

## NON COM DISEASES

# The relationship between illness perception and medication adherence in patients with diabetes mellitus type II: illness perception and medication adherence

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## Keywords

Illness perception • Medication Adherence • Type II diabetes

## Summary

**Introduction.** One of the most well-known chronic diseases in the world is diabetes. Disease perception is the patient's organized cognitive representation of his or her illness and can affect treatment adherence. The aim of this study was to investigate the relationship between illness perception and adherence to the medical regimen in patients with type II diabetes mellitus (T2DM).

**Methods.** This cross-sectional study was performed among 260 patients with type II diabetes referred to Gonabad Diabetes Clinic by systematic random sampling in 2019. Data collection tools were demographic questionnaire, Morisky medication Adherence Scale (MMAS-8), and Brief Illness Perception Questionnaire (BIPQ). Data were analyzed by SPSS 20 software. And using descriptive statistics, Pearson correlation coefficient.  $P < 0.05$  was considered significant.

**Results.** The results showed that the mean score of illness perception of type II diabetes was  $46.39 \pm 9.45$  (range 0-70) and the

mean score of medication Adherence was  $2.93 \pm 1.9$  (range 0-8). The results of Pearson correlation test showed a significant relationship between illness perception and medication Adherence ( $P < 0.001$ ,  $r = 0.199$ ). Also, the regression model showed that the dimensions of disease comprehension and personal control from illness perception were significantly related to medication Adherence of type II diabetic patients ( $P < 0.001$ ).

**Conclusion.** Based on the results of this study on the relationship between illness perception and medical adherence in diabetic patients, it is suggested that in order to understand the increase in adherence to therapy, the perception of the disease should be increased through education to patients. Patients' illness beliefs are candidates for a psycho-educational intervention that should be targeted at improved disease management practices and better adherence to recommended healthy behaviors.

## Introduction

Diabetes is of the most well-known chronic diseases across the world [1]. The number of people with diabetes mellitus was 30 million in the last decade, 1.7 million in the current decade, and is projected to reach 366 million in 2030 [2]. More than 18 million people (6.3%) of the US population have diabetes [3]. The prevalence of diagnosed and undiagnosed diabetes in Iranian men is 8.1% and 5.1%, respectively, and this prevalence in women is 10% and 4.7% [4]. Type II diabetes (T2DM) leads to decreased life expectancy (up to 8 years), increased cardiovascular, cerebral, peripheral vascular disease, vision problems, depression, nephropathy, and 60% of amputations [5]. The financial burden on society is increasing due to the health care cost and population aging with diabetes, so that half of diabetics over 65 years are hospitalized every year [6]. Diabetes is not curable, but it can be controlled [7]. Diabetes medication is very complex [8]. Studies have shown that patients adhere to a complex medication less than a simple one [9]. Patients' poor medication adherence is one of the major clinical concerns that health system employees often face, which has been considered by many researchers

and international symposia as one of the complex and essential problems of the present age in the last two decades [10]. Non-adherence to medication in diabetic patients is correlated to frequent hospitalizations, non-receipt treatment benefits, high treatment costs, and many physician visits. The death rate in patients who do not adhere to their medication is twice as high as other patients [11]. Illness perception is one of the most critical factors. Illness perception refers to the patient's organized cognitive representation of his/her illness [12]. According to Leventhal's theory, patients regulate their behavior and emotional response to disease based on their perception of nature, causes, outcome, controllability, and illness duration. Bandura states that illness perception provides an essential framework for examining patients' beliefs and the impact of its components on health behaviors [13]. Illness perception includes 7 areas of identity (illness perception symptoms), course of the disease (chronic or acute), disease outcome, individual control, therapeutic control, coping with the disease, a period without disease, and emotional manifestations of the disease [14]. Various studies have supported the relationship between illness perception and medication adherence [15, 16]. Rajpura and Nayak (2014) showed

that the illness perception and positive beliefs about treatment in the elderly with hypertension correlate with medication adherence [15]. Chen et al. (2011) showed that illness perception is correlated to medication adherence [17]. Illness perception has a predictive value in using the health behaviors of patients with chronic diseases. Perceptions of the disease can vary in different socio-cultural contexts. Moreover, no study has been found on patients with T2DM and its impact on medication adherence. The purpose of this research was to investigate the relationship between illness perception and medication adherence in patients with type II diabetes referred to the diabetes clinic of Allameh Bohlool Gonabadi Hospital (Gonabad University of Medical Sciences & Health Services) in 30/9/2019.

