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QUALITY OF LIFE OF UNCONTROLLED TYPE 2 DIABETES MELLITUS PATIENTS AND RELATED FACTORS IN THE COASTAL AREA OF KENDARI CITY

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ABSTRACT

Uncontrolled type 2 Diabetes Mellitus (DM) leads to serious complications that significantly impact patients' quality of life. This study aimed to evaluate the relationship between random blood sugar (RBS) levels, Low-Density Lipoprotein (LDL) cholesterol levels, blood pressure, stress levels, and family support with the quality of life of patients with uncontrolled type 2 DM in the coastal area of the Nambo Health Center. The quantitative cross-sectional study was used included 41 respondents from a population of 46 uncontrolled type 2 DM patients, selected using simple random sampling. Data was collected between April and June 2024. RBS levels were assessed using a glucometer, stress levels were measured with the Depression, Anxiety, and Stress Scale (DASS-21), quality of life was evaluated using the Diabetes Quality of Life (DQOL) questionnaire, and family support was assessed using the Hensarling Diabetes Family Support Scale (HDFSS). Data analysis included univariate, bivariate (chi-square test), and multivariate (logistic regression) analyses. The result revealed significant relationships between RBS levels (p=0.024), LDL cholesterol levels (p=0.001), blood pressure (p=0.0001), stress levels (p=0.006), and family support (p=0.008) with the quality of life of DM patients. Multivariate analysis identified LDL cholesterol, blood pressure, and stress as significant predictors of quality of life in type 2 DM patients, while family support did not significantly predict quality of life (p=0.659). These findings highlight the importance of managing factors such as glycemic control, LDL cholesterol levels, blood pressure, and stress levels in improving the quality of life for type 2 DM patients. Intensive and continuous health education programs are crucial to improve patients' knowledge of DM management, especially in coastal areas. Healthcare providers should implement a multidisciplinary approach that includes psychosocial and medical support to enhance the quality of life of uncontrolled type 2 DM patients.

Keywords:
Coastal area, Family support, Quality of life, Stress levels, Type 2 diabetes mellitus

BACKGROUND

Type 2 Diabetes Mellitus (DM) is a chronic disease and the third leading cause of death in Indonesia, with its prevalence steadily increasing. In 2018, blood glucose-confirmed cases among individuals over 15 years old increased from 6.9% to 8.5%, with 0.9% of the population in Kendari City suffering from DM (Kementerian kesehatan, 2018). At Nambo Health Center in Kendari city, 60% of DM patients have uncontrolled blood sugar levels, leading to physical, psychosocial, and spiritual disturbances. Psychosocial challenges such as fear, anxiety, depression, and reduced quality of life are prevalent (Kanera et al., 2019; Kioskli et al., 2019). Research has shown that 65.6% of DM patients suffer from depression, and 73.7% from anxiety, primarily due to neuropathic pain (Cherif et al., 2020). These psychological issues significantly affect daily activities, mood, mobility, self-care, recreation, and social interactions (Duarte et al., 2016; Girach et al., 2019). In a local study, 12 type 2 DM patients in Kendari reported psychological complaints, especially anxiety and stress related to their condition (Saltar et al., 2023), highlighting the need for targeted interventions.

Family support is vital in managing DM and is known to improve daily life satisfaction and quality of life significantly (QoL) (Tarkar, 2021). Support from family members or close friends, whether emotional, instrumental, or informational, can enhance the overall well-being of DM patients. Support from family members or close friends, whether emotional, instrumental, or informational, can enhance the overall well-being of DM patients. Yuliastuti et al. (2022) emphasize the importance of family support in improving patients' QoL, though limited research has explored how this support influences stress levels and quality of life, specifically in patients with uncontrolled type 2 DM. Stress, often termed "diabetes stress," is a critical factor that worsens health outcomes and affects patients' ability to manage their condition effectively (Shepardson et al., 2018). This stress arises from the constant demands of disease management, fears of complications, and the pressure to maintain stable blood sugar levels, which in turn aggravates anxiety and depression, further diminishing QoL. This stress arises from the constant demands of disease management, fears of complications, and the pressure to maintain stable blood sugar levels, which in turn aggravates anxiety and depression, further diminishing QoL.

