Influence of the Use of Medicinal Plants on the Level of Medication Adherence in the Elderly

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ABSTRACT

Many elderly patients take them arbitrarily under the assumption that medicinal plants are without side effects and risks. The present study was conducted to investigate the relationship between the history of medicinal plant consumption and the medication adherence level in the elderly. In this cross-sectional descriptive study, elderly people aged 60 years and older with chronic diseases were included in the study using the available sampling method. For data collection, a three-part questionnaire of demographic information, history of medicinal plant consumption, and medication adherence tool were used. Data were analyzed with SPSS23 statistical software and using statistical tests of one-way analysis of variance, independent t-test, chi-square, and logistic regression. Based on the findings, the amount of history of using herbal medicine with the knowledge of the doctor was 41.4% (148 people), and without the knowledge of the doctor was 27.3% (98 people) in the last year. The average medication adherence in the elderly who used medicinal plants (both groups with and without the doctor's knowledge) was lower compared to the group that had no history of using herbal medicine (P=0.001). Also, there was a statistically significant relationship between the number and frequency of using medicinal plants and the duration of chronic disease with the level of medication adherence (P<0.05). Considering the high consumption of medicinal plants by the elderly with chronic diseases and its relationship with low medication compliance, it is necessary to educate the elderly about the following: the correct way to use medicinal plants and their side effects, drug-herb interactions, the required to inform the doctor about the utilize of medicinal plants, and the need to follow the medication.

Key Words: *Medicinal plants, Medication adherence, Elderly, Patient*

INTRODUCTION

With improved population control methods and increased life expectancy, as well as improved treatment methods, the world population is aging [1, 2]. According to statistics published by the United Nations in 2017, there are approximately 962 million people aged 60 and over in the world, compared to 382 million in 1980. This statistic shows an increase of more than 2.5 times in the elderly population during 37 years. The United Nations predicts that the elderly population in the world will double again by 2050 and their number will approach 2.1 billion [3].

With increasing age, the possibility of chronic diseases and their complications increases [4, 5]. One of the behaviors associated with chronic diseases that predicts its successful treatment and reduces the negative side effects and severity of the disease is patients' compliance with diet therapy [6, 7]. Drug compliance means patients' compliance with the doctor's drug recommendations, and non-compliance with the drug regimen is defined as the non-compliance of people's behavior with the doctor's drug recommendations. Medication adherence is a complex behavioral process and is influenced by several factors such as the individual characteristics of patients, the mutual relationship between doctor and patient, and the care system [8]. The World Health Organization has presented the factors affecting drug adherence in chronic diseases in a five-dimensional model. Based on this model, drug adherence is a multidimensional phenomenon that is influenced by patient-related factors, treatment-related factors, disease-related factors, socio-economic factors, and factors related to health care personnel and the health system [9].

Appropriate use of medication plays a key role in the treatment of most chronic diseases. Across Europe, 31% of

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older adults take 5 or more medications per day [10]. The use of inappropriate drugs in the elderly is significantly associated with an increase in adverse drug reactions and side effects [11]. Non-adherence to prescribed medications is a serious limitation in long-term treatment in chronic patients, which can be associated with medical, social, and economic consequences, and poor adherence to the medication regimen leads to failure to achieve desired clinical goals [12].

Although older people usually have higher medication compliance compared to younger people [13], most of them may have problems such as cognitive, motor, visual, and memory deficits that can cause problems in their care process [14, 15]. Elderly patients may have difficulty swallowing pills, using small medicine packages as well as small-sized medicines, and recognizing the colors or names of certain medicines. Other things such as multiple drugs, complexity of consumption plans, occurrence of adverse drug reactions, cultural aspects, and problems of access to drugs due to high cost can affect the level of drug compliance in the elderly [16]. Elderly people use more medicinal plants and are also more at risk of serious drug interactions [17]. Many elderly patients take them arbitrarily under the assumption that medicinal plants are without side effects and risks. On the other hand, because these people usually take other medicines, the simultaneous use of medicinal plants can become a problem for them and disrupt their treatment. The therapeutic effects of medicinal plants are confirmed and their use has become popular in the health system of many countries of the world. However, people's ignorance and mistaken beliefs that medicinal plants are healthy and harmless may cause adverse and dangerous side effects [18, 19].

