Original Research

RELATIONSHIPS BETWEEN NUTRITIONAL STATUS AND QUALITY OF LIFE AMONG DIABETIC PATIENTS AT THE GENERAL HOSPITAL OF VINH CITY

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ABSTRACT

Aims: This study aimed to determine the nutritional status and quality of life among diabetic patients and assess the relationships between the two aspects.

Methods: A cross-sectional study was conducted on 151 diabetic patients aged 40 years and older, being treated at the General Hospital of Vinh City from February to September 2024. Nutrition status was assessed using the body mass index (BMI), waist-hip-ratio (WHR), and the Subjective Global Assessment (SGA) tool. Quality of life was assessed by EQ-5D-5L.

Results: The rate of overweight/obesity was 45.03%. 80.13% of the participants were well-nourished according to SGA. 75.0% male and 95.2% female diabetic patients had a waist-hip-ratio higher than the recommended level . Mobility and pain/discomfort were the 2 dimensions in which most patients had to deal with. Median EQ-5D-5L and EQ-VAS scores were 0.7787 and 60, respectively. SGA and BMI categories were negatively associated with participants' quality of life.

Conclusion: Nutritional status is associated with quality of life among diabetic patients. Therefore, it is necessary to take great action to improve nutritional care for patients with the disease.

Keywords: *nutritional status, quality of life, diabetes*

I. INTRODUCTION

Chronic diseases such as diabetes, hypertension, cardiovascular diseases are highly associated with aging and impact the quality of life (QoL). As life expectancy has improved globally [1], it is important to determine and manage factors related to QoL among patients with noncommunicable diseases to improve the prevalence of healthy aging.

According to the International Diabetes Federation, approximately 537 million people in the world and 3.99 million people in Vietnam aged 20-79 are currently living with diabetes (2021) [2]. Middle-aged and elderly are the age group with the highest rate of the disease [3]. Diabetes is recognized as a lifelong burden for patients, as it is a major contribution to cardiovascular disease, malnutrition, diabetic neuropathy, nephropathy, retinopathy, and other complications. Therefore, assessing QoL and its associated factors is essential in the comprehensive care of diabetic patient.

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In addition to age, disease duration, medication regimens, and glycaemic control, a patients' nutritional status significantly affect QoL by impacting the progression of complications and comorbidities. A large number of diabetic patients are either overweight or obese, while others are at risks of malnutrition [4]. These conditions may contribute to increased morbidity, prolonged hospitalizations, and ultimately, a diminished QoL. Despite the importance of this issue, limited research has explored the relationship between nutritional status and QoL among diabetic patients'. Accordingly, this study was conducted to assess this association in diabetic patients at Vinh City General Hospital in 2024.

II. METHODS

2.1. Study design and subjects

A cross-sectional study was conducted from February to September 2024 in the Department of Cardiovascular & Endocrinology in the General Hospital of Vinh City. All inpatients in the General Hospital of Vinh City were screened for eligibility based on predefined inclusion and exclusion criteria.

Inclusion criteria included a confirmed diagnosis of diabetes and sufficient physical and cognitive ability to comprehend and respond to interview questions.

Exclusion criteria encompassed individuals with communication impairments (mute/deaf, etc.), diagnosed mental illness or disorders, pregnancy, acute disease conditions (COPD, gout, acute infection, etc.), those who declined participation. Following the screening process, a total of 151 participants met the criteria and consented to participate in the study. The final study population comprised patients aged 40 years and older with a confirmed diagnosis of diabetes, who were receiving treatment at the Department of Cardiovascular and Endocrinology in the General Hospital of Vinh City during the study duration.

2.2. Data collection

Data were collected using a structured questionnaire comprising four sections: general information, anthropometric indices, nutritional assessment, and QoL assessment. Anthropometric measurements, including weight and height, were obtained using a Tanita electronic scale and a standard height rod, following the standardized procedures of the National Institute of Nutrition's standard procedure [5]. All interview and anthropometric measurements were conducted by clinical nutritionists in the hospital.

Classifications

The International Diabetes Federation and Western Pacific Region's standard was applied to classify participants' BMI: Underweight (<18.5), Normal (18.5 - 22.9), Overweight (23 - 24.9), Obese (≥25) and WHO's standard for waist-hip ratio (WHR): Male (≥0.90), Female (≥0.85) [6, 7].

