

QUALITY OF LIFE FOR ELDERLY PATIENTS WITH COEXISTING DIABETES AND OSTEOPOROSIS AT THE GERIATRICS DEPARTMENT OF THE UNIVERSITY MEDICAL CENTER IN HO CHI MINH CITY

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ABSTRACT

Aim: This study aimed to investigate the quality of life (QoL) in elderly patients with both diabetes mellitus and osteoporosis, as well as the factors associated with QoL in this population.

Methods: A cross-sectional study was conducted at the University Medical Center, Ho Chi Minh City, from March to May 2023. The participants were elderly patients diagnosed with both diabetes mellitus and osteoporosis who visited the hospital for medical examinations. Data were collected using a structured questionnaire, and QoL was assessed using the Short Form-36 (SF-36) index. Statistical analyses included Pearson and Spearman correlation coefficients, independent t-tests, Mann-Whitney U tests, ANOVA, and Kruskal-Wallis tests, with statistical significance set at $p < 0.05$. **Results:** The average QoL score was 63.5 ± 22.1 , indicating a moderate level of quality of life. Lower QoL scores were significantly associated with older age, lower educational attainment (particularly those with only lower secondary education), longer duration of osteoporosis, and

an inability to work. **Conclusion:** Elderly patients with diabetes and osteoporosis experience a moderate QoL, with specific sociodemographic and clinical factors negatively influencing their well-being. Interventions targeting education, disease management, and support for maintaining functional independence may help improve QoL in this vulnerable population.

Keywords: *Quality of life (QoL), Elderly patients, Diabetes Mellitus, Osteoporosis, Coexisting Conditions, Short Form-36 (SF-36), Geriatrics, Sociodemographic Factors, Clinical Factors, University Medical Center Ho Chi Minh City, Vietnam.*

I. INTRODUCTION

Osteoporosis and diabetes mellitus are chronic conditions that significantly impact an individual's health and quality of life (QoL). Numerous studies have demonstrated that osteoporosis reduces QoL, both in the presence and absence of fractures¹. Key factors associated with osteoporosis that contribute to diminished QoL include comorbidities, fear of falling, vertebral fractures, and depression.² Similarly, diabetes mellitus and its complications severely affect patient QoL, with the negative impact increasing in cases of multiple complications.³ Notably, approximately 49% of diabetes patients experience depression, further exacerbating their QoL.³

The relationship between diabetes and osteoporosis has been well-documented. In

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diabetes, chronic hyperglycemia leads to the formation of advanced glycation end-products (AGEs), which disrupt bone metabolism and compromise bone quality and strength. Additionally, osteoporosis independently reduces QoL in patients with type 2 diabetes mellitus.⁴ In type 1 diabetes mellitus, insulin deficiency contributes to reduced bone mineral density, increasing the risk of osteoporosis⁵.

Globally, the prevalence of these conditions is rising. According to the International Diabetes Federation (IDF), an estimated 587 million people had diabetes in 2021, with projections reaching 783 million by 2045⁶. The World Health Organization (WHO) estimates that osteoporosis affects approximately 500 million men and women worldwide⁷. In Vietnam, about 5.7% of the population has diabetes⁸. As the population ages, the coexistence of these two conditions is becoming increasingly common. For instance, a study in China reported a 37.8% prevalence of osteoporosis among patients with type 2 diabetes⁹, while Vietnamese studies have shown prevalence rates as high as 50%, and even 55.9% among male patients with type 2 diabetes in Can Tho^{10,11}.

Despite the strong correlation between diabetes and osteoporosis, limited research has focused on assessing QoL in patients with both conditions. Therefore, this study aims to evaluate QoL in patients with coexisting diabetes mellitus and osteoporosis and to identify sociodemographic and clinical factors influencing their mental and physical well-being. The study was conducted at the University Medical Center Ho Chi Minh City, a major healthcare facility serving the southern region of Vietnam. With its diverse patient population from various provinces, the center provides an ideal setting for such research.

II. METHOD

Study design and setting:

This cross-sectional study evaluated 60 elderly patients with coexisting diabetes mellitus and osteoporosis (1 man and 59 women; mean age 73.4 years). Participants were recruited from the geriatric clinic at the University Medical Center Ho Chi Minh City during routine examinations between March 2023 and May 2023. The study was approved by the Ethics Review Board of the University of Medicine and Pharmacy at Ho Chi Minh City.