This topic has attracted the attention of researchers, whether the utilization of medicinal plants affects the medication compliance of chronic patients. In this regard, so far in a few studies, this issue has been examined by researchers, and the results of these studies regarding the effect of the utilization of medicinal plants on the level of medication adherence have been reported to be contradictory. The results of two recent studies showed that the level of medication compliance is lower in patients with chronic diseases who consume medicinal plants [20, 21]. In these two researches, the research population was not only the elderly, but chronic patients in different age ranges were included in the research. In other studies, there is no correlation between the use of medication adherence and medicinal plants [22, 23]. In several systematic review articles on medication adherence in the elderly, the utilization of medicinal plants has not been evaluated in any of the selected studies [24, 25]. However, the use of medicinal plants among the elderly is generally common

and the impacts of medication non-adherence in this group are more worrisome compared to other age groups [26]. Therefore, the researchers decided to conduct this research to determine the relationship between the history of the use of medicinal plants and the medication compliance level in the elderly with chronic diseases.

MATERIALS AND METHODS

This research was a cross-sectional descriptive study. The samples of the present study included 358 patients with high blood pressure, coronary artery disease, chronic respiratory diseases, and type 2 diabetes mellitus. The sample size was estimated to be 358 people based on a pilot study and considering the medication compliance rate of 35%, the confidence interval of 95%, and the acceptable error value of 0.05.

The samples were included in the research using the available method. The criteria for entering the research include being over 60 years old, having high blood pressure, suffering from any of the coronary artery diseases, not having hearing problems and dementia, taking at least one medicine for the disease for at least 1 year, type 2 diabetes and chronic respiratory diseases, self-responsibility. The patient was able to take medication without the help of others. The reason for choosing the mentioned patients was the higher prevalence and availability of these patients in the research environment. The exit criteria also included unwillingness to continue cooperation and incomplete completion of the questionnaire.

The tool used in this research was a three-part questionnaire, the first part of which included demographic information, the second part of the history of medicinal plant consumption in the last 12 months, and the third part of the Morinsky scale to check medication adherence. The 8-question scale was designed by Morinsky *et al.* in 2008. This questionnaire is used to measure medication compliance in all types of chronic patients and includes 8 questions. The first 7 questions are answered with yes and no and scored as 0 and 1, and the last question, which is the eighth question, has a 5-point Likert scale (never, rarely, sometimes, often, and always) that is zero, 0.25, 0.5, 0.75 and 1 are scored. Question number 5 is graded in contrast to other items. The overall range of scores on this scale is between zero and 8, and scoring 8 means high compliance in medication use, scores 6 and 7 mean compliance, and scores less than 6 mean poor compliance [27].

In the current research, the content validity method was used to determine validity, and internal consistency and Cronbach's alpha calculation were used for reliability. In this study, Cronbach's alpha was 0.76, which is acceptable. Answering the questions of this questionnaire and understanding them is easy and can be used in the low-

educated population as well. In elderly people who were unable to complete the questionnaire, the completion of the questionnaire was done with the help of researchers. After entering the collected data in SPSS23, the collected data were analyzed by one-way analysis of variance, independent t-test, chi-square, and logistic regression.