Quality of life is shaped by a person's perceptions of their goals, expectations, and priorities within societal and cultural values (Cai et al., 2021). Identifying the factors that most significantly affect QoL in DM patients requires careful assessment, as highlighted by (Alaofè H et al., 2022), who found that elderly DM patients lacking family support were 4.21 times more likely to have poor QoL. However, most research to date has focused broadly on the psychosocial effects of DM or family support in elderly patients, leaving a gap in understanding the specific experiences of patients with uncontrolled type 2 DM, especially in coastal regions.

Uncontrolled blood glucose levels are a significant issue for DM patients in coastal areas, where limited access to healthcare, low awareness of DM management, and unhealthy dietary habits exacerbate the problem (Ottay et al., 2015). Studies have shown that patients in these regions are prone to higher blood sugar levels compared to urban areas, partly due to inadequate medical care and family support. This study aimed to explore the relationship between family support, stress, and QoL in patients with uncontrolled type 2 DM at the Nambo Health Center in a coastal area. By focusing on this underserved population, this research addresses a critical gap in the literature and offers insights for developing more effective interventions in managing uncontrolled type 2 DM.

METHODS

This study was a quantitative research with a cross-sectional design aimed at assessing uncontrolled type 2 diabetes mellitus (T2DM) patients. The target population for this study consisted of 46 uncontrolled T2DM patients. The sample size was calculated using a descriptive categorical sample size formula, which accounts for the population size, the standard deviation for the confidence level (alpha = 5%, Zalpha = 1.96), and a margin of error of 0.05 (Nanjundeswaraswamy and Divakar, 2021). Based on this calculation, a total sample of 41 respondents was obtained.

Inclusion criteria for the study included patients willing to participate as respondents, having a Random Blood Glucose (RBG) level greater than 200 mg/dl, and being over 18 years of age. On the other hand, exclusion criteria were applied to patients who were unable to communicate effectively, rendering them ineligible for participation. The sampling technique used in this study was simple random sampling, a probabilistic method that ensures each member of the population has an equal chance of being selected. A list of all patients meeting the inclusion criteria was

prepared, and 41 individuals were randomly selected from this list. The random selection was conducted using statistical software to minimize bias and improve the validity of the study results. This research was conducted from April to June 2024 in the coastal region of Nambo Public Health Center, Kendari City.
Operational Definitions

Uncontrolled type 2 diabetes mellitus (DM) was defined as blood glucose levels exceeding normal limits, with a random blood sugar (RBS) measurement greater than 200 mg/dl, assessed using a glucometer (Pamungkas & Chamroonsawasdi, 2020). The stress level variable was assessed using the Depression Anxiety Stress Scale-21 (DASS-21) questionnaire, which has a Cronbach's alpha reliability coefficient of 0.91 (Hakim & Aristawati, 2023). The questionnaire consists of 21 items rated on a Likert scale, measuring stress dimensions such as difficulty relaxing, nervous arousal, irritability, restlessness, overreactivity, and impatience. Stress levels in this study were categorized as mild (0-33%), moderate (34-66%), and severe (67-100%).

The quality of life (QoL) variable was measured using the Diabetes Quality of Life (DQOL) questionnaire, which contains 15 items and has a Cronbach's alpha value of 0.92 (Bujang et al., 2018). This tool evaluates dimensions such as satisfaction, the impact of the disease, and concerns related to physical functioning, psychological well-being, and social challenges. Responses were recorded on an ordinal scale, with the categories defined as follows: good (41-60), moderate (21-40), and low (1-20).

