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# Comparison of Sleep Quality and the Rate of Depression in the Elderly with and Without Diabetes at the Comprehensive Health Service Center

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## Abstract

**Background and Aim:** Quality of sleep and quality of life are the most important indicators for evaluating the health care status in chronic diseases including diabetes. Depressionis one of the main causes of reduced functional ability and impaired quality of life, which inevitably leads to disability. Therefore, this study was designed to compare and determine sleep quality and rate of depression in diabetic and non-diabetic elderly.

**Materials and Methods:** The method of the current research was descriptive and comparative. The statistical population of this research includes elderly people with diabetes and non-diabetic people who refer to the Comprehensive Rural Health Services Center of Galashpel, Mahmoudabad. In this study, 300 elderly participants (150 with diabetes and 150 without) who visited the aforementioned center were included. Data were collected using the Sheikh and Yesavage Depression Questionnaire and the Pittsburgh Sleep Quality Questionnaire. Statistical analysis was performed using SPSS software, version 23.

**Results:** The quality of sleep in non-diabetic elderly is better than in elderly with diabetes (p=0.039). The findings showed that there is a difference between the rate of depression in the elderly with and without diabetes (p=0.006). This means that the rate of depression in the elderly with diabetes is higher than that of non-diabetic elderly.

**Conclusion:** In general, people with diabetes do not have good sleep quality and suffer from depression. Therefore, it is recommended to develop suitable strategies to improve the treatment of these patients and effective training on improving the quality of sleep and reducing their depression.

**Keywords:** Elderly, Diabetes, Sleep Quality, Depression.

## Introduction

Population aging has emerged as one of the most pressing economic, social, and healthcare challenges of the 21st century. As individuals advance in age, they encounter a broad spectrum of health-related difficulties, including the onset of chronic diseases, psychological disorders ranging from mild cognitive impairment to severe dementia and depression, recurrent hospitalizations, reduced life expectancy, and a series of personal losses such as bereavement, economic decline, diminished physical capacity, and, ultimately, the loss of independence (1). Aging is universally recognized as a biological, natural, and irreversible process (2). Advances in population control strategies, rising life expectancy, and improvements in medical interventions have collectively contributed to the global demographic shift toward older populations. Global estimates from 2000 indicated that approximately 13% of the world's population was aged 60 years or older, a figure projected to reach 20% by 2040. In the European Union, the proportion of individuals aged over 60 is expected to rise from 22% in 2000 to 30% by 2025. Over the past two decades, Iran has experienced a rapid and pronounced change in the relative structure of its population (3). According to the 2011 national census, 8.2% of the Iranian population was aged 60 years or older. Although Iran currently retains a relatively

young population structure, projections suggest a sharp demographic shift, with the elderly population expected to exceed 26 million—representing approximately 23% of the total population—by 2050 (4).

As people's abilities decline with age, many diseases affect the health of the elderly. One of the chronic diseases of old age is diabetes. Diabetes is a chronic debilitating disease that poses a public health problem worldwide, especially in low- and middle-income countries, where it is expected to occur in about two-thirds of cases (5). The condition adversely affects multiple organ systems, particularly the cardiovascular and nervous systems, leading to a progressive deterioration in quality of life, substantial healthcare costs, and an excessive burden on resource-limited healthcare systems. One of the important complications of diabetes that is often overlooked in various healthcare settings is mental health disorders. Multiple studies have reported that individuals with diabetes frequently experience poor mental health outcomes, most notably depression and diminished sleep quality (6). The World Health Organization has identified depression as one of the leading contributors to reduced health and progression toward disability. Depression is associated with a higher risk of complications such as diabetes and increased use of health care services. Depression is often associated with poor sleep health, and both conditions are common in diabetic patients (7, 8).

