

Ogholgol Ghajari¹ 
Mohammad Hossain Kaveh² 
Abdolrahim Asadollahi³ 

Adherence to treatment among Turkmen older women with hypertension in northern Iran. A randomized controlled trial

**Przestrzeganie zaleceń lekarskich wśród starszych
kobiet turkmeńskich z nadciśnieniem.
Randomizowane badanie kontrolowane**

Abstract:

Background: One of the most important ways to control high blood pressure is to follow a medication that has a low level among older people, and non-adherence to treatment is an essential issue among older adults in the world. Few studies have been conducted among rural older women in Iran.

Objectives: This study aimed to evaluate the effectiveness of intervention training in adherence to hypertension treatment on blood pressure in the population of Turkmen rural older women in north-eastern Iran in a randomized cluster trial.

Methods: This randomized controlled trial study was performed on 116 rural older adult women with hypertension in north-eastern Iran. Eligible rural older adult women were selected using a two-stage cluster random sampling method and were equally divided into intervention and control groups. For the intervention group, four training sessions were

1 University of Medical Sciences, Gorgan, Iran, o.ghajari@gmail.com

2 Shiraz University of Medical Sciences, Shiraz, Iran, m.kaveh@sums.ac.ir

3 Corresponding Author, Shiraz University of Medical Sciences, Shiraz, Iran, a_asadollahi@sums.ac.ir

conducted using the educational approach to raise older adults' awareness and knowledge of hypertension and its complications. The Hill Bon Drug Demographic Citizenship Questionnaire for older adults was completed at the beginning of the intervention. The Hill Bon Drug Adherence Questionnaire was completed by older adults in the study one month after the intervention and then two months after the intervention. The data in the present study were statistically analyzed using SPSS software version 25 and AMOS version 24.

Results: Although at the beginning of the study, the mean scores of drug adherence and blood pressure were not significantly different in the intervention and control groups, within two months after the intervention, there was a significant difference ($p < 0.001$) in the intervention group following a significant increase in drug adherence. Blood pressure also dropped; however, it did not change significantly in the control group. The numerical value of the RMSEA index was less than 0.05; Cronbach's alpha coefficient and Kapay-Flys coefficient were 0.88 and 0.80, respectively, and the fitness indices indicated the appropriate fitness of the Hill Bon bilingual questionnaire.

Conclusion: Education with the approach of raising awareness about hypertension and its complications increases drug adherence among older adults. Therefore, its use is recommended in providing health counseling services in health centers. A sample of 160 older adults received four sessions of an educational program to control their hypertension. Data were collected at baseline, one-month post-training, and after two-month follow-up using questionnaires of Hill Bon drug adherence scale and monitoring Blood pressure among participants.

Streszczenie:

Wprowadzenie: Jednym z ważniejszych sposobów kontroli wysokiego ciśnienia krwi wśród osób starych jest stosowanie leków obniżających ciśnienie. Zatem nieprzestrzeganie zaleceń lekarskich może stanowić poważny problem. W Iranie przeprowadzono niewiele badań wśród populacji starszych kobiet zamieszkujących tereny wiejskie.

Cele: Niniejsze badanie miało na celu ocenę skuteczności interwencji szkoleniowej w przestrzeganiu zaleceń lekarskich w leczeniu nadciśnienia tętniczego wśród starszych kobiet turkmeńskich żyjących na wsi w północno-wschodnim Iranie.

Metody: Przeprowadzono randomizowane badanie kontrolowane na 116 starszych kobietach z nadciśnieniem tętniczym. Zastosowano dwuetapową metodę doboru zespołowego, w którym badani podzieleni byli na równoliczne grupy interwencyjne i kontrolne. Dla grupy interwencyjnej przeprowadzono cztery sesje szkoleniowe, których celem było podniesienie świadomości i wiedzy starszych osób na temat nadciśnienia tętniczego i jego powikłań. Badani wypełnili dwa kwestionariusze – pierwszy przed rozpoczęciem szkoleń (Hill Bon Drug Demographic Citizenship) oraz drugi, najpierw miesiąc, a potem dwa miesiące po zakończeniu interwencji (Hill Bon Drug). Wyniki poddane zostały analizie statystycznej a przy ich opracowaniu posłużono się oprogramowaniem SPSS w wersji 25 i AMOS w wersji 24.

