Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2015; 3(2A):602-607 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI: 10.36347/sjams.2015.v03i02.014

Research Article

Factors Influencing Adherence to Diabetes Medication in Turkey

Taşkaya Serap[1*], Şahin Bayram[2]
[1]Aksaray University, School of Health Collage, Department of Health Care Management, 68100, Turkey
[2]Hacettepe University, Economics and Administrative Sciences, Department of Health Administration, 06800, Turkey

***Corresponding author**
Serap Taskaya
Email: seraptaskaya@yahoo.com

Abstract: The aim of this study was to investigate factors affecting medication adherence of patients with diabetes. A cross-sectional study was conducted on patients with diabetes being treated with insulin and oral hypoglycemic agents. Outpatients of a public hospital, which is located in Aksaray province in Turkey, are the universe of the study. Questionnaire forms were used as the instruments for data collection in the study. The questionnaire was completed by 360 patients with diabetes during face to face interviews. Socio demographic (age, gendder, marital status, education, insurance and income) and clinic variables (duration of diabetes, medication type, disease type, complication and comorbidity), health belief, health literacy level, patient-physician relationship and drug adherence were determined for each patient. The multiple regression analyses showed that education, type of diabetes, diabetes duration, health belief and health literacy level had a statistically significant association with levels of medication adherence ($p < 0.05$) but there is no relationship between patient-physician relationship and medication compliance. Thus, adherence to medication had related to higher education levels, Type 2 diabetes, longer duration of disease, higher health beliefs and higher health literacy level. Educational and biopsychological aspects of patient's health are very important for diabetes adherence. The results of the study are expected to provide important evidence-based information on factors affecting medication adherence of diabetes to improve the diabetes management and war against disease for clinicians, health managers and health workers.
Keywords: Diabetes, Factors, Adherence, Questionnaire

INTRODUCTION

In this century, one of the most fundamental issue related to health system is chronic diseases in both developed and developing countries. Complications, deaths and costs from these diseases are rising among worldwide. However scientific knowledge and experience show that, chronic diseases and problems resulting from it can be reduced by implementation of evidence-based interventions and so, the management and evaluation of chronic disease issues are getting more important in every society [1].

Diabetes is a chronic disease which affects millions of peoples in the world and prevalence of it has an increasing trend year by year. Much of this disease occurs in developing countries IDF. However it affects the all the socio economic status, age and gender althought a few preventable risk factors are responsible for this condition such as obesity, unhealthy diet, physical inactivity. Diabetes is also one of the most important challenges to health services due to the higher costs, higher mortality and morbidity rates [1-2].

In the Turkey, according to the International Diabetes Federation, nearly 7 million people have been diagnosed with diabetes and prevalance of disease was estimated 14.58% in 2013. In this report, it was found that prevalance of world diabetes is 8.3% and 6.8 % in European countries [3]. As seen, Turkish people are more likely to be diagnosed with diabetes compared with world and European countries. Besides this, diabetes is the eighth leading cause of death and tenth leading couse of disability in this country [4].

In diabetes management, providing glycemic control plays a main role in care and achieving it depends on patients adherence to the medical treatment faithfully [5]. Adherence to medication is defined as the extent to which the patient's medication-taking behavior corresponded with the prescribed medication regimen [6], while non-adherence is described as taking less than 80% of the prescribed treatment [7].

When the patients are well suited to treatment, better clinical results are achieved. For example patient's quality of life perception is positively affected and morbidity, mortality and medical costs are declining [2-8]. However non-adherence to medication has been a common problem in the worldwide among chronic disease like diabetes. In this regard, adherence

to medical treatment regimen is an extremely sensitive subject for health professionals.

Above mentioned, because of the critical importance of compliance to medical treatment, determination of the factors that affect the status of adherence is required in order to ensure a good disease management. According to WHO, the factors influencing adherence to treatment that are identified from the studies may be classifed to five categories such as patient-centered factors (sociodemographic factors, health, belief, health literacy, forgetfullnes etc.), therapy-related factors (complexity of the medical regimen, duration of treatment side-effects etc.), healthcare system factors (poorly developed health services, non-existent reimbursement, patient-physician relationship etc.), social and economic factors(poor socioeconomic status, poverty, unemployment, lack of effective social support networks etc.) and disease factors(severity of symptoms, level of disability, comorbidity, complication etc.) [9-10].