## Methods

This research has employed a cross-sectional descriptive method. The research population included type II diabetes patients referred to the only specialized diabetes clinic of Allameh Bohlool Gonabadi Hospital in 2019. The sample size was obtained according to the study of Dost Mohammadi et al. [21] and based on the formula below, as many as 242 people with 95% confidence interval and 80% test power. Finally, 260 was set given about 10% of exclusion.

$$n = \frac{\left( Z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right)^2}{(\omega)^2} + 3$$

Sampling was conducted through systematic random sampling. The inclusion criteria were diagnosis of T2DM by a specialist, no cognitive problems, ability to communicate in Persian, consent to participate in the study, being over 35 years old, and having at least one year of diagnosis of T2DM with active medical records. The exclusion criteria were dissatisfaction with completing the questionnaire and incomplete completion of the questionnaire.

## MEASURES

The data collection tool in this research is a questionnaire with three sections.

### DEMOGRAPHIC

The first section is related to personal characteristics, including age, gender, marital status, residence status, level of education, employment status, number of hospitalizations, duration of diagnosis, family history of diabetes, smoking, economic status, and smoking, which was completed based on the patient's statements and medical record.

### THE BRIEF-ILLNESS-PERCEPTION-QUESTIONNAIRE (BIPQ)

In the second section, The Brief-Illness-Perception-Questionnaire (BIPQ) form was used to assess the

illness perception. This questionnaire has 9 subscales that have been designed by Broadbent et al. based on the revised form of this questionnaire. The range of scores of the first 8 questions is from 1 to 10. Question 9 is open-answer and questions the three leading causes of the disease, respectively. Each subscale measures a component of illness perception. Five subscales measure cognitive response to disease, including the perception of outcomes, duration of illness, personal control, control through treatment, and symptom recognition. Two subscales measure worry about illness, emotions, and emotional response, and one subscale measures the illness perception ability. Cronbach's alpha for this questionnaire was as much as 0.8. The reliability coefficient of the 6-week retest for different questions was reported from 0.42 to 0.75 [22].

### MMAS-8 DRUG ADHERENCE QUESTIONNAIRE

In the third section, medication adherence was used using the 8-item MMAS-8 Drug Adherence Questionnaire developed by Morisky, Aang and Wood et al. (2008). This questionnaire has 8 items. The method of scoring and interpreting this questionnaire is formulated only in item 8 on a 4-point Likert scale. Other items are answered by yes = 1 and no = 0. Items 5 and 8 are graded, unlike other items. The scores of all items in the questionnaire are summed to calculate the questionnaire's overall score. Its overall score range is between zero and 8. A score greater than 2 is poor drug adherence, 1 and 2 is moderate adherence, and 0 is considered as high adherence. In the research of Koushiar et al. (2013), while measuring the face and content validity of this tool by expert professors, its reliability was reported by Cronbach's alpha method as much as 0.68 [23].

## Ethical considerations

This research has been approved by the ethics committee of Gonabad University of Medical Sciences under the No. IR.GMU.REC.1398.104. the researcher obtained the necessary permits to conduct the research with the director of Allameh Bohlool Gonabadi Hospital's permission after being introduced to the research environment to comply with the ethical standards for conducting research. The researchers referred to the diabetes clinic of Allameh Bohlool Gonabadi Hospital to collect the data. The units were provided to patients to answer and ensure the confidentiality of information after stating the purpose of the study to the patient and obtaining consent and declaration of readiness. If the patient was illiterate, the questions were read to him/her by the researcher. Moreover, medical information was extracted from patients' records. First, the obtained data were initially examined.

## Statistical analysis

The data were imported to SPSS20 software. Data were

described using descriptive statistics, and then data analysis was performed. Chi-square test was used to compare the grouped data, Pearson correlation coefficient was used to determine the relationship, and Independent t-test and ANOVA were used to compare quantitative data in groups related to contextual variables. The significance level in the tests was considered as much as 0.05.

## Results

The present research was conducted on 260 patients with type II diabetes to determine the relationship between illness perception and medication adherence. The mean and standard deviation of patients' age was  $59.05 \pm 11.55$ , and 154 (59.23%) were women (Tab. I).

