Health Belief Glycemic Control and Complications in Individuals with Diabetes Mellitus

Diyabetli Bireylerde Sağlık İnancı Glisemik Kontrol ve Komplikasyonlar

Sibel SEVİNÇ, Nrs. Msc,[a]
Çiçek FADILOĞLU, Dr., Prof.,[b]
Abdullah KATGI, MD, Msc[c]

[a]Coronary Intensive Care Unit,
Buca Seyfi Demirsoy State Hospital,
[b]Department of Internal Medicine Nursing,
Ege University School of Nursing,
[c]Department of Hematology,
Dokuz Eylül University Faculty of Medicine,
İzmir

Geliş Tarihi/*Received:* 03.06.2011
Kabul Tarihi/*Accepted:* 28.01.2012

Yazışma Adresi/*Correspondence:*
Sibel SEVİNÇ, Nrs. Msc
Buca Seyfi Demirsoy State Hospital,
Coronary Intensive Care Unit, İzmir,
TÜRKİYE/TURKEY
sibelsevis@gmail.com

ABSTRACT Objective: The aim of this study is to determine the relationship between glycemic control, diabetes complications and health beliefs in individuals with diabetes. **Material and Methods:** Data were collected by using the following three forms: 1) a "patient information form," consisting of questions regarding socio-demographic information and diabetes mellitus, 2) "health belief model scale," and 3) a "patient laboratory and clinical symptoms form." This study was designed as a descriptive study. The study population consisted of individuals who admitted to Internal Medicine or Outpatient Clinics of Buca Seyfi Demirsoy State Hospital between 31 March and 30 June 2008 and those who fulfilled study criteria and could be reached within the data acquisition period and 140 individuals diagnosed with diabetes and accepted to be participant. **Results:** According to the results of the study, A1C was <7% in 15.7% of the patients and the mean total score of the health belief model scale was 4.01±0.34. The mean health belief score in individuals with diabetes was high; however, the number of patients with good glycemic control was very low and, 70% of the patients had at least one complication. **Conclusions:** There was no significant association between health belief total score, glycemic control, and number of complications.

Key Words: Complications; diabetes mellitus

ÖZET Amaç: Bu çalışmanın amacı; diyabetli bireylerde sağlık inancı ile glisemik kontrol ve diyabet komplikasyonlarının ilişkisini belirlemektir. **Gereç ve Yöntemler:** Veriler 3 form kullanılarak toplanmıştır: 1) sosyo demografik ve diabetes mellitus bilgilerini içeren hastabilgi formu 2) Sağlık İnanç Ölçeği 3) Laboratuvar ve klinik bulgular formu. Bu çalışma tanımlayıcı olarak planlanmıştır. Araştırmanın örneklemini 31 Mart-30 Haziran 2008 tarihleri arasında Buca Seyfi Demirsoy Devlet Hastanesi Dahiliye Klinik ve Polikliniklerine başvuran, diyabet tanısı almış ve araştırmaya dahil edilme kriterlerine uyan, araştırmaya katılmayı kabul eden 140 diyabetli birey oluşturmuştur. **Bulgular:** Çalışma sonuçlarına göre, hastaların %15,7'sinin A1C'si <%7, sağlık inanç puan ortalaması 4,01±0,34'tür. Diyabetli bireylerin sağlık inanç puan ortalamalarının yüksek olduğu, ancak glisemik kontrolü iyi olan bireylerin oranının çok düşük olduğu, hastaların %70'inde en az bir komplikasyon olduğu saptanmıştır. **Sonuç:** Sağlık inancı toplam puanı ile glisemik kontrol ve komplikasyon sayısı arasında anlamlı ilişki olmadığı saptanmıştır.

