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Original Article

Association between Daily Spiritual Experiences and Medication Adherence among Elderly with Diabetes: A Cross-Sectional Study in Golestan Province, Iran

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Abstract

Background: Given the growing elderly population, the high prevalence of chronic diseases such as diabetes, and the critical importance of medication adherence for disease control, this study was conducted to determine the association between daily spiritual experiences and medication adherence among elderly patients with diabetes in Golestan Province, Iran, in 2023.

Methods: This descriptive-cross-sectional study included 200 elderly participants selected via a multi-stage cluster random sampling method based on the inclusion criteria. Sampling was conducted from clinics and endocrinology offices in various cities of Golestan Province. Data were collected using a demographic questionnaire (age, gender, marital status, education level, medication and smoking history, and diabetes history), the Compliance Questionnaire on Rheumatology (CQR) for medication adherence, and the Daily Spiritual Experience Scale (DSES). Data analysis was performed using SPSS software version 26, with a significance level of $P < 0.05$.

Results: A significant negative association was found between spiritual experiences and medication adherence ($P < 0.001$). Low adherence had the highest mean spiritual experience score (75.71 ± 9.88), while high adherence had the lowest (65.08 ± 10.61). Adherence was higher among those using 3–5 medications ($P < 0.001$) and those without hospitalization history ($P = 0.001$). Higher spiritual experiences were associated with reemployment, having four children, primary education, using 3–5 medications, hospitalization history, lower self-rated health vs peers, and disease duration of 6–10 years ($P < 0.05$).

Conclusion: The results demonstrate a significant negative association between daily spiritual experiences and medication adherence among elderly patients with diabetes. This counterintuitive finding, potentially influenced by unmeasured confounders such as health literacy, socioeconomic status, or social support, suggests that higher spirituality may be associated with poorer adherence. Further qualitative and interventional research is warranted to clarify the underlying mechanisms.

Keywords: Spirituality, Medication Adherence, Aged, Diabetes Mellitus, Type 2

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Introduction

Aging is a biological process characterized by progressive physiological decline. This demographic shift presents a major global challenge, with the population aged over 60 years [1], projected to increase from 9.3% in 2020 to 16% by 2050 worldwide [2]. The World Health Organization has identified population aging as a critical 21st-century challenge [3]. Iran is experiencing an even faster demographic transition. According to the Statistical Center of Iran, the population aged over 60 reached approximately 9.9% in 2020 and is projected to reach 25-30% by 2031 [4]. This rapid aging coincides with an increasing prevalence of diabetes, which currently affects over 5 million Iranian adults [5].

Diabetes results from defects in insulin secretion, insulin action, or both [6]. In the United States, there are 16 million elderly individuals living with diabetes, and one in twenty older adults has the condition [3]. In Iran, the latest statistics report over 3 million people with diabetes, with a prevalence of 2.5% in rural and over 5% in urban areas. This number is expected to increase by more than 6.6 million by 2030 [7]. Optimal medication adherence is a critical determinant of positive health outcomes in the elderly population [8]. The World Health Organization conceptualizes adherence as the degree to which an individual's behavior, including medication consumption, dietary habits, and lifestyle modifications corresponds with agreed recommendations from a healthcare provider [3].

Despite its importance, suboptimal adherence to pharmacological regimens is a prevalent issue among diabetic patients [9]. Such non-adherence is consequently linked to increased healthcare expenditures, greater utilization of medical services, and significantly higher mortality rates within this population [3]. In this context, psychosocial factors such as religious beliefs and practices play a pivotal role in how elderly individuals adapt to the challenges of aging and maintain mental well-being. These factors can serve as a buffer, mitigating stress associated with life challenges, including chronic illness [1].

A critical distinction should be made between religiosity, which refers to institutional religious practices and beliefs, and daily spiritual experiences, which represent personal perceptions of the sacred in everyday life. For psychological research, it is essential to clarify this differentiation. While religiosity involves participation in formal religious activities and adherence to specific doctrines, daily spiritual experiences encompass personal feelings of connection with the transcendent—such as feeling God's presence, finding comfort in faith, or experiencing inner peace during ordinary activities [10].