**Tab. I.** Frequency of demographic and severity of medication adherence of patients with type II diabetes (n = 260).

Characteristics	N (%) Mean $\pm$ SD
<b>Gender</b>	
Male	106 (40.77)
Female	154 (59.23)
<b>Marital status</b>	
Single	7 (2.69)
Married	226 (86.92)
Widow	8 (30.8)
Divorced	19 (7.31)
<b>Education</b>	
High school	198 (76.15)
Diploma	34 (13.08)
University	28 (10.77)
<b>Economic status</b>	
Good	14 (5.39)
Moderate	186 (71.53)
Weak	60 (23.08)
<b>BMI</b>	26.47 $\pm$ 4.27
<b>HbA1C</b>	8.43 $\pm$ 1.38
<b>High adherence</b>	0 (0)
<b>Medium adherence</b>	106 (40.8)
<b>Low adherence</b>	154 (59.2)

**Tab. II.** The relationship between education and different dimensions of illness perception and medication adherence of type II diabetic patients

Education Variable	High school	Diploma	University	ANOVA P-value
Perception of consequences	8.03 $\pm$ 2.58	6.52 $\pm$ 3.57	5.18 $\pm$ 3.70	< 0.001
Duration of the disease	7.83 $\pm$ 2.65	8.45 $\pm$ 2.39	8.30 $\pm$ 3.12	0.374
Personal control	3.00 $\pm$ 2.17	2.88 $\pm$ 2.58	2.18 $\pm$ 1.66	0.193
Control through treatment	2.98 $\pm$ 2.63	3.44 $\pm$ 2.73	2.49 $\pm$ 2.48	0.369
Recognizing patients' symptoms	6.83 $\pm$ 2.40	5.61 $\pm$ 2.88	6.37 $\pm$ 3.11	0.034
Worry about the disease	7.92 $\pm$ 2.49	6.88 $\pm$ 2.99	7.00 $\pm$ 3.66	0.045
Illness perception ability	3.18 $\pm$ 2.59	2.54 $\pm$ 2.41	1.41 $\pm$ 1.00	0.001
Emotions and emotional reactions	8.06 $\pm$ 2.75	5.85 $\pm$ 3.90	5.85 $\pm$ 3.90	0.001
Total perception of illness	48.03 $\pm$ 8.26	42.27 $\pm$ 10.89	39.27 $\pm$ 11.35	< 0.001
Total medication adherence	3.07 $\pm$ 1.77	2.97 $\pm$ 1.40	2.88 $\pm$ 1.42	0.834

Based on the results of this study on the relationship between perception of the disease and adherence to the treatment regimen in diabetic patients, it is suggested that in order to understand the increase in adherence to therapy, the perception of the disease should be increased through education to patients. Illness perception in patients with type II diabetes was  $45.9 \pm 39.46$  (range 0-70), and the duration of the disease was  $7.97 \pm 2.67$ . The medication adherence score was  $1.69 \pm 2.93$  (range 0-8). According to the severity of medication adherence of type II diabetic patients, 154 patients (59.2%) had poor drug adherence (Tab. I).

According to the study of the relationship between gender with different dimensions of illness perception and medication adherence of type II diabetic patients, the results show a significant relationship between total scores of illness perception and gender ( $P < 0.001$ ) (Tab. II).

A significant relationship between illness perception and medication adherence in patients with type II diabetes ( $r = 0.199$ ,  $P = 0.001$ ) (Tab. III).

## Discussion

The results indicated relatively low medication adherence, which is not consistent with Dost Mohammadi et al., Who reported high medication adherence in the elderly with hypertension [20]. It can be explained that patients with hypertension possibly were more aware of the disease and its risks.

The illness perception results in patients with Type II Diabetes participating in the research showed that more than half of the patients report their illness perception as moderate and above. These results are consistent with studies of Doust Mohammadi et al. [18] and Taheri-Kharameh et al. [19] In Iran, Angell et al. [20] and Christensen in USA [21] and Mosleh in Jourdan [22]. Research results on the relationship between illness perception and medication adherence can be, according to cognitive theories describing the factors explained the effect on the occurrence of a behavior. In cognitive theories and models, it is assumed that the characteristics and perceptual organization of individuals lead to

**Tab. III.** Correlation matrix between some demographic variables with illness perception and medication adherence of type II diabetic patients