Anahtar Kelimeler: Komplikasyonlar; diabetes mellitus

Turkiye Klinikleri J Nurs Sci 2012;4(1):1-7

The prevalence of diabetes is increasing worldwide. According to the recent global estimates of the World Health Organization (WHO), there will be 300 million people with diabetes by the year 2025. Turkey, with its large land area, growing economy, and more than 65 million inhabitants, is a country where awareness of diabetes is still poor.[1]

Diabetes mellitus (DM) is a chronic disease with symptoms that should be kept under control by behavior modification. Microvascular and macrovascular complications may develop due to DM. All of these complications may result in serious disability and consequently in early death.[2,3]

The treatment costs of an individual with complications of diabetes are three times higher than that of a diabetic individual who develops no complications. In addition to direct costs including tests, follow-up, and treatment costs, indirect costs such as reductions in work efficiency and survival rates, and increased care-giver costs, should also be taken into account.[3-5]

The most important factor in the development of complications is inadequate glycemic control. Complications can be prevented or delayed by effective glycemic control. Management of DM comprises five approaches, including diet, exercise, individual monitoring, education, and medical treatment. Control can be established by increasing self-care management and self-efficiency. Individuals with DM should embrace the recommended approaches to perceive the disease-related complications.[4]

While blood glucose measurement is frequently used in the monitoring of daily glycemic control, glycosylated hemoglobin (A1C) measurement is used for monitoring long-term glycemic control. According to the American Diabetes Association (ADA) criteria, A1C level <7% is an indicator of good long-term glycemic control.[6]

HEALTH BELIEF MODEL (HBM)

The model was first introduced in 1959 by a group of social psychologists (Hochbaum, Kegeles, Leventhal, & Rosenstock) in the United Nations Primary Healthcare Services.[7] This model is mostly used to explain or investigate health-related behavior. According to Rosenstock the model explains the relationship between the individual's beliefs and behaviors, as well as the effect of individual motivation on health behaviors at the level of individual decision making.[8,9]

Changes in behaviour and lifestyle are difficult for people with diabetes. It is a challenge for people with diabetes to self-manage their condition to prevent or delay the onset of complications, for example, making lifestyle changes in the diet and physical activity levels. Successful management of diabetes relies on the individual performing self-care activities designed to control symptoms and avoid complications.[10] Aalto and Uutela found that there was a relationship between perceived benefits and dietary compliance and self-monitoring of blood glucose, between dietary compliance and DM support, and between perceived self-efficiency and blood glucose monitoring in individuals with type 1 DM. They have concluded that a self-care regimen should be individualized for diabetics.[11] Gökdoğan and Akıncı have reported that individuals with DM, regordless of the DM type and gender, interpret their current health status as moderate, and though they perceive DM as a serious condition and believe that the recommendations are beneficial, they execute the recommendations less frequently.[12]

According to HBM, individuals with DM will perceive the severity of the disease and disease-related complications, increase their self-efficiency, and reflect their knowledge on behavior modification and disease management.

The purpose of this study was to determine the relationship between health beliefs and glycemic control and complications in individuals with DM.

MATERIAL AND METHODS

The present study was designed as a descriptive study, to investigate the relationship between health beliefs and glycemic control and complications in individuals with DM.

The study population consisted of individuals who admitted to Internal Medicine or Outpatient Clinics of Buca Seyfi Demirsoy State Hospital between March and June 2008 and those who fulfilled study criteria and those who could be reached within the data acquisition period and individuals who diagnosed with diabetes.

Among patients who diagnosed with DM for at least 6 months ago by a physician, 140 individuals treated in either the Internal Medicine Clinic

or Outpatient Clinic who could be communicated and were willing to participate in the study were selected by a non-probability sampling method and were included in the study.

The dependent variables were the HBM scores of the individuals with DM.

The independent variables were A1C values, diabetes complications, physical activity status, current treatment, the date of diagnosis, and socio-demographic characteristics of the individuals with DM.

In the present study, data were collected by using the following three forms: 1) a "patient information form," consisting of questions regarding socio-demographic information and DM, 2) "HBM scale," and 3) a "patient laboratory and clinical symptoms form."

The patient information form consisted of items such as age, gender, marital status, educational status, income status, type of DM, type of health insurance, and the year of onset of DM.

The HBM scale in DM has been adopted for patients with DM by Tan in 2004, and includes perceived susceptibility (5 items), perceived severity (3 items), perceived benefit (7 items), perceived barriers (11 items), and health behavior activities (10 items). Each section is graded and scored according to a Likert scale from 1 (I do not agree at all), to 5 (I completely agree). The maximum score for each section will be estimated as 5 and the minimum score as 1. A low score reflects low health belief, and a high score reflects a high health belief. Validity and reliability of the Turkish version of the scale has been performed by Kartal and Özsoy in 2007. According to the results of the study, Cronbach's alpha was 0.89 and Cronbach's alpha coefficient (ICC) value was between 0.73 and 0.86.[13,14]

The "patient laboratory and clinical symptoms form" includes fasting and postprandial blood glucose levels, A1C values, and diabetic complications of the patient.

