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Social Determinants Related to Type 2 Diabetes Self-Care and Control Measures

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Abstract

Introduction: Diabetes Mellitus (DM) as a common metabolic disorder, is a controllable disease by the self-care and maintaining the blood sugar. This study is designed to investigate the social determinants of diabetes self-care and control measures.

Methods: It is an analytical cross-sectional study conducted on 310 type-2 DM patients of Shiraz University of Medical Science by convenient sampling method. Self-care behaviors data were collected by self-care scale of Toobert and Glasgow from January to April 2017. Demographic data and serum level of HbA1c were collected. Data were analyzed by SPSS 16 and the significance level was considered as 5%.

Results: In this study, 310 patients with Mean±SD age of 52.11±8.20 were investigated. Significant relationships were observed between self-care and education level (p=0.02) and job (p=0.005). Also a significant reverse relationship was observed between diabetes control and physical activity, weight management and self-care (p<0.05).

Conclusion: Results showed that education level and job can increase self-care especially in weight management and physical activity; therefore, increase of these factors will result in better control of diabetes. In terms of job, it was observed that retired people had more self-care which could be due to their education level and having enough time for these actions.

Keywords: Self-care; Social determinants; Type 2 Diabetes Mellitus

Introduction

Type 2 diabetes mellitus (T2DM) includes 90-95% of diabetes patients which is involving 25.3 million in USA, and 336 million all around the world [1-3]. And also reported that this number is 8% in Iran that will reach to 42.6 million till 2030 [4]. Diabetes increases the risk for many serious health problems including kidney diseases, reduced vision, neuropathy, and cardiovascular diseases [5, 6].

Diabetic patients need daily monitoring of blood sugar, injection, continuous visiting with treatment staff, accurate sport, and diet programs to reach to a satisfying control. Although diabetes control and complications are costly, but in-time diagnosis and correct care based on educating the patients, its acute or chronic complications can be prevented or delayed [7-11].

So controlling the DM is a particular importance [12] and one of these method is self-care and maintaining the blood sugar [13]. Diabetes self-care has been defined as a series of behaviors daily conducted by patients to diabetes control as; diet adjustment, sport, medication, self-monitoring of blood sugar or urine and caring the feet. Basic self-care has been regarded as the cure for diabetes and emphasizes on change in behaviors and management of physical, social and excitement consequences of diabetes.

Studies have shown that some social determination (SD) factors as social, economic, environmental, psychological, political and cultural can cause serious problems for self-care processes [14-23].

Although contribution of patient plays an important role in the self-care programs, but all the patients do not comply with this subject and recognition of the effective factors can help the better programming. Therefore, this study is aimed to investigate some SD factors that affect self-care and control measures among diabetic patients.

Material and Methods

Participants and sampling

This study was a cross sectional that was performed in T2DM patients of Shiraz University of medical science from January to April 2017. All patients provided informed consent before the study. Required sample size was 320 patients that

yielded with expected ratio of self-care approximately: 50%, precision: 5%, confidence level: 95%, and considering the infinite population that we will reach them. Regarding the objective population structure and health centers location, each of them was considered as a district and in each district each peripheral health center located in marginal, central old places or prestigious places were considered as a cluster-head. Then, from each health center, patients were selected by convenience sampling methods. We prefer this sampling method because it is fast, the subjects are readily available. We consider having T2DM as inclusion criteria and age≥30 years. Patients who have pregnant and who unwillingness to cooperate excluded.