Wyniki: Mimo że na początku badania średnie wyniki przestrzegania zaleceń lekarskich związanych z leczeniem nadciśnienia tętniczego nie różniły się istotnie pomiędzy grupą interwencyjną i kontrolną, to jednak w ciągu dwóch miesięcy od zakończenia szkoleń nastąpiła istotna różnica ($p < 0,001$) w grupie interwencyjnej. Wyniki wskazują na znaczny wzrost przestrzegania zaleceń lekarskich. W związku z tym wśród tej grupy badanych osób

unormowało się ciśnienie krwi, czego nie zaobserwowano w grupie kontrolnej. Wartość liczbowego wskaźnika RMSEA wynosiła mniej niż 0,05; współczynnik alfa Cronbacha i współczynnik Kapay-Flysa wynosiły odpowiednio 0,88 i 0,80, a wskaźniki dopasowania wskazywały na odpowiednie dopasowanie kwestionariusza dwujęzycznego Hill Bon.

Wnioski: Prowadzenie działań edukacyjnych związanych z podnoszeniem świadomości oraz wiedzy na temat nadciśnienia tętniczego i jego powikłań znacząco przyczynia się do przestrzegania leczenia farmakologicznego wśród starszych osób. Zaleca się wykorzystanie tego typu szkoleń w świadczeniu usług zdrowotnych. Osoby poddane badaniu uczestniczyły w czterech sesjach szkoleniowych. Dane zbierano przed i po zakończeniu programu edukacyjnego.

Keywords: older adults, aging, antihypertensive drugs, medical adherence, blood pressure control

Słowa kluczowe: osoby stare, starzenie się, leki na nadciśnienie, przestrzeganie zaleceń lekarskich, kontrola ciśnienia tętniczego

1. Background

According to the latest figures from the World Health Organization, hypertension affects more than a third of the population over the age of 60. It affects more than one billion people worldwide, of which 50% are found in developing countries (Shrivastava et al., 2014). Hypertension is the most critical risk factor for cardiovascular disease and global mortality and accounts for the highest proportion of disease burden (Lim et al., 2012). Over the past decades, significant advances have been made in diagnosing and controlling blood pressure. Blood pressure control has risen to more than 50 percent among Americans and more than 65 percent among Canadian patients (Joffres et al., 2013).

According to a meta-analysis study conducted in Iran, the prevalence of hypertension is estimated at 22.1% (Joffres et al., 2013). The results of a review study by Mirzaei et al. in Iran, which included a sample size of 402,282 people, reported a prevalence of hypertension of 22% in total, 23.6% in men and 23.5% in women. On the other hand, this rate was 22.1% in urban areas and 18.6% in rural areas (Mirzaei et al., 2016). The results of another study, a meta-analysis study in 2008, reported a 23% prevalence of hypertension in the age group of 30-55 years and 50% in the age group over 55 years (Rabiei et al., 2009).

The cohort study results in Golestan province showed that out of 50045 people aged 40-75 years, 21350 people, i.e., 42.7%, have high blood pressure. Also, 31.6% of patients were under 50 years old, and 43.9% of patients were between 50 and 60 years old. Also, the prevalence of hypertension in people over 60 years was 61.8%. In general, according to the standardized scale of the World Health Organization, the standardized age prevalence of hypertension in women was

41.8% and in men was 33.1%. The prevalence of Turkmen ethnicity was significantly higher than other ethnic groups (Malekzadeh et al., 2013).

Commitment to treatment means the degree to which patients take medication, follow a diet, or change their lifestyle and respond positively to health care providers' recommendations. On a larger scale, commitment describes a patient's adherence to a treatment plan. In developed countries, the drug adherence rate for chronic diseases is about 50% (De Geest & Sabaté, 2003). The forms and patterns of adherence to the drug and their measurement parameters are different. To measure it, the amount of drugs prescribed and the actual amount of their acceptance are usually used. Dunbar says compliance and the resulting measurement can be in three categories (Rudd et al., 1992). The first is the quantity of the drug, and the second is the difference in consumption. For example, there is a difference between the amount of drug prescribed and the amount of drug used (Blaschke et al., 2012; Cramer et al., 2008). In the meantime, persistence means the ratio of patients who still follow the prescribed drug or the period from the beginning of treatment to discontinuation (Blaschke et al., 2012). In the second category, Dunbar evaluates compliance qualitatively and classifies it into good and bad or obedient and non-obedient (Cramer et al. 2008). However, the definition of a good acceptor varies from study to study but is often considered 80% or 95% higher (Mirzaei et al., 2016). The third category uses a combination of different indicators associated with different behaviors. For example, taking medicine, attending meetings with a doctor, quitting smoking, awareness and knowledge about the treatment process (Osterberg & Blaschke, 2005).

