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Prediction of the quality of life in the adolescents with diabetes based on self-efficacy

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ABSTRACT

Background: The improvement of the diabetic patients' quality of life and detection of the associated influential factors are some of the most important goals of the health care system. Self-efficacy is one of the variables that can affect the quality of life; however, there is no sufficient evidence about the componential effect of this variable on the quality of life of the patients, especially adolescents, with diabetes. Regarding this, the present study aimed to predict the quality of life in the adolescents with diabetes mellitus based on their self-efficacy.

Methods: This correlational study was conducted on the diabetic adolescents, who referred to the diabetes clinic of Zahedan, Iran, in 2016. In total, 100 adolescents were selected using the census method. The data were collected using the Diabetes Quality of Life for Youth questionnaire and self-efficacy scale for diabetes management through self-report. The data analysis was performed in the SPSS version 18 using the descriptive statistics, Pearson's correlation coefficient, and multiple regression.

Results: In this study, the mean scores of the quality of life and self-efficacy were 54.61±5.15 and 45.84±10.53, respectively. According to the results, there was a direct relationship between the total self-efficacy score and the subscale of satisfaction with quality of life (P<0.001, r=0.49). Nevertheless, the total self-efficacy score showed an indirect correlation with other subscales, including the effect of treatment on the quality of life (P<0.001, r=-0.35), disease symptoms (P=0.04, r=-0.20), and the effect of diabetes on patient's activities (P<0.001, r=-0.33). The results of the regression analysis indicated that all the variables of self-efficacy were able to predict the changes in the quality of life. Moreover, the results of the multiple regression revealed that the medical treatment had a significant impact on the patients' quality of life (P<0.001)

Conclusion: Given the fact that the medical care component could predict the quality of life in the adolescents with diabetes, it is recommended to pay special attention to various aspects of this component in the health care programs held for this population.

1. Introduction

Type I diabetes is one of the most common chronic diseases of childhood and adolescence, which has a growing trend in the world. According to the America Diabetes Association, about 1.25 million Americans have type I diabetes, and it is estimated that annually, 40,000 people are diagnosed with this disease in the U.S.[1] There is no new statistics about the prevalence of this disease in Iran. Nonetheless, in a study conducted by Pishdad (2005), the annual incidence of diabetes was reported to be about 3.7 cases per 100,000 in Iran.[2]

This type of diabetes occurs following the inability of pancreatic beta-cells to produce insulin.[3] Therefore, the diabetic patients need to regularly control their blood glucose level, have a controlled diet, and inject insulin daily.[4] However, since these tasks impose some limitations, especially for children and adolescence, they are very difficult and tedious.[5] Nonetheless, the goal of diabetes treatment is not limited to blood glucose monitoring.[6] Rather, the patients' quality of life should receive more attention since diabetes influences the patients' quality of life in almost all physical, psychological, and social aspects of life.[7-8]

Some studies, including Y. Pena et al. (2010), indicated that the health-related quality of life was weaker in the patients with diabetes than that in the general population.[9] Lawrence et al. (2012) stated

that the quality of life in the American adolescents was at an undesirable level.[10] Furthermore, Kerman Saravi et al. (2012) reported a moderate level for the quality of life in the Iranian adolescents with diabetes.[11] On the other hand, Shayeghian et al. (2014) declared that the quality of life was at an unsatisfactory level in these patients.[12] Therefore, the identification of the factors affecting the improvement of the quality of life is not only useful and valuable for the patients, but also reduces the disease-related health care costs.[13]

Regarding this, identifying these factors is of paramount importance. Self-efficacy is one of the factors affecting the quality of life that encompasses several dimensions.[14] Self-efficacy is a structure of social-cognitive theory that refers to the individual's self-esteem in performing self-care behaviors.[15] Bandura (1977) believed that self-efficacy affects all aspects of behavior and leads to a change in the quality of life.[16, 17] Many studies conducted in Iran and other countries have reported a weak to moderate level for self-efficacy in the patients with diabetes.[18-20] Regarding this, it is necessary to identify the different components of self-efficacy and investigate their impacts on the diabetic patients' quality of life. The present study aimed to predict the quality of life in the adolescents with diabetes mellitus based on their self-efficacy.