Depression and impaired sleep quality are closely associated with suboptimal adherence to antidiabetic medication regimens and self-management protocols. This nonadherence heightens the risk of severe short- and long-term complications, including blindness, limb amputation, stroke, cognitive decline, and decreased quality of life. When psychiatric comorbidities in diabetic patients remain undiagnosed and untreated, the likelihood of premature mortality increases substantially. The societal and economic consequences are profound, resulting in catastrophic healthcare expenditures and significant human suffering (5). The literature on the relationship between metabolic control—such as glycemic and lipid regulation—and mental health outcomes remains inconsistent. While some studies have documented significant associations (9,10), others have reported no such relationship (11). Nonetheless, in many investigations, poor glycemic control has been correlated with both depression and poor sleep quality (6,12).

On the other hand, in addition to biological changes due to changes in the social role of the elderly with retirement, the aging process also brings psychological consequences and mood changes for the elderly, which need to be addressed along with physiological problems. Research conducted on the elderly in Iran indicates that the overall health status of this age group is poor or moderate. (13).

Given these considerations, there is a pressing need to comprehensively investigate the health status of older adults, with particular emphasis on sleep quality and key mental health indicators, including depression. Accordingly, the present study aims to evaluate sleep quality and the prevalence of depression among elderly individuals with and without diabetes.

## Methodology

This study was a descriptive-comparative study that was conducted in 1402 on 300 diabetic and non-diabetic elderly attending the Comprehensive Rural Health Services Center of Galashpel, Mahmoudabad according to the Krejci and Morgan table from among 972 elderly covered by this clinic who were selected by convenience sampling method. The inclusion criteria for the study included having a health record at the Comprehensive Rural Health Services Center of Galashpel, diagnosis of diabetes (for the diabetic group), absence of mental and physical disabilities, full consciousness, adequate verbal and auditory ability to respond, and willingness to participate in the study. Exclusion criteria included relocation from Galashpel village and incomplete questionnaire responses. The data collection tools included the Sheikh and Yesavage Elderly Depression Questionnaire (GDS-15)

and the Pittsburgh Sleep Quality Questionnaire (PSQS).

**Sheikh and Yesavage Geriatric Depression Questionnaire (GDS-15):** This questionnaire was extracted by Sheikh and Yasavajeh in 1986 from the 30-question version of the Geriatric Depression Questionnaire (14) and showed good reliability and validity in various studies (15). This questionnaire has 15 questions, each of which includes a zero or one answer, or in other words, yes or no. Its maximum total score is 15. A score of 0-3 indicates no depression, a score of 5-9 indicates moderate depression, and a score of 10-15 indicates severe depression. A total score of more than 7 indicates susceptibility to severe depression (16). This questionnaire has been standardized in Iran by Malakouti et al. (2006) and the Cronbach's alpha reliability coefficient has been reported to be 0.9 (17). In the present study, the reliability of the questionnaire was obtained by the Cronbach's alpha coefficient method as 0.76.

**Pittsburgh Sleep Quality Questionnaire (PSQS):** This questionnaire examines individuals' attitudes about sleep quality over the past four weeks. This questionnaire has 18 questions in 7 subscales or components. The first component is related to subjective sleep quality, which is determined by question number 9. The second component is related to sleep latency, which is determined by two questions, namely the average score of question 2 and the score of part A of question 5. The third component is related to sleep duration, which is determined by question number 4. The fourth component is related to sleep efficiency and effectiveness, which is determined by dividing the total hours of sleep by the total hours the person is in bed, multiplied by 100. The fifth component is related to sleep disturbance, which is obtained by calculating the average score of question 5, and the sixth component is related to sleeping medications, which is determined by question 6. The seventh component is related to poor performance during the day, which is determined by calculating the average score of questions 7 and 8. The minimum score for each question is zero and the maximum is 3. The sum of the average scores of these seven components constitutes the total score of the instrument, which ranges from zero to 21. The higher the score obtained, the lower the sleep quality. A score higher than 6 indicates poor sleep quality. (18) The validity and reliability of this questionnaire have been previously investigated in Iran. The reliability of this questionnaire using Cronbach's alpha coefficient has been reported to be 0.83 (19). In the present study, the reliability of the questionnaire using Cronbach's alpha coefficient was 0.71.