The patient information form and HBM scale were administered to individuals with DM by a face-to-face interview technique by an investigator nurse. Blood samples were obtained by an investigator nurse and A1C, and fasting and postprandial blood glucose measurements were performed in Buca Seyfi Demirsoy State Hospital central laboratory. Individuals with DM were then examined by an investigator physician and were consulted by the relevant specialists for microvascular and macrovascular complications, if necessary.

Data were analyzed with SPSS 15.0 package software for Windows (SPSS Inc., Chicago, IL, USA). In addition to descriptive statistics (mean and standard deviation), the one-way ANOVA test was used for inter-group comparison of quantitative variables and Tukey's honestly significant different (HSD) or the Tamhane test were used to determine the group that caused the difference. Student's t-test and chi-square test were used in the comparisons of two groups. The results were evaluated within a 95% confidence interval and the significance level was considered as $p<0.05$. Cronbach's alpha reliability coefficient was used to compute internal consistency of the scale.

ETHICS

The Turkish version of the HBM Scale and permission for its use, were obtained from Kartal who performed the Turkish validation, by e-mail.

The study was approved by the Ege University Nursing College Ethical Board (2008-35. 17.03.2008) and written permission was obtained from the Chief Physician of the Seyfi Demirsoy State Hospital for interviewing and using data of patients admitted to the Internal Medicine Clinic and Outpatient Clinics of the hospital.

Verbal and written information about the study and confidentiality of the names was given to the patients eligible for the study. Written informed consent was obtained from all patients willing to participate in the study on a voluntary basis before inclusion.

RESULTS

Socio-demographic characteristics are presented in Table 1.

TABLE 1: Socio-demographic characteristics of the patients.

	n	%
Age Group (year)		
20-29	7	5.0
30-39	8	5.7
40-49	29	20.7
50-59	53	37.9
60-70	43	30.7
Gender		
Women	81	57.9
Men	59	42.1
Marital Status		
Married	118	84.3
Single	22	15.7
Education		
Literate	26	18.6
Primary school	92	65.7
High School	22	15.8
Occupation		
Housewife	73	52.1
Retired	44	31.4
Employed	23	16.5
Income		
Poor	48	34.3
Moderate	92	65.7
Total	140	100.0

When the distribution of individuals with DM was evaluated according to body mass index (BMI), 28.6% had a normal weight, 39.3% were overweight, and 32.1% were obese. The duration of DM was 1-5 years in 40% of the patients with DM and the mean duration of DM was 9.17±7.15 years. It was found that 75% did not receive any education for DM, and 85.7% of the 25% who had an education believed in the benefits of education. An appropriate diet was followed by 54.3% of the patients regularly, while 36.4% did not follow any diet, and 9.3% sometimes followed an appropriate diet. Regular walking was part of the exercise regimen for 55% of the patients; 32.1% of those who walked regularly walked every day, 35.7% of them regularly performed foot care, while 50.7% did not perform any foot care, and 13.6% sometimes performed foot care. Of the patients, 20.7% were current smokers, 66.4% did not smoke, and 12.9% were quitters.

It was found that 90% of the individuals had type 2 DM, 37.1% of the individuals were treated with insulin, 58.6% were treated with oral anti-diabetic (OAD) drugs, 4.3% were treated with insulin plus OAD drugs, 52.9% used anti-hypertensive treatment, and 28.6% received anti-hyperlipidemic treatment.

The laboratory values of individuals with DM included the following: mean fasting blood glucose, 184.77±80.17 mg/dL; mean postprandial blood glucose, 247.23±108.53 mg/dL; total cholesterol, 192.96±49.32 mg/dL; triglycerides, 190.42±150.52 mg/dL; low density lipoprotein (LDL), 112.03±37.03 mg/dL; high density lipoprotein (HDL), 44.08±10.42 mg/dL; and A1C 9.02±2.24. mg/dL. Glycemic control was achieved in 15.7% of the patients.