Family support was measured using the Hensarling Diabetes Family Support Scale (HDFSS), a 29-item questionnaire with a Cronbach's alpha reliability value of 0.96 (Hensarling, 2009). The scale assesses four dimensions of family support: empathetic support, encouragement, facilitative support, and participative support. Scores were categorized into three levels: good (58-116), sufficient (29-57), and lacking (14-28).

Univariate analysis was performed to describe demographic data, random blood sugar levels, family support, stress levels, and QoL. Bivariate analysis was applied to examine the relationship between family support and stress levels, as well as quality of life in the coastal area of Nambo Health Center, Kendari, using the chi-square test. Multivariate analysis was carried out to identify significant predictive factors affecting patients' quality of life. Logistic regression was employed to determine the odds ratio (OR) and confidence interval (CI) for each variable, with a p-value of less than 0.05 considered statistically significant.

This study has obtained approval from the Ethics Committee of Mandala Waluya University with the number 11.b/KEP/UMW/III/2024. No ethical issues were found during data collection, and this study adhered to principles that respect participants' rights. The researchers obtained permission from the relevant authorities at the research location and clearly communicated the study's purpose. The confidentiality of participant information was strictly protected. All participants were asked for consent after they were fully briefed on the purpose and procedures of the study.

RESULTS

The characteristics of respondents, including age, sex, education level, occupation, marital status, duration of diabetes, and metabolic markers (blood pressure, LDL cholesterol, and random blood sugar), are presented in Table 1.

Based on Table 1, the majority of the 41 uncontrolled type 2 DM patients in the coastal area of Nambo Health Center were adults (40-59 years old) at 73.2%, while 28.8% were elderly (>=60 years old). Most respondents were female (68.3%) and had completed senior high school (51.2%). The most common occupation was a housewife (53.7%), and 73.2% were married. The majority of patients had been diagnosed with diabetes for 1-5 years (48.8%). Blood pressure was normal in 56.1% of respondents, while 43.9% had high blood pressure. Regarding LDL cholesterol levels, 56.1% had levels below 200 mg/dl, while 43.9% had levels >=200 mg/dl. In terms of random blood sugar levels, 58.5% had levels between 200-299 mg/dl, and 41.5% had levels >=300 mg/dl.

The relationship between random blood sugar levels, LDL cholesterol, blood pressure, stress levels, and family support with the quality of life of uncontrolled type 2 DM patients in the coastal area of Nambo Health Center is presented in Table 2.

Table 2 shows the bivariate analysis of various factors with respondents' QoL. Among those with random blood sugar levels between 200-299 mg/dl, 42.5% reported a good QoL, while 15.0% reported a poor QoL. In contrast, among those with random blood sugar levels ?300 mg/dl, 15.0% reported a good quality of life, while 27.5% reported a poor QoL (p = 0.024). Similarly, LDL cholesterol levels were significantly related to QoL (p = 0.001), with 46.3% of respondents with LDL <200 mg/dl reporting a good QoL, compared to only 9.8% of those with LDL ?200 mg/dl. Blood pressure also showed a significant as-

Table 1. Characteristics of Research Respondents and Metabolic Markers

Characteristics of Respondents	n	%
Age		
Adult (40-59 years)	30	73.2
Elderly (≥60 years)	11	28.8
Sex		
Man	13	31.7
Woman	28	68.3
Level of education		
Elementary school	6	14.6
Junior high school	9	22.0
Senior high school	21	51.2
Higher education	5	12.2
Job		
Civil servant	8	19.5
Self-employed	6	14.6
Employee	1	2.4
Housewife	22	53.7
Pensiunan	4	9.8
Marital status		
Married	30	73.2
Unmarried	1	2.4
Widow/widower	10	24.4
Duration of diabetes (years)		
1-5	20	48.8
6 – 10	12	29.3
>10	9	22.0
Blood Pressure		
Normal	23	56.1
High	18	43.9
The score of cholesterol LDL		
<200 mg/dl	23	56.1
≥200mg/dl	18	43.9
The score of random blood sugar (mg/dl)		
200-299 mg/dl	24	58.5
≥300 mg/dl	17	41.5

sociation (p = 0.0001), with 48.8% of those with normal blood pressure reporting a good QoL, compared to only 7.3% of those with high blood pressure. Stress levels and family support were also significantly associated with quality of life, with lower stress and better family support linked to better QoL (p = 0.006 and p = 0.008, respectively).