Various studies indicate that low adherence reduces treatment success, quality of life, and treatment costs. In contrast, good adherence reduces mortality in clinical studies (Sabaté & Sabaté, 2003; Sokol et al., 2005; Simpson et al., 2006).

Although managing blood pressure is complex, medication is the key to controlling blood pressure in most patients. Medication reduces the effects of high blood pressure (Rash et al., 2014). Studies have shown that drug therapy reduces patient mortality by 46% (Collaboration, 2002; Chowdhury et al., 2013). Despite the proven benefits of prescription drugs in lowering blood pressure and its side effects, many patients refuse to accept and follow medication to control their blood pressure (Sabaté & Sabaté, 2003). A study showed that only 21% of patients had a drug adherence rate of more than 80% (Monane et al., 1997). This drug non-adherence leads to incomplete control of blood pressure, hospitalization, and death (Jung et al. 2013; Collaboration, 2002). The results of a meta-analysis study showed that low acceptance of drug treatment compared to high and good acceptance, 19% risk of cardiovascular

disease, and 29% increased mortality (Chowdhury et al., 2013). It is estimated that 89,000 premature deaths occur in the United States, which can be prevented by taking and adhering to medication in patients with hypertension (Cutler et al., 2007).

In some countries, with the implementation of extensive plans and intervention measures, successes have been achieved in the field of disease control. However, the disease control rate in Iran has been insignificant (Forouzanfar et al., 2017). The leading causes of non-adherence to treatment among hypertensive patients are, i.e., the shortage of sufficient knowledge about the nature of the disease, symptoms, complications, and treatment methods, as well as wrong beliefs that are the significant factors that account for non-adherence to treatment (Jankowska-Polańska et al., 2006).

2. Objectives

To the best of our knowledge, the exact empirical study with the present study framework was not observed; previous studies have only considered part of the relationships, and few similar research studies have yet to have conclusive results. Therefore, about the transition to old age in Iranian society and considering cultural, social, religious, and economic factors that vary from one community to another, the purpose of the present study is to investigate the effect of the effectiveness of intervention training in adherence to hypertension treatment on blood pressure in the population of older Turkmen rural women in north-eastern Iran.

3. Methods

3.1. Study Design and Population

The statistical sample of this study includes 116 rural women over 60 years of age with a history of non-control of hypertension whom rural health centers in rural areas of the central part of Gonbad Kavous cover.

All participants had normal vision and hearing and had physical and mental ability to answer the questions. Participants had no psychiatric or neurological disorders, and they were taking no psychoactive drugs. Other inclusion criteria included older rural women aged over 60 and residence in a rural area, Willingness to participate in the study, History of taking antihypertensive pills, Low adherence to treatment based on the Hill Bin questionnaire (score less than 25 in the questionnaire), Lack of cognitive impairment and ability to communicate and older adults should be covered by rural health centers in Gonbad

Kavous city. Exclusion criteria included absence from more than two educational classes, two absences from intervention classes, and the occurrence of highly stressful events during the project or immediately before its start, such as the death of a family member, failure to follow recommendations, moving to another city, and participation in similar events, training, and refusal to participate in the project.

The sample size was calculated as 58 in each group (by considering 10% for possible attrition rate) based on data from similar studies using the appropriate formula. Sampling in each center was done randomly.

The list of names of older people covered by the center was considered as the basis for sampling. The sampling interval was done by randomization number. The selected people were checked in terms of inclusion criteria, and if they did not have entry conditions, the next person was selected from the list. All participants completed written informed consent. The Shiraz University of Medical Sciences Ethics Committee approved this study ethically (IR.SUMS.REC.1398.1200).

3.2. Data Collection

After obtaining written informed consent, the researcher explained the aims and method of the research to the older women, and then the participants were asked to complete questionnaires. Data were collected using the Persian version of older adults' Demographic The Health Questionnaire was designed by Asadollahi and Noaya Ahmad in 2014 to measure the standard demographic indicators of older adults community, i.e., health status, nutrition, living alone, having a chronic disease, comorbidity, marital status, and education. The initial version has 21 questions and no scoring range. The demographic data included variables such as age, sex, level of education, marital status, having children, housing situation, employment status, monthly income, having and types of disease.