2. Methods

2.1. Design

This correlational study was conducted on the diabetic adolescents, who referred to the diabetes clinic of Zahedan, Iran, in 2016.

2.2. Participants and setting

In total, 100 adolescents were selected using the census method. The inclusion criteria were: 1) age range of 10-18 years, 2) minimum literacy rate, 3) having diabetes for at least one year, and 4) not inflicted with the disease other than diabetes.

2.3. Instruments

The research instruments included the demographic characteristics form, the Diabetes Quality of Life for Youth (DQOLY) questionnaire, and the diabetes management self-efficacy scale.

The demographic form included such information as age, gender, disease duration, education level, the number of insulin injections, and birth order. The DQOLY questionnaire was designed by Ingersoll and Marrero to measure the quality of life in the adolescents with type I diabetes mellitus. This questionnaire includes 52 items, 51 of which cover six dimensions of quality of life on a 5-point Likert scale (never=0, seldom=1, sometimes=2, often=3, always=4). The one remaining item is related to the perception of health, which is rated on a 4-point Likert scale (very bad=4, bad=3, good=2, excellent=1) and has a score range of 0-4.

The areas covered in this questionnaire include the satisfaction with quality of life (23 items with a score range of 0-92), the effect of treatment on the quality of life (4 items with score range of 0-16), the effect of diabetes on individual's activities (5 items with score range of 0-20), the level of anxiety (12 items with score range of 0-48), and the parental monitoring (3 items with score range of 0-12).[21]

The maximum score of this questionnaire is 100, and the higher score indicates the better quality of life. The reliability of this questionnaire was approved by Novato et al. in Brazilian culture (2008) using the Cronbach's alpha coefficient (0.93).[22] The validity and reliability of this questionnaire were also approved in different studies conducted in Iran. Kerman Saravi et al. confirmed the reliability of this questionnaire by Cronbach's alpha coefficient and reported it to be 0.78-0.87.[11, 23]

The Diabetes Management Self-efficacy Scale developed by Bijl et al. in 1999.[24] This scale contains 20 items divided into four sections, including nutrition (9 items), measurement of blood glucose level (4 items), physical activities and monitoring the blood glucose level (4 items), and medical care (3 items). This questionnaire is rated on a 10-point Likert scale (ranging from 0=I cannot do it to 10=I am quite capable of doing it). The total score is 200 and the higher score indicates the higher self-efficacy. The scores in each section are calculated based on 100. The reliability of this scale was reported in the study conducted by Fappa et al. (2016), reporting the Cronbach's alpha coefficient of 0.93.[25] In Iran, Mohamadinejad et al. (2015) approved the validity of this scale by using the content and face validities and reported its reliability to be 0.93 using the Cronbach's alpha coefficient.[26] In the current study, the reliability of this instrument rendered a Cronbach's alpha coefficient of 0.89.

2.4. Data Collection

By taking the ethical consideration into account, the researcher attended in the selected diabetes center. After coordinating with the patients' families, he asked them to be present in the center at the appointed time. In some cases, the researcher personally went to the adolescents' homes and asked them to submit the self-report questionnaire.

2.5. Ethical considerations

Following the research principles, the objectives of the study were individually explained for each participants. Furthermore, the subjects were assured that their information was completely confidential and participation in the study was completely voluntarily and had no effect on their treatment process. The researcher was also available throughout the study and answered their questions. The informed consent was obtained from all the participants.

2.6. Statistical analysis

The normality of the data was controlled by the Shapiro-Wilk test. The data were analyzed using the descriptive indicators (mean and standard deviation), Pearson correlation coefficient (to evaluate the relationship of self-efficacy and its components with the quality of life and its dimensions), and multiple regression (to predict the quality of life based on the components of self-efficacy) through the SPSS version 18.

