



Elderly diabetes patients' health beliefs about care and treatment for diabetes¹

Şenay Şermet Kaya²

Yeter Kitiş³

Abstract

Purpose: This descriptive study aimed to assess elderly diabetes patients' health beliefs about care and treatment for diabetes.

Methods: The universe of the study consists of 1176 diabetic patients aged 65 years and over who are registered to eight family health centers affiliated to Mezitli district of Mersin province. In the sample, it was planned to reach the elderly between 165-330. As a result, 280 elders were reached. After obtaining the necessary permissions from the related institutions, data were collected with Descriptive Characteristics Form and HBMS for Diabetes Patients in 2012 and analyzed with nonparametric tests.

Results: Of 280 patients, 55.7% were male and 60% were aged 65-69. The median value for HBMS showed that the patients had a negative health belief. The patients with higher education levels and those receiving information about diabetes had higher median of values for both the scale and its subscales, those checking their blood glucose had high median of values for the scale and the subscale perceived benefits and barriers, those complying with nutrition therapy had higher median of values for perceived barriers and recommended health behaviours, those having regular check-ups had higher median of values for perceived barriers and those doing exercise regularly had higher median of values for perceived benefits ($p < 0.05$).

Conclusion: Elderly diabetes patients should be offered education about self management and HBMS for Diabetes Patients should be used to determine educational needs and to evaluate effectiveness of education offered to help diabetes patients to develop positive health beliefs.

Keywords: Health beliefs; Health Belief Model; Elderly; Diabetes Mellitus, Diabetes care.

1. Introduction

Causing to complications such as heart disease, renal failure, amputation, and blindness diabetes is an important disease. Its chronic complications presents socioeconomic and quality of life burden (Shah et al. 2015)The prevalence of diabetes for all age-groups worldwide was estimated to be increase (Wild et al., 2004). Diabetes prevalence in Turkey is 13.7% in the adult population and 30% in the population aged 60 years or older (TURDEP-II, 2010).

¹ The article submitted 16th National Public Health Congress Publication Date: 27-31/10/2013

² Research Assist., Ph.D, University of Nevşehir Hacı Bektaş Veli, School of Health, Nursing Department, sermetesenay@hotmail.com

³ Assoc. Prof., Gazi University, Health Sciences Faculty, Nursing Department, yeterkitis@gazi.edu.tr

Diabetes can be controlled by education on awareness of diabetes risk factors and symptoms, and also counselling to patients on diabetes self-management (healthy nutrition, physical activity, self-monitoring of blood glucose and medication adherence)(Avery et al., 2012). People who have diabetes should to carry out daily self-management activities to avoid or delay diabetes-related morbidity. Diabetes self-management education has an important contribution to self-awareness and competencies of people with diabetes on diabetes care (Powers et al., 2015). Individuals' self-efficacy is a crucial to improved self-management. Patients' beliefs are very important for lifestyle modification and self-management in diabetic patient in agreement with health care professionals. So there is a need to know what are patient's beliefs, attitudes and self-efficacy for planning effective diabetes education. By reason of been estimated, the complications and the costs of diabetes can be reduced importantly thanks to increase of knowledge and awareness (Cochran and Conn, 2008). Health Belief Model HBM serves to understand and predict the patients' attitude toward health issues and preventive measures (Rosenstock et al., 1988, Champion and Skinner, 2008) At the beginning HBM was designed to understand why people did not contribute in some early disease diagnosis programs although they are at risk to diseases. According to the HBM, a person more likely can take a health action if he/she perceives the disease is severe; he/she is at risk; health action(s) is beneficial and he/she can apply it; understands limited barriers to the health action and there are some cues about the health action would be beneficial for her/his health; and receives a cue to get the health (Rosenstock et al., 1988). For a long time diabetes has been studied by means of the Health Belief Model (Kartal and Özsoy, 2007, Dimatteo et al., 2007, Mann et al., 2009, Ayele et al., 2012, Fisher et al., 2002, Jin et al., 2008). It has been shown that adaptation of healthy action required for successful diabetes management was significantly correlated with patients' beliefs and attitudes (Cochran and Conn, 2008, Dimatteo et al., 2007, Mann et al., 2009, Ayele et al., 2012, Fisher et al., 2002, Jin et al., 2008).

