
**BURDEN OF TYPE 1 DIABETES MELLITUS IN ADOLESCENT PATIENTS
ATTENDING HEALTH INSURANCE OUTPATIENT CLINICS IN
MALLAWY DISTRICT EL-MINIA GOVERNORATE**

By

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ABSTRACT:

Background: Diabetes mellitus is a worldwide major health problem. Type 1 Diabetes mellitus among adolescents have a psychological and social impact which affects greatly their life. Health related quality of life (HRQoL) related to participant's self-evaluation of health, perceived functional status and well-being. We aimed to determine the HRQoL using the Self-rated health (SRH) measure and determine factors affecting their responses.

Methods: Assessment of health related quality life by using standardized Self-rated health (SRH) measure. Statistical regression analysis was used to determine the association between adolescent patient's responses and selected variables.

Results: 67 adolescents, 36 females (53.7%) and 31 males (46.3%) were included. Average age was 14.06 (± 4.02) and average diabetes duration was 5.71 (± 1.59), while the mean HbA_{1C} was 8.05 (± 1.57). The majority rated their health as good (34%), 23.9% rated it as excellent, 11.9% as very good, 19.4 % as poor (fair) and 10.5% as very poor. Regression analysis showed that regular clinical follow up was the only predictor that was independently and significantly associated with a "better" self-health rating, (p value of 0.02).

Conclusion: Diet control and regular clinical follow up is associated with a better health related quality of life among adolescents with T1DM and should be encouraged through health education programs.

KEY WORDS:

Diabetes

Adolescent

Outpatient

El-Minia

INTRODUCTION:

Adolescence is a transitional stage of physical and psychological human development generally occurring during the period from puberty to legal adulthood it is most closely associated with the teenage years (the age of 10-19 years old)¹.

Adolescents constitute nearly 20% of the world's population (age of majority) and 85% live in low resources developing countries. Adolescence is a life phase of rapid developmental change.²

In a growing number of countries, a demographic transition is occurring. As children survive the dangers of childhood illnesses and move into the second decade of their lives, there is a bulge in the adolescent band of the population pyramid³.

In Egypt there are about 3.9 million Diabetic patients with an expected increase by 2025 to nearly 9 million⁴. Adolescents with type 1 diabetes mellitus (T1DM) face major lifestyle changes and complications which may be life-threatening.

The daily management of type 1 diabetes mellitus in adolescents represents a great challenge due to diet control, multiple daily injections, frequent blood glucose measuring, frequent healthcare visits, and regulation of exercise. Moreover, Adolescents with T1DM are at increased risk for depression, anxiety, and eating problems⁵. It is essential to provide a care for Adolescents with T1DM to alleviate the physical complications of the disease and improve overall health related quality of life which affected by both physical and mental health⁶. Self-reported health is found to reflect several aspects of health including disease severity, physical health status, psychological, social and mental functions⁷⁻¹¹.

Self-rated health (SRH) assessment tool as a measure of self-reported health is a global, health status self-assessment of an individual that has been used and validated since the 1950s¹². It is a comprehensive indicator of HRQoL as it is based on a single question. In diabetes patient populations, it has been used extensively for HRQoL surveys¹³⁻¹⁵. Self-rated health (SRH) assessment is based on the question, "In general, compared with others at your age, how would you rate your health?" Subjects then rate their own health as excellent, very good, good, fair or poor¹⁶.

AIM OF THE WORK:

- Assessment of HRQoL among adolescent's patients with T1DM in Mallawy health insurance diabetes outpatient clinic El-Minia governorate.
- Estimating the effect of diabetes duration, better compliance (including regular follow up, regular monitoring of blood sugars, intensive therapy, hospital visits and regular exercise) as

well as better glycemic control on HRQoL.