Table 3 presents the logistic regression analysis to determine the predictive factors for QoL in type 2 DM patients. The analysis identified LDL cholesterol, blood pressure, and stress levels as significant predictors of QoL. LDL cholesterol had an odds ratio (OR) of 14.102 (CI 95%: 1.157-171.811, p = 0.038), blood pressure had an OR of 23.192 (CI 95%: 1.214-442.939, p = 0.037), and stress had an OR of 20.057 (CI 95%: 1.540-261.256, p = 0.022). Random blood sugar and family support were not significant predictors of QoL, with p-values of 0.628 and 0.659, respectively.

DISCUSSION

The results of this study showed that the majority of respondents were female, consistent with previous research indicating that women are more susceptible to type 2 diabetes mellitus (DM) than men (Kanera et al., 2019). This may be attributed to hormonal, behavioral, and lifestyle factors that affect women's vulnerability to the disease. Additionally, while higher education levels are typically associated with better health awareness, most respondents in this study only completed senior high school. This

Table 2. Distribution of Random Blood Sugar Levels, LDL Cholesterol, Blood Pressure, Stress Levels, and Family Support Based on Respondents' Quality of Life

Variables	Quality of Life				Total		p-value
	Good		Poor				
	n	%	n	%	n	%	
Random blood sugar							
200-299 mg/dl	17	42,5	6	15,0	24	57,5	0,024*
≥300 mg/dl	6	15,0	11	27,5	17	42,5	
LDL cholesterol							
>200 mg/dl	19	46,3	51	12,2	24	58,5	0,001*
≥200 mg/dl	4	9,8	13	31,7	17	41,5	
Blood pressure							
Normal	20	48,8	5	12,2	25	61	0,0001*
High	3	7,3	13	31,7	16	39	
Stress level							
Mild	20	48,8	8	19,5	28	68,3	0,006*
Moderate	3	7,3	10	24,4	13	31,7	
Family support							
Good	19	46,3	7	17,1	26	63,4	0,008*
Poor	4	9,8	11	26,8	15	36,6	

Notes: *Significant at p<0.05

Table 3. Logistic Regression Analysis of Predictive Factors for Quality of Life in Type 2 DM Patients

Variables	OR (95% CI)	p-value
Random blood sugar	0.519 (0.037 – 7.373)	0.628
LDL cholesterol	14.102 (1.157-171.811)	0.038*
Blood pressure	23.192 (1.214 – 442.939)	0.037*
Stress level	20.057 (1.540 - 261.256)	0.022*
Family support	0.571 (0.047 – 6.890)	0.659

Notes: *Significant at p<0.05

lower level of education may hinder their ability to effectively manage their condition, especially in coastal areas with limited access to adequate health information and education (Abdulrehman et al., 2016).

The most common diabetes duration among respondents was 1-5 years, suggesting that many patients were recently diagnosed. However, a significant number of patients had been living with diabetes for more than 10 years, which likely presented greater challenges in disease management. This finding aligns with (Cherif et al., 2020), who reported that longer disease duration increases the likelihood of severe complications. Furthermore, Hefner et al., (2015) noted that patients in coastal regions often face barriers to continuous healthcare access, exacerbating long-term management difficulties.