Kaveh, Asadollahi, and Ghajari designed the Persian version of the Hill Bon Drug Adherence Questionnaire to measure older adults' drug adherence rate in 2019. This questionnaire has nine items, and the respondent section was on a 4-point Likert scale, i.e., "never, sometimes, most often, always." The minimum score is nine, and the maximum possible score is 36. A score of 36 indicates the adherence of older adults to the prescribed medication program for the treatment of hypertension by older adults.

Baseline and demographic data were collected one week before starting the training sessions. Post-intervention data were gathered one week and two months after the end of the training intervention. The participants in the General Health Centre (Public Health Consultant Room) filled out the scales individually in a private session, and questionnaires were delivered to the researcher (OGh).

3.3 Random Allocation

The Random Allocation is based on Efron's Biased Coin algorithm, which is a restrained randomization method. Search iterations were performed by determining one hundred times and 58 people in each group, and a total of 116 people were selected. The random allocation was done using NCSS-PASS software version 15.1 (NCSS Statistical Software, Kaysville, UT, USA). No samples were excluded in the follow-up.

3.4 Procedure and Intervention

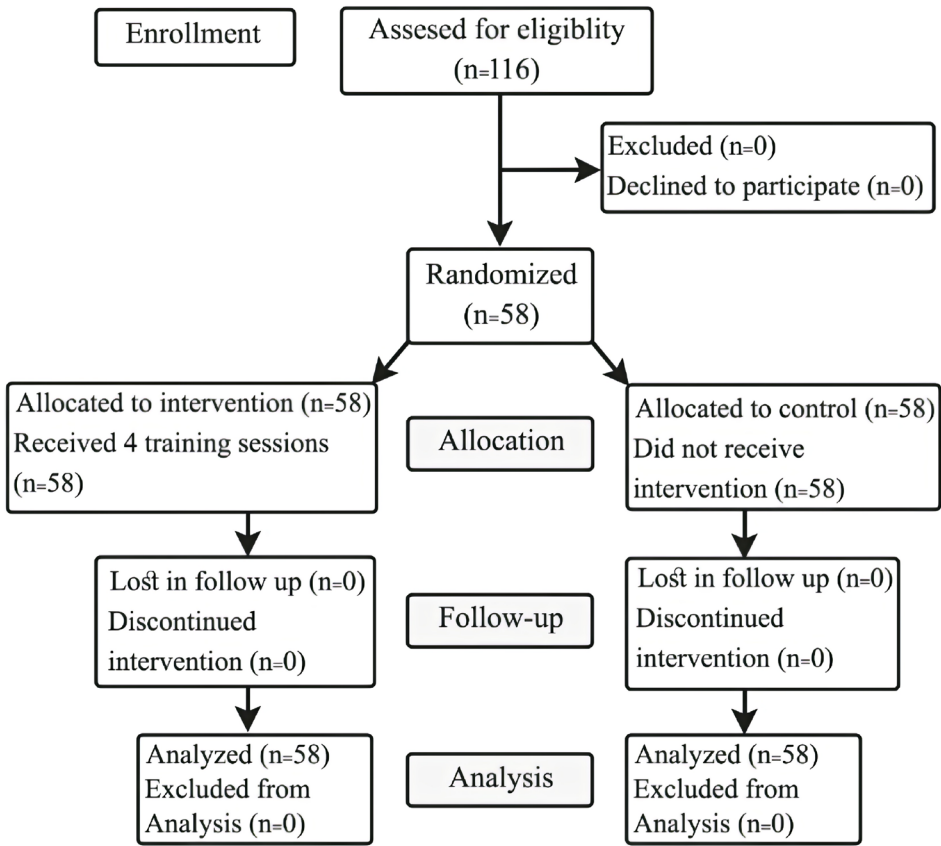
The people in the intervention group participated in training sessions in group participation on drug adherence among rural older adults with hypertension, consisting of four 45-minute sessions per week for four consecutive weeks. The sessions were held in the General Health Centre (Public Health Consultant Room) by two researchers (AA & OGH). The training was performed using teaching/learning methods, including communicating lectures, group discussion, and media such as 2 video clips. The educational content of the sessions included the following:

- Introducing the design and subject of the study. Getting to know high blood pressure and its symptoms, complications, and ways to control it.
- Visiting hemodialysis patients in the hemodialysis department of the city's general hospital.
- A review of the previous meetings – teaching the correct principles of taking high blood pressure medication and its benefits in controlling the disease.
- Review the previous sessions for 15 minutes and education about the possible side effects of the drugs. Moreover, at the end of holding a question-answer session for half an hour.

