Predicting Medication Adherence Based on Personality Characteristics in Individuals with Type 2 Diabetes Mellitus

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Abstract

Objective: Diabetes mellitus is a chronic illness and adherence to medications is vital to manage the illness. The purpose of this study was to examine the prediction of medication adherence based on personality factors in a group of individuals with type 2 diabetes in Yasuj.

Materials and Methods: One hundred twenty individuals with type 2 diabetes who visited health centers were selected for this study through convenience sampling. The participants completed the NEO-Five Factor Inventory and Medication Adherence Rating Scale (MARS). The data were analyzed by mean, standard deviation, and multiple regression analysis using SPSS software.

Results: The results showed that among the big-five personality factors, only neuroticisms significantly predicted adherence to medications (β= -0.31, *P*-value< 0.003). Furthermore, the model explained only 19% of the variance in medication adherence (R^2= 0.19, *P*-value< 0.01).

Conclusion: This study indicated that a large proportion of patients with type 2 diabetes did not adhere to their medications. This study highlighted that the personality trait of neuroticism was important in predicting medication adherence in patients with type 2 diabetes.

Keywords: Diabetes mellitus, Personality, Neuroticism, Social support

Introduction

Diabetes mellitus is an increasingly common chronic illness and a leading cause of death (1). The prevalence of type 2 diabetes (T2DM) has been increasing all around the world and many of the individuals suffering from it are undiagnosed and not even aware of their illness (2). The occurrence of diabetes in Iran has increased and about 11.4% of Iranian adults suffer from diabetes while a third of them do not know that they have this illness (3).

The adherence to treatment has been defined as the extent to which an individual's behavior, in terms of taking medicine, complies with the prescribed treatment of health care professionals (4). Adherence to

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medication and prescribed regimens recommended by the health care system has been inadequate among diabetic patients. As indicated in many studies, a majority of individuals with diabetes do not conform to their treatment (5). Numerous studies have examined the role of various factors on medication adherence in chronic illnesses.

The findings of these studies have indicated that socio-demographic factors, namely age, gender, education, marital status, economic status, social support, clinical factors such as illness severity and disease duration, personality characteristics, and mental health problems, including depression, anxiety, and distress have a significant association with adherence to treatment (6-8).

Several studies have been conducted to investigate adherence to treatment in Iran and they have also reported that a large proportion of patients with diabetes do not adhere to their medicine regimens (9-12).

Several theories have suggested that personality traits can have an impact on patients' compliance with treatment. The most important personality factors that have been reported to contribute to therapeutic adherence are the big five personality factors, including agreeableness, conscientiousness, extraversion, neuroticism, and openness to experience (13).

Agreeableness is defined as being compassionate and cooperative instead of being antagonist towards others. Conscientiousness is described as the tendency to control impulse, act in socially acceptable ways, maintain self-discipline, act dutifully, and strive for achievement, and follow ethical principles. Extraversion is characterized by excitability, sociability, assertiveness, and a high level of emotional expressiveness. Neuroticism is described as poor ability to cope with psychological stress.

Openness to experience is described as the tendency to have a broad range of interests, be curious about the world and other people, be willing to learn new things, and be adventurous (14).

A number of studies have shown that there is an association between big five personality factors and compliance with treatment.

Some of these studies have found a positive association between conscientiousness and agreeableness, as two of the big five personality factors, and medication adherence (15,16). However, some other studies have reported a negative association between neuroticism and medication adherence (17,18).

Given that personality characteristics have been documented to have a significant role in therapeutic adherence among patients with T2DM and that little is known about the association between big five personality traits and medication adherence among Iranian patients with T2DM, the present study was aimed to examine whether and to what extent medication adherence in Iranian patients with T2DM could be predicted based on the big five personality factors, which include neuroticism (N), openness (O), agreeableness (A), extroversion (E), and conscientiousness (C). It was hoped that the results of this study would reveal which of the big five personality factor could predict compliance with medication.