Data collection

Data gathering perform by one of researchers and his coworkers in health central's field. Data tools include two sections. First, demographic information collection forms which includes factors such as age, gender, height, marital status, weight, education, job, age of disease initiation, dependence on insulin, family history, blood sugar check, waist and hip circumference, and serum level of HbA1c. Second part involved a structural self-care profile. Presence of valid tools able to evaluate the level of self-care in different aspects (nutriment, blood sugar measurement and sport) can be found in numerous clinical researches [24, 25]. Here, we used T2DM self-management tool designed by Glasgow and Toobert in order to assess the commitment to self-care behaviors among T2DM patients. This questionnaire has 12 statements: which evaluate understood level and feasibility of 5 functions in self-care field (blood sugar control, receiving drug, healthy food, physical activity, and compatibility) and two overall structures (feasibility in controlling the weight, reliance on ability to manage the diabetes) which measure the level of commitment in 5 fields for 7 days. Response chooses range from 0 to 7, and higher scores indicate higher performance of self-management activities. Then it was rescaled to 100 for better comparison. Each domain was calculated by sum of its items. Then it was rescaled to 100 for better comparison. In previous studies, validity and reliability of the questionnaire have been established. Content validity was tested using a panel of experts. To evaluate the structural of the instrument factor analysis was used. Internal consistency was assessed by average inter item Correlations, which were reported as acceptable (Mean = 0.47). Test-retest correlations over 34 months were reported by the authors and ranged from.40 to .78. Its internal similarity coefficient in range of 0.74 to 0.78 in each question [24, 25]. Namdari and et al. (2006) translated and confirmed the content validity and internal reliability (α=0.77) of this scale [26] in Persian.

Statistical analysis

Qualitative data are expressed as number and percentage, which analyzed by the Chi-square Test or Fisher Exact Test. Quantitative data, were presented as mean and standard deviation and analyzed by Pearson correlation coefficient, Independent two sample T-test, and one-way analysis of variance (ANOVA) with LSD post-hoc Test. Data were analyzed using SPSS for Windows, Version 16.0. (Chicago, SPSS Inc.) and significance level of 5% was considered.

Results

Out of 320 questionnaires 310 patients with complete medical record and good cooperation enrolled in our study. Ten questionnaires were removed because of incomplete data. Mean±SD age of patients was 52.11±8.20 years (rang: 30 to 65). Ninety-one of them (29.40%) were men. The ratio of women to men was 2.40 to 1.00. Majority of the patients were married (278, 89.70%) and most of them (172, 55.50%) had primary education level, 110 (35.50%) of them had secondary education to diploma and 28 (9.00%) of them had university studies. majority of the patients (196, 63.20%) were housewives, them, 33 (10.60%) had free jobs 26(8.40%) of them were clerk and 56 (18.00%) were retired. Their weights varied from 35 to 110 kg and their height varied from 138 to 191 cm. Body max index (BMI) of the them ranged from 14.95 to 42.42, waist circumference varied from 55 to 136 cm and their hip circumference ranged from 50 to 150 cm. Serum HbA1C varied from 4.8 to 16.2 with the mean of 8.14±1.93 with median of 7.8.

T-test results are presented in Table 1 for comparing self-care score in different domains and general by gender. Based on the statistical results contained in this table and the significance level obtained by t-test, there is no significant difference between the mean of self-care score in different domains in men and women.

Self-care relationship with age was measured using Pearson correlation coefficient. The results of this analysis are summarized in Table 2. The correlation coefficient of Pearson in different domains with age is given in the table. There is only a significant direct relation between the age and the ease of blood glucose check. To investigate the relation between self-care and level of education, ANOVA with LSD post hoc test was employed. The results of this analysis are listed in Table 3. According to the p value recorded in this table, there is a significant difference between self-care score for different education levels. Patients with lower education levels had lower self-care scores. LSD post hoc test indicated that this difference is related to the group under the diploma and the university group (p=0.01). In performance domains just blood sugar check domain was difference among 3 groups and The post-hock test (LSD) showed that this difference is related to the group under the diploma and the diploma group (p=0.009).