The evaluation of the distribution of complications in individuals with DM revealed that 57.9% had neuropathy, 19.3% had nephropathy, 50% had retinopathy, 16.4% had diabetic foot, 27.1% had coronary artery diseases (CAD), 4.3% had cardiovascular disease (CVD), and 18.6% had peripheral artery diseases (PAD), while 30% did not have any complications. It was noted that 14.3% had 1, 22.9% had 2, 11.4% had 3, 10.7% had 4, 9.3% had 5, 0.7% had 6, and 0.7% had 7 complications.

The mean total score of the HBM scale was 4.01±0.34, the perceived susceptibility score was 3.45±0.65, the perceived severity score was 4.21±0.82, the perceived benefit score was 3.87±0.56, the perceived barriers score was 4.05±0.42, and the health behavior activities score was 4.25±0.44.

When health belief and socio-demographic data were analyzed, it was found that health belief was increased as the duration of diabetes increased, while no significant differences were noted with other variables.

When the relationship between health belief and glycemic control was evaluated, statistical significance was only noted in the perceived severity subscale and the glycemic control level of those patients who perceived DM as a serious condition and were found to be under control (Table 2).

The relationship between health belief and DM complications is presented in Table 3.

A significant difference was found between perceived barriers and nephropathy, between retinopathy and PAD, and between total health belief score and nephropathy. No significant difference was found between health belief and the total number of complications (Table 4).

DISCUSSION

Health beliefs of patients are considered as the most significant factor influencing their health behavior. According to the HBM, disease-related susceptibility, severity, benefit, barriers, and the perception related with recommended activities play an important role in gaining preventive health behavior.[15,16]

In the present study the mean HBM scale score of all individuals was 4.01±0.34, the health belief scores were higher when compared to previous studies.[14-17]

In the present study evaluating the relationship between health beliefs and glycemic control and DM complications in individuals with DM, a significant relationship was found between the perceived severity and glycemic control, and patients with high perception scores were under better glycemic control. In the follow-up studies about the effects of perceived severity and barriers to glycemic control, Daniel &Messer have found that patients with high perceived severity and low perceived barriers could keep their A1C level under control. It was also emphasized in the same study that there was a significant relationship between glycemic control and belief level of the patients and patients could adapt to recommended treatment interventions easier.[17] In a follow-up study conducted by Skinner and Hampson, a statistically significant association was found between perceived susceptibility and severity subscales related to disease, and A1C. Metabolic controls were found to be better in patients with high disease-related susceptibility and severity perception.[18]

TABLE 2: Relationship between mean health belief score and glycemic control.

	A1c<7	
HBM Subscales	**T**	**p**
Perceived Susceptibility	0.907	0.366
Perceived Severity	2.067	0.041
Perceived Benefits	-0.828	0.409
Perceived Barriers	-1.140	0.256
Recommended Health Related Activities	0.731	0.466
Total	0.261	0.795

HBM: Health Belief Model.

TABLE 3: Relationship between mean health belief score and the complications.

HBM Subscales		Neuropathy	Nephropathy	Retinopathy	Ulceration	CAD	SVD	PAD
Perceived	T	1.153	0.752	-0.096	0.298	0.894	0.343	1.501
Susceptibility	P	0.251	0.453	0.923	0.766	0.373	0.732	0.136
Perceived	T	0.232	1.346	1.201	0.929	0.792	0.692	1.156
Severity	P	0.817	0.181	0.232	0.355	0.429	0.490	0.250
Perceived	T	-0.240	1.199	0.425	0.731	0.156	-0.195	0.453
Benefits	P	0.811	0.233	0.671	0.466	0.876	0.846	0.651
Perceived	T	0.734	2.541	2.109	1.405	-0.793	0.356	2.012
Barriers	P	0.464	0.012	0.037	0.162	0.429	0.722	0.046
Recommended	T	-0.727	0.640	0.872	0.128	-0.239	-0.211	0.043
Health Related Activities	P	0.468	0.523	0.385	0.898	0.811	0.833	0.966
Total	T	0.193	1.976	1.424	1.039	0.057	0.197	1.434
	P	0.848	0.050	0.157	0.301	0.954	0.844	0.154

HBM: Health Belief Model; CAD: Coronary artery diseases; SVD: Systemic vascular diseases; PAD: Peripheral artery diseases.