Materials and Methods

The research design was a cross-sectional study and a total of 120 patients with T2DM from Yasuj, Iran, were selected for this study using convenience sampling. The mean (±SD) age of participants was 52.15 (± 12.25) years, ranging from 24 to 80 years old. It is suggested that 10-15 cases for each predictor variable in the model are enough for regression analysis. In this study, there were five predictor variables; therefore, 120 sample cases were considered to be a sufficient sample size for conducting regression analysis (19).

The sample was recruited from the health centers in Yasuj between July and October 2018. Informed consent was obtained from the patients visiting the health centers. The inclusion criteria in this study were as follows: having the illness for at least 1 year; having

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been diagnosed with T2DM, being at least 20 years old, and not suffering from mental disorders and addiction. The scores for each of the big-five personality factors, including O, C, E, A, and N, were entered into the model as the independent variables, and the MARS scores were included in the model as the criterion variable.

A *P*-value of 0.05 was considered significant in this study. Statistics methods such as frequency, percentage, mean, standard deviation, Pearson correlation coefficients and simultaneous multiple regression analysis were used to analyze data using SPSS software (version 20).

The Medication Adherence Rating Scale (MARS)

The MARS (20) was used to measure medication adherence over one week based on individuals' thoughts and behaviors. This scale consists of 10 items with yes/no responses and the responses are rated on a ten-point Likert scale, ranging from 0 to 10.

The MARS has been used in many studies and its reliability and validity have been reported to be acceptable. These studies have reported a Cronbach's alpha of 0.79 for this scale (21). This scale has also been used in Iran with a reported Cronbach's alpha of 0.91 (9).

The NEO-Five Factor Inventory (NEO-FFI)

The NEO-FFI (22) was used to assess personality characteristics. The Neo-FFI comprises 60 items (12 per domain) and five factors, including neuroticism (N), openness to experience (O), agreeableness (A), extroversion (E), and conscientiousness (C). The answers are rated on a five-point Likert scale, ranging from 0 (strongly disagree) to 4 (strongly agree). NEO-FFI has been translated into many languages.

Numerous studies have reported satisfactory reliability and validity for this scale. The internal consistencies of the factors of this scale as reported in the scale manual were as follows: N= 0.79, E= 0.79, O= 0.80, A= 0.75, C= 0.83 (22). In a study done in Iran, the researchers reported a Cronbach's alpha of 0.83 for conscientiousness, 0.80 for neuroticism, 0.60 for agreeableness, and 0.58 for extraversion (23).

Ethical considerations

The research proposal was approved by the ethical committee of Shiraz University of Medical Science (Code: IR.SUMS.REC.1399.683).

Results

The findings showed that the participants' mean age (± SD) was 52.15 (± 12.25) years ranging from 24 to 80 years old. The majority of patients had a high school education (84.3%) and that the mean duration of illness was 7.64 (± 5.12) years. Moreover, the socio-economic status of most patients was low or moderate (85%). The demographics and clinical data are presented in table 1.

The means and standard deviations of research variables are presented in table 2. The findings of this research also showed that among the personality factors, there was only a significant association between neuroticism and adherence to prescribed medication (r= -0.30, *P*-value< 0.004).

The correlation coefficients are presented in table 3. The results of simultaneous multiple regression analysis indicated that the model was significant (F= 2.22, *P*-value< 0.008) and that all personality factors explained for 9% of the medication adherence (R^2= 0.09). Among the personality factors, only neuroticism significantly predicted medication compliance (β= -0.31, *P*-value< 0.003) and other personality factors, including openness to experience, agreeableness, extroversion, and conscientiousness, did not significantly predict adherence to medications (Table 4). In other words, patients with higher neuroticism were less likely to adhere to their prescribed medication.

