# Pharmacophore

# THE PREDICTIVE ROLE OF DEMOGRAPHIC VARIABLES IN SELF-MANAGEMENT IN ADOLESCENTS WITH TYPE 1 DIABETES

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**ABSTRACT**

Introduction: Different factors affect the self-management of diabetes whose role and effect is still unknown. The present study aims to investigate the predictive role Demographic variables have been implemented in diabetes management in adolescents with type 1 diabetes. Methods: In this cross-sectional study, 200 adolescents with type 1 diabetes who referred to the Iranian Diabetes Association were admitted to the study in 2016. The inclusion criteria were: age range from 15 to 21 years, diagnosis of diabetes for more than a year, complete knowledge of the patient regarding his disease, not having other physical-psychological illnesses and not taking psychiatric or narcotic drugs. To measure self-management of diabetes, the SMOD-A questionnaire was used. Data were analyzed using SPSS software version 18. Results:112 of the participants were female, the mean age of the samples was $17.10 \pm 1.85$ and the mean duration of diabetes was $5.98 \pm 3.79$, 62.5% reported diabetes history among immediate relatives. 42% were the first children of the family and 29.5% were studying at the university. The mean diabetes self-management score was $86.15 \pm 15.18$. The multivariate linear regression test of the stepwise method showed that only the age of the variables studied was that it could predict the amount of changes in self-management diabetes score of 4.9%. And affect it to the extent (Beta= -0.221). Conclusion: The results of this study showed that the adoption of diabetes self-management behaviors is inversely related to the age of the patients. Generally speaking, younger people with diabetes are a strong predictor of diabetes control.

## Introduction

To date, there has not been a conclusive and thorough treatment for type 1 diabetes; a chronic and non-infectious disease, the most important characteristic of which is the disorder of carbohydrate metabolism due to the lack of insulin secretion resulting from the destruction of pancreatic Langerhans cells during autoimmune process**.** The peak of type 1 diabetes onset is between the ages of 10 and 14 years, the beginning of adolescence [1]. Kassi, quoted by the International Association of Children and Adolescents with Diabetes and the American Diabetes Association, states that "adolescents with diabetes are a special group of patients who need special support to manage the disease" [2]. In this period, due to the secretion of puberty hormones, the body resists insulin in a normal way. Therefore, dealing with diabetes is perhaps the most difficult problem for adolescents; in fact, in adolescents with diabetes, this period is associated with problems of a metabolic disorder [3, 4]. Although a group of studies have focused on the etiology of type 1 diabetes and identified factors such as viruses and genetic

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factors as factors that influence the onset of the autoimmune process, other studies have addressed with blood glucose control and modification of diabetes self-management behaviors. The main goal in controlling and managing blood glucose in adolescents with glycosylated hemoglobin is less than 7.5% [1]. Small Wood (2009) stated that when a person is recognized to have diabetes his life is controlled by diabetes management and diabetes management means "adaptation to diabetes"; almost 95% of diabetes management is based on self-management [5]. Diabetes self-management is a major component of diabetes care [6]. Self-management is an active and operational process that is guided by the patient and is defined as sets of behaviors that diabetic patients do in their everyday lives to control diabetes and is affected by various factors. By identifying the factors contributing to the success or failure of the disease self-management process, the treatment team can develop interventions to help the patient or his family to accept and apply a specific treatment plan; This process involves considerations and choices that can be made by patients with diabetes daily [7]. Individual demographic characteristics such as age, gender, educational level, and socioeconomic status of the family are factors that may affect self-management. As Chao (2014) criticizes this issue in his qualitative study entitled "Studying self-management of adolescents with type 1 diabetes at the onset of adolescence with age-related factors and duration of disease" [6]. Regarding the mentioned issues, the present study was designed and carried out to determine the predictive role of demographic variables in self-management in adolescents with type 1 diabetes.

**Methods**

This cross-sectional study was conducted, by simple sampling, on adolescents with type 1 diabetes referring to the Iranian Diabetes Association in 2016. The sample size of this study was 172 (e =2, α = 0.05) and the estimated loss of 200 was predicted.

$$n = \left(\frac{Z_{1-\alpha/2} \times \sigma}{e}\right)^2 \qquad n = \left(\frac{(1.96 \times 13.39)}{2}\right)^2 = 200$$

Inclusion criteria were: age range from 15 to 21 years, diagnosis of diabetes for more than a year, complete knowledge of the patient regarding his disease, not having other physical-psychological illnesses and not taking psychiatric or narcotic drugs. The analyzed demographic data included age, sex, degree of education, socioeconomic status of the family and family history, parental education, parental occupation, birth rank and the duration of suffering from diabetes. To determine the diabetes self-management score of adolescents, the SMOD-A questionnaire, which consists of five subscales "Parental cooperation, diabetes care activities, problem-solving ability in people with diabetes, communication in people with diabetes and The second part includes the "adolescent purposes" area in relation to the illness "designed". The lowest score in this questionnaire is zero and the highest is 144. The scoring method in this questionnaire was based on the Likert scale of the scale of 4 degrees (0-3). The content and content validity of the questionnaire was completed with the help of 8 faculty members. The reliability of the questionnaire was calculated with the help of ten adolescents in the Cronbach's alpha of 0.82. Data were analyzed using descriptive statistics (relative frequency-mean and standard deviation) and regression test in SPSS-18 software. Demographic information questionnaire included: age, sex, educational level, socioeconomic status, family history of diabetes and duration of disease. Data were analyzed using descriptive statistics (relative frequency-mean and standard deviation) and statistical test regression test in SPSS-18 software.