Although examining factors influencing is a core issue, a few studies on this subject has been performed in developing countries just like Turkey. Conducting more studies in these countries could be helpful to fill in the knowledge gap and to formulate worldwide strategies [10]. So this study was conducted for the purpose of determining the factors affecting adherence to medication of patients with diabetes in Turkey. Factors potentially associated with adherence to diabetic medication are determined as socio-demographic variables (age, gender, marital status, education, income, insurance), clinical characteristics (duration of diabetes and duration of medication, type of diabetes, medication type, complication and co-morbidities), health beliefs, health literacy and patient-physician relationship. The results of the study are expected to provide important evidence-based information for clinicians, health managers and health workers.

MATERIALS AND METHODS

Patient selection

A cross-sectional research design was used to study the adherence of patients to medical treatment. Outpatients of a public hospital, which is located in Aksaray province in Turkey, are the universe of the study. The sample size of 360 was calculated with a confidence level of 95 percent. The questionnaire was completed by patients with diabetes during face to face interviews between February to April 2014. The sample included both Type 1 and Type 2 patients with diabetes.

Patients who met the following criteria were invited to participate in this study: patients above 15 years; patients who had been diagnosed with diabetes; and patient who were on prescribed antidiabetic medications for at least six months. Informed consent was taken from all the patients. An institutional ethical committee approval to conduct the study was obtained on February 10th 2014.

Data collection

Data were collected with a self-administered questionnaire was conducted among patients with diabetes. The questionnaire consisted of five parts: socio-demographic and clinic information, Health Belief Model, patient-physician relationship, health literacy, medication adherence.

Factors potentially associated with adherence to diabetic medication include socio-demographic variables and clinical characteristics such as age, gender, marital status, education, income, insurance, medical history (duration of diabetes and duration of medication), type of diabetes, medication type, complication and co-morbidities.

At the second section, to determine diabetes-specific beliefs, Health Belief Model (HBM) Scale were used. Original scale consisting of 76 questions had been revised by Hurley [11] and reduced to 11 items. Scale was divided into 3 domains as perceived high benefits (3 questions), perceived high seriousness (4 questions), and perceived low barriers (4 questions). HBM incorporated a five-point Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree”.

Physician-patient relationship was measured by Patient-Physician Relationship Questionaire with nine items which was created by Van der Feltz-Cornelis et al. [12] Original scale vas designed to measure in primary health care doctor-patient relationship. But then by various researchers, it was used in the hospital and outpatient clinics [13]. Scale was rated as of "1" score "Strongly Disagree", "5" score "Strongly Agree".

In the fourth section of the survey, to measure the health literacy of patients, Short Health Literacy Screening Tool (Brief Health Literacy Screening Tool-BRIEF) were used. Scale has 4 questions and incorporated a five-point Likert scale ranging from 1 “never” to 5 “always” [14].

Finally, adherence to treatment was assessed through the self-report Morisky Medication Adherence Scale (MMAS) [15]. The total scale consists of 4 items, "Yes-No" is answered. But then Erickson et al. [16] used a five-point Likert scale ranging from "1 = never 5 = always". In this study, we also used 5 point Likert scale.

Internal reliability was examined for those questionnaries and all Cronbach’s alpha coefficients were greater than 0.7 (ranging from 0.73 to 0.97). With respect to construct validity, factor analysis were performed. Using the Kaiser criterion, we calculated the 3-factor solutions for Health Belief Model and one

factor solution for each other scales (Patient-Physician Relationship Questionaire, Short Health Literacy Screening Tool and Morisky Medication Adherence Scale). It was the same with orginal scale solutions.

Data analysis

The collected data were stored in an Excel Statistical Package for Social Science (SPSS), version 11.5 for analysis. Frequencies was were computed for categorical variables and means and standard deviation calculated for continuous data. Multiple regression analyses was conducted to evaluate the factors affecting medication adherence. P-value < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

In this study, itwas aimed to investigate whether there were variables such as socio-demographic variables and clinical characteristics, health beliefs, patient-physician relationships and health literacy levels that might influence adherence to treatment of patient with diabetes.

