

# The Factors Related to Self-Treatment Behaviors among Type 2 Diabetic Patients: Application of the Theory of Planned Behavior

Mohadese Sadri<sup>1</sup>, Mahrokh Einolghozati<sup>2</sup>, Majid Barati<sup>3\*</sup>, Younes Mohammadi<sup>4</sup>

## Abstract

**Background:** Diabetes is the most common and severe metabolic disease in human. Self-treatment behaviors are common problems among diabetic patients.

**Aim:** The present study was conducted with aim to identify the factors related to self-treatment behaviors among type 2 diabetic patients based on the Theory of Planned Behavior (TPB).

**Method:** This cross-sectional study was carried out on 381 diabetic patients referred to Hamadan Diabetes Research Center in 2019, which were recruited with a simple sampling method. The participants completed a self-administered questionnaire, including demographic characteristics and TPB constructs. Data were analyzed by SPSS software (version 18) and descriptive statistics, one-way ANOVA, Independent t-test, and Linear regression.  $p < 0.05$  was considered statistically significant.

**Results:** The mean age of the participants was  $55.69 \pm 11.45$  and 68.2% of the patients were male. Also, 22.3% of participants did not refer to a specific physician to monitor the diabetes treatment. Significant differences were found in the mean score of self-treatment behaviors related to gender, dwelling, and having a specific physician ( $p < 0.05$ ). According to the result, the TPB construct explained 16% of the variance in the frequency of self-treatment behaviors. Attitude ( $\beta = 0.227$ ) and perceived behavior control ( $\beta = -0.110$ ) were the best significant predictors of behavioral intention ( $p < 0.05$ ).

**Implications for Practice:** The findings obtained in the present study suggest that applying TPB would be an efficient tool for predicting self-treatment behaviors among diabetic patients.

**Keywords:** Attitude, Diabetes, Self-efficacy, Self-treatment

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1. M.Sc.in Health Education and Health Promotion, Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran

2. B.Sc. in Public Health, School of Public Health, Hamadan University of Medical Science, Hamadan, Iran

3. Associate Professor of Health Education and Promotion, Department of Public Health, School of Health, Autism Spectrum Disorders Research Center, Hamadan University of Medical Sciences, Hamadan, Iran

4. Associate Professor, Department of Epidemiology, Modeling of Noncommunicable Diseases Research Center, Health Sciences & Technology Research Institute, School of Health, Hamadan University of Medical Sciences, Hamadan, Iran

\* Corresponding Author Email: [m\\_baratimehr@yahoo.com](mailto:m_baratimehr@yahoo.com)

## Introduction

Diabetes mellitus, primarily type 2 diabetes, is one of the main threats to human health and the most common glandular disease in the world which is responsible for about 4 million deaths annually (1). The World Health Organization reported the increasing prevalence of diabetes worldwide and has declared that it is a hidden epidemic. A national survey of risk factors for non-communicable diseases has predicted that the prevalence of diabetes in Iran will reach over six million by 2030 (2). People choose ways to relieve sickness or illness that are called treatment-seeking behaviors. These behaviors include disregard for disease, attempted treatment, and self-treatment (3). Self-Treatment refers to patient behavior which controls illness and minimizes its impact on health status and quality of life. Patients with a strong tendency for self-treatment may never seek professional help and advice (4). Available evidence suggests a large gap between what patients should do in their treatment plan and what they do, which fails disease control (5). The most critical causes of self-treatment include insufficient time, lack of access to a physician due to financial problems, lack of medical insurance coverage, lack of knowledge of the effects of medications, and lack of confidence in physicians (6). A qualitative study declared that self-Treatment is one of the main self-management methods in diabetic patients. Medicinal plants, food abstinence, and opium were used by diabetic patients for self-Treatment (4). The prevalence of self-Treatment among students, diabetic patients, and the elderly in Iran were reported as 35.7%, 45%, and 77.6%, respectively (7,8).

