



# Research Paper:

## Moderating Role of Alexithymia in Relationship Between Perceived Social Support, Diabetes-Related Quality of Life, and Glycated Hemoglobin in Patients With Type 2 Diabetes



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**Citation** Shayeghian Z, Amiri P, Hajati E, Gharibzadeh S. Moderating Role of Alexithymia in Relationship Between Perceived Social Support, Diabetes-Related Quality of Life, and Glycated Hemoglobin in Patients With Type 2 Diabetes. Journal of Research & Health. 2020; 10(1):27-34. <http://dx.doi.org/10.32598/JRH.10.1.27>

**doi** <http://dx.doi.org/10.32598/JRH.10.1.27>



### Article info:

Received: 13 Mar 2019

Accepted: 09 Sep 2019

Publish: 01 Jan 2020

### Keywords:

Alexithymia, Social support, Health, Type 2 diabetes

## ABSTRACT

**Background:** Diabetes is a complex and chronic disease, i.e. associated with patients' lifestyle and affects their quality of life. The present study examined the role of alexithymia on the relationship between social support, health-related quality of life, and glycated hemoglobin in patients with type 2 diabetes.

**Methods:** This was an analytical cross-sectional study. The study participants consisted of 100 (60% females) type 2 diabetic out-patients visiting the Labbafinejad Hospital in Tehran City, Iran, between February 2013 and January 2014. Measures of data collection included the multidimensional scale of perceived social support, the diabetes-related quality of life, and alexithymia Scale.

**Results:** The results of two hierarchical linear regression analyses indicated that alexithymia moderated the relationship between perceived social support, quality of life, alexithymia scale, and HbA1c in patients. To evaluate the moderating role, two hierarchical multiple regression analyses were calculated. The obtained results suggested that alexithymia moderates the relationship between social support, health-related quality of life, and glycated hemoglobin in patients with type 2 diabetes ( $P > 0.001$ ).

**Conclusion:** The study findings contribute to a better understanding of effective psychosocial factors in the quality of life and HbA1c among patients with diabetes. Therefore, developing psychological interventions is essential for these patients.

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## Introduction

**T**ype 2 Diabetes Mellitus (T2DM) is among the most prevalent chronic diseases and a major public health problem [1]. It has a high prevalence of approximately 6.8 in different regions of Iran [2] and 8.5 in the world [3]. Moreover, T2DM plays a substantial role in the patient's quality of life [4]. The quality of life impacts adherence to medical treatment and self-management, including self-care activities and medicines taking [5]. Moreover, how a patient takes care of self influences glycated hemoglobin levels (HbA1c; as a reliable indicator for diabetes) [6]. Additionally, some studies indicated that other factors, like social and emotional parameters, affect these relationships [7]. Among social factors, perceived social support has a considerable role in this area [8, 9].

The perceived social support is the perception and actuality that one is cared for, has assistance available from other people, and that one is part of a supportive social network, such as a spouse, relatives or religious institutions, etc. [10]. The perceived social support, as an effective factor, protects people from biopsychological diseases [11, 12]. Additionally, as a "stress buffer," it positively affects the health status of individuals through health protection against the harmful effects of stressful events and the reduction of the adverse effects of chronic illness [13]. Consequently, it directly and positively affects the quality of life [14]. In a meta-analysis study, Wang, Wu, and Liu investigated 182 studies in this field. They found that social support is a strong predictor of health in the patient's life [15]. In addition to social support, one of the strongest predictors of optimal performance and improved health in diabetes patients is emotional competence, and especially emotion regulation [16]; previous studies have mentioned less than two issues of quality of life and social support.

Alexithymia is defined as the disability and difficulty in the cognitive processing of emotional information and emotion regulation. Alexithymia has three dimensions, as follows: Difficulty in Identifying Feelings (DIF), Difficulty in Describing Feelings (DDF), and Externally Oriented Thinking (EOT); underlies the disease and is a sophisticated factor in managing some physical conditions [7]. People with alexithymia, overestimate normal physical feeling, misinterpret the physical symptoms of emotional arousal, demonstrate emotional helplessness by physical complaints, and seek to treat physical symptoms by therapeutic procedures [17].

The importance of considering the role of alexithymia in the mechanisms of development and maintenance of chronic diseases is increasing. This is because alexithymia characteristics (difficulty in identifying and describing feelings) is a significant risk factor for psychosomatic disorders [18]. Motan et al. argued that alexithymia is strongly related to the biopsychological health status of patients [19]. This is because the ability to perception and regulation of emotions leads to better management of chronic diseases [7]. Housiaux et al. also documented that alexithymia had a significant and positive association with glycated hemoglobin in people with diabetes; i.e. higher scores on the difficulty in the verbal descriptions of feelings are related to higher levels of glycated hemoglobin [7].