Considering patients who have limitations on mobility, we determined height and weight by the formula for calculating body height according to knee

height and BMI according to mid-upper arm circumference (MUAC) [8, 9]:

Height: Male: 2.12 × knee height (cm) + 59.06 - Female: 2.09 × knee height (cm) + 57.37

BMI = 0.873 x MUAC (cm) − 0.042

Weight (kg) = BMI x Height ^{2} (m)

The nutrition assessment tool is the Subjective Global Assessment (SGA). Participants will be categorized into 3 groups: Well-nourished (SGA-A), mild-moderately malnourished (SGA-B), severely malnourished (SGA-C) [10].

QoL assessment tool is EQ-5D-5L which comprises 5 dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension has 5 levels: no problems, slight problems, moderate problems, severe problems, and extreme problems [11].

2.3. Statistical analysis

Data was entered using Google Form Application and analyzed with Stata version 16.0. Descriptive statistics were applied to summarize the data: means and standard deviations were calculated for quantitative variables, while frequencies and percentages were used for qualitative variables.

Regression analysis was performed to examine the associations between participants' EQ-5D-5L, EQ-VAS score, and nutritional status. Kruskal-Wallis test was employed to assess the differences between participants' QoL and BMI, SGA classification, and WHR.

III. RESULTS

A total of 151 patients were enrolled in the study, with a mean age of 69.51 years. Approximately 73% of participants were aged over 65 years. The gender distribution includedn 54.97% male and 45.03% female participants. Up to 70% of the patients had been diagnozed with diabetes for 5 years or longer.

3.1. Participants' nutritional status

Although a substantial proportion of patients (47.02%) had a BMI within the normal range, 45.03% were classified as overweight/obese. According to the SGA, the majority of diabetic patients were well-nourished. As shown in Table 1, 75% of male participants had a WHR exceeding the WHO's recommended threshold; notably, this rate was even higher among female participants, reaching 95%.

Table 1. *Nutritional status according to WHR categories (n=151)*

	Frequency (n)	Percentage (%)
Male		
≥ 0.90	51	75.00
< 0.90	17	25.00
Female		
≥ 0.85	79	95.18
< 0.85	4	4.82

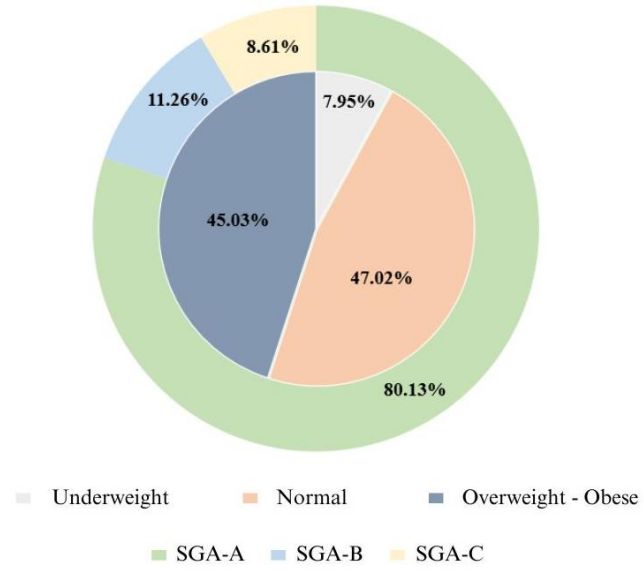

Figure 1. *Nutritional status according to BMI and SGA classification (n=151)*

3.2. Participants' nutritional status

Table 2. *Percentage of respondents for levels 1–5 by dimension (n=151).*

Level	Mobility	Self-care	Usual activities	Pain/ discomfort	Anxiety/ depression
1	55 (36.42)	108 (71.52)	80 (52.98)	40 (26.49)	107 (70.86)
2	27 (17.88)	16 (10.60)	21 (13.91)	46 (30.46)	15 (9.93)
3	25 (16.56)	3 (1.99)	17 (11.26)	36 (23.84)	12 (7.95)
4	35 (23.18)	18 (11.92)	16 (10.60)	18 (11.92)	15 (9.93)
5	9 (5.96)	6 (3.97)	17 (11.26)	11 (7.28)	2 (1.32)
Total (%)	63.58	28.48	47.03	73.51	29.14

Level 1: no problem. Data are shown in n (%).