METHODS:

Patient population and settings

We had obtained agreement from health insurance sector in El-Minia governorate to perform our study

It is a cross sectional analytical hospital based study. Mallawy health insurance outpatient diabetic clinic was chosen randomly

Over a three months period, starting October of 2011 till December of 2011, subjects with T1DM aged 10-19 years presenting to Mallawy health insurance outpatient diabetic clinic for routine follow up were included in the study. The purpose of the study was explained to the patients and their parents, and an informed verbal consent was obtained. Subjects who were psychologically or mentally disturbed were excluded, as well as subjects with diabetes duration < 1 year.

Criteria of inclusion: Adolescents with type 1 diabetes mellitus at age of 10-19 years old and with diabetes duration 1 year or more.

Criteria of exclusion: Patients with age less than 10 or more than 19 years old and adolescents with diabetes duration less than 1 year.

Our patient population is of a low socioeconomic level. They received dry kit automated glucometer, dry kit strips every 2 months and 2 Novopen injecting devices one for short acting insulin and the other one for basal insulin. Treatment regimen at Mallawy health insurance diabetic clinic is, aiming to maintain normoglycemia. Our patients follow an intensive regimen, defined as three (actrapid) injections before meals

along with twice daily injections of basal insulin (insulatard) also daily blood glucose measurements. Occasionally, due to poor compliance, glycemic control is maintained with a less-intensive regimen. Patients are also encouraged to exercise regularly as part of their diabetes management.

Patient referred every 6 months to main health insurance diabetes mellitus clinic in El-Minia city for reevaluation by a physician, nutritional assessment, health education setting, thyroid function tests for associated autoimmune thyroid dysfunction, renal function tests, lipid profile and measure of Glycohemoglobin (HbA_{1C}) which clarify the glycemic control over the past three months.

Data Collection

Subjects' charts were reviewed to obtain level of glycohemoglobin (nondiabetic range 4.2-6.2%) values below 7% is considered acceptable blood glucose control. Also number of acute events in the past 12 months preceding the study participation like emergency room visits or hospital admissions because of diabetes-related medical problems (eg. hypoglycemia or DKA).

Other data obtained from the patients' charts included: diabetes duration, presence of diabetes accompanying morbidity (hypertension, thyroid, celiac or other autoimmune problems) and diabetes related complications (nephropathy, retinopathy and neuropathy).

Questionnaire

Health related quality of life was measured by using the standardized SRH instrument which has been widely used in diabetes patient populations¹³⁻¹⁵.

The words of the questionnaire were carefully chosen to be brief and easy. Colloquial Egyptian Arabic was used. The SRH tool was scored such that positive readings received higher scores (from poor = 1 to excellent = 5). Additionally, patients were asked if they exercised regularly or not (defined as at least 30-45 minutes at least 3 times a week). Moderate activity level in the form of housework, farm work or long walks for same duration and frequency was also considered exercise. Dietary history of the Patients was obtained as regards adherence to diabetes dietary advices.

Statistical analysis

we described the SRH response among adolescents with T1DM then, we explored factors related to 'poorer' versus "better" response groups.

By using intensity sampling method done by combining groups together. Those who responded very poor or poor were grouped together into the "poorer" response group, and those who responded very good or excellent were grouped together into the "better" response group.¹⁷ In order to determine predictor variables we created a dichotomous measure coded 0 if the response was in the "poorer" group and 1 if the response was in the "better" response group. The dichotomizing of SRH response groups does not affect results¹⁸.

Logistic regression analysis was used to evaluate the association of independent variables to the study score results.

Independent variables examined included patient age, sex, HbA_{1C} values, diabetes duration, regular follow-up, type of treatment regimen, self monitoring of blood glucose (SMBG), regular exercise, adherence

to dietary advices, acute complications and chronic complications..

RESULTS:

The sample of the study consisted of 67 adolescents, 36 of which were females (53.7%) and 31 were males (46.3%). Average age was 14.06 (± 4.02) and average diabetes duration was 5.71 (± 1.59), while the mean HbA_{1c} was 8.05 (± 1.57). Table 1 describes subjects characteristics

Self rated health response groups: The majority rated their health as good (23=34.3%), 16=23.9% rated it as excellent, 8=11.9% as very good, 13=19.4% as poor and 7=10.5% as very poor.