Numerous studies also reported that alexithymia is related to a low quality of life in different medical diseases, especially diabetes [20-22]. Alexithymia leads to a decreased perception of the quality of life by reducing the perceived social support and limiting social networks, and consequently, by creating defects in social skills [11]. The lack of ability to recognize and describe the feeling leads to decreased individual perception of social support. Moreover, the individual has deficits in recognizing the emotions of others and responding to them appropriately [23].

Studies revealed the effect of social support on the quality of life and glycated hemoglobin in patients with T2DM. Moreover, alexithymia impacts the process and severity of diabetes; therefore, it is expected to influence the relationship between social support and quality of life in patients. The present study determined the role of alexithymia on the relationship between social support, quality of life, and glycated hemoglobin in patients with T2DM. According to previous studies on the health moderators, it is hypothesized that alexithymia moderates the relationship between social support, quality of life, and glycated hemoglobin in T2DM.

## Methods

This was an analytical cross-sectional study. One hundred patients with T2DM (60% females) were selected by convenience sampling method between February 2013 and January 2014 from the Endocrine Clinic at Labbafinejad Hospital in Tehran City, Iran. The inclusion criteria were the age range of 40 to 60 years and providing an informed consent form. Exclusion criteria were hospitalization, diabetes complications (e.g. nephropathy or neuropathy, and emergency surgery). Free-of-charge blood tests were provided as an incentive for all study participations. This study was approved by the Ethics

Committee of Shahid Beheshti University of Medical Sciences.

All study participants completed 4 questionnaires, including socio-demographic characteristics form, Multidimensional Scale of Perceived Social Support (MSPSS), The Audit of Diabetes-Dependent Quality of Life (ADDQoL), and Toronto Alexithymia Scale (TAS-20).

### Multidimensional Scale of Perceived Social Support (MSPSS)

This is a 12-item self-report scale that assesses total perceived social support and its dimensions (family, friends, and significant others' support) [24]. The scale's psychometric properties are well established abroad with the coefficients of internal consistency of .85-.91 and test-retest reliabilities of 0.72-0.85 [25]. In Iran, the reliability coefficients for the total scale and each of its dimensions has been reported to be acceptable, 0.91, 0.87, and 0.83, and 0.89, respectively [26].

### The Audit of Diabetes-Dependent Quality of Life (ADDQoL)

ADDQoL assessed the quality of life of people with diabetes and reflects how every aspect of diabetes affects the patient's life [27]. This specific scale has 19 items. Each item is scored on a 5-point scale, and the scoring is from +1 (positive effect) to -3 (negative effect). Moreover, to normalize the values and for the ability to compare the raw scores of quality of life, the score rank of each person must be multiplied by its importance [28]. This scale has appropriate validity and reliability [29]. Its calculated Cronbach's alpha coefficient was equal to 0.91 for the Persian version and 0.69 in retesting ( $P < 0.001$ ), suggesting its desirable reliability [30]. In the present study, its Cronbach's alpha coefficient was obtained as 0.95.

### Toronto Alexithymia Scale (TAS-20)

This is a 20-item self-report scale [31]. Each item is evaluated on a 5-point Likert-type scale (from 1 to 5). Five items are reverse scored. This scale has three dimensions. Seven items for Difficulty Identifying Feelings (DIF), which assesses the respondent's ability to identify feelings, and to distinguish between feelings and bodily sensations of emotional arousal (e.g. "I am often confused about the emotions I feel") Five items belong to Difficulty Describing Feelings (DDF), which reflects difficulty in communicating feelings with other people (e.g. "I can easily describe my feelings") Eight items

are dedicated to Externally Oriented Thinking (EOT) style, which estimates the degree to which respondents are more concerned with external, objective events than their inner psychological states (e.g. "I prefer to solve problems rather than describing them"). In samples of adult Iranian populations, reliability coefficients for total scale alexithymia scores, and its three factors were 0.85, 0.82, 0.75, and 0.72, respectively [32].

### Glycated Hemoglobin Measurement (HbA1c)

Hemoglobin A1C provides an average value of blood glucose control over the past 2 to 3 months. It is an important blood test that suggests how well diabetes is being controlled. The normal range of glycated hemoglobin in healthy subjects is 4%-7% and the American Diabetes Association has defined levels  $< 7%$  as appropriate glycemic control. High levels of glycated hemoglobin indicate poor control of blood glucose [33]. In this study, glycaemic hemoglobin values were measured using the HPLC method and DS5 HbA1c measurement system (Hb gold).