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Table 1. Demographics and clinical characteristics of individuals with type II diabetes (n= 120)

Variable	Frequency	Percent
Gender		
Male	46	38.3
Female	74	61.7
Education		
High school	103	84.3
Undergraduate	14	11.7
Postgraduate	3	2.5
Economic Status		
Poor	36	30
Good	17	14.2
Very good	1	0.8

Table 2. Means and standard deviations of big five personality factors and the MARS

Big five factor	Mean	SD
Medication adherence	6.7	2.0
Neuroticism	2.9	0.53
Extraversion	2.29	0.50
Openness to experience	1.92	0.35
Agreeableness	2.57	0.40
Conscientious	2.89	0.56

SD= Standard Deviation

Table 3. Relationships of big five personality factors and medication adherence

Big five factors	r	*P*-value
Neuroticism	-0.30	0.01
Extraversion	0.13	0.08
Openness to experience	0.03	0.25
Agreeableness	0.05	0.24
Conscientiousness	0.08	0.18

R= Correlation coefficient

Table 4. Simultaneous multiple regression analysis for predicting medication adherence

Big five factors	β	*P*-value
Neuroticism	-0.31	0.003
Extraversion	0.01	0.90
Openness to experience	-0.03	0.93
Agreeableness	-0.05	0.60
Conscientiousness	-0.02	0.89

B= Beta

Discussion

The findings of this study showed that among the personality factors, only neuroticism negatively predicted adherence to medication in individuals with T2DM. Indeed, individuals who rated high on this personality trait were less likely to comply with their medication. This finding is in line with those of previous studies, indicating that individuals with some specific personality traits, such as neuroticism, were disposed to non-adherent behavior (13).

For example, in their study on individuals with T2DM, Novak et al. (2017) found that higher neuroticism was linked to lower levels of medication adherence (17). Similarly, in another research, a negative relationship was observed between some personality factors, such as neuroticism, and compliance with therapeutic medications (13).

A possible explanation for this finding is that individuals with high scores on neuroticism tend to worry and cannot follow their medication or diet regimens. Previous research has also shown that people influenced by these personality characteristics tend to engage in health-compromising behaviors, such as smoking which pose more risk to their health (24), and adhere loosely to disease management suggestions (25).

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While the results of this study are in agreement with those of most previous studies, there are a few studies the results of which are not in line with those of the present research. For instance, in one study on individuals with T2DM in Iran, a positive association was observed between neuroticism and HbA1C level (26). This discrepancy in results can be explained by differences in demographic and social factors of the participants of this study and those of other studies.

Also, diabetes self-management is complex and difficult and it seems unlikely that patients with neuroticism be successful at it. Furthermore, diabetes complications can lead to functional limitations and reduce the quality of life (27). In terms of conscientiousness, no significant association was observed between medication adherence and this personality trait in the present study.

This finding is contrary to those of most previous results, which indicated that patients who were high on conscientiousness were more compliant with treatment. For instance, in one study, Molloy et al. (2014) found that a higher level of conscientiousness was associated with better medication adherence (28).

Regarding other personality factors, including agreeableness, extraversion, and openness, the results of this research did not indicate any significant association between these three factors and medication adherence. Previous research has reported mixed results on the relationship between these three personality characteristics and adherence to treatment. While some studies showed the significant association between the personality traits and compliance of treatment (29), other studies did not find any significant relationship between the aforementioned factors and medication adherence (30).

The study has some limitations. First, the cross-sectional methodology and in studies with this type of design, it is almost impossible to explore cause-effect. Moreover, the role of demographic variables, such as gender and age was not investigated in this study because the sample size was not large enough to include these variables into the model. Finally, in this study, medication adherence was assessed by a questionnaire, but to have a precise evaluation of adherence medication, the assessment of the HbA1C level should also have been considered.

It is hoped that the results of this study, which examined the role of personality traits in medication adherence, can help clinicians to identify individuals with poor self-management adherence and provide them with necessary instructions, care, and therapy. Clinical practitioners are recommended to consider the role of personality traits in adherence to treatment and provide patients with effective interventions when necessary.

Conclusions

This study indicated that the majority of patients with T2DM complied with their medication. The present study also highlighted that individuals with type 2 diabetes who were high on neuroticism were less likely to comply with their prescribed medication. Indeed, individuals who experience emotional problems, such as anxiety, stress, or depression, are more likely to ignore medical advice.

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Conflict of Interest

The authors declare no conflict of interest.

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