Inclusion criteria were: (1) age 18 years or older, (2) community-dwelling status, and (3) a confirmed diagnosis of both diabetes mellitus and osteoporosis or current use of medications for these conditions. Exclusion criteria included a history of injury-related fractures, blindness, or cognitive impairments that could interfere with participation. Data on quality of life and disease status were collected through direct, face-to-face interviews using a structured, pre-validated questionnaire.

Sample size and sampling procedure

The sample size for this study was calculated using the formula for estimating the mean QoL score among individuals with osteoporosis. The calculation was based on a 95% confidence level ($Z_{\alpha/2} = 1.96$), and a margin of error of 4 points, reflecting the desired precision. The standard deviation (SD) utilized in this estimation was sourced from a study conducted by Ippei Kanazawa et al., which reported an SD of 13.45 for the SF-36 QoL score among osteoporosis patients. Applying these parameters, the minimum required sample size was determined to be 44 participants.

A convenience sampling method was used to recruit participants. Data was collected from Monday to Friday over two months.

Eligible patients were approached by the investigator, who provided detailed information about the study's objectives, potential benefits, associated risks, and measures to ensure confidentiality. After obtaining informed consent from patients who met the inclusion criteria, face-to-face interviews were conducted to collect the necessary data.

Instrument

A structured questionnaire was developed based on the 36-item Short Form Survey (SF-36)¹². The questionnaire consisted of three parts, comprising a total of 50 questions. The first part included 11 questions to collect general and sociodemographic information, such as name, age, marital status, and educational background. The second part contained 3 questions related to the current status of diabetes and osteoporosis. The third part consisted of the 36 items from the SF-36 quality of life (QoL) questionnaire, which evaluates both physical and mental health domains.

Assessment of Osteoporosis and Diabetes

Patients were eligible for the study if they had been diagnosed with osteoporosis or were currently using osteoporosis medication. Osteoporosis was assessed by physicians using dual-energy X-ray absorptiometry (DEXA). According to the World Health Organization (WHO) criteria, osteoporosis was diagnosed in patients with a T-score equal to or less than -2.5 standard deviations (SD).

For diabetes assessment, patients were identified through blood tests. A diagnosis of diabetes mellitus was confirmed if the patient had a fasting plasma glucose level ≥ 126 mg/dL or a glycated hemoglobin (HbA1c) level $\geq 6.5\%$. Patients who were already on

diabetes medication were also included in the study.

Assessment of QoL

The 36-item short-form survey (SF-36) was utilized to measure QoL. The SF-36 is a widely used instrument for evaluating physical and mental well-being at both individual and population levels. It consists of eight subscales corresponding to key health domains: physical functioning (pf), role limitations due to physical health (rp), bodily pain (bp), general health (gh), role limitations due to emotional problems (re), energy/fatigue (ef), emotional well-being (ew), social functioning (sf), each domain is scored on a scale from 0 to 100, with higher scores indicating better quality of life.

Data collection

Face-to-face interviews were conducted by trained researchers to ensure consistency and accuracy in data collection. To maintain participant confidentiality and prevent data duplication, each participant was assigned a unique identification number linked to their medical records. Interviews lasted approximately 15 to 20 minutes, during which structured questions aligned with the study objectives were asked. Upon completion, questionnaires were reviewed for completeness before data entry. The collected responses were then converted into numerical data for analysis.

Statistical analysis

Data were analyzed using Stata 17 software. Data input was carried out using EpiData software. Continuous variables were presented as means \pm standard deviations (SD). Differences between groups were assessed using the independent t-test, Mann-Whitney U test, one-way ANOVA, and Kruskal-Wallis test, depending on the distribution of the data. Relationships between variables were evaluated using

Pearson and Spearman correlation coefficients. A p-value of less than 0.05 was considered statistically significant.

Ethical considerations

This study was approved by the Ethics Committee in Biomedical Research at the University of Medicine and Pharmacy, Ho

Chi Minh City, Vietnam (Approval No. 22/HDDD-DHYD, dated February 20, 2023). Participation was entirely voluntary, and individuals had the right to withdraw from the study at any time or decline to answer specific questions without any repercussions.