Variable	Illness perception		Medication adherence	
	Correlation coefficient (r)	Significance (P)	Correlation coefficient (r)	Significance (P)
Age	0.166	0.008*	0.137	0.029*
Duration of diabetes	0.151	0.042*	0/059	0.344
Number of hospitalizations	0.134	0.082	-0.047	0.541
FBS	-0.173	0.006*	-0.153	0.043*
HgA1C	-0.288	p< 0.001*	-0.191	0.005*
BMI	-0.050	0.465	-0.078	0.187
Perception of consequences	-	-	0.090	0.149
Duration of the disease	-	-	-0.023	0.079
Personal control	-	-	0.179	0.004*
Control through treatment	-	-	0.064	0.305
Recognizing patients' symptoms	-	-	0.158	0.308*
Worry about the disease	-	-	0.020	0.751
Illness perception ability	-	-	0.252	p < 0.001*
Emotions and emotional reactions	-	-	0.085	0.173
Total illness perception	-	-	0.189	0.002*

shape there are some behavioral characteristics that have different consequences has it. Some of these features and perceptual organizations, such as sensory, Being emotional, perceiving low risk and not paying attention to the consequences of behavior, consequences Negative brings with it a weakness in problem solving, emotional processing Weakness, irritability as well as the development of certain behavioral characteristics Which disrupts adherence to personal care orders and at a particular level, adherence to the treatment regimen [23]. Various protective mechanisms have been proposed to explain the effects of illness perception on medication adherence. Most of these mechanisms are summarized in two areas, which are physical factors and psychological mediators. The factor that has received the most experimental support concerning physical factors is the lower activity of the hypothalamic-pituitary-adrenal axis in people who have a rational perception of illness and believe in appropriate treatment [24]. Regarding psychological mediators that mediate the illness perception with medication adherence, medication adherence can affect psychological factors. On the other hand, these factors affect medication adherence. Mohammad pour et al., in a study in Iran showed that lack of awareness about the illness is one of the factors correlated to medication non-adherence [25].

The two components of personal control and illness perception ability in the illness perception group had a significant relationship in medication adherence in patients with type II diabetes, which means that those who have a greater perception of their illness, their health status is subject to their personal control, feel more responsible for their health, and follow higher treatment. The results of this research are in line with the previous studies on illness perception level and their medication adherence [26-28]. Rajpura and Nayak, in a study in USA reported a positive relationship between illness perception and positive beliefs about treatment

in the elderly with hypertension with high medication adherence [15]. Taheri Kharameh et al. conducted a study they concluded that the two components of personal control and illness perception ability were the most important predictors of medication adherence, consistent with this research [19]. Ross et al., in a study in UK concluded that illness perception and beliefs about hypertension predict patient adherence [26]. Kretchy et al., in a study in Ghana showed that patients with better perceived health status were more likely to adhere to medication [27]. Alluhayyan in study in Saudi Arabia found a significant positive correlation between illness perception subscales of personal control, treatment control, and understanding with all domains Medication Adherence [28].

Among different disease groups, such as asthma, chronic renal failure and diabetes, several studies have presented illness perception as an important framework for predicting patients' capacity to cope and for developing interventions to prompt self-management in chronic disease.[29-31] Appropriate health beliefs, such as perceived seriousness of illness, vulnerability to complications and efficacy of treatment can predict better compliance among diabetic and hypertension patients [32, 33]. Hand et al. found that asthmatic patients adhered well to recommended treatment when the treatment regimen made sense to them and when they felt they had the ability to succeed at the regimen. [34] In addition, a significant association was found between patients' illness perception and osteoarthritis patients' decisions to seek medical help and adherence to medical advice [35].

One of the limitations of this study is that the present research tests are self-assessment tests. The measured abilities and characteristics in this self-assessment are based on individuals' self-perception, which is closely related to their self-concept. If self-concept does not correspond to reality, such scales cannot well reflect the

individual's true characteristics and abilities and only express the individual's self-perception.

## Conclusion

In conclusion, we found that low medication adherence is predictable when the illness perception is low. There is a significant relationship between illness perception and medication adherence in patients with type II diabetes. Strengthening illness perception to increase patient's medication adherence is a critical treatment strategy in educational interventions. Therefore, it is suggested that educational programs appropriate to the level of education of diabetic patients in order to increase health literacy and illness perception in diabetic patients should be considered.

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## Conflicts of interest statement

The authors declare no conflict of interest.

## Authors' contribution

SSB and ADN designed the study, SSB and HA were involved in collecting the data and patient's management, ADN performed the data analysis. SSB drafted the manuscript. All authors read and approved the final manuscript.

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