In patient behavior domains in health food, physical activity frustration and diabetes management also there was a significant difference. The post-hock test showed that in the health food and physical activity domains this difference is related to the group under the diploma and the diploma group (p=0.008 and p=0.008 respectively) and in the frustration and diabetes management domains this difference is related to the group under the diploma and the university group (p=0.02 and p=0.04, respectively)

To investigate the relationship between self-care and job, ANOVA and LSD post hoc test was employed. The results of this analysis are listed in Table 4. There is a significant difference between self-care scores in job groups. In case of adaption or frustration, physical activity, receiving health food and checking blood sugar, in behavior domain, there were significant differences in different jobs. In domain of function, for receiving

drug, there was also a significant difference. However, the other aspects of this domain had no significant difference for different job titles. In total, the difference between housewives and retired (p=0.02) and free job and retired (p=0.007) were significant.

The relationship between self-care and insulin receive was calculated by T-test. The average score in total domain was 67.50±9.13 in patients who received insulin and 65.90±8.13 in those who did not received insulin this difference was not statistically significant (p=0.110 and t=1.57). According to Pearson correlation coefficient, the correlation between self-care score and HbA1c level was calculated whose results are listed in Table 5. According to this table, there is a reverse and significant relationship between self-care score and HbA1c, in a way that those with higher self-care score, have lower HbA1c level (their diabetes is under control).

Table 1: Mean of self-care score in gender level

Domains		Gender		p-value t -test
		Male	Female	
Total		66.97±8.63	66.95±8.82	0.24
performance	Receiving drug	91.07±14.34	90.58±15.58	0.79
	Blood sugar check	84.89±24.26	82.53±25.60	0.45
	Healthy food	76.64±16.1	77.65±15.73	0.611
	Physical activity	26.71±16.62	25.39±16.21	0.51
	Frustration	55.09±14.39	54.66±14.41	0.81
Patient behavior	Blood sugar check	54.07±23.94	55.89±26.25	0.56
	Receiving drug	61.54±24.8	60.73±28.21	0.81
	Healthy food	56.48±19.02	59.29±29.33	0.65
	Physical activity	58.09±22.77	60.18±22.09	0.18
	Frustration	65.27±24.37	61.10±25.6	0.25
	Weight management	65.71±22.76	62.19±25.75	0.77
	Diabetes management	81.27±13.15	80.80±12.15	0.98

Table 2. Correlation coefficient between self-care score and age

Domains		Pearson's correlation coefficient	p-value
performance	Receiving drug	0.102	0.07
	Blood sugar check	0.020	0.07
	Healthy food	0.063	0.26
	Physical activity	-0.015	0.79
	Frustration	-0.059	0.30
Patient behavior	Blood sugar check	0.171	0.002
	Receiving drug	-0.016	0.78
	Healthy food	0.058	0.305
	Physical activity	0.052	0.36
	Frustration	0.060	0.25
	Weight management	0.045	0.43
	Diabetes management	0.027	0.63
Total		0.078	0.16

Table 3: Mean of self-care score in different domains in education level

Domains		Education level			p-value ANOVA
		Under diploma	Diploma	University	
Total		65.85±9.06	67.67 ±8.54	70.14± 6.89	0.02
performance	Receiving drug	90.0±15.67	90.91±14.35	90.18±16.08	0.97
	Blood sugar check	86.19±21.75	78.18±29.05	84.82±26.43	0.03
	Healthy food	78.7± 14.88	75.45±16.12	76.56±19.33	0.23
	Physical activity	24.78±15.85	26.64±16.76	28.55±17.48	0.41
	Frustration	55.16± 4.34	53.84± 4.72	56.19± 13.38	0.65
Patient behavior	Blood sugar check	54.3±24.80	58.55±26.77	49.29±24.63	0.16
	Receiving drug	58.84±27.75	62.73±26.19	67.16±27.33	0.23
	Healthy food	55.81±18.36	62.06±20.72	60.71±16.48	0.02
	Physical activity	56.98±22.89	64.18±21.12	60±21.08	0.02
	Frustration	60.70±25.58	62.36±25.23	72.14±24.22	0.04
	Weight management	61.16±24.53	65.09±25.62	68.57±23.99	0.21
	Diabetes management	79.43±13.22	82.31±13.80	84.82±11.06	0.04