More than 64% of the patients were with Positive family history of T1DM. The intensive management regimen was followed by majority of patients 86.6% (n=58) with only 13.4% (n = 9) taking 2 shots/day (pre-mixed insulin) and 88% (n=59) were testing their blood glucose ≥ 2 times/day while 12% (n = 8) testing their BG < 2 times per day. Seventeen subjects (25.3%) reported exercising regularly at least three times per week. Also, the majority (77.6%, n = 52) followed up regularly at the clinic. Thirty one subjects (46.3%) reported acute diabetes related complications requi-

ring either hospitalization or an ER visit (severe hypoglycemia or DKA) within the past year. Thirty three subjects (49.3%) were observed to have evidence of one or more chronic diabetes complications.

The mean diabetes duration in the "poorer" SRH group was significantly longer than that of the "better" SRH group (7.62 \pm 3.98 vs. 4.91 \pm 3.45, $p = 0.02$).

Whereas in terms of age, there was no statistically significant difference between the "poorer" and the "better" groups, respectively (13.72 \pm 2.65 vs. 12.49 \pm 3.29, $p = 0.18$). This was also seen in terms of differences in mean HbA_{1c} values (poorer: 7.56 \pm 1.09 vs. better: 8.02 \pm 1.82, $p = 0.34$) as shown in table 2.

Table 3 shows the results of comparison between the two groups, i.e. "better" and "poorer" groups using logistic regression. 49.3% of subjects who rated their health as very good or excellent had a regular clinical follow up, while it was a much smaller percentage in the "poorer" group (6%), with an OR of 15.69 which was highly significant ($p = 0.003$). there were no other significant differences between the groups.

Table 1: Characteristics of adolescent patients with type 1 diabetes mellitus attending health insurance outpatient clinics in Mallawy district El-Minia governorate 2011

Subject Characteristics		(No.)	(%)
Positive family history		43	64.1
sex	• Male	31	46.3
	• Female	36	53.7
Adherence to dietary advices		29	43.3
Intensive therapy (≥ 3 shots/day)		60	89.5
Regular exercise		61	91
Regular clinic follow up		50	74.6
Self Monitoring Blood Glucose (≥ 2 times/day)		49	73.1
Acute complications		31	46.3
Chronic complications		33	49.3
Diabetes accompanying morbidity		13	19.4

Table 2: Comparing means of age, diabetes duration and Hb1Ac between Poorer and Better SRH groups of adolescent patients with type 1 diabetes mellitus attending health insurance outpatient clinics in Mallawy district El-Minia governorate 2011

mean	Poorer SRH group	Better SRH group	P value
Age	13.72 \pm 2.65	12.49 \pm 3.29	p = 0.18
Diabetes duration	7.62 \pm 3.98	4.91 \pm 3.45	p = 0.02
Hb1Ac	7.56 \pm 1.09	8.02 \pm 1.82,	p = 0.34

Table 3: Group comparison of adolescent patients with type 1 diabetes mellitus attending health insurance outpatient clinics in Mallawy district El-Minia governorate 2011

Variables	Poorer SRH group (20=29.8%)		Better SRH group (47=70.2%)		OR	CI	P value
	No	(%)	No	(%)			
Positive family history	12	60%	31	65.9%	2.02	0.46-8.92	.35
Female sex	13	65%	23	48.9%	1.35	0.40-4.57	.63
Adherence to dietary advices	13	65%	16	34%	1.52	0.25-9.38	.65
Intensive therapy (≥ 3 hots/day)	17	85%	43	91.4%	1.44	0.18-11.29	.73
Regular exercise	17	85%	44	93.6%	2.30	0.34-15.44	.38
Regular clinical follow up	4	20%	46	97.8%	15.69	1.80-136.62	.003
Self Monitoring Blood Glucose(≥ 2 times/day)	15	75%	34	72.3%	1.52	0.25-9.38	.65
Acute complications	10	50%	21	44.6%	.70	0.420-2.42	.58
Chronic complications	14	70%	19	40.4%	.36	0.10-1.25	.10
Diabetes accompanying morbidity	4	20%	9	19.1	1.13	0.32-3.95	.85

DISCUSSION:

Studying health related quality of life among Egyptian adolescents with T1DM, especially of lower socio-economic status, and its relation to risk factors can help us to identify the best treatment regimen and help adolescents with a low HRQoL to decrease the daily stress related to diabetes mellitus.