3. Results

The demographic characteristics of the participants are illustrated in Table 1.

The mean total score of the quality of life in the diabetic adolescents was 54.61±5.15. The highest and lowest mean scores of the quality of life dimensions were related to the effect of treatment on the quality of life (66.12±14.19) and disease symptoms (23.33±3.72), respectively. In addition, the mean score of the self-efficacy was 45.84±10.53. The maximum and minimum scores of self-efficacy dimensions were diet control (52.94±16.08) and medical care (44.02±10.51), respectively (Table 2).

There was a direct relationship between the total self-efficacy score and the subscale of satisfaction with the quality of life (P<0.001, r=0.49). Nevertheless, the total self-efficacy score showed an indirect correlation with other subscales, including the effect of treatment on the quality of life (P<0.001, r=-0.35), disease symptoms (P=0.04, r=-0.20), and the effect of diabetes on the patient's activities (P<0.001, r=-0.33). The results of the correlational analysis are displayed in Table 3.

In the regression analysis, the correlation coefficient between the variables was calculated to be 0.57, indicating a relationship between the dependent and independent variables. However, the adjustment factor (R^2=0.33) revealed that in the diabetic adolescents, 33% of all changes in the quality of life depend on the self-efficacy components. In other words, the independent variables (i.e., blood glucose monitoring, diet, physical activity, and medical care) predicted nearly 33% of the variance of the quality of life. As the test was significant (P<0.001, F=11.6), it can be concluded that the independent variables could predict the changes in the quality of life.

According to Table 4, out of the self-efficacy components, medical care was the only factor, which had a significant effect on the quality of life (P<0.001). Accordingly, for an increase of one standard deviation in the medical care, the person's quality of life increases 0.56 of standard deviation.

Table 1. Demographic characteristics of the participants

Variables		N (%)
Gender	Male	52 (52)
	Female	48 (48)
Education level (year)	M±SD	7.94±2.57
Age (year)	M±SD	15.12±2.79
Disease duration (year)	M±SD	3.4±1.81
The number of insulin injection per day	M±SD	2.88±0.74

Table 2. Mean quality of life and self-efficacy in the adolescents with diabetes

Variables		M±SD
Quality of life	Satisfaction	8.42±45.78
	Effect of treatment on quality of life	14.19±66.12
	Disease symptoms	3.72±23.33
	Individual's activities	12.02±61.20
	Anxiety	11.89±65.27
	Parental monitoring	22.95± 56.16
	Total score	5.15±54.61
Self-efficacy	Blood glucose control	14.47±47.65
	Diet control	16.08±52.94
	Physical activity	12.79±46.77
	Medical care	10.51±44.02
	Total score	10.53±45.84

Table 3. Correlation between the components of self-efficacy and quality of life dimensions in the diabetic adolescents