Table 4: Mean of self-care score in different domains in different jobs

Domains		job				p-value ANOVA
		Housewife	Clerk	Free job	Retired	
Total		66.46±8.63	66.39 ±6.82	63.91± 8.32	70.28±9.56	0.005
Performance	Receiving drug	89.86±16.16	95.67±8.61	84.77±17.16	94.87±10.6	0.006
	Blood sugar check	82.84±25.02	87.5±25.98	85.94±18.17	81.03±28.89	0.66
	Healthy food	77.23±15.89	78.84±20.46	75.97±10.77	77.90±15.89	0.90
	Physical activity	24.97±16.65	32.00±14.85	23.97±17.41	26.76±14.78	0.18
	Frustration	54.61±14.35	56.15± 5.22	53.54± 2.26	55.47±15.47	0.89
Patient behavior	Blood sugar check	55.20±25.61	43.85±21.18	49.75±21.51	65.00±26.49	0.001
	Receiving drug	59.80±27.91	56.15±24.01	56.25±22.39	70.00±27.23	0.03
	Healthy food	58.7±15.02	54.10±17.31	51.45±18.41	63.69±20.17	0.02
	Physical activity	59.39±21.9	60±21.90	50.62±20.93	66.43±22.91	0.01
	Frustration	60.82±25.04	66.92±21.86	58.12±26.08	67.86±26.60	0.16
	Weight management	61.53±25.45	63.08±21.68	59.38±21.24	71.43±25.25	0.05
	Diabetes management	80.46±13.04	79.80±12.83	79.03±12.98	84.22±12.7	0.19

Table 5: Correlation coefficient between self-care score and HbA1c level (diabetes control)

Domains		Pearson's correlation coefficient	p-value
performance	Receiving drug	-0.033	0.58
	Blood sugar check	-0.030	0.61
	Healthy food	0.002	0.96
	Physical activity	0.018	0.76
	Frustration	0.104	0.08
Patient behavior	Blood sugar check	-0.199	0.001
	Receiving drug	-0.069	0.25
	Healthy food	-0.064	0.28
	Physical activity	-0.008	0.88
	Frustration	-0.112	0.06
	Weight management	-0.079	0.18
	Diabetes management	-0.151	0.01
Total		-0.133	0.02

Discussion

Self-Care Programs Composed >90% Of Blood Sugar Control Programs In T2DM. Environmental And Social Factors Stopped 85% Of Diabetic Patients From Following Their Care Behaviors [27]. Numerous Studies Have Shown That Social Determinants Can Influence Self-Care And Diabetes Control [28, 29]. Identification Of Effective Factors Of Self-Care And Diabetes Control In Each Region Can Resolve The Problems For The Educators Of Self-Care Programs And Help Them To Take More Effective Steps For Enhancement Of Their Programs To Prevent From The Complications And Control Diabetes. In This Regard, Presented Study Is Aimed To Determine The Relationship Between Social Determinant And Self-Care And Diabetes Control Programs In Diabetic Patients.

In This Study, We Showed That Social Factors Such As Job And Education Level Can Influence Self-Care And Diabetes Control. In Terms Of Job, The Highest Score Of Self-Care Was For Retired People Which Can Be Attributed To Several Reasons. First, Due To Having A Fixed Income, They Don't Have Serious Economic Issue And Their Job Stress Is Low Which Can Be Understood By Comparing Their Results With Those Having Free Jobs (With Lower Self-Care Scores). The Second Reason Is More Free-Time Of Retired Patients As Working Patients Have Less Free Time To Follow Their Self-Care Programs. Regarding Level Of Education, People With Higher Education Level Had Higher Self-Care And Their Diabetes Was More Under Control. This Can Be Understood From The Direct Relationship Between Self-Care Score And Education Like Previous Studies [14-16, 27, 17, 28, 18-20, 26, 29, 21, 22, 30, 24, 25, 23]. Therefore, It Can Be Said That Job Security And Having Enough Time For Management Of Diabetes Are The Bases For Reducing The Stress In Patient Which Facilitate The Behaviors And Control Diabetes More Effectively.