TABLE 4: Relationship between mean health belief score and number of complications.

	Complication numbers	
HBM Subscale	**F**	**P**
Perceived Susceptibility	0.956	0.447
Perceived Severity	0.660	0.654
Perceived Benefits	0.409	0.842
Perceived Barriers	1.262	0.284
Recommended Health Related Activities	1.409	0.225
Total	0.832	0.529

HBM: Health Belief Model.

In several other studies, glycemic control levels were better in patients with DM who had higher self-care activities as well.[2,19-23]

Song and Kim have concluded that an intensive diabetes management program was effective on A1C levels in individuals with type 2 DM.[24]

In the present study, the complication rates of individuals with DM are high and this result showed that their glycemic control is not optimal.

According to the results of the DCCT study group, the U.K. Prospective Diabetes Study (UKPDS) group and the ADA study, it has been demonstrated that microvascular and macrovascular complications are prevented by good glycemic control in individuals with DM.[25] In the present study, consistent with the literature, the findings of good glycemic control in individuals with a high perception of disease severity resulted in a low number of complications associated with good glycemic control.

A significant difference was found between perceived barriers, a subscale of HBM, and nephropathy, retinopathy, and PAD, as well as between total health belief and nephropathy in individuals with diabetes included in the study.

Tan has also reported a significant relationship between perceived severity, perceived susceptibility, perceived barriers and complication preventing behaviors in health belief.[14]

Wu et al. found that significant differences between self-care behaviour and complications and patient education on DM. Selfcare behaviour was significantly and positively correlated with duration of diabetes, efficacy expectations and outcome expectations.[10] Mollaoğlu and Beyazıt have reported that regular and repetitive education provided by the nurses had a positive effect on the metabolic values of persons with DM.[26] Gün et al. found that duration of diabetes was negatively correlated, while health insurance, duration of education, and education about diabetes was positively correlated with diabetic care scores. When developing clinical management programs for patients with diabetes, duration of diabetes, health insurance and educational level should be considered and the patients must be educated in diabetes.[27] Karahan et al. have reported that Turkish diabetic patients need better strategies to improve self-management of diabetes.[28]

CONCLUSION

In conclusion, it was found that the mean health belief score in individuals with DM was high; however, the number of patients with glycemic control was very low and 70% of the patients had at least one complication. There was no significant association between health belief total score, glycemic control, and the number of complications.

Training programs for patients and their relatives are of critical importance in improving their management of diabetes. This present study can be carried out on a larger universe and sample with the cooperation of different disciplines.