		Self-efficacy					Quality of life					
		Blood glucose control	Diet control	Physical activity	Medical care	Total score	satisfaction	Effect of treatment	Disease symptoms	Effect of diabetes on individual's activity	anxiety	Parental monitoring	Total score
Self-efficacy	Blood glucose control	1											
	Diet control	r=1 P<0.001	1										
	Physical activity	r=0.593 P<0.001	r=0.593 P<0.001	1									
	Medical care	r=0.046 P=0.651	r=0.046 P=0.651	r=0.266 P=0.007	1								
	Total score	r=0.810 P<0.001	r=0.810 P<0.001	r=0.854 P<0.001	r=0.259 P=0.010	1							
	Satisfaction	r=0.333 P<0.001	r=0.333 P<0.001	r=0.468 P<0.001	r=0.334 P<0.001	r=0.490 P<0.001	1						
Quality of life	Effect of treatment	r=-0.335 P<0.001	r=-0.335 P<0.001	r=-0.254 P=0.011	r=-0.025 P=0.807	r=-0.352 P<0.001	r=-0.462 P<0.001	1					
	Disease symptoms	r=-0.191 P=0.058	r=-0.191 P=0.058	r=-0.214 P=0.032	r=-0.038 P=0.705	r=-0.200 P=0.047	r=-0.258 P=0.009	r=-0.251 P=0.012	1				
	Effect of diabetes on individual's activity	r=-0.247 P=0.013	r=-0.247 P=0.013	r=-0.331 P<0.001	r=0.147 P=0.144	r=-0.330 P<0.001	r=-0.501 P<0.001	r=0.350 P<0.001	r=0.427 P<0.001	1			
	Anxiety	r=0.013 P=0.901	r=0.013 P=0.901	r=-0.118 P=0.241	r=0.344 P<0.001	r=-0.064 P=0.527	r=-0.112 P=0.269	r=0.322 P<0.001	r=0.132 P=0.192	r=0.375 P<0.001	1		
	Parental monitoring	r=-0.129 P=0.201	r=-0.129 P=0.201	r=-0.111 P=0.273	r=0.397 P<0.001	r=-0.122 P=0.227	r=0.071 P=0.480	r=0.071 P=0.482	r=-0.147 P=0.146	r=0.121 P=0.231	r=0.466 P<0.001	1	
	Total score	r=0.065 P=0.519	r=0.065 P=0.519	r=0.094 P=0.353	r=0.560 P<0.001	r=0.118 P=0.252	r=0.448 P<0.001	r=0.181 P=0.072	r=0.122 P=0.226	r=0.225 P=0.025	r=0.754 P<0.001	r=0.591 P<0.001	1

Table 4. Multiple regression analysis of quality of life in the diabetic adolescents based on the predictive variable of self-efficacy

Variables Dependent variables		Unstandardized regression coefficients	Standard error	Standardized regression coefficients	Correlation	t	p-value
Quality of life	Blood glucose control	0.15	0.11	0.20	0.11	1.31	0.19
	Physical activity	-0.01	0.14	-0.14	-0.007	-0.08	0.93
	Medical care	0.61	0.09	0.60	0.56	6.64	<0.001
	Self-efficacy score	0.19	0.24	-0.19	-0.06	-0.81	0.41

4. Discussion

As the findings of the study indicated, there was a correlation between the variables of self-efficacy and quality of life, and the set of self-efficacy components could predict the changes in the quality of life. Nonetheless, the medical care was the only component that had a statistically significant effect. However, the majority of the studies generally indicated that diabetes can be controlled through focusing on self-efficacy.[27-29]

The self-efficacy and quality of life are multilateral and subjective variables and their results largely depend on human perception. Regarding this, it seems that a proper medical care enables the patients to take care of themselves by improving their awareness and attitude. This ability reduces the complications of the disease and improves the patients' sense of comfort and well-being, which brings them a better perception of the quality of life as well as health improvement.

In line with the results of this study, Mishalia et al.'s (2011) highlighted the necessity of self-efficacy reinforcement in the patients since this variable is effective in the patient's adherence to treatment and diabetes control, followed by the improvement of quality of life.[30] Furthermore, in a study conducted by Bazazian and Rajab (2012), it was demonstrated that the improved self-efficacy could lead to the enhancement of quality of life in the adults with diabetes.[31] Likewise, Tol et al. (2011) also reported a linear and direct relationship between the self-efficacy and quality of life in the diabetic patients.[32] Moreover, Rezasefat Balesbaneh et al. (2014) introduced the self-efficacy as an essential precondition for successful self-care behaviors in the diabetic adolescents.[33] Additionally, several studies have revealed the positive impact of self-care in the improvement of quality of life.[34, 35]

In the aforementioned studies, the self-efficacy was introduced as an essential factor in determining the patients' quality of life despite the fact that the patients were mostly adults and from various communities with different cultures. However, the above studies did not investigated the effect of self-efficacy components on the quality of life and its dimensions.