This Study Like Previous Studies, Indicated A Reverse Significant Relationship Between Self-Management And Serum Hba1c; More Self-Care Will Control Diabetes Better [31, 32]. However, A Reverse Interpretation Can Be Found; Patients With Lower Hba1c, Have Better Physical And Psychological Health. Also For Justification Of Hba1c Correlation With Diabetes Self-Management It Must Be Noted That Maybe Those With Higher Self-Management Achieved In Controlling Diabetes And Therefore They Will Have Lower Hba1c. So For Obtaining Better Life Quality, Diabetic Patients Should Follow Their Self-Care Programs Which Include Diet, Regular Sport, Regular Blood Sugar Test, Drug Follow-Up, And Caring The Feet [33].

Due To Sensitivity Of The Topic And Also Unreliability Of The Responses, Economic Condition Was Not Entered Into The Analysis. Social-Economic Position Is A Combinational Index Of Education Level And Income. People Normally Respond More Reliably To Questions About Their Jobs And Education. It Must Be Noted That People's Income Differs From Their Salary And Is Generally Higher Than Monthly Salary. In Many Countries Including Iran, The Respond To Income Are Not Real And The Best Method For Measuring This Index Is A Challenge. Therefore, In This Study, Although These Data Were Collected, But Due To Unreliability Of The Data, The Information Regarding The Economic Level Was Not Entered Into The Statistical Analysis. Some Sociology Researchers Believe That Social Condition Reflects Economic Condition As Well. However, In Some Rare Cases, Economic Condition Is Not A Function Of Social Situation And Hence Some Studies Investigated Economic Condition Beside The Social Condition And Revealed That Social Factors Such As Economic-Social Ones Are Significantly Associated With Diabetes, Self-Care, And Related Consequences. They Also Showed That Diabetes Complications Are Related To High Economic And Social Condition And Also High Self-Efficiency. Similar Studies Also Revealed That Low Social Position And Lower Education Level Could Result In Higher Death And More Rate Of Diabetes [34, 35].

Education Level Also Reflects Economic Condition And Can Be Regarded As A Basis For Gaps In Receiving Health Services And Therefore, General Health Condition. In This Study, Similar To Other Studies, It Was Indicated That Education Affects Self-Care From One Hand And Is Also Effective On Diabetes Control On

The Other Hand. In Recent Decades, Interest In Health Knowledge For Collecting Enough Evidence About Personal Response To Disease Controls Via Self-Care Has Been Increased. In Recent Two Decades, Studies Have Shown That Health Knowledge Can Increase Personal Responsiveness And People's Management And Disease Control Ability Through Self-Care. Health Knowledge, Itself, Is Under The Influence Of Education Level [36]. In Present Study, The Majority Of Patients Have Primary School Education. Previous Studies Showed That People With High Social-Economic Position Preferred Private Health Centers To Public Ones [37].

This Study Also Showed No Significant Relationship Between Insulin Treatment And Diabetes Self-Management. This Study Was Designed On A Statistically Acceptable Sample And Proper Cooperation Was Done By Health Centers' Staff. Data Collection Tools Were Also Reliable And Accurate; However, There Were Some Weak Points Which Were Highlighted After Analysis. For Example, This Study Was Only Conducted On Public Centers Whose Referring Patients Did Not Involve Extensive Social And Economic Classes. Therefore, It Is Suggested To Consider This Point And Design A Research With Diabetic Patients Of Public And Private Health Centers Will Be Included Or Change The Sampling Method In A Way That This Drawback Could Be Adjusted.

Conclusion

Results showed that education level and job can increase self-care especially in weight management and physical activity; therefore, increase of these factors will result in better control of diabetes. In terms of job, it was observed that retired people had more self-care which could be due to their education level and having enough time for these actions.

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Conflicts of interest statement

The authors declare that they have no conflict of interest.

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