

## Original Article

# Self-care agency and quality of life among Iranian adolescents with diabetes mellitus type 1

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## ABSTRACT

**Background & Aim:** Juvenile or type 1 diabetes mellitus is the most common metabolic and endocrine disorder in childhood and adolescence that affects quality of life. On the other hand, self-care agency could be considered as a significant factor in improving the quality of life. This study aimed to investigate the self-care agency and quality of life among Iranian adolescents with diabetes mellitus type 1 referring to the Diabetes Center at Sina Hospital in Tabriz, Iran.

**Materials and Methods:** In a descriptive correlation study, 120 diabetic adolescents were selected from a pool of referrals to the Diabetes Center at Sina Hospital affiliated to the Tabriz University of Medical Sciences, using the convenience sampling process. Adolescents completed a demographic and clinical characteristics questionnaire, the Diabetes-Specific Quality Of Life Brief Clinical Inventory (DQOL-BCI), as well as the Self-Care Appraisal Scale. Statistical analysis included Pearson correlation coefficient, independent samples t-test, one-way ANOVA and linear regression. Data was analyzed by SPSS ver.16.

**Results:** The mean score of quality of life and self-care agency was 32.14 (8.17) and 30.24 (8.64), respectively. There was a significant relationship between the quality of life and self-care agency ( $P<0.05$ ). Furthermore, a significant correlation with some of the demographic and clinical characteristics was revealed ( $P<0.05$ ).

**Conclusion:** Based on the association between the quality of life and self-care agency in diabetic adolescents, researchers emphasize the need for planning diabetes education programs based on self-care training to improve the quality of life.

## Introduction

Diabetes mellitus is one of the most common chronic illnesses that causes a high level morbidity and mortality worldwide (1). The World Health Organization (WHO) has estimated that around 285 million people worldwide suffer from diabetes. Every year, 20% of diabetic patients die because of disease complications and the numbers are on the rise (2). Currently, there are almost five to seven million diabetic patients in Iran (3).

Approximately 10% of all Iranian adolescents and nearly 42% of overweight youth meet the criteria for metabolic syndrome, suggesting that one in ten adolescents is affected by diabetes (4). It seems that the onset of health problems is a significant predictor of the individual's response to the disease (5). So, adolescence is an extremely important period in the formation of healthy behaviors in adulthood (6). Type 1 diabetes mellitus, like other chronic diseases, affects the lives of patients in a variety of ways, such as feeling unmotivated, disappointed, socioeconomic setbacks and social isolation (7).

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As a chronic condition, it can negatively affect the physical, social, psychological and socioeconomic aspects of adolescent life (8). Kermansaravi et al. have reported that diabetic children and adolescents had difficult social activities, which resulted in poor quality of life (9).

Self-care is an important behavior for people who are living with and trying to adapt to diabetes diagnoses (10). Self-care agency can be defined as an individual's ability to continuously assess health-related needs and perform self-care activities aimed at promoting and maintaining health and well-being (11). Self-care agency actions (health-promoting behaviors) are developed during life and not only when there are health problems. Thus, self-care agency could promote health and well-being, as well as prevent and manage illness (8). Orem stated that self-care is a human regulatory function that people must do for themselves or have performed for them to maintain physical and psychological functioning and development within norms compatible with life-critical conditions (12). The healthcare professionals can recognize the diabetes's negative impact on the patient's quality of life. Furthermore, they have the opportunity to emphasize the importance of self-care and plan programs to control the disease and maintain a healthy lifestyle (13, 14). In addition, Walke et al, have emphasized how effective self-care can improve glycemic control, drug adherence and improve quality of life (15). Afshar et al. have shown that self-care agency among diabetic adolescents has improved their HbA1c level and quality of life (16).

Therefore, self-care could play a significant role in managing diabetes mellitus type 1 among adolescents and reducing the complications of diabetes. According to Slim et al., the prevalence of diabetes complications (for example cardiovascular and nonvascular risks) was 27% to 76% in patients (17). Tan et al., suggested that patients with diabetes

mellitus type 1 would have more success in managing their chronic disease by adhering to prescribed therapeutic regimens and participating in self-care activities (18). Although published literature acknowledged self-care for the management of diabetes, patient's non-adherence is a major global problem leading to high morbidity and mortality (13). Non-adherence to self-care also increases healthcare costs for additional office visits, laboratory tests, hospitalization, dialysis and other treatments for managing diabetes complications (19). Nurses would help patients make informed decisions in accordance with their particular circumstances such as managing a chronic illness (12).

