

Quality of Life of Type 1 Diabetic Indian Children and Adolescents - Cross Sectional Study

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ABSTRACT

Background and objectives: Quality of life in Individuals with Type 1 diabetes mellitus (T1DM) especially children and adolescents is affected by multiple factors. Aims and Objectives: To ascertain the factors influencing quality of life in Indian children and adolescents with Type1 Diabetes.

Materials and Methods: Forty-six children and young people with T1DM, aged 6–18 years were assessed using Down Quality of Life for young, WHO-5 well-being index, Diabetes treatment satisfaction Questionnaire (DTSQ), Diabetes specific Quality of Life scale, strength and difficulty questionnaire (SDQ).

Results: Four of study participants were found to be 16.6±0.6 years, 70% of the study participants belonged to age group of 10-19 years. Mean age at onset of diabetes was 9.9±2.8 years. 83% of patients belonged to upper middle income group and none of the participant belonged to lower socio economic status. Good education levels found in our study participants (65.2% of the patients had studied till high school) and their parents (52% had studied till graduation level). Vitamin D deficiency and Hypothyroidism was reported by 4% of the total patients. It was found that 17% of the study participants were obese. 8% were anaemic and 21% had Vitamin D deficiency. Mean (SE) SDQ Parent Proxy scores were 17.75 (0.8) for total difficulties, 4.97 (0.3) for emotional symptoms, 4.04 (0.3) for conduct problems, 4.84 (0.3) for hyperactivity-inattention symptoms, 3.65 (0.3) for peer relationship problems and 5.96 (0.4) for prosocial behaviours. WHO-5 well-being index indicated presence of Poor well-being (raw score <13) in 17% of patients. Low mood was found in 26 % of the subjects. The mean score of the DTSQ was 32.5±13.8 All the patients reported satisfaction with treatment. Hyperglycemia was perceived by 48% of the participants most of the times. Similarly Perceived frequency of hypoglycaemia was reported to be 30.4%. Interpretation of the score. The mean DAWN QoL score was 35. Almost 50% of patients reported adverse impact on the overall quality of life, as well as individual sub-domains of the scale.

Conclusion: Children with recent diagnosis, older age at onset, elevated HbA1c, were identified to have higher prevalence of various psychological and cognitive problems. Hence children and adolescents should be prioritized for behavioral and cognitive evaluation.

Key words: Type 1 diabetes mellitus, Children, Adolescents, Quality of life

INTRODUCTION

According to International Diabetes Federation (IDF), Diabetes mellitus has been found to be affecting 425 million people globally and as per the estimations the number of people with diabetes may rise to 629 million in 2045.¹ Out of the total,

one-third of these diabetics are elderly; people older than 65 years of age. In addition to high prevalence of DM in adults and aged the estimates of children and adolescents with T1DM is on the rising trend.¹ It is estimated that the incidence of T1DM among children and adolescents is

increasing in many countries particularly in children and adolescents under the age of 15 years, and the overall annual increase is estimated to be around 3% with strong indications of geographic differences. More than 96,000 children and adolescents under 15 years are estimated to be diagnosed with T1DM annually and the number is estimated to be more than 132,600 when the age range extends to 20 years.¹

T1DM is usually caused by an autoimmune reaction where the body's immune system attacks the insulin-producing beta cells in the islets of the pancreas gland. Patients suffering with T1D need daily insulin injections in order to maintain a glucose level in the proper range and without insulin would not be able to survive.²

Chronic nature of the T1DM and multipronged management causes significant stress among the patients. Financial constraints, poor health-seeking behavior and the social stigma attached to the T1DM may further aggravate the psychosocial and behavioural profiles of children/adolescents with T1DM.³

The current study was conducted with the objective to ascertain the factors influencing quality of life in Indian children and adolescents with T1DM.

MATERIAL AND METHODS

A cross sectional study was conducted at a tertiary care hospital located in northern India. One hundred forty children with T1DM were screened for the study. Only 46 children were enrolled after applying inclusion and exclusion criterion and receiving consent for the study. Inclusion criteria included children on insulin therapy and above 6 years of age. Children less than 6 years and suffering from psychiatric disorder were excluded.