Research indicates that religious and spiritual beliefs significantly influence both mental and physical health, thereby contributing to the concept of successful aging [1]. Spirituality, defined as a multidimensional construct that encompasses hope, meaning in life, forgiveness, moral values, and a connection to God or others, provides a framework for coping and self-expression. The positive role of spirituality in sustaining the health of the elderly has been highlighted by leading researchers [11, 12], and individuals with stronger spiritual inclinations consistently report greater life satisfaction and hope [1].

However, despite evidence linking spirituality with health outcomes, previous studies in Iran have not specifically examined the relationship between daily spiritual experiences and medication adherence among elderly patients with diabetes. This gap in the literature highlights the need for research specifically investigating how daily spiritual experiences may influence medication adherence in this vulnerable population. Therefore, given the growing elderly population in Iran, the significance of diabetes as one of the most common chronic diseases in old age, and the crucial role of medication adherence in disease management, this study aimed to investigate the association between daily spiritual experiences and medication adherence among elderly individuals with diabetes in Golestan Province, Iran.

Methods

Study Design and Setting

This descriptive-cross-sectional study was conducted in 2023 among elderly patients with diabetes in Golestan Province, Iran.

The statistical population comprised all elderly individuals with diabetes in Golestan Province. The inclusion criteria were: willingness to participate in the study; age over 60 years; residence in Golestan Province; physical and mental capacity to answer the questionnaires; no history of drug or alcohol abuse; and a diagnosis of diabetes for at least six months. The exclusion criterion was incomplete responses to the questionnaires.

Sampling and Sample Size

After obtaining approval from the Islamic Azad University, Aliabad Katul Branch, and receiving an ethical code from the university's ethics committee, sampling of elderly individuals with diabetes from city clinics and endocrinology offices was initiated. Participants were selected based on the inclusion criteria using a multi-

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stage cluster sampling method. In the first stage, clinics and offices were identified as primary clusters, and eligible individuals within each cluster were then randomly selected. The number of clusters, the number of individuals within each cluster, the response rate, and the handling of incomplete data were recorded and reported.

The sample size was determined using the correlation coefficient formula with a type I error of 0.05 (α), a type II error of 0.20 (β), and an estimated correlation coefficient (r) of 0.2, yielding a sample size of 200 participants.

Bias Minimization and Data Quality

To minimize bias during data collection, the following measures were implemented: structured questionnaires with predefined response options were used to reduce interviewer and response bias; data collection was conducted by trained researchers to ensure standardization; participant confidentiality was assured to encourage honest responses; and incomplete data were systematically handled according to standard statistical procedures. It should be noted that access through clinics may introduce selection bias, as patients who attend clinics may differ in adherence and access to care compared to the general population of elderly individuals with diabetes.

Data Collection Instruments

After explaining the study objectives and the procedure for completing the questionnaires, and assuring participants of the confidentiality of their responses, written informed consent was obtained. The data collection instruments included:

Demographic Questionnaire: This structured checklist covered variables such as age, gender, marital status, education level, medication and smoking history, and diabetes history, with predefined response options for all items to ensure consistent and efficient data collection.

Medication Adherence (Compliance Questionnaire on Rheumatology – CQR): The Compliance Questionnaire on Rheumatology (CQR) was originally developed to assess medication adherence in patients with rheumatologic conditions; however, its items evaluate general beliefs, attitudes, and behaviors related to long-term medication use, which are not disease-specific. Therefore, the CQR has been widely applied in patients with chronic diseases requiring continuous pharmacological treatment, including non-rheumatologic conditions. The final version of this tool contains 19 items scored on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree). Six items (4, 8, 9, 11, 12, and 19) are reverse-scored. The total score is calculated by subtracting 19 from the sum of the item scores, then dividing the result by 0.57, yielding a range from 0 (no adherence) to 100 (complete adherence) [13]. In a study by Garcia-Gonzalez et al., the CQR demonstrated confirmed validity, a Cronbach's alpha of 0.71, 98% sensitivity, and 67% accuracy for diagnosing treatment adherence [14].