Diabetes is one of the most important diseases affecting the quality of life in old age (Beğer et al., 2009). Decreased awareness of health problems, denial of symptoms, difficulty in expressing complaints and accessing health services, considering complaints as normal, low education levels and health staff' insufficient interest have been reported to make diabetes control difficult. Life style and medication management for glycaemia and lipid control, hypertension, is important for reducing morbidity and improving long-term quality of life for patients diagnosed by diabetes. Elderly diabetes patients should be evaluated by a diabetes team at certain intervals, barriers to care should be identified and individual monitoring should be performed carefully. So that individualized diabetes care can be planned, beliefs predictive of health behaviour should be evaluated. Considering that changing elderly individuals' life styles and health behaviour can be more difficult due to old age related restrictions, it is of great importance to evaluate health beliefs and the literature seems to be limited in this regard. Therefore, the aim of this study was to evaluate elderly diabetes patients' health beliefs about care and treatment of diabetes.

2. Method and Material

This is a descriptive study and was performed between January and June 2012. The study population included 1176 diabetes patients aged 65 years or older followed by eight family health care centres in a small town of Mezitli province in Mersin. The study sample was five-ten times the number of the items in Health Belief Model Scale for diabetes patients (HBMS) (33 items) and was planned to include number of 165-330 elderly diabetes patients. Stratified sampling was used to determine the number of patients to be enrolled from each family health centre. Due to difficulties in contacting the patients at their homes (not having a phone or not opening the door for safety reasons), elderly diabetes patients presenting to family health centres with any conditions were enrolled in the study until the planned size of the sample was achieved. As a result of the hot weather people migrated to highlands we access the sample size to 280.

Inclusion criteria were lack of emergency health problems, willingness to participate and ability to communicate. In addition, the number of correct answers to the questions in Standardized Mini Mental Test about orientation, attention and calculation (e.g. questions what the year, month and day it is, whether it is morning or noon, where one lives, listing five days of the week in the reverse order) were taken into account (Küçükdeveci, et al., 2005). Data were collected with a descriptive characteristics form and HBMS at face to face interviews.

The descriptive characteristics form was composed of 22 questions about socio-demographic features, disease and treatment. HBMS for Diabetes Patients was developed by Schwab et al. by taking account of five subscales of Health Belief Model (HBM) to evaluate beliefs about and attitudes towards diabetes and its treatment. The validity and reliability of the scale for the in Turkish language was tested by Kartal and Özsoy in 2005 in type II diabetes patients (Kartal and Özsoy, 2007, Schwab et al., 1994, Tan, 2004). The test-re-test reliability of the scale was 0.90 and Cronbach's alpha ranged from 0.73 to 0.86 for the subscales and was 0.89 for the scale in general. The scale included a total of 36 items and five subscales; i.e. perceived susceptibility (5 items), perceived seriousness (3 items), perceived benefits (7 items), perceived barriers (11 items) and recommended health behaviour (10 items). In the present study, Cronbach's alpha was 0.71 for the scale in general, 0.55 for perceived susceptibility, 0.55 for perceived seriousness, 0.86 for perceived benefits, 0.82 for perceived barriers and 0.88 for recommended health behaviour. The scale is a Likert scale and the items are scored on a five-point scale (1 corresponding to completely agree and 5 corresponding to totally disagree). The highest score to be obtained is 5. Scores of 4 and higher indicate positive health beliefs and scores lower than 4 indicate negative health beliefs.^{9,18}

Data were analyzed with Statistical Package for the Social Sciences (SPSS 11.5). Shapiro-Wilk test was used to determine whether scores for the scale in general and scores for the subscales were normally distributed. Mann Withney U was used to compare median of values for categorical variables of two groups depending on the distribution characteristics of the data. Kruskal-Wallis test was used to compare median of values between the groups for categorical variables with more than two subgroups depending on the distribution feature. Type 1 error level was considered as .05.

Ethical approval was obtained from the Mersin University Ethics Committee (No.112, 22/12/2011). The participants were informed about the aim of the study and their written consent was taken.

3. Results

Out of 280 elderly diabetic patients included in the study, 55.7% were male, 60% were aged 65-69 years, 46.4% were primary school graduates, 1.6% was illiterate and 90.7% were unemployed. In addition, 38.9% had diabetes for more than 10 years, 77.9% were taking oral anti-diabetic medications, 51.8% had a family member with diabetes and 77.9% had a disease accompanying diabetes. Of all the patients included, 96.4% had access to a health centre when they needed, 61.1% complied with their diet, 85% had their regular check-ups, 90.4% measured their blood glucose (most of them did it when they needed it), 94.6% took their medications regularly and 47.6% did exercise. Ten percent of the patients were smokers.

Table 1 presents the patients' median of values for HBMS and its Subscales. The scores for the subscales recommended health behaviour and perceived benefits were higher (Table 1).