A review of the literature has revealed that most researchers used nonspecific tools to measure quality of life (9, 13) and they had less focus on self-care agency. In addition, the relation of background factors with self-care agency and quality of life has not been investigated in Iran. There is a need to identify the factors affecting the self-care and quality of life based on the culture of each society. Considering the onset of diabetes mellitus type 1 in the critical adolescence age could help to understand the negative impact of the disease on the quality of life, especially when it is compounded with an inadequate self-care agency (15). The present study aimed to evaluate self-care agency, quality of life and its determinants among adolescents with diabetes mellitus type 1 referred to the Diabetes Center of Sina Hospital in Tabriz, Iran.

## **Materials and Methods**

In a descriptive-correlational study, each adolescent with diabetes mellitus type 1 referred to the diabetic clinic at Sina hospital was selected by convenient sampling, during the period from April to December of 2015. Sina Medical Center is a referral hospital in Tabriz, Iran and one of the main diabetic care facilities in the province of Eastern Azerbaijan. Inclusion criteria included: being between the

ages of 12 to 18 years; diagnosed with diabetes mellitus type 1 by an endocrinologist; and having more than one year history of insulin injection. Exclusion criteria consisted of having other chronic disease based on clinical records of adolescents.

The sample size calculated 120 adolescents with diabetes mellitus type 1 using the following parameters: confidence interval of 95%, statistical test power equal 90% and  $r=0.3$  based on the results of a previous study (16).

The data were collected using the demographic and clinical characteristics of adolescents, a revised self-care agency and a brief clinical inventory of diabetes-specific quality of life. Demographic data and clinical characteristics of diabetic adolescents included demographic variables such as age, sex, patients' education level, parent's education level, and clinical data included daily insulin dose and fasting blood sugar. In addition, the most recent HbA1c value, a standard measure of glycemic control over the previous 90 days, was taken from available clinic records held at the diabetes clinic.

The Appraisal of Self-Care Agency Scale Revised with 15-items (ASAS-R) was used to measure self-care agency, which was a revised and improved version of the original tool (20). It is based on a 5-point Likert type scale ranging from 1 (totally disagree) to 5 (totally agree), with higher scores pointing to a greater self-care agency. The revised instrument was modified to 15-items, including three domains: "having power for self-care"; "developing power for self-care"; and "lacking power for self-care" with a Cronbach's alpha of 0.89 (19). For this study, content validity was used to assess the validity. The reliability was determined using alpha chronbach ( $\alpha = 0.76$ ). The Diabetes Quality of Life – The Brief Clinical Inventory (DQOL-BCI) was originally developed by Ingersoll et al., in 1999 as part of a 3-year research trial aimed at developing a brief, highly reliable and valid tool for

measuring the quality of life for diabetic patients.

In fact, DQOL-BCI was designed to be used in clinical research and practice for evaluating and capturing actions with the greatest impact on patient's self-care behaviors, leading to satisfactory disease control (21).

The number of inventory items was reduced to 15 after validity and reliability were determined (22). Items were ranked in a 5-point Likert scale in two general formats. The total score range was 15–75 (21).

In a study by Mirfeizi et al., researchers evaluated the IDQOL-BCI for reliability and validity and reported good content validity (CVI values  $> 0.75$  and CVR values  $> 0.99$ ) with internal consistency ( $\alpha = 0.75$ ) and test-retest reliability (ICC = 0.81). Researchers found a three-factor structure included: complications with diabetes; diagnosis, therapy, follow-up; and psycho-social implications(23). In other studies, IDQOL-BCI tool showed a good internal consistency ( $\alpha = 0.78-0.92$ )(22, 23). For this study, content validity were used to evaluate the validity. The reliability was determined using alpha chronbach ( $\alpha = 0.78$ ).

Data analysis was performed using SPSS version 16.0 (SPSS Inc, Chicago, IL, USA). Descriptive statistics included mean, standard deviation (SD), for quantitative and frequency, and percentage qualitative variables.