RESULTS AND DISCUSSION

In the present study, 358 samples participated. The Mean ± SD of the participant's age was 69.44±8.13 years. A little more than half of the participants (52.23%) were female. The majority of the participants were married (87.68%), with an education level below diploma (71.64%). Based on the type of disease based on the patient's self-report, 169 people had a history of coronary artery disease, 292 people had a high blood pressure history, 192 people had a type 2 diabetes mellitus history, and 112 people had a chronic respiratory disease history. Since some patients had a history of more than one disease, the total number is more than 358. Based on the results, none of the variables had a statistically significant difference between the two groups (P>0.05). The average age of participants with a history of using herbal medicine was 69.46±7.95 and participants without a history of using herbal medicine were 69.38±8.21. The Mean ± SD of the chronic disease duration of the participants with a history of using herbal medicine was 8.07±4.32 and the participants without a

history of using herbal medicine were 7.98±5.89, statistically, these two variables did not have a statistically significant difference (P>0.05). As the results presented in **Table 1** show, approximately 35% of the participants had high medication adherence.

Table 1. Frequency of medication adherence in the elderly with chronic disease.

Compliance rate	N (%)
Weak	146 (40.78)
Medium	86 (24.02)
High	126 (35.2)

The overall mean of drug compliance in the elderly with chronic disease was 48.5 (in the range of poor compliance). There was no statistically significant relationship between the average medication compliance with age, marital status, gender, education level, and the number of drugs consumed (P>0.05). However, there was a statistically significant relationship between the duration of chronic disease and the mean score of medication adherence (P<0.05). In this way, in patients who had been infected for more than 10 years, the level of medication compliance was lower (P=0.01). Other results indicated that 246 patients (68.7%) had used medicinal plants during the last year, and 43.9% (108 patients) of them utilized at least one medicinal plant during the last week **(Table 2)**.

Table 2. Mean ± SD of participants' medication compliance score according to the history of using herbal medicines.

Variable		N (%)	Mean ± SD	P
Use of medicinal plants in the past year	No	112 (31.28%)	6.2 ± 3.41	0.001
	With the doctor's knowledge	98 (27.3%)	21.35 ± 5.2	
	Without the doctor's knowledge	148 (41.34%)	5.2 ± 6.27	
Number of herbs used in the last week	1	108 (43.9%)	5.2 ± 3.29	0.02
	2	75 (30.48%)	154.98 ± 5.1	
	≥3	63 (25.6%)	77.3 ± 4.2	
Frequency of using medicinal plants in the last week	1	96 (39.02%)	27.3 ± 5.2	0.01
	2	79 (32.11%)	16.28 ± 5.2	
	≥3	71 (28.86%)	87.41 ± 4.2	

The findings of a one-way analysis of variance regarding the relationship between the using medicinal plants history and medication adherence showed that the overall F level is significant (P=0.001). The method of Scheffe's post hoc was used to compare the means two by two. The findings showed that the mean score of drug compliance in those who did not use herbal medicine was statistically significantly different from the other two groups (use without and with the doctor's knowledge) (P<0.05). In this way, both groups of patients who had a history of utilizing

medicinal plants had less compliance compared to the group that had no history of using medicinal plants. There was no significant difference in the mean drug compliance score between the two groups using medicinal plants without and with the doctor's knowledge (P<0.05). The results of a one-way analysis of variance regarding the relationship between the number of medicinal plants consumed in a week and drug adherence showed that the overall F level is significant (P=0.02). By carrying out Sheffe's post hoc test, it was found that the mean score of

adherence in those who used 3 or more types of herbal medicine per week was significantly lower than that of other participants (P<0.05), but there was no statistically significant difference between the groups using 1 and 2 types (P>0.05). Furthermore, statistical analysis showed that there is a significant relationship between the frequency of utilizing medicinal plants and the average score of medication adherence (P=0.01). The results of Shefeh's post hoc test showed that the average drug compliance score in the group that used medicinal herbs 3 or more times a week was significantly lower than the other two groups (P<0.05), however, no significant difference

was observed between the other groups (P>0.05). Also, the logistic regression method was used to control the simultaneous impact of demographic variables on the relationship between history of medicinal herb consumption and medication adherence. For this purpose, according to the cut-off point of the medication adherence questionnaire, the level of adherence was divided into two categories: adherence and non-adherence, and using the logistic regression method, the relationship between independent variables and the status of medication adherence was investigated, the results of which are presented in **Table 3**.