Table 1. The Patients' Median of Values For HBMS And Its Subscales

Subscales	Median (% 25-75)
Perceived susceptibility	2.50 (2.50/3.25)
Perceived seriousness	4.00 (3.66/4.33)
Perceived benefits	4.00 (4.00/4.28)
Perceived barriers	3.77 (3.55-3.77)
Recommended health behavior	4.00 4.00/4.60)
Total	3.81 (3.69/4.06)

In the present study, the elderly with higher education levels had higher scores for HBMS and its subscales ($p=0.003$). The elderly diabetes patients with a regular income had higher median of values for perceived seriousness and the patients offered information about diabetes had higher scores for HBMS and its subscales ($p=0.015$). However, this study did not show a significant relation between health beliefs about treatment of diabetes and age, gender, marital status and employment status ($p>0.05$) (Table 2). And did not find a significant relation between duration of diabetes and types of treatment offered and scores for HBMS and its subscales ($p>0.05$) (Table 3).

Table 2. The distribution of the patients' median of values for HBMS and its subscales by their socio-demographic features (n=280)

Socio-demographic Features		Perceived susceptibility	Perceived seriousness	Perceived benefits	Perceived barriers	Recommended health behaviour	Total	
n (%)		Median (%25-75)	Median (%25-75)	Median (% 25-75)	Median(%25-75)	Median (%25-75)	Median(%2575)	
Education	***Literate / Illiterate	52(18.6)	2.87(2.50/3.50)	4.00(3.33/4.00)	4.00(4.00/4.25)	3.77(3.36/3.77)	4.00(4.00/4.47)	3.75(3.64/3.99)
	Primary school	130(46.4)	2.75(2.50/3.25)	4.00(3.66/4.33)	4.00(4.00/4.46)	3.77(3.44/3.77)	4.00(4.00/4.60)	3.81(3.69/4.03)
	High school or higher education	98(35.0)	2.50(2.25/3.00)	4.00(3.66/4.33)	4.00(4.00/4.42)	3.77(3.66/3.88)	4.05(4.00/4.70)	3.84(3.69/4.06)
*p		p = 0.008	p = 0.321	p = 0.037	p = 0.007	p = 0.035	p = 0.003	
Income	Having a regular income	220 (78.6)	2.50(2.50/3.25)	4.00(3.66/4.33)	4.00(4.00/4.42)	3.77(3.55/3.77)	4.00(4.00/4.60)	3.81(3.69/4.06)
	Not having a regular income	60 (21.4)	2.87(2.50/3.43)	3.66(3.33/4.00)	4.00(4.00/4.39)	3.77(3.44/3.77)	(4.00(4.00/4.60)	3.80(3.70/3.99)
**p		p = 0.069	p = 0.015	p = 0.626	p = 0.370	p = 0.712	p = 0.720	
Receiving education on diabetes	Yes	177 (63.2)	2.50(2.50/3.25)	4.00(3.66/4.33)	4.00(4.00/4.57)	3.77(3.55/3.88)	4.10(4.00/4.70)	3.84(3.72/4.12)
	No	103 (36.8)	2.75(2.50/3.25)	3.66(3.33/4.00)	4.00(4.00/4.28)	3.77(3.33/3.77)	4.00(4.00/4.50)	3.75(3.66/3.93)
		p = 0.260	p< 0.001	p=0.048	p=0.007	p=0.019	p=0.001	

* Kruskal Wallis ** Man-Whitney U ***Seven patients were just literate and did not have any formal education.

Table 3. The distribution of the patients' median values for HBMS and its subscales by their features about management of diabetes (n=280)