Daily Spiritual Experiences Scale (DSES): The Daily Spiritual Experiences Scale (DSES) was used to investigate spiritual experiences. This 16-item scale uses a 6-point Likert scale (1 = never or almost never to 6 = most of the time), with total scores ranging from 16 to 96; higher scores indicate more frequent spiritual experiences. The DSES has shown a correlation coefficient of 0.71 with the Allport and Ross religious orientation questionnaire. Its reliability has been established through a test-retest correlation of 0.96, a Spearman-Brown coefficient of 0.88, and a Cronbach's alpha of 0.91 [15]. The questionnaire's correlation coefficient was confirmed as 0.87 in the study by Taqvi and Amiri [1].

Statistical Analysis

The collected data were analyzed using SPSS software version 26. Statistical analyses included the chi-square test, independent t-test, and ANOVA. A P-value of less than 0.05 was considered statistically significant.

Results

The study included 200 participants with an equal gender distribution (50% female, 50% male). The majorities of participants were aged 65-70 years (47%), married (90%), and identified as housewives (39.7%).

In terms of education, 27% had a diploma and above. Economically, most participants (68.2%) reported their income was less than their expenditure. Further detailed demographic data are presented in Table 1.

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Table 1: Demographic characteristics of the studied subjects

Variable		Category	(%) Frequency
Sex	Woman	100	50
	Men	100	50
Age	65-60	43	21.5
	70-65	94	47
	75-70	48	24
	76 Above	15	7.5
Marriage	Single	20	10
	Married	180	90
Job	Housekeeper	79	39.7
	Day laborer	23	11.6
	Employee	25	12.6
	Tradesman	13	6.5
	Retired	55	27.6
	Reemployment	4	2
Education	Illiterate	27	13.5
	Elementary	35	17.5
	Guidance	48	24
	High school	36	18
	Diploma and above	54	27
Economic situation	Income less than expenses	135	68.2
	More income than expenses	63	31.8
Live with whom	Alone	39	19.5
	With wife	114	57
	Spouse and married children	30	15
	Children	17	8.5
Number of children	1	7	3.9
	2	47	26
	3	38	21
	4	30	16.6
	4 More than	59	32.6

Table 2: Disease-related characteristics and diabetes complications of the studied subjects

Variable		Category	(%) Frequency
Number of drugs used	2-1	34	17.1
	5-3	87	43.7
	5 More than	78	39.2
Chronic disease	Yes	193	96.5
	No	7	3.5
The presence of two diseases at the same time	Yes	141	70.5
	No	59	29.5
Hospitalization history	Yes	77	38.5
	No	123	61.5
Understanding your own health	peers Better than	43	21.6
	Similar to peers	108	54.3
	Worse than peers	48	24.1
Duration of illness	years 5-1	31	17.1
	years 10-6	65	35.9
	years 10 More than	85	47
Ocular complications			63
Hypertension			63
Renal complications			40
Diabetic foot			1
Skin ulcer			2
Thyroid disorders			15

Note: The presence of two diseases at the same time indicates the co-existence of diabetes and at least one other chronic disease.

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Regarding clinical characteristics, a significant proportion of participants (43.7%) used 3-5 medications, and the vast majority (96.5%) had at least one chronic disease, with 70.5% having two or more concurrent conditions. Most participants (61.5%) had no history of hospitalization in the past year, and over half (54.3%) perceived their health status as similar to their peers.

The duration of diabetes was more than 10 years for 47% of participants. The most common complications were hypertension and eye complications (each 31.5%). A comprehensive overview of clinical characteristics is provided in Table 2.

Table 3: Examining the relationship between the demographic characteristics of the study subjects and medication adherence