REFERENCES

1. Satman I, Yilmaz T, Sengül A, Salman S, Salman F, Uygur S, et al. Population-based study of diabetes and risk characteristics in Turkey: results of the turkish diabetes epidemiology study (TURDEP). Diabetes Care 2002;25(9):1551-6.
2. Sousa VD, Zauszniewski JA, Musil CM, Price Lea PJ, Davis SA. Relationships among self-care agency, self-efficacy, self-care, and glycemic control. Res Theory Nurs Pract 2005;19(3):217-30.
3. Kahn CR, Weir GC, King GL, Jacobson AM, Moses AC, Smith RJ. Joslins's Diabetes Mellitus. 14th ed. Philadelphia: Lippincott Williams & Wilkins; 2005. p. 1189.
4. Fadıloğlu Ç. Diyabet Hemşireliği Kitabı. 1. Baskı. İzmir: Meta Matbaacılık; 2004. p.21-5.
5. İmamoğlu Ş, Özyardımcı Ersoy C. Diabetes Mellitus 2009. Multidisipliner Yaklaşımla Tanı,Tedavi ve İzlem. Genişletilmiş 2. Baskı. İstanbul: Deomed; 2009. p.574.
6. American Diabetes Association. Standards of medical care in diabetes--2010. Diabetes Care 2010;33(Suppl 1):S11-61.
7. Güler Ç, Çobanoğlu Z. Risk İletişimi ve Risk Yönetimi, Çevre Sağlığı Temel Kaynak Dizisi No 47. Ankara: Sağlık Projesi Genel Koordinatörlüğü; 1997. p.48.
8. Harvey JN, Lawson VL. The importance of health belief models in determining self-care behaviour in diabetes. Diabet Med 2009; 26(1):5-13.
9. Çenesiz, E, Atak N. [The evaluation of the researches in the Health Belief Model in Turkey]. TAF Prev Med Bull 2007;6(6):427-34.
10. Wu SF, Courtney M, Edwards H, McDowell J, Shortridge-Baggett LM, Chang PJ. Self-efficacy, outcome expectations and self-care behaviour in people with type 2 diabetes in Taiwan. J Clin Nurs 2007;16(11C):250-7.
11. Aalto AM, Uutela A. Glycemic control, self-care behaviors, and psychosocial factors among insulin treated diabetics: a test of an extended health belief model. Int J Behav Med 1997;4(3):191-214.
12. Gökdoğan F, Akıncı F. [Practices and perceptions about their health and diseases of patients with diabetes mellitus in Bolu]. Journal of Cumhuriyet University School of Nursing 2001;5(1):10-7.
13. Kartal A, Ozsoy SA. Validity and reliability study of the Turkish version of Health Belief Model Scale in diabetic patients. Int J Nurs Stud 2007;44(8):1447-58.
14. Tan MY. The relationship of health beliefs and complication prevention behaviors of Chinese individuals with Type 2 Diabetes Mellitus. Diabetes Res Clin Pract 2004;66(1):71-7.
15. Finfgeld DL, Wongvatunyu S, Conn VS, Grando VT, Russell CL. Health belief model and reversal theory: a comparative analysis. J Adv Nurs 2003;43(3):288-97.
16. Ratanasuwan T, Indharapakdi S, Promrerk R, Komolviphat T, Thanamai Y. Health belief model about diabetes mellitus in Thailand: the culture consensus analysis. J Med Assoc Thai 2005;88(5):623-31.
17. Daniel M, Messer LC. Perceptions of disease severity and barriers to self-care predict glycemic control in Aboriginal persons with type 2 diabetes mellitus. Chronic Dis Can 2002;23(4):130-8.
18. Skinner TC, Hampson SE. Personal models of diabetes in relation to self-care, well-being, and glycemic control. A prospective study in adolescence. Diabetes Care 2001;24(5):828-33.
19. Aljasem LI, Peyrot M, Wissow L, Rubin RR. The impact of barriers and self-efficacy on self-care behaviors in type 2 diabetes. Diabetes Educ 2001;27(3):393-404.
20. Heisler M, Smith DM, Hayward RA, Krein SL, Kerr EA. How well do patients' assessments of their diabetes self-management correlate with actual glycemic control and receipt of recommended diabetes services? Diabetes Care 2003;26(3):738-43.
21. Johnston-Brooks CH, Lewis MA, Garg S. Self-efficacy impacts self-care and HbA1c in young adults with Type I diabetes. Psychosom Med 2002;64(1):43-51.
22. Jones H, Edwards L, Vallis TM, Ruggiero L, Rossi SR, Rossi JS, et al. Changes in diabetes self-care behaviors make a difference in glycemic control: the Diabetes Stages of Change (DiSC) study. Diabetes Care 2003;26(3):732-7.
23. Parchman ML, Pugh JA, Noël PH, Larme AC. Continuity of care, self-management behaviors, and glucose control in patients with type 2 diabetes. Med Care 2002;40(2):137-44.
24. Song MS, Kim HS. Intensive management program to improve glycosylated hemoglobin levels and adherence to diet in patients with type 2 diabetes. Appl Nurs Res 2009;22(1):42-7.
25. American Diabetes Association. Implications of the United Kingdom Prospective Diabetes Study. Diabetes Care 2002;25(Suppl 1):S28-32.
26. Mollaoğlu M, Beyazit E. Influence of diabetic education on patient metabolic control. Appl Nurs Res 2009;22(3):183-90.
27. Gün İ, Günay O, Naçar M, Aykut M, Çetinkaya F. [Adherence of diabetic patients to the recommendations on diabetes in Kayseri]. Turkiye Klinikleri J Med Sci 2010; 30(6):2004-10.
28. Karahan E, Özkara E, Öner FH, Saatçi AO. [HbA1c awareness in Turkish diabetic population at a tertiary setting] Turkiye Klinikleri J Med Sci 2009;29(4):927-31.