III. RESULT

Table 1: Baseline characteristics and QoL scores (n = 60)

Characteristics	Frequency (n)	Percentage (%)
Age*	73.4 ± 6.9	
Sex		
Female	59	98.3
Male	1	1.7
Educational status		
< Secondary education	51	85.0
≥ Secondary education	9	15.0
Occupation		
Unable to work	41	68.3
Able to work	19	31.7
Income sentiment		
Not enough	9	15.0
Enough	48	80.0
Abundance	3	5.0
Marital status		
Single	4	6.7
Married	22	36.7
Widow/Widower	34	56.6
Living Arrangements		
Living alone	9	15.0
Living with relatives	15	25.0
Living with family members	36	60.0
Medical conditions		
Diabetes duration*	7.4 ± 8.3	
Osteoporosis duration*	3.2 ± 3.7	
HbA1c level		
< 7%	21	35.0
≥ 7%	39	65.0

(*): Age and the duration of diabetes and osteoporosis are presented in frequency (n) ± the standard deviation (SD)

A total of 60 participants were recruited from the University Medical Center in Ho Chi Minh City to take part in the study. Table 1 presents the baseline characteristics of the

patients. The patients participating in this study had an average age of 73.4 ± 6.9 years. Only one male patient was recruited into the study. Eighty-five percent of patients involved in the study did not receive secondary education or higher. Fifteen percent of the study participants reported

unsatisfactory incomes. A notable subset of the cohort (31.7%) remained engaged in occupational activities despite a high average age. We noted that the participants' occupations included housewife, farmer, and

business owner. The participants in the study had an average osteoporosis duration of 3.2 years and an average diabetes duration of 7.4 years. Additionally, 65% of the patients exhibited an HbA1c value of 7% or higher.

Table 2: Average score of each QoL domains (n = 60)

SF-36 Domains	Mean \pm SD
Role limitations due to physical health (RP)	46.3 \pm 48.9
Energy/fatigue (EF)	57.3 \pm 20.4
Pain (BP)	57.5 \pm 31.3
General Health (GH)	50.4 \pm 22.7
Physical functioning (PF)	49.4 \pm 32.4
Role limitations due to emotional problems (RE)	85.6 \pm 34.4
Social functioning (SF)	81.3 \pm 22.5
Emotional well-being (EW)	80.0 \pm 17.6
Overall	63.5 \pm 22.1

The mean SF-36 domain scores are found in Table 2. In this study, the quality of life was measured with the SF-36 index, with an average score of 63.5 \pm 22.1, indicating a fair level of quality of life. Among patients, 20 patients had an overall QoL score below 50, and only 5 had a score below 25.

The domains associated with mental and emotional well-being exhibited the highest average scores for quality of life (QoL). Role limitations due to emotional problems (RE)

was the domain with the highest average score (85.6 \pm 34.4). Both social functioning (SF) and emotional well-being (EW) had average scores greater than 80. Physical aspects of QoL were notably lower than those of the mental health domains, with both role limitations due to physical health problems (RP) (46.3 \pm 48.9) and physical functioning (PF) (49.4 \pm 32.4) showing average SF-36 scores below 50.

Table 3: Association of quality of life with sociodemographic characteristics (n = 60)

Factor	Category	n	Mean \pm SD	p-value*
Age			Coefficient: -0.43	0.007
Education level	< Secondary Education	51	59.9 \pm 21.7	0.0017
	\geq Secondary Education	9	83.5 \pm 10.1	
Jobs	Unable to work	41	57.6 \pm 22.2	0.0024
	Able to work	19	76.1 \pm 15.9	
Marital status	Single	4	83.7 \pm 10.2	0.11
	Married	22	64.7 \pm 22.7	
	Widow/Widower	34	60.3 \pm 21.7	
Cohabitation status	Relative	15	69.6 \pm 18.6	0.12
	Family member	36	59.6 \pm 20.3	
	Alone	9	68.8 \pm 31.8	
Income sentiment			Coefficient: 0.07	0.6

(*): The tests used in the table are, in order: Spearman (for the variables age and income sentiment), Wilcoxon Mann-Whitney (for the variable education level), and Kruskal-Wallis (for the variables jobs, marital status, and cohabitation status).

Age was identified as a factor that correlates with QoL, affecting both the mental and physical aspects of quality of life ($p < 0.05$). People with higher ages had 0.43 points lower in QoL score than average. Education status also stands out as a significant element influencing the QoL in

patients with diabetes and osteoporosis. It was observed that people with higher education had a better quality of life score ($p < 0.05$). Being able to work is also seen as a factor predicting a higher overall quality of life score ($p < 0.05$).