Variable		Low (%) Frequency	Average (%) Frequency	High (%) Frequency	P-value
Sex	Women	17 (17.0)	28 (28.0)	55 (55.0)	0.923
	Men	15 (15.0)	28 (28.0)	57 (57.0)	
Age	60-65	6 (14.0)	11 (25.6)	26 (60.5)	0.202
	65-70	15 (16.0)	21 (22.3)	58 (61.7)	
	70-75	7 (14.6)	17 (35.4)	24 (50.0)	
	Above 76	4 (26.7)	7 (46.7)	4 (26.7)	
Marital Status	Single	1 (5.0)	3 (15.0)	16 (80.0)	0.07
	Married	31 (17.2)	53 (29.4)	96 (53.3)	
Occupation	Housekeeper	18 (22.8)	23 (29.1)	38 (48.1)	0.34
	Day laborer	2 (8.7)	6 (26.1)	15 (65.2)	
	Employee	1 (4.0)	5 (20.0)	19 (76.0)	
	Tradesman	3 (23.1)	5 (38.5)	5 (38.5)	
	Retired	7 (12.7)	16 (29.1)	32 (58.2)	
	Reemployment	1 (25.0)	1 (25.0)	2 (50.0)	
Education	Illiterate	8 (29.6)	14 (51.9)	5 (18.5)	< 0.001
	Elementary	10 (28.6)	11 (31.4)	14 (40.0)	
	Guidance	7 (14.6)	10 (20.8)	13 (64.6)	
	High school	5 (13.9)	8 (22.2)	23 (63.9)	
	Diploma and above	2 (7.3)	13 (24.1)	39 (72.2)	
Economic Situation	Income less than expenses	26 (19.3)	40 (29.6)	69 (51.1)	0.06
	More income than expenses	5 (7.9)	16 (25.4)	42 (66.7)	
Living Situation	Alone	9 (23.1)	10 (25.6)	20 (51.3)	0.132
	With spouse	12 (10.5)	32 (28.1)	70 (61.4)	

People whose number of drugs used was 3-5 had significantly (P<0.001) more medication adherence. People who had no history of hospitalization had more medication adherence (P=0.001). Also, with the understanding of health more than peers and the duration of the disease 6-10 (P<0.001), medication compliance increased (Table 4).

Analysis of the relationship between demographic factors and medication adherence revealed that participants with a primary education level and those with exactly four children demonstrated significantly higher medication adherence (P < 0.001). The complete analysis of demographic factors is shown in Table 3. In examining demographic correlates of spiritual experiences, significant differences were found.

Participants who were re-employed, those with four children, and those with primary education reported significantly higher levels of spiritual experiences (P < 0.001). The full results are displayed in Table 5.

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Table 4: Examining the relationship between the disease-related characteristics of the study subjects and medication compliance

Variable		Low (%) Frequency	Average (%) Frequency	High (%) Frequency	P-value
Number of drugs used	1-2	0 (0.0)	5 (14.7)	29 (85.3)	< 0.001
	3-5	9 (10.3)	20 (23.0)	58 (66.7)	
	More than 5	23 (29.5)	31 (39.7)	24 (30.8)	
Chronic disease	Yes	31 (16.1)	54 (28.0)	108 (56.0)	0.992
	No	1 (14.3)	2 (28.6)	4 (57.1)	
Presence of comorbidities	Yes	25 (17.7)	45 (31.9)	71 (50.4)	0.044
	No	7 (11.9)	11 (18.6)	41 (69.5)	
Hospitalization history	Yes	19 (24.7)	27 (35.1)	31 (40.3)	0.001
	No	13 (10.6)	29 (23.6)	81 (65.9)	
Self-rated health	Better than peers	5 (11.6)	13 (30.2)	25 (58.1)	< 0.001

Table 5: Relationship between demographic characteristics and spiritual experiences

Variable		Mean	Standard Deviation	P-value
Sex	Women	68.04	11.40	0.938
	Men	68.91	11.38	
Age	60-65	69.52	11.56	0.236
	65-70	67.97	12.01	
	70-75	69.18	9.18	
	Above 76	74.16	12.39	
Marital Status	Single	63.75	8.03	0.03
	Married	69.56	11.54	
Occupation	Housekeeper	70.72	11.80	< 0.001
	Day laborer	67.30	9.53	
	Employee	64.58	8.58	
	Tradesman	77.88	8.09	
	Retired	66.28	10.63	
	Reemployment	80.20	21.94	
Education	Illiterate	73.68	9.31	< 0.001
	Elementary	73.75	12.84	
	Guidance	69.40	10.91	
	High school	66.43	13.70	
	Diploma and above	64.85	8.35	
Economic Situation	Income less than expenses	70.27	11.64	0.051
	More income than expenses	66.96	9.72	
Living Situation	Alone	68.96	10.78	0.292
	With spouse	68.34	11.53	

Among clinical factors, participants using 3-5 medications reported significantly more spiritual experiences ($P < 0.001$). Those with a history of hospitalization had higher spiritual experiences ($P = 0.032$).