These findings emphasize the need for more effective health education programs, mainly targeting women and individuals with lower education levels, to improve type 2 DM management. In addition, regular monitoring and intensified interventions for patients with longer disease durations are crucial to prevent serious complications. The high random blood sugar (RBS) scores observed in this study indicated that many patients require better glycemic management, which includes dietary adjustments, increased physical activity, and more appropriate medical treatment. Juanamasta et al. (2021) highlighted that community-based interventions in coastal areas can enhance DM management outcomes through a more holistic approach.

The study revealed a significant relationship between RBS levels and the QoL of patients with uncontrolled type 2 DM. This was consistent with

previous research showing that higher blood sugar levels are associated with poorer QoL among DM patients. Poor glycemic control can lead to significant declines in physical activity and emotional well-being (Girach et al., 2019). However, in this study, 42.5% of respondents with RBS levels between 200-299 mg/dl reported a good quality of life, which is higher than findings from Cherif et al., (2020), who reported lower QoL scores for similar blood sugar levels. This discrepancy may be explained by factors such as family support, which may play a key role in improving patients' QoL despite elevated blood sugar levels. Yuliastuti et al., (2019) emphasized the importance of social support in DM management, particularly in coastal areas.

A comparison with existing literature reinforces the understanding that good glycemic management is crucial for enhancing the quality of life in patients with type 2 DM. Nonetheless, variations in the study's findings underscore the need for further evaluation of other factors influencing patients' QoL. The results highlight the significant relationship between RBS levels and quality of life in uncontrolled type 2 DM patients in the coastal area of Nambo Health Center, indicating that effective glycemic control is essential not only for preventing physical complications but also for improving overall QoL.

The findings have important implications for healthcare providers at Nambo Health Center. More intensive efforts are needed to control patients' blood sugar levels, including education on diabetes management, psychosocial support, and appropriate medical interventions. Furthermore, the study emphasizes the critical role of family support in helping patients manage their diabetes and improve their quality of life. This provides a basis for developing more effective and comprehensive intervention programs for managing type 2 DM in the coastal area of Nambo Health Center. A multidisciplinary approach focusing on good glycemic control and quality of life improvements can lead to better long-term outcomes and contribute to reducing the overall burden of diabetes in the community.

The study also identified a significant relationship between LDL cholesterol levels and quality of life among patients with uncontrolled type 2 DM. This aligns with previous research showing that high LDL cholesterol levels are linked to poorer quality of life in DM patients (Knudsen et al., 2023). Duarte et al. (2016) similarly reported that patients with elevated LDL cholesterol levels experience a higher risk of cardiovascular-related declines in quality of life. However, in this study, 46.3% of respondents with LDL cholesterol >200 mg/dl reported a good QoL, which contrasts with previous findings that typically reported lower quality of life at similar cholesterol levels (Girach et al., 2019). This difference may be attributed to other factors, such as family support and individual health conditions, that may affect perceptions of QoL. The comparison with existing literature confirms the importance of LDL cholesterol control in improving the QoL for type 2 DM patients. The variations in findings indicate a need for further exploration of additional factors that may impact patients' quality of life. The results underscore the significant association between LDL cholesterol and QoL in uncontrolled type 2 DM patients, indicating that effective cholesterol management is crucial not only for preventing cardiovascular complications but also for enhancing overall QoL. This study strengthens the existing evidence on the negative impact of high LDL cholesterol on QoL (Wratsangka et al., 2021), and underscores the need for a holistic approach to type 2 DM management.

Additionally, the study identified a significant relationship between blood pressure levels and quality of life in uncontrolled type 2 DM patients at Nambo Health Center. This is consistent with previous studies linking high blood pressure to lower QoL in DM patients (Adamu et al., 2022). Sitorus et al. (2022) also supported this finding, highlighting that poor blood pressure management can lead to significant declines in physical and emotional well-being. However, 48.8% of respondents in this study with blood pressure levels >200 mmHg reported good QoL, which is higher than previous reports Cherif et al. (2020). This variation may be due to other factors, such as family support or co-existing health conditions affecting QoL perceptions.