Table 3. Multivariate logistic regression about the factors affecting medication non-adherence in the elderly with chronic diseases.

Demographic characteristics and drug history		Adjusted odds ratio	95% confidence interval	P
Age		1.032	0.1-922.115	0.69
Marital status	Married	1		
	Deceased wife	0.931	0.1-538.608	0.194
	Single	0.946	0.1-595.727	0.159
Gender	Male	1		
	Female	0.976	0.1-645.597	0.86
Level of education	Illiterate	1		
	High school	0.912	0.1-613.681	0.868
	Diploma	0.771	0.1-462.581	0.851
	University degree	0.842	0.1-543.547	0.91
The number of drugs used		0.920	0.1-347.320	0.649
Duration of chronic illness		1.05	0.1-923.146	0.03
Use of medicinal plants in the past year	No	1		
	With the doctor's knowledge	1.910	1.2-523.661	<0.01
	Without the doctor's knowledge	2.092	1.2-491.745	<0.01
Number of herbs used in the last week		1.072	0.1-972.340	0.04
Frequency of using medicinal plants in the last week		1.086	0.1-852.290	0.03

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As the results of **Table 3** also show, the rate of non-compliance with medicinal herbs, the longer duration of chronic disease, the enhancement in the number (type) of medicinal herbs utilized in the past week, and the enhancement in the frequency of medicinal herbs used in the past week. For example, the medication non-adherence rate in patients who had a history of utilizing medicinal plants without the doctor's knowledge was about 2.09 times higher compared to patients who had no history of utilizing herbal medicine (P < 0.001; adjusted odds ratio = 2.092). In **Table 4**, the frequency of the type of medicinal plants used by 246 elderly people who used medicinal plants is presented.

Table 4. The frequency of types of medicinal plants used by the elderly with chronic diseases.

Types of medicinal plants	N (%)
Mint	145 (58.94)
Thyme	133 (54.06)
Borage	124 (50.4)
Dill	115 (46.74)
Fenugreek	97 (39.43)
Ginger	84 (34.14)
Other plants	73 (29.67)

As presented in **Table 4**, the most medicinal plants used by the elderly with chronic diseases included mint, thyme, borage, dill, fenugreek, and ginger, respectively.

The findings of the current study showed that, in general, the average score of medication compliance of the elderly with chronic diseases is in the weak range, and about two-thirds of the participants had used medicinal plants in the last year. The elderly who had a history of utilizing medicinal plants had less medication adherence. In the present study, regarding the amount of history of using medicinal plants, the results showed that 68.7% of the participants used medicinal plants, in Pablo *et al*.'s research, the rate of use of medicinal plants in patients with hypertension and diabetes was reported as 80.3% [28]. In Krousel-Wood *et al*. [29] research, this rate was 70.9%. The results of past research on the relationship between the utilization of medicinal plants and drug adherence were different and contradictory. The results of research in Turkey showed that patients with chronic diseases who used herbal medicine had a lower level of medication adherence [21]. In another study, it was found that there is a significant negative relationship between the consumption of medicinal plants and the medication compliance level [19]. However, in a study conducted in Denmark, it was found that there is no relationship between the consumption of medicinal plants and the medication adherence level [23]. Also, the findings of research in Nigeria revealed that there was no significant relationship between the use of herbal medicines and drug compliance in AIDS patients who used highly active antiviral drugs [22]. The different statistical populations (type of disease, the different age ranges of the studied population, etc.) as well as background conditions can justify the difference between the findings of the current research and the findings of previous research.

In the present study, it was found that both groups of medicinal herb consumers (with the doctor's knowledge and without a doctor) had less compliance compared to the group that had no history of medicinal herb consumption. In previous research, the relationship between medication adherence and the utilization of medicinal plants has not been classified separately with the doctor's knowledge and without the doctor's knowledge. In the present study, 41.34% of the patients used medicinal plants without the doctor's knowledge, and in a study in Brazil, 30% of the elderly did not inform the doctor about the utilization of medicinal plants [19], which compared to the present study, the amount of reporting not doing so is less in the Brazilian study.