**Results**

112 of the participants were female, the mean age of the samples was 17.10 ± 1.85 and the mean duration of diabetes was 5.98 ± 3.79, 62.5% reported diabetes history among immediate relatives. 42% were the first children of the family and 29.5% were studying at the university (Table 1). The mean diabetes self-management score was 86.15 ± 15.18. The multivariate linear regression test by stepwise method (ANOVA: 0.002, F: 10.095) showed that only the age of the variables studied was that it could predict the amount of changes in self-management diabetes score of 4.9%. And affect it to the extent (Beta = -0.221) (Table 2).

**Table 1:** demographic criterions of diabetic youth

|  |  |  |
|---|---|---|
| Grade | First year high school | 58 (29%) |
|  | Second year high school | 84 (42%) |
|  | Collegial | 58(29%) |
| Economical level | Week | 17(8.5%) |
|  | Moderate | 109(54.5%) |
|  | Good | 68(34%) |
|  | Very good | 6(3%) |
| Birthday rating | $1^{st}$ | 84(42%) |
|  | $2^{nd}$ | 75(37.5%) |
|  | $3^{rd}$ | 24(12%) |

| | | |
|---|---|---|
| | ≥4th | 17(8.5%) |
| Father education level | Illiterate | 4(2%) |
| | Low literate | 29(14.5%) |
| | Diploma | 99(49.5%) |
| | ≥bachelor | 68(34%) |
| Mother education level | Illiterate | 0 |
| | Low literate | 37(18.5%) |
| | Diploma | 109(54.5%) |
| | ≥bachelor | 54(27%) |
| Father job | Employee | 60(30%) |
| | Worker | 12(6%) |
| | Free job | 90(45%) |
| | Jobless | 14(7%) |
| | Retired | 24(12%) |
| Mother job | Employee | 44(22%) |
| | Worker | 0 |
| | Free job(house wife) | 141(70.5%) |
| | Jobless | 0 |
| | Retired | 5(2.5%) |

Log self-management=117.246-1.830 age

**Table 2:** liner multivariate regression (stepwise) of demographic criteria and diabetic self-management

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| | Model | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 2239.910 | 1 | 2239.910 | 10.095 | .002 |
| | Residual | 43490.070 | 196 | 221.888 | | |
| | Total | 45729.980 | 197 | | | |

| Model Summary | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .221a | .049 | .044 | 14.89591 |

| Coefficients | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 117.246 | 9.888 | | 11.857 | .000 |
| | Age | -1.830 | .576 | -.221 | -3.177 | .002 |

| Excluded Variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Beta In | T | Sig. | Partial Correlation | Collinearity Statistics |
| | | | | | | Tolerance |
| 1 | Gender | -.101 | -1.453 | .148 | -.103 | 1.000 |
| | grade | .058 | .281 | .779 | .020 | .113 |
| | Economical level | -.042 | -.604 | .546 | -.043 | .986 |
| | Year of illness | -.106 | -1.422 | .157 | -.101 | .870 |
| | Birthday rating | -.026 | -.368 | .713 | -.026 | 1.000 |
| | Family HX | -.102a | -1.474 | .142 | -.105 | 1.000 |
| | Father education level | .037a | .523 | .602 | .037 | .989 |
| | Mother education level | -.071a | -1.026 | .306 | -.073 | .999 |
| | Father job | -.003a | -.045 | .964 | -.003 | .998 |
| | Mother job | .073a | 1.050 | .295 | .075 | .999 |

**Discussion**

The aim of this study was to investigate the predictive role of demographic variables in diabetes self-management in adolescents with type 1 diabetes. The only demographic variable that was able to predict diabetes self-management changes in adolescents with diabetes was age. The result of this study was consistent with Keough's (2011) study. He conducted this cross-sectional study to determine the difference between the various diabetes management behaviors and its subscales in the three early, middle and late stages of adolescence on 504 adolescents aged 13 to 21 years old with type 1 diabetes using the SMOD-A tool. In terms of collaboration with parents, average scores show a gradual decrease with age in different adolescents. In the early period of adolescence, the level of collaboration with parents was at its highest and late adolescence was characterized with the lowest level of cooperation. Keough points out that this is due to increased autonomy and increased sense of responsibility with increasing age and not being dependent on parents any more. Though, the presence of an adult to assess self-management in adolescents is always necessary. In the area of problem solving in diabetes, there is also a significant difference the early and middle period of adolescence, but there was no significant difference between the middle period and the late period of adolescence. Keough points out that problem solving is a feature affected by knowledge