Features of Diabetes Management		Perceived Susceptibility	Perceived Seriousness	Perceived Benefits	Perceived Barriers	Recommended health behaviour	Total	
n (%)		Median (25-75)	Median (25-75)	Median (25-75)	Median (25-75)	Median (25-75)	Median (25-75)	
Taking medicates regularly	Yes	265 (94.6)	2.50(2.50/3.25)	4.00(4.66/4.33)	4.00(4.00/4.28)	3.77(3.55/3.77)	4.00(4.00/4.60)	3.81(3.69/4.06)
	No	15 (5.4)	2.50(2.25/3.00)	4.00(4.66/4.33)	4.14(4.00/4.57)	3.66(3.22/4.77)	4.10(4.00/4.60)	3.72(3.63/4.09)
**p		$p = 0.148$	$p = 0.721$	$p = 0.725$	$P = 0.274$	$p = 0.898$	$p = 0.363$	
Compliance with the diet	Yes	171 (61.1)	2.50(2.50/3.25)	4.00(3.33/4.33)	4.00(4.00/4.42)	3.77(3.55/3.88)	4.00(4.00/4.70)	3.81(3.72/4.09)
	No	109 (38.9)	2.75(2.50/3.25)	4.00(3.66/4.33)	4.00(4.00/4.42)	3.77(3.33/3.77)	4.00(4.00/4.50)	3.78(3.66/4.00)
*p		$p = 0.578$	$p = 0.892$	$p = 0.860$	$p = 0.012$	$p = 0.021$	$p = 0.076$	
Having check-ups	Yes	239 (85.4)	2.50(2.50/3.25)	4.00(3.33/4.33)	4.00(4.00/4.42)	3.77(3.55/3.77)	4.00(4.00/4.60)	3.81(3.69/4.06)
	No	41 (14.6)	2.50(2.50/3.25)	4.00(3.66/4.33)	4.00(4.00/4.28)	3.66(3.38/3.77)	4.10(4.00/4.60)	3.78(3.69/4.00)
**p		$p = 0.737$	$p = 0.292$	$p = 0.154$	$p = 0.010$	$P = 0.462$	$p = 0.550$	
Doing exercise**	Yes	134 (47.9)	2.75(2.50/3.25)	4.00(4.33/3.33)	4.00(4.00/4.57)	3.77(3.33/3.77)	4.00(4.00/4.70)	3.84(3.69/4.09)
	No	146 (52.1)	2.50(2.25/3.25)	4.00(3.66/4.33)	4.00(4.00/4.28)	3.77(3.55/3.77)	4.00(4.00/4.50)	3.78(3.69/4.00)
**p		$p = 0.443$	$p = 0.523$	$p = 0.031$	$p = 0.563$	$p = 0.095$	$p = 0.372$	
Monitoring blood glucose***	Yes	253 (90.4)	2.50(2.50/3.25)	4.00(3.66/4.33)	4.00(4.00/4.42)	3.77(3.55/3.77)	4.00(4.00/4.60)	3.81(3.69/4.06)
	No	27 (9.6)	3.00(2.50/3.50)	4.00(3.33/4.00)	4.00(4.00/4.14)	3.55(2.88/3.77)	4.00(3.80/4.50)	3.75(3.57/3.90)
**p		$p = 0.102$	$p = 0.127$	$p = 0.047$	$P = 0.006$	$P = 0.185$	$p = 0.020$	
Smoking	Yes	28 (10.0)	2.62(2.50/3.25)	4.00(3.66/4.66)	4.00(4.00/4.39)	3.77(3.58/3.77)	4.10(4.00/4.67)	3.75(3.70/4.13)
	No	252 (90.0)	2.50(2.50/3.25)	4.00(3.41/4.33)	4.00(4.00/4.42)	3.77(3.55/3.77)	4.00(4.00/4.60)	3.81(3.69/4.06)
**p		$p = 0.598$	$p = 0.282$	$p = 0.720$	$p = 0.734$	$p = 0.628$	$p = 0.896$	

* Man Whitney U test **Exercise was evaluated by the question whether the patients did exercise or not. They were not asked the questions how long and how often they did exercise. *** If only reveals that the patients measured their blood glucose at home. Since the frequency of glucose measurement varied widely. It was not categorized.

Ninety-one point seven percent or higher percentages of the patients agreed with the items expressing positive health beliefs under the heading of recommended health behaviour and 88.2% and higher percentages of the patients agreed with the items expressing positive health beliefs under the heading of perceived benefits. A low percentage of the patients agreed with two items expressing positive health beliefs under the heading of perceived seriousness. Seventy-one percent and higher percentages of the patients did not agree with the items expressing negative health beliefs under the heading of perceived barriers. Fifty-nine percent or higher percentages of the patients agreed with two items expressing negative health beliefs under the subscale of perceived susceptibility (Table 4).

Table 4. The distribution of the percentages of the responses to HBMS (n=280)

Items of Health Beliefs Model Scale	Do not agree (%)	Neutral (%)	Agree (%)
Perceived Susceptibility			
1. People with Type 1 diabetes (young type) have higher chance to get diabetes complications	2.86	35.36	61.79
2. People with Type 2 diabetes (adult type) do not usually get diabetes complication	71.43	18.21	10.36
3. As long as I feel well. I am unlikely to develop diabetes complications	63.21	8.57	28.21
4. I will not get diabetes complications because my wound heals fast	59.64	17.14	23.21
Perceived Seriousness			
5. I think that diabetes is a serious disease	4.29	1.43	94.29
6. Type 1 diabetes (young type) is a serious disease	0.71	35.36	63.93
7. Type 2 diabetes (adult type) is as serious as Type 1 diabetes	16.79	32.14	51.07