Inferential statistics including Pearson correlation test, independent samples t-test, One-way ANOVA and linear multiple regression were used for a significant level of  $p<0/05$ . The normality was examined by Kolmogorov-Smirnov measures.

After obtaining an approval from the Ethics Committee at Tabriz University of Medical Sciences with a reference number [97371], legal guardians of each adolescent completed informed consent with assurance for patient confidentiality and health information privacy.

**Results**

The Mean (SD) of adolescents' age was 14.7 (1.8) years. Furthermore, the mean (SD) of duration of disease and daily insulin dose were 4.7 (1.4) years and 37.3 (11.4) units, respectively. The mean (SD) of fasting blood sugar was 121 (27.3). The HbA1c in most of them (93.1%) was > 7. Other individual characteristics are shown in Table 1. The mean (SD) of adolescents in various dimensions of

quality of life, including diabetes complications, diagnosis, therapy and follow-up and psychosocial impacts of diabetes were 8.2 (2.7), 7.4 (2.1) and 9.3 (3.2), respectively. The Mean (SD) of total quality of life and self-care agency were also 32.14 (8.17) and 30.24 (8.64), respectively. As seen in table 2, There was a significant relationship between various dimensions of quality of life and self-care agency (P<0.05).

**Table 1.** Frequency distribution of some demographic and clinical characteristics in adolescents

Variable	N (%)
<b>Sex</b>	
Male	39 (32.5)
Female	81 (67.5)
<b>Patient's level of education</b>	
Secondary school	73 (60.8)
High school	47(39.2)
<b>Father's level of education</b>	
Primary school	8(6.7)
Secondary school	11 (9.2)
High school	16(13.3)
Diploma	50 (41.7)
University	35 (29.1)
<b>Mother's level of education</b>	
Primary school	5(4.2)
Secondary school	4 (3.3)
High school	8(6.7)
Diploma	70 (58.3)
University	33(27.5)

**Table 2.** Correlation between self-care capability scores and various dimensions of quality of life

IDQOL-BCI	Self-care agency	
	P value	r *
IDQOL-BCI	< 0.001	0.47
Complication of diabetes	< 0.001	0.57
Diagnosis, therapy and follow-up	< 0.001	0.44
Psycho-social effect of diabetes	< 0.001	0.41

\*Pearson coefficient

As seen in Table 3, there were significant relationships between the main variables of study, including self-care agency and quality of life and demographic variables, including sex, disease duration, parent's level of education, adolescent education, daily insulin dose and HbA1c (P <0.05).

In the regression model, parent's level of education, male gender and an increased mean score of disease duration, daily insulin dose and the last HbA1c were determinants of quality of

life and self-care agency in adolescents with diabetes mellitus type 1. Moreover, the regression analysis showed that an increased mean score of self-care agency was the determinant of quality of life. The coefficients of the variables affecting the quality of life and self-care agency in multiple linear regression analysis are shown in table 5. It is noteworthy that the recommended model explains 54.80% and 51.43% of the variance changes in outcome variables (R2=0.548 and R2=0.514

**Table 3.** Correlation of quality of life and self-care agency with adolescents’ demographic characteristics

Variables	Quality of life		Self-care agency		
	Mean (SD)	P	Mean (SD)	P	
Sex	Male	33.2(8.7)	0.01*	30.6 (7.2)	0.02*
	Female	31.6(8.2)		29.4(7.9)	
Patient’s level of education	Secondary school	32.4(8.9)	0.14*	30.1(8.2)	0.27*
	High school	32.1(8.4)		30.3(8.6)	
Mother’s level of education	Primary school	31.5(9.2)	0.03**	28.4(8.1)	0.01**
	Secondary school	31.4(9.3)		28.8(8.4)	
	High school	32.2(8.5)		29.2(8.8)	
	Diploma	32.8(8.9)		29.7(8.3)	
Father’s level of education	University	33.1(8.6)	0.01**	30.2(9.1)	0.03**
	Primary school	31.1(8.7)		28.9(8.5)	
	Secondary school	31.9(8.2)		29.1(8.2)	
	High school	32.7(9.5)		29.6(8.9)	
	Diploma	33.4(9.2)		30.1(9.3)	
University	33.9(8.9)	30.3(9.2)			