Additionally, participants who perceived their health as worse than their peers and those with disease duration of 6-10 years showed significantly higher levels of spiritual experiences ($P < 0.05$). These results are detailed in Table 6.

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Table 6: Relationship between disease-related characteristics and spiritual experiences

Variable		Mean ± SD	P-value
Number of drugs used	1-2	62.8 ± 8.78	< 0.001
	3-5	68.39 ± 10.94	
	More than 5	72.22 ± 11.75	
Chronic disease	Yes	69.07 ± 11.33	0.538
	No	66.36 ± 12.81	
Presence of comorbidities	Yes	69.63 ± 10.86	0.207
	No	67.4 ± 12.43	
Hospitalization history	Yes	71.15 ± 11.07	0.032
	No	67.61 ± 11.37	
Self-rated health	Better than peers	68.55 ± 11.61	0.003

Interestingly, analysis of the relationship revealed an inverse pattern. Participants in the 'low adherence' group demonstrated the highest mean score of spiritual experiences (75.71 ± 9.88), while those in the 'high adherence' group showed the lowest mean score (65.08 ± 10.61) (P < 0.001).

This indicates a negative association between spiritual experiences and medication adherence in this population. The complete correlation analysis is presented in Table 7.

Table 7: Comparison of Spiritual Experiences Across Different Levels of Medication Compliance

Medication Compliance	Low (Mean ± SD)	Average (Mean ± SD)	High (Mean ± SD)	P-value
Spiritual Experiences	75.71 ± 9.88	72.91 ± 10.58	65.08 ± 10.61	< 0.001

Discussion

This study investigated the relationship between daily spiritual experiences and medication adherence among elderly patients with diabetes in Golestan province. The central and most intriguing finding was a significant negative correlation between these two variables. Contrary to the commonly held assumption that spirituality universally promotes positive health behaviors, our results revealed that participants with low medication adherence reported the highest levels of daily spiritual experiences, while those with high adherence reported the lowest. Our analysis identified several key determinants of medication adherence. Adherence was significantly higher among participants using 3-5 medications, those without a recent history of hospitalization, and those with shorter disease duration (6-10 years).

Furthermore, specific demographic factors, such as having a primary education level and exactly four children, were also associated with better adherence.

Regarding spiritual experiences, higher scores were significantly linked to being re-employed, having four children, a primary education, using 3-5 medications, a history of hospitalization, a lower self-perception of health compared to peers, and a disease duration of 6-10 years. The inverse relationship we observed presents a complex picture within the existing literature. On one hand, some studies, often from Western contexts, suggest that spirituality can be a positive resource for coping and adherence [11, 12], and a study by Alvarez et al. reported a significant relationship between spirituality and treatment adherence in heart failure patients [16].

Conversely, our findings align with another strand of research that highlights the potential for spiritual beliefs to hinder active disease management. For instance, Duke reported that while spirituality aided in adapting to chronic disease, it was not associated with better medication adherence, as participants believed God's will would protect them from illness [17]. More directly, Habte et al. indicated that religious beliefs and healing practices could sometimes replace medical procedures, such as using holy water instead of antidiabetic drugs, which interferes with treatment efficacy [18]. These discrepant findings can be explained by several key factors: cultural context, differences in measurement instruments, and variations in disease characteristics across study populations. Systematic reviews of the literature confirm that religious and spiritual beliefs can sometimes act as a barrier to health-seeking behaviors through mechanisms such as passive deferral to God's will [19].