Forty-six children and young people with T1DM, aged 6–18 years outcome were assessed by using Down Quality of Life for young⁴, WHO-5 well-being index⁵, Diabetes treatment satisfaction Questionnaire (DTSQ)⁶, Diabetes specific Quality of Life

scale⁷, strength and difficulty questionnaire (SDQ)⁸.

Interpretation of the score: The mean score (39) on Diabetes-specific Quality of life while around 26% of respondents had a better or moderate quality of life on this scale, 74% of them had a poor quality of life. It was observed that while none of the socio-demographic factors (age, sex, education or parents' education) had any effect on the quality of life of the respondent as measured through these scales, the control of Diabetes (measured as HbA1c levels) and comorbidity had a significant association with the quality of life.

1, Quality of life questionnaire (published by the DAWN youth project): This is a 22-item validated questionnaire to assess possible problems in the following six domains: Impact of symptoms related to diabetes, impact of the treatment, impact on activities, parents' issues, worry about the future, and perception of one's own health.

2. WHO-5 well-being Index was administered to subjects aged 12-18 years (n = 34). It comprises of five positively worded items; related to positive mood, vitality, and general interests; which are rated on a 6-point Likert scale from '0' (not present) to '5' (constantly present). Higher scores indicate better well-being. The raw score was calculated by totalling the figures of the five answers. The raw score ranges from 0 to 25, 0 representing worst possible and 25 representing best possible quality of life.

3. Diabetes treatment satisfaction Questionnaire (DTSQ) covers eight items with regard to the diabetes treatment over the past weeks and measures overall satisfaction, convenience, flexibility, understanding of diabetes, willingness to recommend current treatment to others and willingness to continue the current treatment. Each item is rated on a 7-point Likert scale with a score ranging from 0 (i.e., very dissatisfied) to 6 (i.e., very satisfied).

4. Diabetes specific quality of life score (DSQoL): The score has been expressed as a percentage of the total QoL Score for ease

of comparison and analysis. To obtain a percentage score ranging from 0 to 100, the raw score was recorded. Those patients with a QoL score of more than 70 had a better QoL, those with a QoL score of 50-70 had a moderate QoL, and those with less than 50 had a poor QoL.

5. Strengths and difficulty questionnaire: For each of the five subscales, a score ranged from 0–10 if all five items were completed. Further, a total difficulties score was calculated by summing the scores from the first four subscales (range 0–40).

STATISTICAL ANALYSIS

Statistical analysis was carried out by using SPSS version 21.0. Descriptive statistics i.e. mean ± standard deviation, percentages for categorical variables was performed. Bivariate analysis was carried out using Student's t-test and Spearman's rank correlation to assess the strength of association with potential predictors. P < 0.05 was considered statistically significant.

RESULTS

Participants (N=46) distribution was as follows: children (6-12 years, 9%), adolescents (13-18 years, 70%) and young adults (> 18 years, 22%) (Table-1). The mean age of study participants was found to be 14.4 ± 0.6 years. More than half of the study population was male (52%). Out of the total patients, 65.2% had studied till high school, 17% were college going students, 9% had studied up to primary and secondary level each (Table-1). Majority of the participants (83%) belonged to upper middle income group, followed by 8% each belonging to upper and upper lower socio economic status. None of the participant

belonged to lower socio economic status (Figure-1).

Table 1: Demographic profile of the participants

Variable	N (%)
<10 years	4 (8.7)
10- 19	32 (69.6)
>19	10 (21.7)
Total	46 (100.0)
Gender	
Male	24 (52)
Female	22 (48)
Education	
Primary	4 (8.7)
High School	30 (65.2)
Secondary	4 (8.7)
College	8 (17.4)
Total	46 (100)
Education level of the study participants	
Graduation	24 (52.2)
High school	4 (8.7)
Post-Graduation	4 (8.7)
Secondary School	14 (30.4)