A total of 360 patients with diabetes participated in this study. Table 1 describes socio-demographic and clinic variables of these 360 participants 64.4% were female and most patients were married (73.3%) and insured (91.4%). Most patients had primary education and (54.2%) and only few (6.6%) had university education. The mean age was 51 years (SD ±14.45). Of the participants only 10% (n = 36) had a diagnosis of type 1 diabetes and the duration of the disease varied between 1 year and 35 years (m= 8.94, SD = 7).

Table 1: Socio-demographic and clinic factors of patient with diabetes

Variables	n	(%)	Variables	n	(%)
Gender			**Types of Diabetes**		
Female	232	64.4	Type 1	36	10
Male	128	35.6	Type 2	324	90
Marital status			**Tedavi Tipi**		
Married	264	73.3	İnsülin	148	41.1
Not Married	96	26.7	Oral hypoglycemic agents	212	58.9
Education			***Complication**		
No formal education	108	30	No	289	80.3
Primary school	131	36.4	Yes	71	19.7
Middle and high	91	25.3	****Comorbitity**		
University	30	8,3	No	224	62.2
Insurance			Yes	136	37.8
No	31	8.6		**Mean**	**S.D.**
Yes	329	91,4	Dur. of Diabetes	8.94	7
	Mean	**S.D.**	Dur. of Medication	8.51	6.9
Age	53,19	14,45	***Complication:** coroner disease, eye disease ve nephropaty		
Income (TL)	1056,81	663,03	****Comorbidite:** hypertension, collesterol, celiac disease, depression, asthma		

Multiple regression analyses technique was used to examine the proportion of variance in a adherence to medication as explained by a set of independent variables such as socio-demographic and clinic factors, health belief, patient physician relationship and health literacy. As recommended by Tabachnick and Fidell [17], the independent variables should not be strongly related to each other. In this study, age and duration of medication were excluded because of the highly intercorrelated with duration of diabetes.

Table 2 shows regression analysis results. At the end of the multiple linear regression analyses, several factors were found to have significant effects on the medication adherence ($R = 0.383$; adjusted $R^2 = 0.147$; $F = 12,160$; $p < 0.001$).

Firstly it was found that patients' medication adherence levels did not depend on gender, marital status, insurance and income ($p>.05$). Also, medication type, comorbidite and complication did not affect adherence to diabetes medication. By contrast, the level of education, duration of diabetes and type of diabetes are important factors for compliance to treatment. According to this, people who have more education, longer diabetes duration and Type 2 diabetes has more compliant to medical treatment.

Another findings that were found after using multiple regression, health literacy level and health belief of patients were statistically significantly associated with medication adherence. However patient-physician relationship did not affect compliance to diabetes medication. Beta values which used to the contribution of each variables to medication adherence

indicated that health literacy (β=.275) is the larger beta coefficient than the other independent variables.

Table 2 also shows no multicollinearity was found among the independent variables (variance inflation factor (VIF) for multicollinearity were between 1.022 and 1.269). In model, Durbin Watson value was 1.874 that means there was no otocorrelation problem.

Table 2: Multiple regression analysis for adherence to medical treatment

	Adherence to Medication				
Vaiables	**UnStd. β Coefficiency**	**Std. β Coefficiency**	**t**	**p**	**VIF**
Constant	1.191		2.476	.014	
Health Literacy	.209	.275	4.977	.000	1.269
Health Belief Model	.273	.171	3.204	.001	1.186
Primary School	-.297	-.124	-2.475	.014	1.049
Type of Diabetes	.452	.118	2.313	.021	1.085
Duration of Diabetes	.017	.104	2.094	.037	1.022
	Adj. R^2= 0.147		F=12.160	p=0.000	Durbin- Watson=1.874

At the end of the multiple regression analyses, educational situtiation had an positive influence on patients' compliance to treatment. More educatued patients showed higher rate of medical adherence than patients who had no formal education and graduated from primary school. Because more educated people tend to understand the consequences of non-adherence. It was found by some researchers to have better adherence [18], while someone did not find a relationship between education and adherence to medication [19].