Self-Treatment among diabetic patients causes a rapid fluctuation in the blood glucose of these patients, leading to earlier emergence of diabetes complications. These complications include neuropathy (73.6%), retinopathy (32.2%), and nephropathy (12.3%) (9). Consequently, controlling blood sugar in an appropriate range is essential to control diabetes and prevent its debilitating side effects (10). Researchers believe that education is at the core of all preventive behaviors. In the meantime, using theories and models of behavior change will lead to a better understanding of health behaviors and an analysis of the factors that influence these behaviors, which is essential in designing and implementing effective health interventions (11). Theory of Planned Behavior (TPB) is one of the theories of behavior change. According to this theory, behavioral intention is the most important determinant of behavior in any individual. Behavioral intention is also influenced by three constructs attitude, subjective norms, and perceived behavioral control (12). TPB is applied to identify and understand environmental and individual factors affecting behavior. In this theory, in addition to measuring one's direct behavior, one may measure behavioral intention as a mediating factor between beliefs and behavior (13). The previous studies confirmed the effectiveness of the TPB in describing self-care behaviors of chronic diseases such as hypertension and diabetes in (13,14).

Regarding the lack of theory-based studies on the determinants of self-treatment behaviors among diabetic patients in Iran, and the adverse effects of self-treatment on the process of treatment and disease control in diabetic patients, this study was performed with aim to determine the factors associated with self-treatment behaviors among type 2 diabetic patients using the TPB.

## Methods

This cross-sectional study was conducted in 2019 on 381 patients with type 2 diabetes who referred to the Diabetes Research Center of Hamadan, west of Iran. According to the 54.7% prevalence of self-treatment behaviors among diabetic patients in previous studies (15), with confidence intervals of 95% and a standard error of 0.05, the samples size required for this research was estimated to be 381 people. Participants were selected using a simple random sampling method. Inclusion criteria were the presence of an active profile in the diabetes center and informed consent to participate in the study. Exclusion criteria included not completing the questionnaire and not cooperating with the research team. After approval of the study by the ethical committee of Hamadan University of Medical Sciences, an informed consent was obtained from all participants before the project. Participants were ensured that they could decide whether to participate in the research.

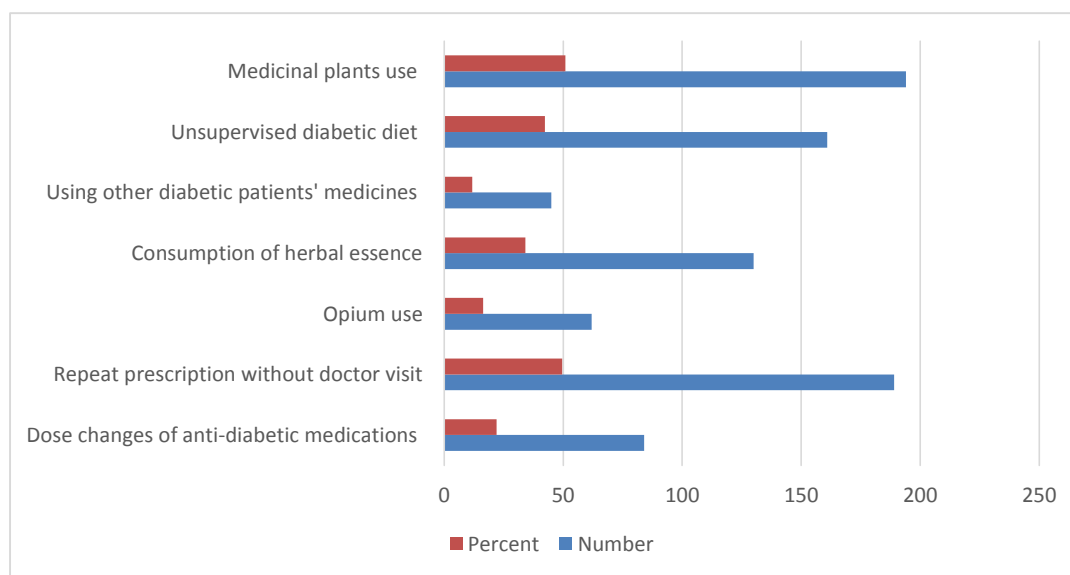
Data collection tool was a researcher-made questionnaire designed using the similar studies (13). Data was collected using an interview and self-report, completed in 15 minutes. The content validity of the questionnaire was assessed by a panel of experts using the opinions of 9 health education and promotion experts. The final form of questions in each section was determined by applying the desired changes. The experts finally approved the form by estimating the value of the content validity ratio (CVR>0.72) and content validity index (CVI>0.68) for questions. The reliability of the