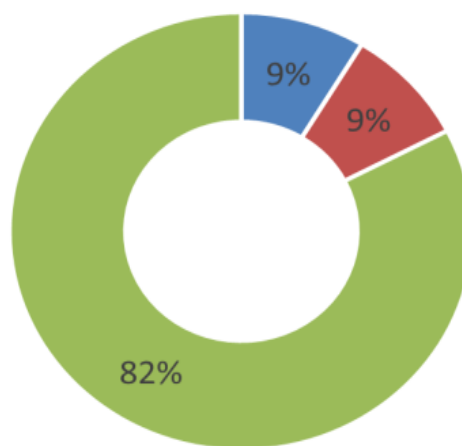


Figure 1: Pie diagram representing distribution of socio economic status of the participants

The mean age onset of diabetes was 9.9 years and approximately 40% of the children were diagnosed with T1DM in last 2 years. The mean fasting blood glucose levels were 143.5 (49.5). Mean HbA1c was 9.6±0.3%. BMI ranged from 12.6- 25.2 with mean BMI value of 18.3 (Table-2).

Table 2: Clinical parameters of study participants related to diabetes control

Variable	Mean (SE)	Minimum	Maximum
Age at onset of diabetes	9.9 (0.4)	5	18
Mean Fasting Blood Sugar levels	143.5 (7.3)	70	266
Mean Postprandial blood sugar levels	204.4 (7.2)	148	331
Mean HbA1C	9.6 (0.3)	5.6	14.5
Mean BMI	18.3 (0.5)	12.6	25.2

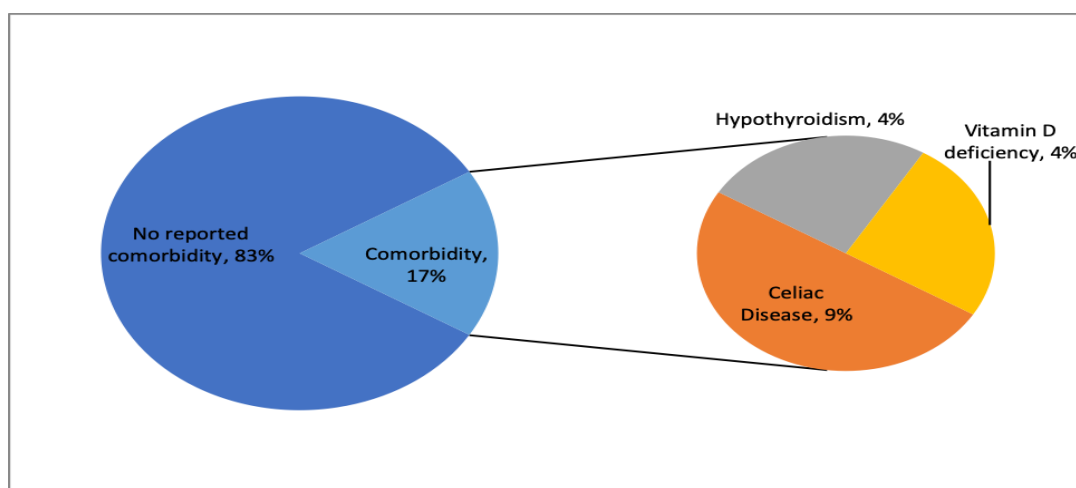


Figure 2 : Distribution of self-reported comorbidity among type 1 diabetes patients enrolled in the study

Vitamin D deficiency and Hypothyroidism was self reported by 4% of the total patients (Figure-2). Evaluation showed that 17% of the study participants were obese, 8% were anaemic and 21% had Vitamin D deficiency. Hypothyroidism and celiac disease were found to be present in 21% and 34.7% of the study participants. Glycaemic control represented by HbA1c was found to be $>8\%$ in 74% of the total subjects which represents uncontrolled diabetes $>$ in children below 6- 12 years age group all the participants had HbA1c levels more than 8%.