3.5. Statistical Analysis

All parameters were normally distributed, as shown by the Shapiro-Wilk test. Independent t-tests were used to determine differences between groups at baseline. The chi-square test was used for statistical analysis of demographic data—repeated Measures ANOVA was used to determine the statistical significance of differences between pre-training and post-training. When significance was noted, paired t-tests were used for post-hoc comparisons. The collected data were then analyzed using descriptive and analytical statistics by SPSS software (version 24). The significance level was considered $P < 0.05$ in all statistical tests. The flow diagram of sample selection and research design based on CONSORT guidelines is illustrated in Figure 1.

Figure 1. Flow diagram of sample selection



4. Results

4.1. Demographic information

The frequency distribution of health and demographic data in the control and intervention groups is summarized in Table 1. A comparison of the frequency distribution of the primary variables of the study participants according to the two groups showed no significant differences between the studied groups.

Table 1. Comparison of sociodemographic characteristics of the groups

	Intervention (N = 58) mean (std) n (%)	Control (N = 58) mean (std) n (%)	P-value
Age	64.31 [2.12]	65.17 [3.36]	0.47
Health Overall	3.16 [1.11]	3.02 [0.73]	0.32
Nutrition Overall	14.14 [1.35]	13.67 [1.66]	0.51
Living Alone			0.22
yes	9 [15.5]	9 [15.5]	
no	49 [84.5]	49 [84.5]	
Chronic Disease			0.14
Heart Disease	14 [24.1]	15 [25.9]	
Arthritis	12 [20.7]	20 [34.5]	
Diabetes	7 [12.1]	14 [24.1]	
comorbidity	25 [43.1]	9 [15.5]	
Smoking			0.73
no	58 [100]	58 [100]	
Monthly Income			0.61
Few	14 [24.1]	27 [46.6]	
Moderate	15 [25.9]	23 [39.7]	
Good	29 [50]	8 [13.8]	
Employment			0.7
Housewife	58 [100]	58 [100]	
Marital Status			0.47
Married	49 [84.5]	38 [65.5]	
Widow	9 [15.5]	20 [34.5]	
Education			0.6
No Formal School	58 [100]	58 [100]	

4.2. Results of research variables

In this randomized clinical trial study, as shown in Table 2, there was no significant difference between the intervention and control groups before the intervention regarding changes in mean systolic, diastolic, mean arterial blood pressure scores, and drug adherence. However, after the intervention, a significant difference ($P < 0.001$) was recorded between the two groups in these values.

Table 2. Changes in mean blood pressure scores and drug adherence, before and after intervention between groups

		Intervention (N = 58) Mean (SD)	Control (N = 58) Mean (SD)	P-value of Independent Samples T-Test
Systolic blood pressure	Before the intervention	158.02 (15.01)	166.21 (16.09)	0.1
	After the intervention	128.71 (8.19)	158.1 (17.54)	<0.001
Diastolic blood pressure	Before the intervention	95.43 (9.28)	96.21 (12.75)	0.71
	After the intervention	80.95 (4.24)	97.67 (8.65)	<0.001
Mean arterial blood pressure	Before the intervention	116.29 (7.62)	119.54 (11.7)	0.09
	After the intervention	96.87 (4.91)	117.82 (9.6)	<0.001
Drug Adherence	Before the intervention	32.6 (3.48)	32.26 (2.52)	0.25
	After the intervention	36	33.53 (2.39)	<0.001
Behavioral subscale of drug adherence	Before the intervention	18.24 (1.58)	18.91 (1.44)	0.19
	After the intervention	20	18.78 (1.39)	<0.001
Cognitive subscale of drug adherence	Before the intervention	14.36 (1.97)	14.34 (1.41)	0.96
	After the intervention	16	14.76 (1.17)	<0.001

4.3. Results of intercorrelations between variables

The present study findings showed significant and positive intercorrelations between study variables. According to the results of the paired t-test, the changes in the mean score of drug adherence and its subscales after training were significantly different in the intervention group ($P < 0.001$), and there was no significant difference in the control group (Table 3).