Perceived Benefits			
8. Keeping blood sugar close to normal can help to prevent diabetes complications	1.79	1.07	97.14
9. Regular exercise helps to improve diabetes control	2.14	2.14	95.71
10.Reduce weight helps overweight people with diabetes to delay or prevent complications	1.43	2.14	96.43
11. Stop smoking helps to delay or prevent diabetes complication	1.07	4.29	94.64
12. Avoiding regular sweet intake helps in diabetes control	1.43	0.00	98.57
13. Low fat diet helps to delay or prevent diabetes complication	2.86	2.50	94.64
14. Control blood pressure helps to delay or prevent diabetes complication	4.64	7.14	88.21
Perceived Barriers			
15. There is not much use in trying to have good blood sugar control because the complications of diabetes will happen anyway	92.86	1.43	5.71
16. People with Type 2 diabetes (adult type) do not need to do regular blood sugar tests	88.57	3.57	7.86
17. It is not necessary to do blood sugar testing at home because I go to see doctor regularly	83.93	1.79	14.29
18. Deep fried and fatty food is not a problem for people with diabetes	93.21	0.71	6.07
19. As long as I take my medication daily. I do not have to control my diet Intake	87.86	0.71	11.43
20. There is no relationship between smoking and diabetes complications	85.36	7.50	7.14
21. Looking slightly rounded in body size is a sign of good health	88.93	3.21	7.86
22. I do not have to check my feet daily because they look healthy	75.00	3.21	21.79
23. Diabetes is curable so it is not a serious disease	71.79	3.21	25.00
Recommended Health Behaviour			
24. It is important to keep my blood sugar in good control	1.07	0.71	98.21
25. It is important to check my blood sugar several times a week at home	3.93	0.00	96.07
26. It is important to keep my weight under good control	0.36	0.36	99.29
27. It is important to stop smoking	0.36	1.07	98.57
28 It is important to take a low fat diet	1.07	1.79	97.14
29. It is important to avoid regular sweet intake	1.43	1.07	97.50

30. It is important to take medication as prescribed	0.71	1.07	98.21
31. It is important to check my feet daily	3.57	4.64	91.79
32. It is important to check my blood pressure regularly	2.86	4.64	92.50
33. It is important to make exercise regularly	1.79	2.50	95.71

* The responses "do not agree" and "totally disagree" were categorized under the heading of "do not agree" and the responses "agree" and "completely agree" were categorized under the heading of "agree".

4. Discussion

The median of value for HBMS was 3.81, which suggested that the patients had negative health beliefs. Kartal, in an interventional study on diabetes patients, most of whom were aged 50 years or older; found that the patients had negative health beliefs about their disease (3.58 ± 0.47) before they were offered education (Kartal, 2014). Yandım in a comparative study on diabetes patients, most of who were aged 40 years or older (94%), showed that both patients with diabetic foot (3.47 ± 0.30) and those without diabetic foot (3.57 ± 0.27) had negative health beliefs (Yandım, 2011). Consistent with the literature, the present study also revealed that the median of value for HBMS (3.81) indicated negative health beliefs among the elderly diabetes patients and the scores were even higher than those reported in the literature.

Socio-demographic features like age, gender, marital status, education and income in HBM are considered as factors which modify health beliefs (perceived susceptibility, seriousness, benefits and barriers) which play a role in fulfilling health behaviour (Champion and Skinner, 2008). In the present study, the elderly with higher education levels had higher scores for HBMS and its subscales ($p < 0.05$). This finding shows that higher education levels have positive effects on health beliefs, which is consistent with the literature (Dimatteo et al., 2007, Tan, 2004, Kartal, 2014). The elderly diabetes patients with a regular income had higher median of values for perceived seriousness and the patients offered information about diabetes had median of values for HBMS and its subscales ($p < 0.05$). These findings show that elderly diabetes patients' health beliefs are affected by their incomes and receiving information about the disease, which is consistent with the literature (Yandım, 2011, Mollaoğlu et al., 2009, Sharifirad et al., 2009, Kartal et al., 2008, Kitiş and Emiroğlu, 2006). However, this study did not show a significant relation between health beliefs about treatment of diabetes and age, gender, marital status and employment status ($p > 0.05$), which is congruent with the literature (Tan, 2004, Sharifirad et al., 2009, Kartal et al., 2008, Akça and Çınar, 2008).