\*t -test \*\* one -wey Anova

**Table 4.** Correlation of quality of life and self-care agency with adolescents’ clinical characteristics

Variables	IDQOL-BCI		Self-care capability	
	P value	r*	P value	r*
History of disease (year)	0.004	0.28	0.01	0.21
Fasting blood sugar (mg/dL)	0.001	0.27	0.04	0.27
HbA1c (mmol/mol)	0.001	0.37	0.03	0.32

\*Pearson coefficient

**Table 5.** Linear regression between predictor variables and dependent variables

Predictor variables	Dependent variables	Standardized coefficients (Beta)	P value*
Male gender	Quality of life	-0.124	0.07
	Self-care agency	-0.162	0.09
Father’s level of education	Quality of life	0.175	0.01
	Self-care agency	0.196	0.04
Mother’s level of education	Quality of life	0.176	0.01
	Self-care agency	0.169	0.02
History of disease	Quality of life	0.167	0.02
	Self-care agency	0.139	0.02
Daily insulin dose	Quality of life	-0.136	0.62
	Self-care agency	-0.193	0.73
Last HbA1c(mmol/mol)	Quality of life	0.184	<0.001
	Self-care agency	0.174	<0.001
Self-care agency	Quality of life	0.196	<0.001

Quality of life      R2= 0.548  
 Self-care agency    R2= 0.514

for quality of life and self-care agency, respectively).

**Discussion**

The aim of the present study was to evaluate the quality of life and self-care agency among

adolescents with diabetes melituse type 1. Based on the findings, the mean score of DQOL was higher in higher parental education, males, lower daily insulin dose and prolonged disease duration. Kermansaravi et al., reported that increasing parental education has positive impact on the quality of life in adolescents with type 1 diabetes (9). Parental

education might have a direct impact on child health because it increases the ability to acquire and process information. This helps parents to make better health investments for themselves and their children (24). Furthermore, Mohammadi et al., concluded that male diabetic patients in comparison with female diabetic patients and non-insulin-treated patients compared with insulin-treated patients had better quality of life (25). Brown et al., also found that patients who are treated with high insulin dose have a poor quality of life and more burden of illness than those treated with low insulin or oral blood glucose-lowering drugs (26).

In this study, we found a significant relationship between DQOL and HbA1c, similar to studies, which reported that HbA1c (glycemic control) was negatively correlated with QOL (27, 28). Furthermore, study results suggest that diabetic adolescents have less adherence to their daily insulin dose and treatment plan, leading to high HbA1c. Given the importance of diabetes management for the prevention of negative outcomes, it is essential to plan long-term programs based on education for adolescents with diabetes mellitus type 1 to control their blood sugar, reduce the risk of disease and improve quality of life (29).

In this study we found a significant relationship between self-care agency and sex, parents' education, disease duration, daily insulin dose and HbA1c. Kiadaliri et al. revealed that better socioeconomic status and parents' education were associated with more efficient self-care among the diabetic adolescents (27). Moore et al., Jahanlou et al., found that both high level of self-care agency and self-efficacy result in better self-care management, in turn leading to better glycemic control (30, 31). Costly complications of diabetes often arise from poor glycemic control; can be reduced by appropriate diabetes self-care management. Contrasting with our finding indicating high mean score of self care agency in male adolescents, Dashiff et al., Found that female adolescents have exhibit better self-care. It can be explained by the fact

that cultural factors affect self-care agency in both sexes.

The study findings indicated that diabetic adolescents had a poor DQOL and self-care agency. According to the findings of this study and other studies conducted in Iran, it seems that routine education is not enough to improve the quality of life and self-care agency among diabetic teenagers.

There is a need for health providers to plan educational programs based on both patient-center and family-center to improve self-care behaviors in multiple domains, including healthy choices of foods, physical activity and proper blood glycemic monitoring and monitoring of 'quality of life'.

This study has several limitations. First, although it was conducted on all adolescents referred to diabetic clinic during sampling period, the number of adolescents was limited. The generalizability of findings should be made with caution. Next, we measured self-care agency and quality of life only by using questionnaires. Thus, replicating such studies with larger sample size and multi-method is required.

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