Another factor affecting adherence to medical treatment is type of disease. Being a patient with type 1 was associated with decreased medication adherence diabetes. Although some authors report that patients with type 1 diabetes was more compliant to medication [20], others demonstrate patients with type 2 diabetes showed better addherednce [21].

In this research, it was found out that there was a relationship betmeen duration of diabetes and adherence rate. Thus, a person which had longer diabetes history had more adherent than patient with shorter diabetes duration. These interrelationship were consistent with Ayman *et al*. [18], and were inconsistent with Bezie *et al*. [22] and Arslan [23]. By contrast, some researhers found there was no relationship between duration of diabetes and adherence to medical treatment [19].

CONCLUSION

Our results confirm that the most important factor contributing to adherence to medication was the level of patients'health literacy. Patients who had higher health literacy were care and knew about their disease and it's consequences ans so they were more compliant. Some studies had found that adherence to medication was better when patient had higher health literacy [24, 25], but some studies had found there was no relationship between them [26].

Finally a significant higher rate of adherence to medication was observed in patients who exhibited higher health belief compared with the others who did not have. This situation was thought that patients with higher perceived seriousness, higher perceived benefits of treatment and the low perception of barrier were more complient with treatment. Daniel and Messer [27], Gutierrez and Long [28] and Pourghaznein *et al*. [29] found that health belief was associated with adherence to treatment.

We conclude that participants with higher healh belief and literacy level are more likely to have higher adherence to diabetes medications. Thus, low literacy and health beliefs may be very important barrier to achieving high rates of adherence to treatment. So educational and biopsychological aspects of patients health are very important to improve treatment adherence. Patient should be educated about the advantages of use of medical treatment regulary and common unappropriate beliefs must be eliminated. Further research is also recommended in order to identify interventions to improve treatment adherence in patients with diabetes on a larger sample population.

A major ***limitation*** of our ***study*** is that we collected data only at a ***single*** hospital. So results of study can not be generalized to the universe. Nevertheless, it can say that the results achieved, can reveal important clues regarding diabetes. Another limitation of this research, questionnaire was presented in the hospital environment to respondents. Especially the objective assessment regarding the patient-physician relationship can be affected in the hospital environment. However, to avoid to this problem, the patient completed the survey when they received the services. Because of this reason, it was considered that it could reflects their actual ideas

ACKNOWLEDGMENT

The author thanks Aksaray Hospital managers to give us permission to conduct this study. Also we would like to thanks to all patients who participated in this study.