The Kolmogorov-Smirnov test was used for the distribution of continuous variables. Normally-distributed data were expressed by mean and standard deviation, and categorical data were expressed by frequency (percentage). The Independent Samples t-test was used to compare the mean score difference of continuous variables in two genders. Furthermore, the Chi-squared test was used to compare categorical data. To evaluate the role of alexithymia in the relationship between perceived social support, diabetes-related quality of life, and quality of life, two hierarchical multiple regression analyses were calculated, as follows:

In the first analysis, the diabetes-related quality of life was considered the criterion variable; first, social support was entered as the predictor variable, followed by the main effect alexithymia (second step) and interaction alexithymia  $\times$  social support (third step). In the second analysis, HbA1c was the criterion variable; first, social support was entered as a predictor variable, followed by the main effect alexithymia (second step) and interaction alexithymia  $\times$  social support (third step). All obtained data were analyzed in SPSS.

## Results

Demographic and anthropometric characteristics of 100 patients with T2DM (60% females) with the Mean $\pm$ SD age of 55.44 $\pm$ 8.59 years are listed in Table 1. In total, 83% of the study samples were married, and

**Table 1.** Socio-demographic and anthropometric characteristics of patients with T2DM (n=100)

Variable	Total	Female	Male	P	
Age (y), Mean±SD	55.44±8.59	55.17±7.34	55.85±10.27	0.69	
Education, No. (%)	High school or below	37 (61.7)	17 (42.5)	0.04	
	Diploma & associate degree	38 (38)	21 (35)	17 (42.5)	0.04
	Bachelor's or above	8 (8)	2 (3.3)	6 (15)	0.02
Marital status, No. (%)	Single	2 (2)	1 (1.7)	1 (2.5)	0.02
	Married	83 (83)	45 (75)	38 (95)	0.10
	Widow or divorced	15 (15)	14 (23.3)	1 (2.5)	0.07
Body mass index (kg/m <sup>2</sup> )	29.46±4.62	30.65±4.16	27.69±4.74	0.11	
Diabetes duration (years)	4.22±1.49	4.26±1.42	4.15±1.61	0.70	



**Table 2.** Hierarchical multiple regression analysis for predicting the diabetes-related quality of life by social support and alexithymia

Step	Indexes	R	R <sup>2</sup>	B	SD	β	F	P
1	Social support	0.61	0.36	0.35	0.04	0.62	27.96	0.00
2	Alexithymia	0.66	0.43	0.28	0.08	0.28	24.48	0.00
3	Social support × alexithymia	0.68	0.46	0.01	0.00	0.83	20.23	0.00



54% had primary school education. In addition, 72% were prescribed with oral glucose-lowering therapy to control blood glucose, 2% received insulin alone, and 25% used both medication and insulin. Table 2 presents the result of hierarchical multiple regression analysis for predicting the diabetes-related quality of life by social support and alexithymia.

According to regression analysis results, 36% of the variance of diabetes-related quality of life was explained by social support; by adding alexithymia, it increased to %43. The third step, after entering the moderating effect of social support × alexithymia, explained 46% of the variance of diabetes-related quality of life (P<0.001). The moderating role of alexithymia increased by 10% of the R<sup>2</sup> value, which was significant (P<0.05, df=4.68,

and DR2=0.02). Moreover, to determine the effect of alexithymia dimensions (DIF, DDF & EOT) on the quality of life, in another analysis, stepwise regression analysis was used. Its obtained results indicated that DIF alone explained 30% of the variance of diabetes-related quality of life (P<0.001, β=0.54, F=41.03). Furthermore, the two other dimensions (DDF and EOT) were excluded from data analysis.

The hierarchical multiple regression analysis results for predicting glycated hemoglobin by social support and alexithymia are outlined in Table 3.

According to the regression analysis results, social support explained 23% of the variance of glycated hemoglobin; by adding alexithymia, this value increased to 31%.

**Table 3.** Hierarchical multiple regression analysis for predicting of glycated hemoglobin by social support and alexithymia

Step	Indexes	R	R <sup>2</sup>	B	SD	β	F	P
1	Social support	0.48	0.23	0.05	0.03	0.66	28.69	0.00
2	Alexithymia	0.56	0.31	0.10	0.03	0.80	21.55	0.00
3	Social support × alexithymia	0.59	0.35	0.01	0.00	-0.98	16.92	0.00



In the third step, the interactive effect of social support  $\times$  alexithymia was included in the model and was statistically significant ( $P < 0.001$ ). Additionally, alexithymia moderated the effect of social support on glycaemic hemoglobin. The moderating role of alexithymia increased by 12% of the  $R^2$  value, which was significant ( $P < 0.05$ ,  $DF = 5.62$ ,  $DR2 = 0.04$ ). Furthermore, to determine the effect of alexithymia dimensions (DIF, DDF & EOT) on glycated hemoglobin, stepwise regression analysis was used. Its relevant results revealed that DIF alone explained 34% of the variance of glycated hemoglobin ( $P < 0.001$ ,  $\beta = 0.69$ ,  $F = 51.26$ ). Moreover, the two other dimensions (DDF and EOT) were excluded from data analysis.