questionnaire was evaluated using the internal consistency method among 38 diabetic patients in a pilot study. Cronbach's alpha of the questions for attitude, subjective norms, perceived behavioral control, and behavioral intention was 0.87, 0.76, 0.93, and 0.71, respectively; these results reveal the internal consistency of this questionnaire. The questionnaire consisted of two sections—demographic characteristics and the TPB constructs. The demographic and background factors included gender, age, marital status, number of children, place of residence, education, duration of illness, family history of diabetes, insurance coverage, and having a physician. The TPB constructs were assessed by 35 questions composed of four significant constructs: a) attitude, b) subjective norms, c) perceived behavioral control, and d) behavioral intention. The items were rated on a 3-point scale ranging from 1 (disagree) to 3 (agree). The positive attitude toward self-treatment was assessed by 11 items, i.e., "Self-treatment makes me to more control my diabetes." Six items assessed the normative beliefs encouraging self-treatment, i.e., "My doctor's opinion is that I should not do self-treatment." Six items assessed the motivation to comply, i.e., "I accept my doctor's opinion about self-treatment." Six items assessed the perceived behavioral control, i.e., "Despite the high cost of referring to a doctor, I can avoid self-treatment." Moreover, the intention of self-treatment was evaluated by six items, i.e., "I intend to use other medicinal plants along with prescribed medications." Self-treatment behaviors were measured by seven items rated on a 2-point scale ("yes" and "no" scored 1 and 0, respectively). The reliability of the questionnaire was investigated by calculating internal consistency; Cronbach's alpha was found to be 0.87 for "attitude", 0.76 for "subjective norms", 0.93 for "perceived behavioral control" and 0.71 for "behavioral intention."

Data were analyzed by SPSS software (version 18) (Inc, Chicago, IL, U.S.A) and descriptive statistics, one-way ANOVA, Independent t-test, and Linear regression.  $p < 0.05$  was considered statistically significant.

## Results

The mean of the participant's age was  $55.69 \pm 11.45$  years, ranging from 18 to 90 years. Two hundred sixty persons (68.2%) of the patients were male, and 321 (84.3%) were married. Also, 326 persons (85.6%) were from urban areas, and 126 (33.1%) were illiterate. In addition, 22.3% of participants did not refer to a specific physician to monitor diabetes treatment. The frequency of diabetes self-management behaviors in participants is presented in Figure 1. According to the results, the most common self-treatment behaviors among diabetic patients were repeat prescriptions without doctor visits and consumption of medicinal plants. Also, 50.9% of diabetic patients had at least one self-treatment behavior.



**Figure 1. Frequency of Self-Treatment Behavior Among Diabetic Patients**

Table 1 summarizes the descriptive and inferential results from the independent T-test and ANOVAs with demographic variables and self-treatment behaviors. According to the results, male gender, residing in the village, and not having a specific doctor were significantly related to self-treatment behaviors ( $p<0.05$ ).

**Table 1. Mean, standard deviation, range of scores and percentage of mean from maximum obtainable score for Theory of Planned Behavior constructs**

Variables	Mean±SD	Range of scores	Percentage
Positive attitude toward self-treatment	21.27±5.84	11–33	46.6
Normative beliefs encouraging self-treatment	11.10±3.08	6–18	42.5
Motivation to comply	14.23±3.44	6–18	68.5
Perceived behavioral control	16.72±2.95	6–18	89.3
Intention of self-treatment	13.65±3.06	7–21	47.5
Self-treatment behaviors	2.05±1.57	0–7	29.2

Descriptive statistics (means, standard deviation, and range of scores) of TPB constructs are presented in Table 2. According to the results, all constructs of TPB except perceived behavioral control were evaluated at an undesirable level.