REFERENCES

1. Turkish Ministry Of Health; Türkiye Kronik Hastalıklar ve Risk Faktörleri Sıklığı Çalışması. Anıl Matbaa Ltd., Şti, Ankara, 2013: 3-4.
2. Singh D; How can chronic disease management programmes operate across care settings and providers? World Health Organization Publication, Copenhagen, 2008: 1-4.
3. International Diabetes Federation; IDF Diabetes Atlas. 6th edition, IDF Publication, Belgium, 2013: 58-59.
4. Turkish Ministry of Health;Türkiye Hastalık Yükü Çalışması. Aydoğdu Ofset, Ankara, 2006: 8-15.
5. Farsaei S, Sabzghabaee AM, Zargarzadeh AH, Amini M; Adherence to glyburide and metformin and associated factors in type 2 diabetes in Isfahan, Iran. Iranian Journal of Pharmaceutical Research, 2011; 10(4): 933-939.
6. Wu JR, Moser DK, Chung ML, Lennie TA; Objectively measured, but not self-reported, medication adherence independently predicts event-free survival in patients with heart failure. J Card Fail., 2008; 14(3): 203–210.
7. Delamater AM; Improving patient adherence. Clinical Diabetes, 2006; 24(2): 71-77.
8. Hagerstrom GE; Personal Factors, Perceptions, Influences and Their Relationship with Adherence Behaviors in Patients with Diabetes. Georgia State University. USA, 2010: 13-24.
9. World Health Organization; Adherence to long-term therapies: Evidence for action. WHO Press, Geneva, 2003: 27-38.
10. Jin J, Sklar GE, Oh VMS, Li SC; Factors affecting therapeutic compliance: A review from the patient's perspective. Therapeutics and Clinical Risk Management, 2008; 4(1): 269–286.
11. Hurley A; The health belief model; Evaluation of diabetes scales. Diabetes Educator, 1990; 16(1): 44-48.
12. Van der Feltz-Cornelis CM, Van Oppen P, Van Marwijk HW, De Beurs E, Van Dyck R; A patient doctor relationship questionnaire (Pdrq-9) in primary care: Development and psychometric evaluation. Gen Hosp Psychiatry, 2004; 26(2): 115–120.
13. Wenger HC, Chen HC, Chen HJ, Lu K, Hung SY; Doctors' emotional intelligence and the patient– doctor relationship. Medical Education, 2008; 42(7): 703–711.
14. Haun J, Noland-Dodd V, Varnes J, Graham-Pole J, Rienzo B, Donaldson P; Testing the BRIEF health literacy screening tool. Federal Practitioner, 2009: 24-31.
15. Morisky DE, Green LW, Levine DM; Concurrent and predictive validity of a selfreported measure of medication adherence. Med Care, 1986; 24(1): 67-74.
16. Erickson SR, Coombs JH, Kirking DM, Azimi AR; Compliance From Self-Reported Versus Pharmacy Claims Data With Metered-Dose İnhalers. The Annals of Pharmacotherapy, 2001; 35(9): 997-1003.
17. Tabannick BG, Fidel LS; Using Multivariate Statistics. 5th edition. NY: Harpercollins College Publishers, New York, 2008: 61-91.
18. Ayman SA, Abd-El-Aziz AE; Degree of compliance towards therapeutic tasks among diabetic patients attending a health ınsurance setting ın Cairo. The Egyptian Journal of Hospital Medicine, 2007; 27: 234– 244.
19. Sweileh MW, Aker O, Hamooz S; Rate of compliance among patients with diabetes mellitus and hypertension. An-Najah Univ J Res (N. Sc.), 2005; 19: 1-12.
20. Peyrot M, Rubin RR, Lauritzen T, Snoek FJ, Matthews DR, Skovlund SE; Psychosocial problems and barriers to improved diabetes management: results of the Cross-National Diabetes Attitudes, Wishes and Needs (DAWN) study. Diabet Med., 2005; 22(10): 1379–1385.
21. Ruggiero L, Spirito A, Coustan D, McGarvey ST, Low KG; Self-Reported Compliance With Diabetes Self-Management During Pregnancy. Int J Psychiatry Med., 1993; 23(2): 195-207.
22. Bezie Y, Molina M, Hernandez N, Batista R, Niang S, Huet D; Therapeutic compliance: A prospective analysis of various factors involved in the adherence rate in type 2 diabetes. Diabetes & Metabolism, 2006; 32(6): 611-616.
23. Arslan E; Tip 2 Diabetes Mellituslu Hastaların Tedaviye Uyumlarını Etkileyen Faktörler. Dicle Üniversitesi. Diyarbakır, 2011: 37-38.
24. Cho YI, Lee SYD, Arozullah AM, Crittenden KS; Effects of health literacy on health status and health service utilization amongst the elderly. Social Science & Medicine, 2008; 66(8): 1809-1816.
25. Gazmararian JA, Williams MV, Peel J, Baker DW; Health literacy and knowledge of chronic disease. Patient Educ Couns., 2013; 51(3): 267–275.
26. Kim S, Love F, Quistberg DA, Shea JA; Association of health literacy with self-management behavior in patients with diabetes. Diabetes Care, 2004; 27(12): 2980–2982.
27. Daniel M, Messer LC; Perception of disease severity and barriers to self care predict glysemic control in aboriginal persons with type 2 diabetes mellitus. Chronic Diseases in Canada, 2002; 23(4): 130-138.
28. Gutierrez J, Long JA; reliability and validity of diabetes specific health beliefs model scales in patients with diabetes and serious mental illness.

Diabetes Research and Clinical Practice, 2011; 92(3): 342-347.

29. Pourghaznein T, Ghaffari F, Hasanzadeh F, Chamanzari H; The relationship between health beliefs and medication adherence in patients with type 2 diabetes: A correlation-cross sectional study. using multivariate statistics, 2013; 10(4): 1-7.