## Discussion

The current study investigated the role of alexithymia in the relationship between perceived social support, quality of life, and glycated hemoglobin in patients with T2DM. The obtained results indicated that social support in patients with T2DM has a significant positive correlation with the quality of life and a significant negative correlation with glycated hemoglobin. Moreover, there was a significant negative correlation between the quality of life and alexithymia. In other words, when patients perceived more effective social support, they reported a better quality of life, more appropriate hemoglobin levels, and a lower score of alexithymia.

These findings were in line with those of Tang et al. and Glasgow et al. who reported a significant positive relationship between social support and quality of life in patients with diabetes [34, 35]. Lumely et al. [11] and Meunier et al. [36] founded a significant negative relationship between social support and glycated hemoglobin in patients with diabetes. In addition, Bratis et al. [37] and Posse et al. [38] suggested a significant negative relationship between social support and alexithymia. This means that individuals with alexithymia, regardless of the perceived social support, have difficulty in establishing social relationships and using social support. This is because of their poor emotional awareness, including empathy and understanding of the experiences of others which is indispensable for the formation and development of intimate relationships and consequently encountering health issues [23].

Other studies suggested that social support and alexithymia in patients with T2DM were predictors of their life quality; this finding was in line with those of Liu et al. [39] and Tang et al. [34] who stated social support is a predictor of life quality in patients with diabetes. Grassi

et al. [21] also documented that alexithymia is a predictor of the quality of life in patients.

Besides, the collected results revealed that alexithymia moderates the relationship between social support and quality of life, and glycated hemoglobin. In line with these findings, Schafer et al. reported that patients who had weaker family ties were less likely to comply with diabetes diet; thus, they had unfavorable metabolic control, leading to a negative effect on their quality of life [40]. In other words, the difficulty in identifying and describing feelings (DIF and DDF) leads to an inability to recognizing the individual requirements and expressing them to others. Consequently, it reduces social support perception and the use of health services. Therefore, their metabolic control would be reduced and consequently, glycated hemoglobin would be increased. These issues would harm the patients' quality of life [7].

The results of measuring the dimensions of alexithymia by regression analysis suggested that the only DIF was a predictor of quality of life in patients. This finding is consistent with that of Housiaux et al. [7] who stated DIF interferes with the ability of patients to receive health services and their disease management. Meunier et al. in their study ( $n = 45$  patients with diabetes), demonstrated that DIF was associated with higher levels of blood glucose; therefore, it should be considered as a vulnerable factor in the intensity and change of quality of life in diabetes patients [36].

A limitation of this study was using self-report measures. The relatively small sample size also limited the generalizability of the research outcomes. Finally, to enrich the impact of future management research, we recommend applying multilevel designs to existing models and considering the effects of these variables in the treatment. Additionally, to enhance the effectiveness of therapeutic interventions in improving the quality of life and controlling blood glucose in patients with T2DM, we recommend considering the emotional aspects of the disease, especially alexithymia.

## Conclusion

Diabetes management is complex and challenging. Consequently, controlling this process is a permanent challenge, influenced by the intertwined collection of biopsychosocial factors. Social support, as one of the factors influencing the quality of life and glycated hemoglobin, is effective in numerous diabetes-related interventions. Furthermore, alexithymia, as a psychological construct, plays a moderating role in the relationship be-

tween these factors. Understanding these factors and their relationships provides contexts for future studies and appropriate planning for more effective interventions in diabetes control. Improvement and development of quality of life in patients with diabetes are important and effective in promoting the therapeutic purposes of diabetes; these purposes would not be achieved without identifying psychosocial moderators and factors influencing the quality of life and glycemic control. Eventually, the high prevalence of alexithymia in patients with diabetes and its effect on their quality of life and glycated hemoglobin reflects the importance of this psychological construct in diabetes. Thus, it requires particular attention from health officials.

## Ethical Considerations

### Compliance with ethical guidelines

Ethical approval for the study was obtained from the Ethics Committee of the Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences (Code: 433EC).

### Funding

This research was supported by the Social Determinants Endocrine Health & Obesity Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences.

### Authors' contributions

Study design: Zeinab Shayeghian, Parisa Amiri; Data collection and analysis: Elnaz Hajati, Safoora Gharibzadeh; Manuscript preparation: Zeinab Shayeghian, Parisa Amiri, Elnaz Hajati.

### Conflict of interest

The authors declared no competing interests.

### Acknowledgments

We thank Labafinejad Hospital staff and all patients who participated in this study.

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