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Original Article

Assessment of Quality of Life in Children with Type 1 Diabetes Mellitus

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ABSTRACT

Background: Type 1 diabetes mellitus (T1DM) is a chronic autoimmune disease that affects children and adults. It requires continuous insulin administration for glucose control. T1DM significantly impacts children's quality of life (QOL), affecting their daily activities andcausing emotional and social challenges.
Aim: The current study aims to assess the effect of Type 1 DM on the quality of life of children who seek treatment for the disease.
Methodology: This cross-sectional study included 60 children with Type 1 Diabetes Mellitus (T1DM) divided into two age groups. The *Pediatric Quality of Life Inventory (PedsQL) questionnaire* assessed their quality of life from Physical, Emotional, Social and Schooling dimensions.
Results: The study on children with Type 1 Diabetes Mellitus (T1DM) aimed to examine the differences in quality of life based on age and gender. The participants were divided into two age groups: 8-12 years and 13-18 years, with most children falling into the 8-12 years category. Male children constituted a higher proportion compared to females. Significant differences were found between the age groups across various dimensions of quality of life, with the 8-12 years group generally reporting higher scores. However, no significant gender differences were observed. Children with T1DM face physical, emotional, social, and schooling challenges, indicating the condition's impact on their lives.
Conclusion: This study emphasizes the multidimensional impact of T1DM on children's quality of life and suggests targeted interventions. By addressing these multidimensional factors, we can better meet the needs of children with T1DM and improve their overall well- being.

Key Words: *Diabetes mellitus, QOL, T1DM*

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INTRODUCTION

India carries the weightiest childhood illnesses globally, with a massive child population. Consequently, children grappling with type 1 diabetes persist in their struggle to attain the recognition they deserve[1]. In Karnataka, a multicentric registry was established to gather data over 13 years. The registry revealed an occurrence rate of 3.7 per 100,000 boys and 4.0 per 100,000 girls[2].

Type 1 diabetes mellitus (T1DM) is a chronic autoimmune disease that affects children and adults. T1D is a chronic condition requiring continuous exogenous insulin administration to maintain glucose control[3]. It is characterized by destroying beta cells in the pancreas,which leads to a lack of insulin production. Insulin is a hormone essential for the body to use glucose for energy. Without insulin, glucose builds up in the blood, leading to serious health complications. The precise cause of this autoimmune destruction is not fully understood, butit is believed to involve a combination of genetic and environmental factors[4]. Genetic factors significantly predispose individuals to T1D, while environmental factors include viral infections (e.g., rubella, mumps, cytomegalovirus) and cow's milk protein consumption[5].

T1DM can have a significant impact on the quality of life (QOL) of children. Children with T1DM must monitor their blood sugar levels and adjust their insulin doses. They may also experience frequent hypoglycemic (low blood sugar) and hyperglycemic (high blood sugar) episodes. These episodes can disrupt daily life and lead to anxiety, depression, and social isolation[6].

Several factors can affect the QOL of children with T1DM, including age at diagnosis, glycemic control, and psychosocial factors. Children diagnosed with T1DM at a younger age tend to have lower QOL than children diagnosed at an older age. Younger children may likelyhave difficulty understanding and managing their disease. Glycemic control is also an important factor in QOL. Children with better glycemic control tend to have higher QOL. It is likely since they are less likely to experience hypoglycemic and hyperglycemic episodes. Psychosocial factors, such as stress,

anxiety, and depression, can also have a negative impact on QOL[6].

Although, interventions can improve the QOL of children with T1DM. These interventions include education and support, glycemic control, and psychosocial interventions. Education and support can help children to understand and manage their disease[7]. Psychosocial interventions can help children to cope with the emotional and social challenges of living with T1DM. The current study aims to assess the effect of Type 1 DM on the quality of life of children who seek treatment for the disease. The findings from this study will contribute to the existing body of knowledge on the QoL of children with T1DM.

METHODOLOGY

Study Design:

The study employed a cross-sectional design to examine the differences in various dimensions of quality of life among children with Type 1 Diabetes Mellitus (T1DM) based on age and gender. This design allowed for data collection at a single point, providing a snapshot of the participant's quality of life. By comparing different age groups and genders, the study aimed to understand how these factors influence the quality of life experienced by children with T1DM.

Participants:

The participants in the study were children diagnosed with Type 1 Diabetes Mellitus. The sample was divided into ages 8-12 and 13-18. This division allowed for examining potential differences in quality of life between younger and older children with T1DM. The study included 60 children, with 33 (55%) falling into the 8-12 age group and 27 (45%) falling into the 13-18 age group. Gender distribution showed 19 female children (31.7%) and 41 male children (68.3%) included in the study.