In the present study, among the demographic factors, the only factor related to medication adherence was the chronic disease duration, which decreases with the increase in the duration of the medication. However, in a study in Turkey, medication adherence was only positively related to education level [21]. In another study in Brazil, age was the only influencing factor on medication adherence [19]. In the study of Jin *et al*. education level had a negative

relationship with medication adherence [30]. The different demographic characteristics of the participants can justify these differences. For example, in the present study, more than 67% of the elderly participants had an education level below the diploma, which is different from previous studies done in other countries of the world.

In the present study, the most used medicinal plants were mint, thyme, borage, dill, fenugreek, and ginger. In a systematic study of medicinal plants used by the elderly, the most commonly used medicinal plants were ginkgo biloba, garlic, ginseng, aloe vera, chamomile, peppermint, and ginger. Among these medicinal plants, ginkgo and garlic were the most used among the elderly [31]. The difference in the type of medicinal plants used can be due to the difference in the type of medicinal plants available in different communities as well as the cultural differences in the communities.

Examining medication adherence is an important assessment in the management and treatment of chronic diseases, especially in the elderly. If appropriate medication compliance is achieved, hospitalization, drug resistance, and disease recurrence can be avoided in patients with chronic diseases [21]. In this regard, different factors affecting medication adherence should be identified to plan and implement the best measures to improve medication adherence in patients with chronic diseases, especially the elderly. In this study, the amount of medication compliance in the elderly was in the poor range, and in addition, the use of medicinal plants was related to a decrease in medication compliance, and also some of the participants had not informed their doctor about the use of medicinal plants. In previous research, it has been stated that most of the elderly believe that medicinal plants have fewer side effects compared to chemical drugs, and medicinal plants are considered a suitable option for disease treatment [32]. Therefore, to improve medication compliance, various interventions can be used, such as teaching the patient about medicinal plants, their effects, and possible side effects in the elderly. In this context, it is helpful to establish a reliable relationship and establish easy communication between the treatment team and the elderly. Establishing proper communication makes it possible for the patient to express his opinions about the disease and the treatments utilized, including medicinal plants, in a stress-free environment. In addition, education of the elderly leads to increased health literacy and motivation, and medication adherence increases if appropriate support is provided by healthcare professionals [28].

Although many medicinal plants have potential benefits, these plants may endanger the patient's health due to their unknown and harmful effects, especially when taken together with oral medications. Therefore, it is very important to inform consumers about the possible dangers

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of medicinal plants [33]. As mentioned in the results, a large percentage of participants do not inform the doctor about the medicinal herbs used, which can lead to drug interactions. Therefore, it should be noted by doctors that all patients should be asked about the history of using medicinal herbs and possible side effects. The treatment team can play an essential role in promoting medication adherence in the elderly and must evaluate and clearly define the reasons for using medicinal plants and emphasize to patients that common treatment is a priority and in case of using medicinal plants, the doctor and nurse must be aware.

This study plays an important role in introducing one of the important factors in medication adherence, but it has some limitations. First, because this study was conducted only in a teaching hospital, the generalization of the findings to other settings should be done with caution. This study has a medium sample size. Therefore, for future research, it is suggested that similar research be done in other centers or non-hospitalized elderly people with a larger sample size. It is also suggested to carry out more research in the field of identifying other factors affecting medication adherence.

CONCLUSION

The present study showed that the level of medication adherence in the elderly is generally poor. A large percentage of the elderly used medicinal plants. The results showed that the elderly who used medicinal plants had a lower medication compliance rate. A significant percentage of the elderly did not inform their physician about the medicinal plant's use. Necessary training should be provided to the elderly with chronic diseases regarding compliance with medication, drug-herb interactions, the correct way to use medicinal plants, their side effects, and the requirement to inform the physician about the medicinal plants use.

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