**Table 2: Linear regression analysis to predict the behavioral intention based on the constructs of the Theory of Planned Behavior**

Independent variables	B	SE	$\beta$	P value	Adjusted R <sup>2</sup> (%)
Positive attitude toward self-treatment	0.227	0.026	0.433	<0.001	20
Normative beliefs encouraging self-treatment	-0.025	0.049	-0.025	0.618	
Motivation to comply	0.053	0.042	0.059	0.216	
Perceived behavioral control	-0.116	0.049	-0.111	0.019	
Constant	10.305	1.144	--	<0.001	

B=Unstandardized regression coefficient, SE=Standard error

Linear regression analysis was used to predict behavioral intention among diabetic patients (Table 3). The results showed that attitude ( $\beta=0.433$ ,  $p<0.001$ ) and perceived behavioral control ( $\beta=-0.111$ ,  $p<0.01$ ) had a significant role in explaining the variance of behavioral intention. In total, different structures of the TPB explained 20% of the variation of the behavioral intention of self-treatment changes.

**Table 3: Linear regression analysis to predict the self-treatment behaviors based on the constructs of the Theory of Planned Behavior**

Independent variables	<i>B</i>	SE	$\beta$	<i>P</i> value	Adjusted <i>R</i> <sup>2</sup> (%)
Intention of self-treatment	0.205	0.024	0.399	<0.001	16
Constant	-0.744	0.338	--	0.028	

B=Unstandardized regression coefficient, SE=Standard error

Moreover, linear regression analysis was used to predict the self-treatment behaviors among diabetic patients (Table 4). Accordingly, the behavioral intention ( $\beta=0.376$ ,  $p<0.001$ ) and perceived behavioral control ( $\beta=-0.172$ ,  $p<0.001$ ) had a significant role in explaining the variance of self-treatment behaviors. In total, behavioral intention explained 18.4% of the variation of self-treatment behavior changes.

**Table 4: Association between self-treatment behaviors and demographic variables among participants**

Variables	N (%)	Mean±SD	<i>P</i> value
<b>Gender</b>			
Female	260 (68.2)	1.92±1.50	0.019
Male	121 (31.8)	2.34±1.67	
<b>Age (yr)</b>			
<30	10 (2.6)	2.01±1.24	0.520
31-40	24 (6.3)	1.79±1.58	
41-50	82 (21.5)	2.30±1.56	
51-60	136 (35.7)	1.64±1.96	
>60	129 (33.9)	1.52±2.03	
<b>Marital status</b>			
Single	60 (15.6)	1.83±1.36	0.246
Married	321 (84.4)	2.09±1.60	
<b>Number of Children</b>			
No child	63 (16.5)	2.01±1.51	0.877
1-2 child	78 (20.5)	1.97±1.51	
3-5 child	188 (49.3)	2.12±1.64	
>5 child	52 (13.7)	1.98±1.51	
<b>Dwelling</b>			
Urban	326 (85.6)	1.95±1.49	0.012
Rural	55 (14.4)	2.64±1.86	
<b>Education</b>			
Illiterate	126 (33.1)	2.20±1.71	0.353
Primary	116 (30.4)	1.93±1.53	
High school	83 (21.8)	2.14±1.48	
Academic	56 (14.7)	1.82±1.42	
<b>Duration of diabetes (yr)</b>			
<1	30 (7.9)	2.23±1.59	0.725
1-5	105 (27.6)	1.95±1.64	
5-10	123 (32.3)	2.14±1.42	
>10	123 (32.2)	2.01±1.66	
<b>Family history of diabetes</b>			
Yes	238 (62.5)	2.03±1.55	0.795
No	143 (37.5)	2.08±1.61	
<b>Insurance coverage</b>			
Yes	365 (93.4)	2.05±1.56	0.870
No	25 (6.6)	2.01±1.68	
<b>Having a specific doctor</b>			
Yes	296 (77.7)	1.92±1.52	0.002
No	85 (22.3)	2.51±1.67	