In this study, to collect data, the researcher referred to the Comprehensive Rural Health Services Center of Galashpel, Mahmoudabad, explained the objectives of the study to the elderly who referred to the center for health and wellness services, and the elderly who agreed to participate in the study were selected, and the consent form was signed or fingerprinted by the elderly, and the questionnaires were completed by the researcher for each elderly person through an interview. The elderly were assured that the information would remain confidential. The present study has been approved by the Ethics Committee.

## Data Analysis

Descriptive and inferential statistical methods were employed. Descriptive statistics included frequency distributions, percentages, and charts to summarize study variables. As the obtained significance level was greater than 0.05, the assumption of normality was supported, and accordingly, parametric methods were utilized for testing the study hypotheses (Table 1). Inferential analyses were conducted using independent-samples t-tests and Student’s t-tests via SPSS version 23. Statistical significance was set at $p < 0.05$.

**Table 1:** Evaluation of the Normality of Study Data by the Kolmogorov–Smirnov Test in Elderly Individuals with and without Diabetes

| | Elderly Group With Diabetes | | Elderly Group Without Diabetes | |
|---|---|---|---|---|
| | Depression | Sleep Quality | Depression | Sleep Quality |
| Mean | 2.70 | 1.31 | 1.26 | 2.84 |
| Standard Deviation | 0.49 | 0.06 | 0.59 | 0.59 |
| Kolmogorov–Smirnov Z Statistic | 4.93 | 3.63 | 2.94 | 2.19 |
| P-Value | 0.11 | 0.22 | 0.17 | 0.13 |

## Results

The demographic characteristics of the study sample indicated that among the elderly individuals with diabetes, 99 participants (66%) were female and 51 (34%) were male. In the non-diabetic elderly group, 86 participants (57.3%) were female and 64 (42.7%) were male. The mean ± standard deviation (SD) age was 70.83 ± 6.448 years in the diabetic group and 70.82 ± 6.429 years in the non-diabetic group. Additionally, 69.3% of the diabetic elderly and 61.3% of the non-diabetic elderly were illiterate (Table 2).

Sleep quality was assessed and compared between the diabetic and non-diabetic elderly groups. Levene's test indicated a significance level (sig) of 0.039, which is less than the 0.05 threshold. Therefore, the assumption of equal variances for independent groups regarding sleep quality was violated. Given that the confidence interval bounds were both negative, the hypothesis that sleep quality differs between groups was supported. Specifically, sleep quality was found to be significantly better in the non-diabetic elderly group compared to the diabetic elderly group.

Depression prevalence was also examined in both groups. Levene's test yielded a significance level (sig) of 0.006, again below 0.05, indicating unequal variances between the groups. Since the confidence interval bounds were both positive, the mean depression score in the diabetic elderly group was significantly higher than that in the non-diabetic group. Thus, the hypothesis was confirmed: depression prevalence is greater among elderly individuals with diabetes compared to their non-diabetic counterparts (Table 3).

Table 3: **Independent t-test table for elderly people with and without diabetes**

| Variable | Group | Mean± SD | Test index | P-value |
|---|---|---|---|---|
| **Sleep quality** | Diabetic | 1/31±0/06 | t=-2/07 | 0/03 |
| | Non-diabetic | 2/84±0/59 | | |
| **Depression** | Diabetic | 2/70±0/49 | t=20/38 | |
| | Non-diabetic | 1/26±0/59 | | |

## Analytical Findings

- The decrease in the mean RBC count at doses higher than 0.2 mSv (in HP(10)) was statistically significant ($P < 0.001$).
- A significant correlation was observed between cumulative radiation doses (6 and 30 months) and a decrease in hematological indices (especially RBC) ($P < 0.05$).
- Based on ANOVA, a significant decrease in mean RBC was observed with increasing HP(10) dose level ($P = 0.004$). This decrease was not significant for WBC ($P = 0.094$) or PLT ($P = 0.469$).
- No significant correlation was found between hematological indices and demographic variables (age, gender, work experience, number of shifts) ($P > 0.05$ for all).