SDQ Parent Proxy scores were 17.75 (0.8) for total difficulties, 4.97 (0.3) for emotional symptoms, 4.04 (0.3) for conduct problems, 4.84 (0.3) for hyperactivity-inattention symptoms, 3.65 (0.3) for peer relationship problems and 5.96 (0.4) for prosocial behaviours. The SDQ revealed that nearly a third of the subjects had a significant adverse impact on quality of life due to their diabetes.

WHO-5 well-being index indicated presence of Poor well-being (raw score <13) in 17% of patients. Low mood was found in 26 % of the subjects. A raw score below 13 indicates poor well-being and is an indication for further evaluation.

The mean score of the DTSQ was 32.5 ± 13.8 . All the patients reported satisfaction with treatment. Hyperglycemia was perceived by 48% of the participants most of the times. Similarly Perceived

frequency of hypoglycaemia was reported to be 30.4%. Item wise analysis of DTSQ questionnaire revealed highest positive response of patients for treatment recommendation and treatment continuation. The mean score on quality of life scale was found to be 32.5 ± 2 . Almost 50% of patients reported adverse impact on the overall quality of life, as well as individual sub-domains of the scale.

The mean score on Diabetes-specific Quality of life questionnaire was found to be 39. This ranged from a minimum value of 18 to a maximum value of 92 Please specify low score means poor quality of life. This ranged from a minimum value of 18 to a maximum value of 92. While around 26% of respondents had a better or moderate quality of life on this scale, 74% of them had a poor quality of life (Table-3).

The results of bivariate analysis for the association of various potential predictors with the overall results are presented (Table 4). No significant association of socio demographic factors was observed with the quality of life of the respondents except the control of Diabetes (measured as HbA1c levels) Table 4 presents the mean values and 95% confidence intervals for the five scales employed in the study stratified as per categories of different socio-demographic variables while the overlap between confidence intervals represents non-significant statistical difference, the

complete separation between confidence intervals of comparators represent statistically significant difference. It was observed that while none of the socio-demographic factors (age, sex, education or parents' education) had any effect on the

quality of life of the respondent as measured through these scales, the control of Diabetes (measured as HbA1c levels) had a significant association with the quality of life.

Table 3: Quality of life of the respondents as per different questionnaires

Variable	N (%)	
WHO-5 Well Being Index	Poor well-being (raw score <13) [n (%)]	8 (17.4)
	Normal well-being (raw score ≥13) [n (%)]	38 (82.6)
	Average Raw Score [mean (SE)]	15.91 (0.5)
	Average Score [mean (SE)]	63.6(2.05)
	Low mood (score <52) [n (%)]	12 (26)
	Depression (score <28) [n (%)]	0
Diabetes treatment satisfaction Questionnaire	Most of the time	22 (47.8)
	Some of the time	4 (8.7)
	Most of the time	14 (30.4)
	Some of the time	4 (8.7)
DTSQ item descriptive statistics	Current treatment satisfaction	46 (100)
	Treatment convenience	35 (76.1)
	Treatment flexibility	31 (67.4)
	Treatment understanding	36 (78.3)
	Treatment recommendation	42 (90.1)
	Treatment continuation	43 (93.5)
Quality of life Questionnaire (Dawn Youth)	DAWN QoL score (mean± SD, SE)	32.5±13.8,SE=2.04
	Significant adverse impact on QoL n (%)	22 (47%)
	Significant adverse impact in sub-domains	
	Impact of symptoms related to DM; n (%)	22 (47%)
	Impact of treatment; n (%)	23 (50%)
	Impact on activities; n (%)	22 (47%)
	Parent issues; n (%)	25 (55%)
	Worries about diabetes; n (%)	25 (55%)
	Health perception; n (%)	22 (47%)
Strengths and Difficulties Questionnaire	Close to average (0-13)	8 (18.2)
	Slightly raised/ lowered (14-16)	2 (4.5)
	High/ low (17-19)	17 (38.6)
	Very High/ low (20-40)	17 (38.6)
	Total	44 (100)
	Close to average (0-13)	8 (18.2)

Table 4 :Association of potential predictors with outcomes on bivariate regression analysis