Measures:

The study employed the Pediatric Quality of Life Inventory (PedsQL) questionnaire to assess the quality of life of children with T1DM. This validated questionnaire measures children's and adolescents' quality of life. By utilizing this comprehensive instrument, the study aimed to capture different aspects of the participants' well-being and functioning. The questionnaire covered multiple dimensions: Physical, Emotional, Social and Schooling

Data Collection:

Data collection involved administering the PedsQL questionnaire to the participants. The questionnaire was completed either by the children themselves or with the assistance of their parents or guardians, depending on the child's age and capability. This approach ensured that the responses accurately represented the perspectives of the participants. The completed questionnaires were coded and entered into a database for further analysis.

Data Analysis:

Descriptive statistics, such as frequencies and percentages, were calculated to summarize the demographic characteristics of the participants. Mean scores were calculated for each dimension of the PedsQL questionnaire, providing an overall measure of the quality of life in different domains for children with T1DM. Additionally, statistical analysis techniques such as t-tests or chi-square tests were employed to examine significant differences between age groups and gender about the various dimensions of quality of life. These analyses aimed to identify any disparities in quality of life experienced by different age groups and between male and female children with T1DM.

Ethical Considerations:

The study obtained approval from the relevant institutional review board or ethics committee to uphold ethical standards. Informed consent was obtained from the parents or guardians of the participating children, with consent sought from the children by their age and understanding. Confidentiality and anonymity of the participants' data were strictly maintained throughout the study, ensuring the privacy and protection of their personal information.

RESULTS

Age

In our study, we divided the children into two age groups according to the category as demanded by the PedsQL questionnaire. The two age groups were 8-12 and 13 – 18. It was found that a greater proportion of children belonged to the age group of 8-12 years, 33 children, with the percentage being 55. The other group of children (who belonged to the age group of 12-18 years) consisted of the rest, 45% of the rest 27 children. In our study, the mean age among cases was 11.8 years. Female children consisted of 19, which made up 31.7%. Male child predominance was found in this study, with the total number of male children being 41 (68.3%). Children who belonged to the age group of 8-12 years had significantly higher scores compared to the other group of children who belonged to the age group of 13-18 years. A statistically significant difference was found between age groups concerning Physical, Emotional, Social, Schooling, and Psychosocial domains. Scoring for the physical domain was 54.8 and 70.7 for the 13-18 years and 8-12 years, respectively. (Graph 1) Similarly, the emotional domain had the scoring of 57 and 75. The social domain scored 57 and 71, whereas the schooling domain scored 49 and 65 for the 13-18 years and 8-12 years, respectively. In both age groups, the highest score was given for the emotional domain. The least scoring was given for the schooling domain.

Gender

Female children consisted of 19, which made up 31.7%. Male child predominance was found in this study, with the total number of male children being 41 (68.3%).

The mean scores of the various dimensions were compared between male and female children. Male children scored 64.7, 68, 65, 59, and 63.9 in physical, emotional, social, schooling and psychosocial domains, respectively. The following were the scoring of female children in each physical, emotional, social, schooling and psychosocial domains 61.02, 64, 64, 55, 60.96. No statistically significant difference between males and females concerning Physical, Emotional, Social, Schooling, and Psychosocial domains was found. (Graph 2)

Physical Dimension

A significant portion of children (41.7%) reported never experiencing difficulty, while 44% reported seldom experiencing difficulty. However, a small percentage (1.7%) reported often experiencing difficulty. None of the children reported ever experiencing difficulty, and a majority (58.3%) reported sometimes experiencing difficulty. Only a small percentage (3.3%) reported almost always experiencing difficulty.

Similar to running, none of the children reported experiencing difficulty. A significant portion (53.3%) reported sometimes experiencing difficulty, while a minority (21.7%) reported often experiencing difficulty. Only a small percentage (3.3%) reported never experiencing difficulty, while the majority reported sometimes (60%) or often (10%) experiencing difficulty. A significant percentage (70%) reported difficulty performing this task, indicating potential challenges in self-care and independence. Most children (65%) reported sometimes experiencing difficulty performing household tasks. Most children (45%) reported experiencing pain sometimes, while a considerable percentage (21.7%) reported often experiencing pain. None of the children reported ever experiencing low energy. A significant percentage (48.3%) reported sometimes experiencing low energy, while 26.7% reported often experiencing low energy. (Table 1)