According to HBM, perceived seriousness associated with a disease is a factor which triggers health behaviour (Rosenstock et al., 1988, Champion and Skinner, 2008). We investigated whether duration of diabetes, types of treatment, presence of complications and having a family member with diabetes affected perceived seriousness about the disease, but did not find a significant relation between duration of diabetes and types of treatment offered and scores for HBMS and its subscales ($p > 0.05$). Several other studies in the literature showed that there was not a significant relation between these variables and health beliefs (Dimatteo et al., 2007, Ayele et al., 2012, Jin et al., 2008, Kartal, 2014, Yandım, 2011, Akça and Çınar, 2008). Tan and Yandım revealed that the relation between presence of complications due to diabetes and health beliefs was not significant (Tan, 2004, Yandım, 2011). Lack of a significant relation between health beliefs and variables related to the disease can be attributed to the fact that the sample was not heterogeneous in terms of these variables.

Positive health beliefs about diabetes are expected to improve patients' compliance with their treatment. Regular administration of medications and insulin, formation and maintenance of

a diet, having regular check-ups, doing exercise regularly and measuring one's own blood glucose level are important indicators of compliance with diabetes. It has been shown in the literature that there is a relation between compliance with diabetes and health beliefs about care and treatment for the disease. A meta-analysis revealed that there is a positive relation between perceived seriousness about the disease and compliance with its treatment, but that compliance is affected when patients' health is impaired (Avery et al., 2012, Man et al., 2009, Fisher et al., 2002, Jin et al., 2008, Mollaoğlu et al., 2009, Kitiş and Emiroğlu, 2006, Akça and Çınar, 2008).

In a study by Farmer et al., 61.7% of the patients were reported to take their medications regularly and they believed that this behaviour would be beneficial for treatment of their disease. The patients not taking their medications regularly were reported to act so due to their beliefs that the medications may have side-effects and cause weight gain (Jin et al., 2008). Several other studies showed that believing in treatment given and its effectiveness had a positive effect on patients' compliance with their treatment (Ayele et al., 2012, Akça and Çınar, 2008). Consistent with the literature, the current study also revealed that the patients receiving their medications regularly had higher median of values for HBMS, but did not have a significant relation ($p > 0.05$).

Diabetes patients' compliance with their diet and treatment plays an important part in maintenance of metabolic control of this disease (Fisher et al., 2002, Tekin et al., 2007). Studies on diabetes patients' compliance have revealed that the patients have insufficient compliance with their diet and that elderly patients have more difficulty in compliance than adults (Mollaoğlu et al., 2009, Badur, 2009). Kartal reported that the patients with sufficient compliance had higher scores for health beliefs ($p < 0.05$) and Ayele et al. showed that the patients believed in seriousness of their disease had better compliance with their diet (Kartal and Özsoy, 2007, Ayele et al., 2012, Kartal, 2014). Self-management education about diabetes based on the whole person approach can improve positive health beliefs. Shafirad et al showed that education about nutrition offered in accordance with HBM had a positive influence on patients' health beliefs and enhanced compliance with their diet (Sharifirad et al., 2009). Patients doing exercise feel fresher and keep their weight under control in combination with a diet. Doing exercise also helps elderly diabetes patients to achieve normal blood glucose levels without any pharmacological treatments. In studies by Kartal et al, Yandım and Javanshir, the patients doing exercise had more positive health beliefs (Kartal, 2014, Yandım, 2011, Javanshir, 2006). Measuring one's own blood glucose levels and complying with recommended check-ups are also linked with positive health beliefs (Tan, 2004, Kartal, 2014). Relevant research suggested that the patients measuring their own blood glucose levels had more positive diabetes related health beliefs (Jin et al., 2008, Tan, 2004, Kartal, 2014). In studies by Akça and Çınar, Skovlund and Peyrot diabetes patients were shown to have a very low compliance with having regular check-ups (Akça and Çınar, 2008, Skovlund and Peyrot, 2005). Compatible with the results of abovementioned studies, this study revealed that the patients having check-ups at regular intervals had higher scores for perceived barriers, the patients doing exercise had higher scores for perceived benefits and that the patients measuring their own blood glucose levels had higher scores for perceived barriers, perceived benefits and health behaviour in general. Based on the evidence from the literature and these findings, it is clear that there is a positive relation between health beliefs about care and treatment for diabetes and compliance with treatment.