	WHO 5 Mean (95% CI LL-UL)	Down QOL for young (95% CI LL-UL)	DS QOL (95% CI LL-UL)	DTSQ Overall treatment satisfaction Mean (95% CI LL-UL)	SDQ Mean (95% CI LL-UL)
<10 years	21.0 (17.0-25.0)	20.5 (15.0-26.0)	36 (34-38)	33.1 (30.1-36.1)	19.0 (18.0-20.0)
10- 19	15.5 (14.4-16.6)	34.6 (30.1-39.4)	37.1 (29.3-44.5)	31.1 (28.2-33.4)	18.8 (17.2-20.2)
>19	14.6 (12.6-16.6)	30.5 (22.8-39.1)	46.4 (35.4-59.9)	26.9 (21.1-32.9)	14.1 (10.1-17.9)
<i>P value</i>	0.04	0.136	0.46	0.29	0.02
Gender					
Male	16.9 (15.4-18.4)	30.5 (25.3-36.3)	39.8 (31.2-49.5)	29.9 (26.1-33.2)	17.5 (15.1-19.8)
Female	14.5 (13.1-15.9)	34.7 (28.9-40.4)	38.1(30.7-46.7)	30.7 (27.6-33.6)	18.1 (16.3-19.5)
<i>P value</i>	0.04	0.30	0.79	0.76	0.72
Education					
Primary	19.1 (13.1-25.1)	33.5 (26-41)	37(34-40)	30.1 (24.1-36.1)	19.1 (18.1-21.1)
High	15.5 (14.4-16.5)	31.9 (26.9-37.1)	37.8 (30.1-45.9)	32.3 (29.8-34.6)	18.9 (17.2-20.4)
Secondary	19.5 (19.1-21.1)	38.7 (26.3-50)	32 (24- 40)	27.1 (18.1-36.1)	12.5 (7.1-18.1)
College	13.5 (11.7-15.1)	31.3 (21.4-41.7)	48 (33.7-64.6)	24.6 (18.1-31.8)	15.7 (11.7-19.8)
<i>P value</i>	0.09	0.82	0.58	0.09	0.05
Parent Education					
Graduation	16.1 (14.5-17.9)	30.1 (25.2-35.5)	42.5 (33.5-51)	30.1 (26.7-33.2)	17.5 (15.4-19.6)
High school	18.1 (17.9-18.2)	40 (33- 47)	24 (22-26)	36.1 (35.9-36.2)	18.5 (17.1-20.1)
Post-Graduation	14.1 (12.1-16.1)	31.5 (17- 46)	64 (50-78)	36.1 (35.9-36.2)	12.5 (7.1-17.2)
Secondary School	15.1 (13.2-17.2)	34.7 (26.6- 43.4)	30.3 (23.6- 37.9)	27.4 (22.1-31.9)	19.7 (17.9-21.8)
<i>P value</i>	0.44	0.530	0.009	0.117	0.091