Emotional Dimension

Most children with T1DM (51.7%) reported feeling afraid or scared sometimes, while a significant portion (31.7%) reported feeling this emotion rarely. A small percentage (10%) reported feeling afraid or scared often, and none of the respondents indicated feeling this emotion almost always, suggesting that many children with T1DM experience fear or scaredness at varying frequencies. Most children with T1DM (56.7%) reported feeling sad sometimes, while 30% reported feeling sad rarely. A small percentage (6.7%) reported feeling sad often, and none of the respondents indicated feeling this emotion almost always. It indicates that many children with T1DM experience sadness to some extent. Most children with T1DM (55%) reported feeling angry sometimes, while 35% reported feeling angry seldom. None of the respondents indicated feeling angry often or almost always. It suggests that a substantial proportion of children with T1DM experience anger to some degree, although it is not as prevalent as other emotions. A significant portion of children with T1DM(48.3%) reported having trouble sleeping sometimes, while 33.3% reported having trouble sleeping rarely. A smaller percentage (18.3%) indicated having trouble sleeping often, and none of the respondents reported this issue, almost always indicating that a considerable number of children with T1DM experience difficulties with sleep to varying degrees. (Table 2)

Most children with T1DM (61.7%) expressed worry about what will happen to them sometimes, while 31.7% reported never feeling this worry. A small percentage (6.7%) indicated worrying often, and none of the respondents reported worrying almost always, implying that a significant number of children with T1DM experience worry about their future, potentially related to their condition.

Social Dimension

Children with Type 1 Diabetes mellitus rarely have trouble getting along with other children (0% "Never"). Other teenagers generally do not exhibit a lack of interest in being friends with children with Type 1 Diabetes (33.3% "Never" and 45% "Almost Never"). Children with Type 1 Diabetes mellitus experience teasing from other children to a moderate extent (41.7% "Never," 48.3% "Almost Never," and 10% "Sometimes"). While teasing is still present, the percentage is relatively low. Children with Type 1 Diabetes mellitus do feel, to some extent, that they cannot do things that other children their age can do (3.3% "Never," 41.7% "Almost Never," 43.3% "Sometimes," and 11.7% "Often"). Children with Type 1 Diabetes mellitus find it somewhat difficult to keep up with children their age (1.7% "Never," 35% "Almost Never," 51.7% "Sometimes," and 11.7% "Often"). (Table 3)

Schooling Dimension

Most individuals report difficulty paying attention, with 50% indicating "Almost Never" and 30% indicating "Sometimes." A substantial percentage of individuals report experiencing forgetfulness, with 61.7% indicating "Almost Never" and 21.7% indicating "Sometimes." Similar to forgetfulness, a significant percentage of individuals report having trouble keeping up with their schoolwork, with 61.7% indicating "Almost Never" and 21.7% indicating "Sometimes." A notable portion of individuals report missing school because of not feeling well, with 50% indicating "Sometimes" and 28.3% indicating "Often." Some individuals report missing school to go to the doctor or hospital, with 13.3% indicating

"Sometimes" and 60% indicating "Often." (Table 4)

DISCUSSION

The study found that children with Type 1 DM had significantly lower scores than healthy children in all five domains of the PedsQL questionnaire: Physical, Emotional, Social, Schooling, and Psychosocial. The largest difference was found in the Physical domain, with children with Type 1 DM scoring an average of 15.9 points lower than healthy children.

The study also found a significant score difference between the two age groups. Children aged 8-12 had significantly higher scores than those aged 13-18 in all five domains. The association between age and quality of life in type 1 diabetes is complex. Evidence suggests that younger children with type 1 diabetes may have a lower quality of life than older children and adolescents. It may be due to several factors, including the physical and emotional demands of managing the disease, the lack of social support, and the associated stigma[8].

Coolen et al. (2021) found that children with type 1 diabetes had significantly lower scores than healthy children on quality of life measures, including physical health, emotional well- being, and social functioning. The study also found that the impact of type 1 diabetes on quality of life was greater for adolescents than younger children. Similarly, *Hilliard et al. (2019)* found that children with type 1 diabetes were more likely to experience anxiety and depression than healthy children. The study also found that children with type 1 diabetes were to miss school days and have lower grades than healthy children[9].

The current study included 60 children, 41 (68.3%) male and 19 (31.7%) female. However, when comparing the mean scores, no significant disparities were observed between male and female children in any of the domains assessed.

Our study showed that many children reported experiencing some difficulty with physical functioning, particularly in walking, running, and lifting heavy objects. These findings are consistent with those of other studies that have examined the physical health of children with chronic health conditions.

Varni et al. (2001) found that children with chronic health conditions had significantly lower scores on the PedsQL Physical Functioning Scale than healthy children. (10) Similarly, *Burwinkle et al. (2003)* found that children with chronic health conditions were more likely to report difficulty with physical activities such as running, playing sports, and walking up stairs[10].