Table 4: Association of quality of life with disease factor (n = 60)

Factor	Category	p-value*	Coefficient	Mean (CI)
Diabetes duration		0.33	-0.34	-1.0 to 0.35
Osteoporosis duration		0.041	-1.57	-3.1 to -0.063
Glycemic Control	HbA1c < 7%	0.88		65.4 (47.7 - 85.1)
	HbA1c ≥ 7%			67.9 (45.6 - 83.8)

(*): The tests used in the table are, in order: linear regression (for variables diabetes duration and osteoporosis duration), t-test (for variable glycemic control).

In relation to factors associated with the disease, the duration of osteoporosis stood out as the sole factor observed to deteriorate the quality of life for patients ($p < 0.05$). There were no noticeable differences in the patients' QoL scores in terms of diabetes duration or glycemic control groups.

III. DISCUSSION

The average SF-36 scores for each aspect ranged from 46.4 to 85.6, indicating that patients in this study demonstrated higher QoL scores across all aspects compared to participants in a similar study conducted in Japan⁴. In this study, individuals with diabetes and osteoporosis exhibited higher mental health scores compared to their physical health scores. A comparable finding was observed in the research conducted in Japan⁴. This is because both osteoporosis and diabetes are conditions that directly impact the physical health of patients, which indirectly influences their mental well-being.

Patients in Vietnam exhibited higher quality of life scores not only in terms of physical health but also demonstrated significantly better psychological well-being compared to their Japanese counterparts⁴. Furthermore, based on a depression survey conducted in three countries Vietnam, Japan, and Indonesia, the elderly population in Vietnam was found to have the lowest depression rate among the sampled populations, with only 17.2% experiencing depression compared to 30% among the elderly in Japan¹³. The difference in mental health scores between Vietnam and Japan could be explained by disparities in cultural norms, life philosophies, and perceptions of illness among the elderly populations in these nations.

Age appeared as the predominant factor influencing quality of life (QoL) and has been recognized as a significant determinant affecting the quality of life in individuals with osteoporosis and diabetes. The group of patients who still regularly participated in work activities had a better quality of life compared to patients who had retired or were unable to work anymore. This may be because patients who are able to continue

working must have a decent physical health condition. Additionally, working helps with socializing, leading to better social functioning among patients. A study in Korea in 2017 demonstrated that elderly patients who were still working have better QoL and mental health¹⁴.

Osteoporosis duration was the only disease factor found to be correlated with the deterioration in quality of life (QoL) in this study. As the duration of osteoporosis lengthens, there may be a decrease in the overall physical health of the subjects and an increased chance of suffering from complications of osteoporosis over time. A study conducted in Poland with 198 postmenopausal osteoporosis patients aged 50 and above showed that a longer duration of osteoporosis causes a greater decline in QoL¹⁵. To address the reduced quality of life associated with the duration of osteoporosis, implementing a comprehensive management plan that includes weight-bearing exercise, calcium and vitamin D supplementation, and pharmacological treatments like bisphosphonates can help strengthen bones, reduce fracture risk, and improve overall well-being.

This was the first study to examine the QoL in patients with diabetes and osteoporosis at the University Medical Center, Ho Chi Minh City. The strength of this study lies in its valuable insights into the quality of life (QoL) of patients with diabetes and osteoporosis—two of the most prevalent diseases among elderly patients—and the sociodemographic and clinical factors contributing to it.

Our study has limitations: a small sample size limits definitive conclusions, a gender imbalance may affect quality-of-life differences due to postmenopausal

osteoporosis in females, unaccounted comorbidities in our older participants could skew results, the lack of a control group weakens comparisons, and the cross-sectional design calls for a prospective study to validate findings.

IV. CONCLUSIONS

Elderly patients with diabetes and osteoporosis often experience a moderate quality of life (QoL). Research indicates that specific sociodemographic and clinical factors are significantly linked to poorer QoL in this population. These factors include older age, lower levels of education (particularly those who have only completed lower secondary education), a longer duration of osteoporosis, and the inability to work. Interventions aimed at improving education, disease management, and support for maintaining functional independence may enhance the quality of life for these vulnerable individuals.

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