Table 4 to be continued...					
Diabetes Control					
Normal (HbA1C upto 5.6)	18.1 (17.9-18.2)	55 (only 2 cases)	18 (only 2 cases)	11.5 (11-12)	27.1 (26.9-27.2)
High risk (HbA1C 5.7-6.4)	19.1 (18.9-19.2)	9 (only 2 cases)	92 (only 2 cases)	36 (35- 37)	12.1 (11.1-13.1)
Diabetic (HbA1C 6.5 and above)	15.5 (14.4-16.6)	32.6 (28.9- 36.4)	37.5 (32.1- 43.1)	30.9 (28.6- 32.9)	17.6 (16.1-18.9)
<i>P value</i>	0.31	0.01	0.01	0.01	0.01
Comorbidity					
Comorbid Hypothyroidism					
No	16.2 (14.8-17.4)	35.3 (30.9-39.7)	33.8 (28.7-40.1)	28.7 (25.8-31.5)	18.6 (17.1-19.9)
Yes	14.3 (12.8-15.6)	23.7 (16.1-33.6)	58.1 (38.8-75.3)	35.7 (35.4-36.0)	14.1 (10.1-18.4)
<i>P value</i>	0.36	0.01	.01	0.01	0.02
Comorbid Anaemia (<11)					
No	15.7 (14.5- 16.8)	33.3 (28.9- 37.9)	38.5 (32.1- 45.9)	30.4 (27.7- 32.6)	17.6 (16.1- 19.1)
Yes	17.1 (14.1- 20.1)	32.1 (27.1- 37.1)	35.1 (20.1- 50.1)	27.1 (18.1- 36.1)	19.1 (14.1- 24.1)
<i>P value</i>	0.52	0.93	0.69	0.39	0.61
Comorbid Vitamin D deficiency (<30)					
No	16.3 (15.1-17.5)	32.6 (28.3- 37.3)	40.1 (33.1- 47.8)	28.7 (25.8- 31.4)	17.4 (15.6-18.9)
Yes	13.5 (11.7-15.6)	35.7 (24.2- 45.2)	30.1 (22.7- 39.1)	36.1 (35.9- 36.1)	19.5 (18.2-20.9)
<i>P value</i>	0.13	0.89	0.56	0.01	0.27
Comorbid Celiac serology					
No	16.8 (15.7-17.9)	29.7 (24.2- 35.1)	44.1 (35.9-53.3)	31.6 (28.5- 34.2)	16.7 (14.7-18.7)
Yes		39.4 (33.8- 45.1)	27.7 (24.3- 31.3)	27.3 (22.8- 31.4)	19.5 (18.5-20.7)
<i>P value</i>	0.01	0.01	.01	0.07	0.08
Socioeconomic status					
Upper	14.0 (12.1-16.1)	31.5 (17.1-46.1)	64.0 (50.0-78.1)	36.0 (35.9-36.1)	12.5 (7.2-17.1)
Upper- lower	18.0 (17.9- 18.1)	40.1 (33.1- 47.1)	24.0(22.1-26.1)	36.0 (35.9-36.1)	18.5(17.1-20.1)
Upper- middle	15.7 (14.5-17.1)	31.8 (27.6-36.4)	38.1 (31.9-44.2)	29.1 (26.3-31.6)	18.2 (16.7- 19.7)
<i>P value</i>	0.28	0.538	0.017	0.089	0.084

DISCUSSION

T1DM is a life-long condition. It puts significant burden on individual as well as family. Health care burden of seeking treatment is high in terms of frequent consultations with health care professionals for dose adjustments, injections, monitoring of blood sugar levels, dietary and lifestyle modifications, emergency hospital admissions. Moreover, financial impact on the family of the patient cannot be ignored. The above financial parameters however were not applicable to our subset of patients, as the treatment and medicines were provided free being a government hospital. In addition to the visible health care and economic burden, T1DM has a significant influence on the quality of life, emotional well-being and behavior of the affected children, which usually goes unaddressed.

In our study, the age of participants ranged between 7-22 years and mean age was 14.4±0.6 years which is similar to other reported studies, thus making findings of our study comparable to findings for similar age groups in our settings.^{8, 9} McCarthy et al¹⁰ in 2003 reported that socio economic

status has a greater effect on academic performance in diabetic children than medical variables. The implication of this has been interpreted by Puri et al in terms of prioritization for IQ assessment among those belonging to lower SES as probably they are at higher risk of cognitive impairment.⁸ 82.6% of our study participants belonged to upper middle-income group and none of the participant belonged to lower socioeconomic status. Good education levels found in the current study participants (65.2% of the patients had studied till high school) and their parents (52% had studied till graduation level). This explains the good education levels of parents and children. Expenditure was not a major issue in our study as parents of the participants were working in Indian Army and their health expenditures are borne by the government.