The findings of this study suggest that children with chronic health conditions may experience significant challenges in their physical functioning. These findings suggest that many children with type 1 diabetes face challenges related to mobility, physical activities, strength, and daily tasks. Pain and low energy are also prevalent among this population. These difficulties may impact their overall physical well-being, independence, and quality of life. Healthcare providers and caregivers should address these issues to support the children in managing their condition effectively and improving their overall physical functioning and well-being. These challenges can negatively impact their quality of life, including their abilityto participate in activities they enjoy, attend school, and overall well-being.

The most common emotional challenges reported by children with T1DM were fear, sadness, anger, and worry. Given the challenges of living with a chronic health condition, theseemotions are understandable.

The results of this study are consistent with the findings of other studies that have examined the emotional well-being of children with T1DM. For example, a study by *Anderson et al. (2009)* found that children with T1DM were more likely to experience anxiety and depression than healthy children[11]. Similarly, a study by *Commissariat et al. (2015)* found thatchildren with T1DM reported feeling sad, angry, and worried more than healthy children[12].

These findings suggest that children with T1DM are at an increased risk for emotional problems. It is likely since living with T1DM can be a very stressful and demanding experience. Children with T1DM must constantly monitor their blood sugar levels, take insulin injections, and ensure they eat a healthy diet. They also have to be careful about what activities they participate in, as some activities can increase their risk of hypoglycemia or hyperglycemia.

The emotional challenges of living with T1DM can significantly impact a child's quality of life. Children struggling with emotional problems may have difficulty attending school,making friends, and participating in activities they enjoy. They may also be more likely to experience physical health problems like poor blood sugar control.

It is important to provide emotional support to children with T1DM. It can help them cope with their condition's challenges and live a full and happy life. There are many ways to provide emotional support, including talking to the child about their feelings, teaching them relaxation techniques, and encouraging them to participate in activities they enjoy. It is also important to provide the child with support from their family and friends.

The results of our study suggest that children with Type 1 Diabetes mellitus (T1DM) have a good social life. They rarely have trouble getting along with other children, and other teenagers are generally not opposed to being friends with them. However, they do experience some teasing from other children, and they feel to some extent that they cannot do things that other children their age can do. They also find it somewhat difficult to keep up with children their age.

A study by *Wiebe et al. (2016)* found that children with T1DM were no more likely to report having trouble getting along with other children or being teased than healthy children. However, the study did find that children with T1DM were more likely to report feeling that they could not do things that other children their age could do, and they were also more likely to report feeling that they had difficulty keeping up with children their age. These findings are consistent with the findings of other studies that have examined the social well-being of children with T1DM[13].

The results of this study show that many individuals experience difficulty paying attention, forgetfulness, trouble keeping up with schoolwork, and missing school due to illness or medical appointments. These findings are consistent with other studies on the quality of lifeof children and adolescents with chronic health conditions.

Asaad et al. (2021) studied 122 schoolchildren with Type 1 diabetes mellitus (T1DM). The study found that higher glycated haemoglobin (HbA1C) levels were negatively correlated with academic skills and classroom attention in children with T1DM. Most participants had HbA1C levels above 9.5%, and nearly half had chronic T1DM-related complications. Academic performance was negatively correlated with higher HbA1C levels and a longer duration of the illness. However, there was no significant difference in academic scores between diabetic children with chronic complications and those without[14]. It suggests that children and adolescents with chronic health conditions are at risk for experiencing several challenges in the schooling domain. These challenges can have a negative impact on academic achievement, social-emotional well-being, and overall quality of life.

Table 1: The table illustrates the distribution of physical dimensions among the study population (N=60)

Physical dimensions	**Never**	**Almost Never**	**Sometimes**	**Often**	**Almost Always**
Difficult to walk more than 100 metres	41.7%	44%	11.7%	1.7%	0
Difficult to run	0	23.3%	58.3%	15%	3.3%
Difficult to do sports activities/exercise	0	21.7%	53.3%	21.7%	3.3%
Difficult to lift heavy things	3.3%	26.7%	60%	10%	0
Difficult to take a bath or shower	70%	30%	0	0	0
Difficult to do house chores	21.7%	65%	13.3%	0	0
Feel pain	1.7%	31.7%	45%	21.7%	0
Low energy	0	25%	48.3%	26.7%	0
Values are expressed as frequency and percentage					

Table 2: The table illustrates the distribution of emotional dimensions among the studypopulation (N=60)