## Discussion

This study aimed to investigate the factors affecting self-treatment in type 2 diabetic patients using TPB. The results of the present study showed that 50.9% of diabetic patients had at least one self-treatment behavior. In this regard, the results of a study among Iranian diabetic patients showed that 48.7% of the patients had self-treatment (16). The rate of consumption of medicinal plants varied in different studies and population groups; its rate was reported 84% in the study of Mahmoudian et al. and 30% in the research by Tabatabai et al. (17, 18). In a study by Başaran and colleagues, half of the patients who performed self-treatment used medicinal plants and related compounds. The main prescribed drugs were forgotten in 27% of these patients (19). Similar results are reported by other studies (9, 20). However, the rate of self-treatment in Kuwaiti and Jordanian diabetic patients was lower than in the present study (21, 22). This inconsistency may be due to differences in the means of self-treatment assessment and place of research.

The present study's findings showed a significant relationship between gender and self-treatment behaviors; in other words, men reported higher levels of self-treatment than women. In this regard, the Sharifirad et al. (23) and Khaksar et al. (24) reported similar results regarding self-treatment behaviors. However, the study's results by Ahmadi et al. showed that men and women followed a similar pattern in self-treatment behaviors (25). The discrepancy in the results may be due to socio-cultural differences among individuals from different regions. One of the reasons for the higher rate of self-treatment among men is the higher mean age of men compared to women. As age increases, limited access to health care systems, on the one hand, and more profound beliefs about traditional diabetes treatment methods, on the other hand, increase the likelihood of self-treatment behaviors. In the present study, patients living in rural areas and those who did not have a specific physician reported higher rates of self-treatment. In the study of Movahed et al. (26), 61% of patients were dissatisfied with the quality of the physician-patient relationship, which led to patients' tendency to traditional medicine.

As the essential hypothesis of the TPB and the most critical hypothesis of the current study, the results showed that attitude and perceived behavioral control were associated with the intention of self-treatment. In addition, intention and perceived behavioral control predicted self-treatment behaviors. In other words, perceived behavioral control has a significant role in predicting intention and behavior simultaneously. In the study by Kabodi et al. (9), the attitude and enabling factors were the best predictors of self-treatment behaviors in diabetic patients and explained 24% of the behavior variance. In the present study, patients who believed in their efficacy and ability to control self-treatment behaviors had more control over their self-treatment behavior. Other studies also confirm the impact of self-efficacy and perceived behavioral control on increasing self-care and self-regulation behaviors among diabetic patients (27, 28). The results of similar studies also show that self-efficacy and a sense of behavior control are very important in behaviors that require problem-solving (10). Diabetes is also a chronic disease with many factors affecting its treatment and control and requires different knowledge, skills, and resources among patients (29). The results of this study are consistent with the results of other studies (9, 30). In this context, it seems necessary to pay particular attention to educate lifestyle emphasizing treatment adherence, self-efficacy, and overcoming barriers to control diabetes. One of the limitations of the present study was gathering information through interviews with patients. According to research, this method is only sometimes a reliable method for self-treatment assessment. However, given that the researcher was not a member of the treatment team, this resulted in patients answering the questions honestly.

## Implications for practice

The findings of the present study suggest that applying TPB would be an efficient tool for predicting self-treatment behaviors among diabetic patients. Therefore, it is suggested to design educational interventions based on this theory concerning modifying factors of attitude and perceived behavioral control as an effective educational strategy to manage and modify self-treatment behaviors in diabetic patients.

## Acknowledgments

The study was approved by the Research Council of Hamadan University of Medical Sciences (Project number: 9709065246) and conducted with the support of the Vice-Chancellor for Research

and Technology. As a result, the writers would like to appreciate all participants of the study. The study was also approved by the Research Ethics Committee of Hamadan University of Medical Sciences (ID: IR.UMSHA.REC.1397.292).

### Conflicts of interest

The authors declared no conflict of interest.

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