The results of this study indicated that the mean score of the quality of life in the diabetic adolescents was at a moderate level. The highest mean score belonged to the effect of treatment on the quality of life, while the lowest score was related to the disease symptoms. In line with the results of this study, Kerman Saravi et al. (2012) reported a moderate level for the quality of life in the adolescents with diabetes. The satisfaction with the quality of life and the effect of diabetes on parental monitoring were the highest and lowest mean scores in the mentioned study, respectively.[11] Shams et al. (2016) also reported a moderate level for the quality of life in the diabetic patients. They observed that the lowest and highest mean scores were related to the physical health and the overall mental health, respectively.[35] Although the results of the aforementioned studies were different in terms of the favorable and unfavorable aspects of the quality of life reported by the patients, similar to the present study, all of these studies underscored the necessity to conducted further investigations about the quality of life in the diabetic patients. The reason for some discrepancies between the results of these studies can be due to the use of different research instruments, especially in the study conducted by Shams et al. Moreover, the quality of life is a multidimensional variable, which is entirely subjective and driven by the perception of people; therefore, different age groups and cultures can be influential factors in the patients' opinions and perceptions.

Da Costa and Vieira (2015) reported an optimum level for the quality of life in the diabetic adolescents in one of the cities of Brazil, which is inconsistent with the results of this study.[36] They believed that the achievement of this favorable result was due to such factors as monitoring of the private clinics on the disease process in the diabetic adolescents, the proper provision of medication by the public organization delivering services to the patients, spending sufficient time for medical and counseling appointments, and available emergency services in accordance with the cultural and social background of the adolescents. Nevertheless, Lawrence et al. reported an unfavorable level for the quality life in the American adolescents and ascribed it to the low level of parents' information and education in this regard.[10]

The findings of this study revealed that the self-care of the diabetic adolescents was at a moderate level. The dimensions of diet control and medical care had the highest and lowest mean scores, respectively. In agreement with the results of this study, Kordi et al. indicated a moderate level for the self-efficacy of the women with gestational diabetes.[37] Chih et al. (2010) also reported that self-efficacy had significant effect on the heath functioning of the diabetic patients. They suggested that self-efficacy is associated with the quality of life, disease improvement, severity of disease, and psychological adjustment. Therefore, it can be concluded that self-efficacy can strengthen the sense of capability in performing the diet by increasing the control of a person on his disease. Therefore, the health-improving behaviors are developed in the patient, and their risky behaviors are abandoned. This causes a reduction in the disease complications, creates sense of self-control, and improves the positive attitude towards the quality of life.[38]

In consistent with the results of the present study, in a study carried out by Rahimi et al. (2015), the majority of the patients with diabetes were reported to have a proper level of self-efficacy.[39] In a study by Davari et al. (2015), the mean score of the self-efficacy was at the optimum level, and the patients had lower perception of self-efficacy in self-monitoring of blood glucose.[40] Rezasefat Balesbaneh et al. (2015) reported that the self-care in the adolescents with diabetes was lower than moderate.[33] The disagreement between the results of these studies and those of the current one can be due to the employment of different study populations and instruments. It should be noted that self-efficacy is a dynamic construct, which is subject to change; therefore, the aging as well as personal and family characteristics can significantly affect it.

One of the drawbacks of this study was the effect of the mental status of the participants on their response; however, this factor was uncontrollable. In addition, the sampling was performed just in one diabetes center through census method, which could affect the generalizability of the findings.

5. Conclusion

As the findings of the present study indicated, the self-efficacy variables could predict the changes in the quality of life; nonetheless, the only factor, which was statistically significant was the medical care. Therefore, it is recommended to pay special attention to various aspects of this component in the health care programs held for this population.

Conflicts of interest

The authors declare no conflicts of interest.

Authors' contributions

Fatieh Kerman Saravi: design, participation in data analysis, and final approval of the article, Ali Navidian: cooperation in the design, and data analysis and interpretation, Ebrahim Ebrahimi Tabasi: cooperation in the design of the project, participation in the drafting of the article, Tayebeh. Sargazi Shad: cooperation in the design, data collection, and drafting of the initial version of the article.

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