and skill that always develops with age. Although abstract thinking is formed during the middle period of adolescence, its main development is in the late period of adolescence. For this reason, there was a significant difference between the early period and the late period of adolescence [8]. In the study of Chao (2014), no significant difference was found in gender and race at age of diagnosis and duration of disease. Chao (2014) conducted a cross-sectional study aimed at describing self-management activities based on the age of diagnosis and the duration of the disease in adolescents with type 1 diabetes, aged (11-14) in hospitals in Arizona states, Yale, Miami. The instrument used in this study was SMOD-A. 320 adolescents participated in this study. In the area of collaborating with parents, more than half of the subjects pointed out that they collaborated with their parents, especially when their blood glucose is not in the normal range and they are advised to regulate it with their parents, and this group of adolescents receive the highest level of parental support and attention when they adjust their blood sugar, carbohydrate levels, and insulin dose. Chao pointed out that there was a significant difference between the demographic variables and the clinical features of the patients who suffered from this disease for a long time; in people who had the disease for less than two years, the level of collaboration with parents was higher than those who had the disease for more than 5 years [6]. Maranda conducted a study (2016) entitled "The relationship between pet care and glycemic control" on 223 adolescents with type 1 diabetes mellitus (9-19 years old) at Massachusetts University. The SMOD-A tool was also used in this study. Adolescents were divided into control and intervention groups. Those who were in the control group were older than those who were in the intervention group and the control group had a weaker glycemic. This is due to increased sense of responsibility, self-efficacy in adolescents in relation to age. The level of parental supervision and adolescents' cooperation with them decreases with age [9]. In general, it can be concluded from the results of this study that with increasing the age of adolescents, self-management activities are reduced in them; the formation of sense of responsibility and independence leads to the lack of dependence of adolescents in controlling self-management behaviors. It can also be said that by increasing the duration of diabetes, signs of depression develop in the disease, as a result of which, these people first endured isolation, and through withdrawing from family, peer group and health team, their tendency to control diabetes diminishes.

The result of this study was not consistent with that of Tal et al. (2011). This study titled "Analysis of some factors related to prediction capability of self-management in type 2 diabetic patients" was carried out on 140 patients in Isfahan. The findings of this study showed that other demographic variables such as duration of illness, gender, underlying illness, BMI, education higher than diploma, drug therapy, perceived health status from the patient's perspective, diabetes distress and self-efficacy all had a meaningful relationship with diabetes management itself. The predictive capability in this study was 46%. The multivariable regression model describes the variables that affect moderated self-management as perceived health status from the patient's perspective, diabetes status and self-efficacy [10]. In Keough's study (2011), age had a meaningful relationship with the mean score of cooperation with parents, diabetes communication and diabetes self-care activities. Girls obtained higher scores in the mentioned areas. Studies have suggested that girls are not independent in their diabetes management behaviors, but they do these activities more and better than boys. In social situations, such as attending school or parties, boys do not properly handle diabetes self-management behaviors or avoid them altogether [8]. Lack of predictive capability in demographic variables such as education level and socioeconomic status in controlling diabetes self-management behaviors may be due to the heterogeneity of the research community in this study. Although adolescents with diabetes may be in a reasonable socioeconomic status, the onset of symptoms of depression with an increase in the duration of illness causes the adolescent to resign from the social environment and reduce the desire to control diabetes and leads to the reduction of diabetes self-management behaviors.

**Conclusion**

This study provided valuable information on diabetes self-management in adolescents with type 1 diabetes and introduced factors that have direct and predictive relation to these variables. The results of this study showed that the adoption of diabetes self-management behaviors is inversely related to the age of the patients. In general, younger people with diabetes are a strong predictor of diabetes control. In fact, the shorter the duration of diabetes, the more interested the people to adopt diabetes self-management behaviors. Also, in the early years of the disease, parents have more supervision and there is more collaboration between parents and adolescents. In this way, the best proposed regression model for intervention planning in adopting self-management behaviors for adolescents with diabetes is to focus on reducing diabetes distress and increasing their self-efficacy through family, peer group and healthcare group, especially nurses.

**Research Limitations**

Of the limitations of this study is that no similar study with the same title in adolescence around the world was found. Considering the fact that this study was conducted in the Iranian Association for Diabetes and that those who referred to this center usually had an average economic level, the results of this study cannot be generalized to those of governmental centers. Questionnaires were completed in a self-reporting way so that the mental and psychological conditions of adolescents with the disease with regard to their age, illness and the large number of questions, especially in the self-administered diabetes questionnaire, somewhat influence the results of the research when responding to it. In spite of attempts to establish appropriate interactions with the research units, it was partly outside the control of the researcher.

**Acknowledgments**

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