## Discussion

The aim of this study was to compare sleep quality and the prevalence of depression between elderly individuals with and without diabetes. The first hypothesis proposed a difference in sleep quality between diabetic and non-diabetic elderly groups. The results confirmed this hypothesis, indicating that sleep quality in non-diabetic elderly was significantly better than in those with diabetes. This finding supports the acceptance of the hypothesis regarding the difference in sleep quality between the two groups.

The findings align with previous studies by Birhanu et al. (20) and Fadaie Vatan et al. (21), which reported that nearly half of

diabetic patients experience poor sleep quality. Type 2 diabetes, poor glycemic control, and depression were identified as key factors contributing to poor sleep quality. Raising awareness about the need to improve sleep hygiene among diabetic patients can serve as an effective management strategy to enhance their sleep quality.

Furthermore, the second hypothesis of the present study examined the difference in the rate of depression between elderly individuals with and without diabetes. The results indicated a significant difference in depression prevalence between the two groups. These findings are consistent with those reported by Zhang et al. (22), Khan (23), and Nasrollahi and Mivechi (24). Their studies showed that categorizing individuals as diabetic or non-diabetic forms a family of common psychological issues such as depression, and implementing strategies like stress management education alongside depression treatment is essential to enhance coping skills, adaptation, and psychological health in these patients.

Additionally, findings from research by Shariat et al. (25), and Alvarez Cisneros et al. (26) identified low education levels, poor economic status, uncontrolled blood glucose, and gender as independent risk factors for anxiety and depression, with living without family being an independent risk factor for depression in diabetic patients over 60 years old. They also found that depression is highly prevalent among middle-aged and elderly patients with type 2 diabetes and negatively impacts glycemic control. Lower levels of social support, use of oral hypoglycemic agents and insulin therapy, longer disease duration, and female gender were associated with depression in outpatient diabetic patients. Therefore, early screening and identification of such factors could help mitigate some of the adverse effects of depression in outpatient diabetic patients. Given the increasing elderly population and the prevalence of chronic diseases such as diabetes, special attention and psychiatric assessments are recommended for timely diagnosis and ultimately effective treatment of depression and sleep disorders in these patients.

Considering the low sleep quality among diabetic elderly in this study, training in relaxation techniques, muscle loosening, regulation of activity and sleep schedules, and cognitive distraction methods to control or alleviate sleep disturbances is suggested. Since the elderly population is growing, implementing supportive programs and timely investments to improve their quality of life and reduce societal costs in the future is advised.

It is recommended to promote the view that aging is a positive life phase characterized by increased wisdom and experience, and through active participation of the elderly in social relationships, they can be protected against mental health challenges and depression reduction.

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## Limitations

One of the limitations of the study was the use of convenience sampling, which the researcher was compelled to employ due to the prevailing circumstances. Another limitation was the inability of some elderly participants to complete the questionnaire.

## Conflict of Interest

The authors declare no conflicts of interest.

**Table 2:** Demographic characteristics of subjects, divided into elderly people with and without diabetes

| Variable | Characteristics | Diabetic | | Nondiabetic | |
|---|---|---|---|---|---|
| | | Number | Percentage | Number | Percentage |
| **Gender** | Female | 99 | 66 | 86 | 57/3 |
| | Male | 51 | 34 | 64 | 42/7 |
| **Age** | Between 60-65 years old | 25 | 16/7 | 23 | 15/3 |
| | Between 66-77 years old | 34 | 22/7 | 40 | 26/7 |
| | Between 71-75 years old | 46 | 30/7 | 36 | 24 |
| | Between 76-80 years old | 31 | 20/7 | 34 | 22/7 |
| | Over 80 years | 14 | 9/3 | 17 | 11.3 |
| **Education** | Illiterate | 104 | 69/3 | 92 | 61/3 |
| | Under-diploma | 40 | 26/7 | 52 | 34/7 |
| | Diploma | 6 | 4 | 6 | 4 |

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