In our context, such beliefs could lead to the perception that health outcomes are entirely dependent on God's will (a misinterpretation of tawakkul), thereby diminishing the perceived personal responsibility for

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proactive behaviors. To address the descriptive nature of our demographic findings, we can interpret them through established theoretical frameworks. The association between primary education and better adherence aligns with the Health Belief Model, suggesting this educational level may optimize perceived benefits of treatment while maintaining health literacy. Similarly, the significance of having exactly four children finds explanation in the Theory of Planned Behavior, where this specific family structure may provide optimal subjective norms and perceived behavioral control through family support networks.

The influence of demographic factors also finds support in previous research. Employment, particularly recent re-employment, can generate enthusiasm and a sense of well-being, potentially leading to better adherence as individuals invest in maintaining their health to continue working; a finding confirmed in studies on cancer populations [20, 21]. Furthermore, family structure plays a crucial role. Shareinia et al. highlighted that marital status and the number of children increases the likelihood of medication compliance, as family members act as effective caregivers and enhance motivation for self-care [22]. Several psychosocial frameworks offer plausible explanations for the observed inverse relationship.

From the perspective of the Health Belief Model and Locus of Control, individuals with intense daily spiritual experiences may develop a powerful external locus of control regarding their health, believing their well-being is ultimately in God's hands; this belief could reduce the perceived severity of non-adherence and diminish the perceived benefits of medication. This aligns with the dichotomy of Passive Reliance versus Active Coping, where spirituality manifests as a form of passive surrender rather than a source of strength for proactive behaviors. Moreover, regarding Illness Perception, while high spirituality may foster greater acceptance of illness and reduce psychological distress, this very acceptance might inadvertently lower the motivation for the rigorous, active struggle required for consistent medication management.

The relationship we observed where higher spirituality was linked to a lower self-perception of health and a history of hospitalization suggests a complex, bidirectional interplay. It is plausible that the onset of significant health challenges or a negative health perception itself may prompt individuals to seek solace and meaning through intensified spiritual engagement, making spiritual coping more salient in the face of illness. Several limitations of this study must be acknowledged. First, the cross-sectional design precludes any causal inference. Second, the data were self-reported, which is susceptible to social desirability bias. Third, the study was conducted in a single province in Iran, limiting the generalizability of the findings. Finally, although several demographic and clinical characteristics were examined, no multivariable regression analysis was performed; therefore, the potential effects of unmeasured and residual confounding cannot be excluded.

These findings carry important implications for clinical practice. Healthcare providers should not assume that spiritually inclined elderly patients are automatically more adherent. Instead, a nuanced assessment is crucial. Clinicians should engage in conversations to understand the patient's health and spiritual beliefs, gently exploring whether their faith supports or inadvertently hinders active self-management. Patient education could be reframed to integrate spiritual beliefs, emphasizing that using medication can be viewed as using the means God has provided. For future research, longitudinal studies are needed to trace the temporal relationship between spirituality and adherence. Qualitative inquiries are essential for deeply exploring the subjective experiences and reasoning of patients. Thus, future trials should test spiritually-integrated counseling that frames medication adherence as a partnership, aligned with religious health principles.

Conclusions

In conclusion, this study found a significant negative association between daily spiritual experiences and medication adherence among elderly diabetics in Golestan province, Iran. This suggests that in this specific cultural context, heightened spirituality may be linked to a form of passive reliance that compromises active treatment engagement, rather than fostering it. Healthcare providers must be cognizant of this complex relationship. Future research should move beyond correlation to explore causal mechanisms and develop culturally sensitive interventions that harmonize spiritual beliefs with essential self-care behaviors for chronic disease management.

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Data availability

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The datasets generated and/or analyzed during the current study are not publicly available due to privacy and confidentiality considerations but may be obtained from the corresponding author upon reasonable request and with the permission of the relevant ethics committee.

Author(s) contribution

All authors contributed to the conception and design of the study, data collection, data analysis, interpretation of the results, and preparation and revision of the manuscript. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Conflicts of interest

The authors declare no conflict of interest regarding the publication of this article.

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Ethics statement

This study was approved by the Ethics Committee of the Islamic Azad University, Aliabad Katul Branch, Iran, under the ethical code IR.IAU.AK.REC.1402.004. Written informed consent was obtained from all participants before data collection. Participants were informed about the purpose and procedures of the study, the voluntary nature of their participation, and the confidentiality of their information.

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