In the present study, the patients got lower scores for two items of the subscale perceived susceptibility: item 3 "I do not develop diabetes complications as long as I feel well" and item 4 "I do not develop diabetes complications since my wounds heal quickly". It was also striking that the patients got lower scores for perceived susceptibility in the item "Type 2 diabetes is as serious as Type 1 diabetes." This is a widespread belief and can be attributed to the fact that patients with Type 1 diabetes have to take insulin and frequently have acute complications. A considerable proportion of the patients agreed with the following two items expressing negative health beliefs: "I do not have to check my feet as long as they look healthy" (item 22) and "Diabetes can be cure and therefore, it is not a serious illness (item 23). This agreement shows

that the patients had weak health beliefs about checking their feet and seriousness of the disease. When perceived susceptibility and perceived seriousness are dealt with together, they are called perceived threat (Champion and Skinner, 2008). As a result, although the patients included in this study had low scores for health beliefs, some proportion of the patients had lower scores for diabetes related perceived threat.

In the HBM for diabetes and its treatment, responses scored four or above indicate a positive health belief. In the present study, the health belief score obtained by the elderly diabetes patients was about 4 and it was higher than those obtained in other studies using the same scale (Mann et al., 2009, Kartal, 2014, Yandim, 2011). However, the patients got lower scores for perceived susceptibility to diabetes and its treatment than for other subscales. It may be that the patients did not have sufficient education about diabetes. As presented in Table 2, the patients' scores for health beliefs about diabetes were affected by their education levels and receiving education about diabetes.

This study has two limitations. The first limitation of this study is that it was performed on elderly diabetes patients living in a small town. Therefore, the results of the study are restricted with this population. The second limitation of the study is that self-efficacy was not evaluated. In fact, the subscale self-efficacy was not included in the validity and reliability analyses.

5. Conclusions

In conclusion, in our study, diabetes is one of the most frequent health problems in the Turkish population. An effective management of this disease requires making changes in patients' life styles. Diabetes patients' compliance with their treatment and new life styles is associated with their beliefs about diabetes and its treatment. The elderly diabetes patients included in this study had a median of value of 3.81 for HBMS for Diabetes, indicative of a negative health belief, and lower scores for the subscales perceived susceptibility and perceived seriousness. The study revealed that there was a relation between income and perceived seriousness and the patients with higher education levels got higher scores for all the subscales out of perceived seriousness and that the patients offered education about diabetes had higher scores for the scale and its subscales. Diabetes self-management education is an important tool to develop a positive health belief about diabetes. Aging related losses of abilities and education levels should be taken into account in preparation and implementation of education programs about diabetes. In addition, self-efficacy is an important cognitive variable incorporated into HBM. Further studies on health beliefs about diabetes and its treatment should also include this variable and should be performed on elderly diabetes patients from all regions so that they represent the conventional population.

Acknowledgements

We would like to thank all the adult people who participated in this study and to İltar Helvacı because of statistical analysis. This research did not receive any funding.

Conflict of interest: The authors declare that they have no conflict of interest.

References

1. Shah, A.D., Langenberg, C., Rapsomaniki, E., Denaxas, S., Pujades-Rodriguez, P., Gale, C.P., Deanfiel, C., et al. (2015). Type 2 diabetes and incidence of cardiovascular diseases: A cohort study in 19 million people. *Lancet*, 3, 105-13.
2. Wild, S., Roglic, G., Green, A., Sicree, R., King, H. (2004). Global prevalence of diabetes estimates for the year 2000 and projections for 2030. *Diabetes Care*, 27(5), 1047-53.