Emotional dimensions	**Never**	**AlmostNever**	**Some-times**	**Often**	**AlmostAlways**
Feel afraid or scared	6.7%	31.7%	51.7%	10%	0
Feel sad	6.7%	30%	56.7%	6.7%	0
Feel angry	35%	55%	10%	0	0
Trouble sleeping	33.3%	48.3%	18.3%	0	0
Worry about what willhappen to me	0	31.7%	61.7%	6.7%	0
Values are expressed as frequency and percentage					

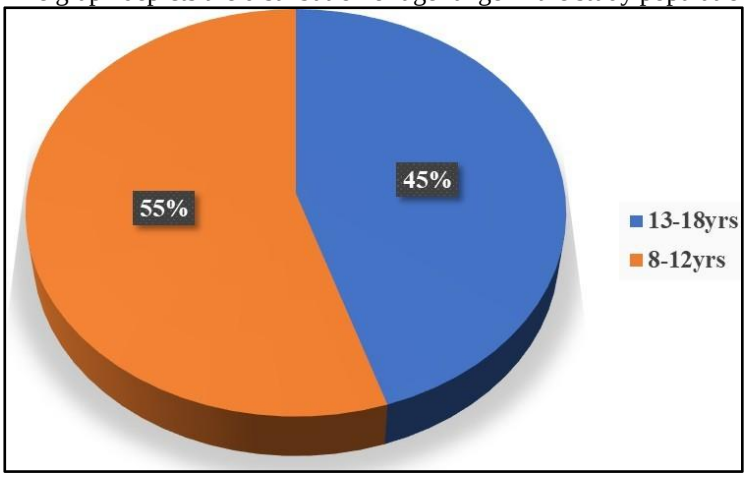
Table 3: The table illustrates the distribution of social dimensions among the study population(N=60)

Social dimensions	Never	AlmostNever	Some-times	Often	AlmostAlways
Trouble getting along withother children	0%	16.7%	50%	33.35%	0%
Other teens do not want tobe my friend	33.3%	45%	21.7%	0%	0%
Other children tease me	41.7%	48.3%	10%	0%	0%
Cannot do things that otherchildren of my age can do	3.3%	41.7%	43.3%	11.7%	0%
Difficult to keep up withchildren of my age	1.7%	35%	51.7%	11.7%	0%
Values are expressed as frequency and percentage					

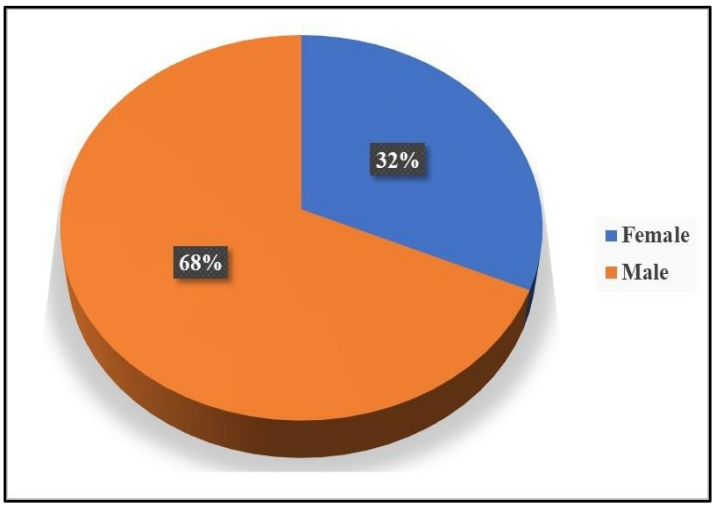
Table 4: The table illustrates the distribution of schooling dimensions among the studypopulation (N=60)

Schooling dimensions	Never	AlmostNever	Some-times	Often	AlmostAlways
Difficult to pay attention in class	18.3%	50%	30%	1.7%	0
Forget things	16.7%	61.7%	21.7%	0	0
Trouble keeping up withschoolwork	16.7%	61.7%	21.7%	0	0
Miss school because ofnot feeling well	0	21.7%	50%	28.3%	0
Miss school to go to thedoctor or hospital	0	0	13.3%	60%	26.7%
Values are expressed as frequency and percentage					

Graph 1: The graph depicts the distribution of age range in the study population (N=60)



Graph 2: The pie graph depicts the distribution of gender in the study population (N=60)



CONCLUSION

This study highlights the multidimensional impact of T1DM on the quality of life of children. The findings underscore the importance of addressing physical, emotional, social, and schooling aspects when considering interventions and support for children with T1DM. Strategies to manage pain, improve energy levels, address emotional well-being, foster supportive social environments, and provide academic support may enhance children's overall quality of life with T1DM.

DECLARATIONS

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