It was found that mean values for different parameters of blood sugar control (mean fasting blood glucose levels, mean postprandial blood sugar levels, HbA1c) were higher than normal values, thus indicating poor control among enrolled

participants. This calls for more frequent interaction of patients and health care providers.^{11,12}

For the study sample, mean (SE) SDQ Parent Proxy scores were 17.75 (0.8) for total difficulties which is higher than that reported by a study from US 6.8 (5.5).¹³ Amongst the subdomain, the maximally reported adverse impact was related to symptoms of diabetes and perception of health, while the minimally reported was the impact on activities. In the US based study, aggregate SDQ Parent Proxy Version total difficulties and scale scores were not correlated with HbA1c or duration of T1D and did not differ by gender, visit type, or age category.¹³ Equal percentage of patients scored a high/ low or very high/ low score of 38.6% each. 18% of the participants were reported to have score of close to average, thus implying need for watchful waiting, monitoring and care as usual. Those with very high score need a referral for mental health services.

WHO-5 well-being index indicated presence of Poor well-being (raw score <13) in 17% of patients and low mood was found in 26% of the subjects. In a similar study by Puri et al, low mood was found to be present in 21.3% of the subjects. It has been noted that the WHO-5 instrument is highly specific for depression, and a lower score indicates a greater prevalence of/predilection for depression. The overall mean (standard deviation (SD)) WHO-5 score in our study population was 15 as compared to that reported by Puri et al as 74 (19.4). This is higher (indicating better emotional adjustment) than that reported by de Wit *et al.*, among Dutch diabetic children, which was 63.3(18.9).² Puri et al detected a 'low mood' in 21.3% of the subjects. This assumes special significance in children as depression is easily missed among them. In fact, depressed children may be perceived as 'well-behaved' and 'well-adjusted'. Children with suboptimal disease control should undergo regular psychological review, and counseling.

The mean score of the DTSQ was 32.5±13.8. All the patients reported satisfaction with treatment. Hyperglycemia was perceived by 48% of the participants most of the times. Similarly Perceived frequency of hypoglycaemia was reported to be 30.4%. Though DTSQ is commonly used to compare different medications and treatment strategies, it is an important tool to assess the quality of diabetes care in clinical settings. We used the tool keeping in mind the treatment satisfaction in mind. This variable is important as an improvement in treatment satisfaction may enhance patients' self-efficacy and adherence to therapy, leading to the achievement of long-term stable glycaemic control and reduced risk of diabetic complications.¹⁴ We could not find any study from India reporting the scores of DTSQ for Type 1 diabetes mellitus. A study by Singh et al reported the scores for Type 2 diabetes mellitus patients for comparing treatment satisfaction among two group of patients.¹⁵

The mean DAWN QoL score in our subjects was found to be 35. In study by Puri et al., mean DAWN QOL score was 29.3. The maximum (worst) possible score in study by Puri et al was 84. This results have been found to be comparable to the QoL score of 97.5 (with maximum possible score of 255, using the diabetes quality of life for youth (DQOLY) questionnaire) reported by Matziou *et al.*, in their study in Greek adolescents aged 11-18 years.¹⁶ Amongst the possible predictors studied, early onset of diabetes (before age 5 years) was associated with significantly lesser negative impact on the overall QoL score as well as in most of the subdomains. In comparison to children who were diagnosed after 5 years of age, those with early onset were more optimistic about their life with diabetes, were less worried about the limitations imposed by diabetes on their current activities and future achievements, and had a more positive perception of their health. This may be related to the fact that being introduced to a way of life

incorporating diabetes management at a tender age, they make fewer comparisons to their more carefree life before the diagnosis of diabetes, and hence adapt better.

Ingreski et al¹⁷ and Awata et al¹⁸ have reported a positive association between education and Quality of life. Puri et al however did not find any association of poorer glycemic control with either the overall QoL score, or the 'perception of one's own health status' subdomain.⁸

Major strength of this study was the use of standardized tools for measuring the quality of life. Another strength lied in using interview method for data collection, which is more appropriate method compared to self-completion questionnaire method due to low literacy level of the participants.

This study concludes that children with recent diagnosis, older age at onset, elevated HbA1c, are recommended for more frequent/detailed behavioral and psychological evaluation. It is important to recognize early the psychological problems in children with T1DM, as these may lead to poor motivation and inability to manage the multifaceted treatment plan. It is hoped that the results of this study will sensitize treating physicians for early behavioral monitoring and psychological evaluation of Type 1 diabetic children.

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