Similarly, the study showed a significant relationship between stress levels and QoL among uncontrolled type 2 DM patients. This finding aligns with prior research indicating that higher stress levels are associated with lower QoL in DM patients (Gómez-Pimienta et al., 2019). Ardilla et al. (2020) also reported that poor stress management could result in significant declines in both physical and emotional well-being. However, in this study, 48.8% of respondents with mild stress reported good QoL, which is higher than the findings from previous research. This discrepancy may be due to individual coping mechanisms and social support, which help mitigate the negative impact of stress (Zuhara et al., 2017).

These findings highlight the importance of stress management in improving the quality of life for type 2 DM patients. Although there are varia-

tions in the results, the study underlines the need for further evaluation of additional factors that may affect QoL in these patients. The significant relationship between stress levels and quality of life reinforces the importance of effective stress management to prevent psychological complications and enhance overall quality of life. Scientifically, this study supports existing evidence on the negative impact of high stress on quality of life and underscores the need for a holistic approach to managing type 2 DM.

In practice, these findings have important implications for healthcare providers at Nambo Health Center. More intensive efforts are required to manage patients' stress levels, including education on stress management techniques, psychosocial support, and appropriate medical interventions. Additionally, the study underscores the critical role of family support in helping patients manage their diabetes and improve their quality of life. This provides a foundation for developing more effective and comprehensive intervention programs for managing type 2 DM in the coastal area of Nambo Health Center. Focusing on good stress management and improving patients' quality of life through a multidisciplinary approach can lead to better long-term outcomes and reduce the burden of diabetes in the community.

Finally, the study identified a significant relationship between family support and QoL among uncontrolled type 2 DM patients. This aligns with previous research showing that good family support is associated with higher QoL in DM patients (Luthfa et al., 2019). Setyoadi et al. (2023) also found that patients receiving strong family support experienced better emotional and physical well-being. However, 46.3% of respondents in this study with good family support reported good QoL, which is higher than previously reported in similar contexts. This difference may be due to other factors, such as individual coping mechanisms or variations in healthcare access.

Comparing these findings with existing literature highlights the importance of family support in improving the QoL for type 2 DM patients. Although there are variations in the results, this study emphasizes the need for further evaluation of additional factors that may influence QoL in this patient population. The significant relationship between family support and QoL underscores the importance of effective family involvement in preventing psychological complications and enhancing overall quality of life. This study strengthens existing evidence on the positive impact of good family support on QoL and highlights the need for a holistic approach to managing type 2 DM.

The logistic regression analysis showed that cholesterol, blood pressure, and stress were significant predictors of QoL in type 2 DM patients. These findings align with previous research, which has identified these factors as having a substantial impact on the quality of life for DM patients (Alaofè H et al., 2022; Adamu et al., 2022). Shah et al. (2015) also supported these findings, showing that poor cholesterol and blood pressure management results in significant declines in quality of life. However, this study found that family support was no longer a significant predictor of QoL, which differs from earlier research emphasizing its importance (Yamin & Sari, 2018). This discrepancy may be due to methodological differences or unique characteristics of the study sample. In coastal areas, barriers to healthcare access and limited social support might have influenced these results.

CONCLUSIONS

This study has evaluated the demographic, clinical characteristics, and factors influencing the QoL of patients with uncontrolled type 2 diabetes mellitus (DM) in the coastal area of Nambo Health Center. Based on the findings, several key conclusions can be drawn: There is a significant relationship between random blood sugar levels, LDL cholesterol levels, blood pressure, stress levels, and family support with the quality of life in uncontrolled type 2 DM patients. Patients with better blood sugar, LDL cholesterol, and blood pressure control, lower stress levels, and stronger family support tend to have a higher QoL. Family support has proven to play a crucial role in improving the QoL of type 2 DM patients, indicating that interventions involving family members can have a significantly positive impact.

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