3. Association of Endocrinology and Metabolism in Turkey. Turkey Epidemiology Study Results of Diabetes, Obesity, Hypertension and Endocrine Diseases (TURDEP-II). (2010). Access date, 2011 March 10. Access address, http://www.turkendokrin.org/files/file/TURDEP_II_2011.pdf.
4. Avery, L., Flynn, D., Wersch, A.V., Sneihotta, F.F., Trenell, M.I. (2012). Changing physical activity behavior in type 2 diabetes; a systematic review and meta-analysis of behavioral interventions. *Diabetes Care*, 35(1), 268-89.
5. Powers, M.A., Bardsley, J., Cypress, M., Duker, P., Funnell, M.M., Fischl, A.H., Maryniuk, M.D., Siminerio, L., Vivian, E. (2015). Diabetes self-management education and support in type 2 diabetes a joint position statement of the American Diabetes Association, the American association of diabetes educators, and the academy of nutrition and dietetics. *Diabetes Care* 38(7), 1372-82.
6. Cochran, J., Conn, V.S. Meta-analysis of quality of life outcomes following diabetes self-management training. (2008). *Diabetes Educ*, 34(5), 815-23.
7. Rosenstock, I.M., Strecher, V.J., Becker, M.H. (1988). Social learning theory and the Health Belief Model. *Health Education Quarterly*, 15 (2), 175-183.
8. Champion, L.V., Skinner, C.S. (2008). The Health Belief Model. In: Glanz, K., Rimer, B.K., Viswanath K, editors. *Health behavior and health education theory, research and practice*. 4th ed. San Francisco: Jones and Bartlett LLC.
9. Kartal, A., Özsoy, S. (2007). Validity and reliability study of the Turkish version of Health Belief Model scale in diabetic patients. *Int J of Nurs Stud*, 44 (8), 1447 - 58.
10. Dimatteo, M.R., Haskard, K.B., Williams, S.L. (2007). Health beliefs disease severity and patient adherence: A meta-analysis. *Med Care*, 45 (6), 521-8.
11. Mann, D.M., Ponieman, D., Leventhal, H., Halm, EA. (2009). Predictors of adherence to diabetes medications: The role of disease and medications beliefs. *J Behav Med*, 32(3), 278-84.
12. Ayele. K., Tesfa, B., Abebe, L., Tilahun, T. Girma E. (2012). Self care behavior among patients with diabetes in Harari, Eastern Ethiopia: The Health Belief Model perspective. *Plos One*, 7(4), 1-6.
13. Fisher, B.E., Walker, E.A., Bostrom, A., Fischhoff, B. (2002). Behavioral science research in the prevention of diabetes. *Diabetes Care*, 25, 599-606.
14. Jin, J., Sklar, G.E., Oh, V.M.S., Chuen, S. (2008). Factors affecting therapeutic compliance: A review from the patient's perspective. *Ther Clin Risk Manag* 4 (1), 269-86.
15. Beğer, T., Erdinçler, D.S., Çurgunlu, A. (2009). Diyabetes Mellites in elderly. *Akademik Geriatri Derg*, 1, 20-30.
16. Küçükdeveci, A.A., Kutlay, S., Elhan, A.H., Tennant, A. (2005). Preliminary study to evaluate the validity of the mini-mental state examination in a normal population in Turkey. *Int J of Rehabil Res*, 28 (1), 77-9.
17. Schwab, T., Meyer, J., Merrell, R. (1994). Measuring Attitudes and Health Beliefs among Mexican Americans with Diabetes. *Diabetes Educ*, 20 (3), 221-227.
18. Tan, M.Y. (2004). The relationship of health beliefs and complication prevention behaviors of Chinese individuals with type 2 diabetes mellitus. *Diabetes Res Clin Pract*, 66 (1), 71-77.
19. Kartal, A., Özsoy, S.A. (2014). Effect of planned diabetes education on health beliefs and metabolic control in type 2 diabetes patients. *Hacettepe Üniv Hemş Fak Derg*, 1(2), 1-15.
20. Yandım, A. (2011). Health beliefs of diabetic foot and non-diabetic patients. Master thesis, University of Mersin, Mersin.
21. Mollaoğlu, M., Özkan T.F., Kars, F.T., Çelik Z. (2009). Effect of diabetes education program on attitudes of diabetic patients. *Fırat Sağlık Hizmetleri Derg*, 5(13), 95-105.
22. Sharifirad, G., Entezari, M.H., Kamran, A., Azadbakht, L. (2009). The effectiveness of nutritional education on the knowledge of diabetic patients using the Health Belief Model. *J Res Med Sci*, 14(1),1-6.

23. Kartal, A., Çağırğan, G., Tıǧlı, H., Güngör, H., Karakuş, N., Gelen, M. (2008). Type 2 diabetic patients' attitudes about care and treatment and factors affecting the attitudes. *TAF Prev Med Bull*, 7(3), 223-230.
24. Kitiş, Y., Emirođlu, N.O.(2006). The effects of home monitoring by public health nurse on individuals diabetes control. *Appl Nurs Res*, 19(3), 134-143.
25. Akça, T.A., Çınar, S. (2008). Comparison of psychosocial adjustment in people with diabetes with and without diabetic foot ulceration. *Aust J Adv Nurs*, 25(4), 87-96.
26. Tekin, O., Erarslan, E., Işık, B., Özkara, A. (2007). Treatment barriers in diabetic patients and their importance in glycemic control: A cross-sectional study in the Pursaklar region of Ankara. *Yeni Tıp Derg*, 24(2),105-109.
27. Badur, F. Evaluation of adherence to drug treatment in diabetic elderly. Master thesis, University of İstanbul, İstanbul.
28. Javanshir, M. (2006). Assessing diabetes attitudes of patients with Type I and Type 2 Diabetes. Master thesis, University of İstanbul, İstanbul.
29. Skovlund, S.E., Peyrot, M. (2005). The diabetes attitudes, wishes and needs (dawn) program: A new approach to improving outcomes of diabetes care. *Diabetes Spectr*, 18 (3), 136-142.