The median EQ-5D-5L index was 0.7787 (IQR=0.4481) and the median EQ-VAS score was 60 (IQR=25). Table 2 shows that the two dimensions with the highest proportion of patients "having problems" were mobility and pain/discomfort. In usual activities, 17 patients, accounting for 11.26%, experienced extreme problems. The proportion of participants reporting "no problems" varied across dimensions, with the highest rates observed in self-care (71.52%) and anxiety/depression (70.86%).

3.3. The relationship between nutritional status and quality of life among study participants

Multivariate multiple linear regression model

As shown in Table 3, the stepwise method produced 2 multivariate linear regression models for the EQ-5D-5L and EQ-VAS scores with adjusted R^2 of 0.1795 and 0.1824, respectively. The factors significantly associated with the EQ-5D-5L index were SGA classification and WHR. According to EQ-VAS scores,

related factors were SGA classification and patients' BMI. All identified factors demonstrated negative correlations with the respective quality of life measures.

Table 3. *Coefficients of two multiple linear regression models (n=151).*

Model	Regression coefficient	95% confidence interval		*p*
EQ-5D-5L				
(Constant)	1.916242	1.263995	2.568489	<0.001
SGA	-0.2471962	-0.3265657	-0.1678267	<0.001
WHR	-1.003546	-1,663318	-0.3437741	0.003
EQ-VAS				
(Constant)	151.9388	120.1545	183.723	<0.001
BMI	-3.280958	-4.471538	-2.090378	<0.001
SGA	-14.77001	-20.64425	-8.895772	<0.001

Bổ sung thêm đơn vị BMI và SGA trong mô hình phân tích

Correlations of QoL scores between subgroups

Table 4. *Differences between the EQ-5D-5L index of the participants in each subgroup (n=151).*

Nutritional status	Median (IQR)	Mean rank	*p*
SGA classification			
Well-nourished	0.8005 (0.2859)	83.46	<0.001*
Mild/moderate malnourished	0.5368 (0.7731)	54.35	
Severe malnourished	0.2031 (0,4740)	34.84	
WHR classification			
Above the recommendation	0.7787 (0.3793)	77.08	0.435*
Normal	0.7665 (0.6235)	68.90	

** Kruskal-Wallis test*

Table 4 shows a statistically significant association between the median EQ-5D-5L scores and the SGA-A, B, and C groups. The median QoL scores of the participants decreased gradually from the well-nourished to the severe malnourished groups.

Table 5. *Differences between the EQ-VAS scores of the participants in each subgroup (n=151).*

Nutritional status	Median IQR)	Mean rank	*p*
BMI classification			
Underweight	45 (30)	44.67	<0.001*
Normal	70 (25)	96.31	
Overweight/Obese	50 (25)	60.32	
SGA classification			
Well-nourished	60 (25)	78.24	0.016*
Mild/moderate malnourished	65 (25)	84.85	
Severe malnourished	40 (30)	43.58	

** Kruskal-Wallis test*

As shown in Table 5, a statistically significant association was reported between median EQ-VAS scores in all subgroups classified by BMI and SGA. The median QoL score among participants with normal BMI was remarkably higher than those classified as underweight and the overweight/obese. Severe malnourished participants had a significantly lower QoL score than the SGA-A and B group.

IV. DISCUSSION

4.1. Study participants' nutritional status

According to BMI, the proportion of "overweight/obese" individuals in our study was approximately equivalent to that of patients with normal BMI. In contrast, previous study had generally reported a higher prevalence of normal BMI among diabetic patients. In particular, our study recorded a significantly higher proportion of "overweight/obese" compared to other studies conducted in Vietnam, but significantly lower than those reported in international studies [12]. This difference might be caused by the differences in sample size, study location, participants' age, disease status, and demographic and racial factors. Nonetheless, the prevalence of overweight and obesity among diabetic patients remains consistently high across studies.

