to norm scores of young adults with chronic illnesses, with differences too modest to be clinically significant. In addition, one-quarter of young adults with T1DM experienced weariness[22]

Marisa E. Hilliard is the individual who was responsible for carrying out the research. Her name is Marisa. In the course of our investigation, we came to the realization that 60%percent of the quality of life associated with children is comparable to what we found[23]

The findings of another study, on the other hand, suggest that the intermediate level of quality of life is 59%, which is quite identical to the findings of our own study due to the fact that both studies were conducted by the same researchers[24]

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