Burden of type 1 diabetes mellitus in adolescent patients is due to daily demands of diabetes management and the fear of complications; so, their health related quality of life can be

easily affected. Adolescents with T1DM have been shown to have a lower HRQoL than the general population^{19,20}, so it is essential to include improvement of HRQoL in the management plan.

In the present study, we compared the groups that either rated their health as better as or poorer than adolescents at their age and to estimate factors made these groups different. There were non significant differences between the two combined groups regarding diabetes duration, presence of family history, presence of compli-

cations and regular exercise while there was a significant difference between the two combined groups regarding regular clinical follow up. Management regimen, sex and age were not different between the 2 groups.

A better health perception in the adolescents group who have been more recently diagnosed (shorter diabetes duration), without family history, exercised regularly, health educated and had regular clinical follow up with healthier diabetes management

Herman et al.,⁴ in their study of prevalence of diabetes in Egypt and potential risk factors, have found that rural residents were least sedentary (52%), lower socioeconomic status urban residents were more sedentary (73%) and higher socioeconomic status urban residents were the most sedentary (89%). Our population consists mostly of the first two groups of residents, which could also explain the overall increased activity level among our subjects, but one that is mostly in the form of housework, farm work or long walks necessary to obtain daily basic needs.

A study by Tsai et al.,¹⁴ looking at SRH among adults with T1DM showed that adults who reported being active had an increased likelihood of 81% for reporting excellent, very good or good SRH when compared with adults who reported being inactive regardless of diabetes status.

Furthermore, they found that adults with diabetes who had ever taken a course or class (55.4%) for managing diabetes had a higher proportion of being active than diabetic patients who had never taken such a class ($p < 0.001$), which is in

agreement with our results. Other studies have shown that those with a better glycemic control have a better health related quality of life²¹⁻²³. This may be explained by the possibility that patients in those studies had been more exercising activities. Exercise is one of the main pillars in diabetes management so mild to moderate exercise or activity is encouraged, even if it is in the form of housework or a walk. Physical activity has been demonstrated to improve mental well-being²⁴. In addition, regular exercise improve blood glucose control, reduce cardiovascular risk factors, and contribute to weight loss^{25,26}. The American Diabetes Association technical reviews on exercise in patients with diabetes, as well as other studies, have summarized the value of exercise in the diabetes management plan^{26,28}.

As regards to diabetes duration, studies have also shown either no association to diabetes duration^{21,29} or a better health related quality of life with a shorter duration^{30,31}, which is similar to our results. Treatment regimen factor showing either no association as in our study^{29,32} or a better health related quality of life with more intensive treatment^{19,33}. It is possible we did not see this association with more intensive treatment because the majority of our children are on the more intensive regimen, making any comparisons invalid. Other studies have shown that male gender^{30,33} younger age^{21,33} and higher socioeconomic status^{15,21,31} were associated with better HRQoL, which again has not been the case in our study. This could imply either that there is variability in perception even with the same health status

Studies of adults with diabetes have consistently found that complications are associated with

worsened health related quality of life^{21,29,31}. Complications like micro-albuminuria, renal impairment, peripheral neuritis and retinopathy affect negatively SRH responses.

CONCLUSIONS:

In our study we found that diet control and regular clinical follow up is associated with a better health related quality of life among adolescents with type 1 diabetes mellitus and it is important in developing successful treatment strategies for adolescents with diabetes and should be encouraged through health education programs to them

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