Considering SGA categories, the majority of participants in our study were classified as well-nourished. The proportion of patients with mild/moderate malnourished and severe malnourished were 11.26% and 8.61%, respectively. A study conducted in Pakistan reported a comparable rate of severe malnutrition, although 48.2% of their patients were mild/moderate malnourished [13]. Nutritional status is affected by various factors, including energy intake, eating habits, and physical activity. Moreover, nutritional status worsens as the severity of complications increases. Those situations might be an explanation for the study results.

4.2. Study participants' quality of life

In the dimensions of self-care and anxiety/depression, a relatively high proportion of participants reported "no problems". Meanwhile, a recent study conducted in early 2024 found that the proportion of respondents who did not have problems in any of the EQ-5D-5L dimensions was minimal, ranging from 0% to 11.0% [14]. This difference might be attributed to differences in the study population; especially, the aforementioned study focused on patients with severe diabetic polyneuropathy, a condition associated with significantly impaired quality of life. In our study, mobility and pain/discomfort are the 2 dimensions in which most patients had problems to deal with. In usual activities, 11.26% of patients had severe problems.

The median EQ-5D-5L score in our study was 0.78 (IQR = 0.45), which was higher than those reported by Vuong Tien Nam (0.44) [14]. In comparison, a study conducted in Canada reported a median of 0.85, indicating a relatively higher Variation in QoL scores across studies may be attributed to differences in participants'characteristics, demographic factors, disease severity, and nutritional status. In addition, using different conversion scales for QoL scores might also create differences in study results. Overall, the QoL among diabetic inpatients is lower than outpatients, as

shown by the QoL score and also by each dimension.

The median EQ-VAS score among diabetic patients participating in our study was 60 (IQR = 25), which aligns with the observed distribution of EQ-5D-5L index values. This score was higher than that reported by Vuong Tien Nam, yet lower than the findings from Vo Duc Tri's study [12, 13]. This is reasonable, as outpatients and patients who do not have severe complications of diabetes are more likely to have better feelings about their health status.

4.3. The relationship between nutritional status and quality of life among study participants

Identifying the factors associated with QoL in diabetic patients is crucial for targeting patients who require specialized care to enhance their well-being. A large number of previous studies had examined determinants of QoL among individuals with diabetes, relatively few had explored the association between QoL and nutritional status.

In the present study, results from multivariate linear regression analysis and statistical testing revealed two key factors significantly associated with QoL: SGA classification and BMI.

SGA classification was found to be a significant predictor of QoL. QoL scores declined progressively from the well-nourished group to the severely malnourished group. SGA is a relatively comprehensive nutrition assessment tool, including 5 clinical factors related to nutrition: reduced food intake, unwanted weight loss, symptoms affecting oral feeding, oral function, functional capacity, and metabolic demand. Besides, SGA also assesses several physical factors such as subcutaneous fat thickness, muscle loss, and edema. Given its multidimensional approach, the SGA is considered predictive of clinical outcomes. These findings suggest that deterioration in nutritional status adversely affects both physical and mental health, ultimately reducing patients' QoL. This is consistent with the results of other studies in the world [16].

Additionally, BMI was also significant associated to QoL. Patients with normal BMI had better QoL compared to those who were overweight/obese or underweight. A study conducted by R. Apple confirmed that BMI has a significant relationship with physical and mental components of QoL [17]. However, another study enrolling 22,827 elderly people in the US concluded that the greatest negative impacts of the various BMI categories on QoL were on physical rather than mental aspects, especially for those in the underweight and obese categories [18]. This is consistent with the results of our study that the majority of the participants had no problem with anxiety/depression (70.86%).

V. CONCLUSION

This study revealed a high prevalence of overweight/obesity (45.03%) among diabetic patients, along with elevated waist-to-hip ratio (WHR), affecting 75% of male and 95.18% of female participants. Nutritional status and QoL are negatively associated. The QoL score of patients decreased significantly from the well-nourished to the severe malnourished group and from normal BMI to the overweight-obese and underweight group.

Recommendations: Medical staff should place greater emphasis on the nutritional care of diabetic patients, particularly in managing malnutrition and addressing overweight/obesity, in order to improve patients' quality of life.

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