Table 3. Changes in mean within-group scores of drug adherence, before and after intervention

		Mean	SD	Std. Error Mean	95% CI		t	df	P-value of Paired Samples T-Test
					Lower	Upper			
Drug Adherence. Pre-Post	Intervention (N = 58)	-1.836	2.949	0.274	-2.379	-1.294	-6.707	115	<0.001
	Control (N = 58)	-0.276	0.696	0.091	-0.459	-0.093	-3.020	57	0.304
Behavioral subscale of drug adherence. Pre-Post	Intervention (N = 58)	-0.810	1.497	0.139	-1.086	-0.535	-5.829	115	<0.001
	Control (N = 58)	0.138	0.437	0.057	0.023	0.253	2.403	57	0.320
Cognitive subscale of drug adherence. Pre-Post	Intervention (N = 58)	-1.026	1.591	0.148	-1.318	-0.733	-6.947	115	<0.001
	Control (N = 58)	-0.414	0.676	0.089	-0.592	-0.236	-4.660	57	0.211

5. Discussion

This study aimed to determine the effectiveness of the educational approach to adherence to treatment among the population of older Turkmen women with hypertension in Gonbad Kavous city of Golestan province. Antihypertensive medication adherence reduces hypertension effectively and, as a result, reduces the risk of other cardiovascular diseases. Non-adherence with antihypertensive medication can increase the risk of hospitalization in older adults and has a negative impact on hypertension management (Jankowska-Polańska et al., 2017). According to the results, the educational intervention increased drug adherence among the intervention group and reduced systolic, diastolic, and moderate arterial blood pressure. An interventional study by Lee et al. showed that follow-up of pharmacists in patients with hypertension reduces systolic blood pressure (133.2 to 129.9) (Lee et al., 2006), which is consistent with the results of the educational intervention of the present study. A study by Saffari et al. on the effect of face-to-face training intervention and telephone SMS showed that SMS training is ineffective in reducing diastolic blood pressure (Saffari et al., 2019). Also recent studies indicate a positive effect of education on adherence to treatment in patients with hypertension, which is similar to the results of the present study after education (Ozoemena et al., 2019;

Mirniam et al., 2019; Shen et al., 2019; Yazdanpanah et al., 2019; Lor et al., 2019; Haramiova et al., 2017; Abughosh et al., 2017; Li et al., 2014; Bernocchi et al., 2014; Beune et al., 2014; Konrady et al., 2001). According to the review of previous studies and the importance of mean arterial blood pressure concerning the risk of cerebrovascular diseases (CVD), the present study showed that educational intervention positively reduces mean arterial blood pressure. This value before the intervention was 116.29 ± 7.62 , and after the training, it was 96.87 ± 4.91 in the intervention group. Also, there is a significant difference in the cognitive and behavioral subscales' scores of the Hill Bon Drug Adherence Questionnaire (9-item) after the intervention, which indicates an increase in the cognitive dimension of medication adherence among older adults after training.

5.1. Conclusions

The results of this study showed that the educational program can be effective in raising the awareness of patients with hypertension about behaviors based on adherence to antihypertensive drugs.

5.2. Limitations

The study's main limitation was the short intervention duration, which should be considered in future research. On the other hand, pulse pressure's effect on cardiovascular disease incidence should be considered in future research. The coincidence of training sessions with the winter season and snowfall had made it difficult for older women to go to the trails' venue. Special transport facilities were provided for them between their homes and the city's General Health Centre to solve this issue.

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Authors' Contributions

OGh has contributed to the design, performed the interviews, and written the Introduction section; AA has supervised the program and written the methods and results sections, and MK has written the discussion and conclusion parts. All authors have approved the final manuscript as well.

Ethical Considerations

Ethical matters, e.g., plagiarism, informed consent, misconduct, data fabrication and falsification, double publication and submission, redundancy, etc., have been observed by the authors. All the participants received a verbal explanation about the study objectives and procedures and then signed written informed consent to take part in the study. The participants were also reassured about the anonymity and

confidentiality of their information. All procedures performed in studies involving human participants were by the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments, including informed consent and confidentiality of all personal information.

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Patient Consent

Written and verbal consent of patients was obtained before participating in the study.

Conflict of Interests

The authors declare that they have no competing interests.

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