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Correlation Between Insulin Therapy and Quality of Life in Patients with Type 2 Diabetes Mellitus and Hypertension at Sunan Kudus Islamic Hospital

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ABSTRACT

Purpose: This study aims to examine the relationship between insulin therapy effectiveness and quality of life among patients with type 2 diabetes mellitus and comorbid hypertension at Sunan Kudus Islamic Hospital. It hypothesizes that glycemic and blood pressure control are significantly associated with patients' quality of life.

Research Method: This quantitative observational-analytical study employed a cross-sectional design. A total of 105 patients were selected through purposive sampling. Quality of life was assessed through interviews using the validated EQ-5D-5L questionnaire, while random blood glucose and blood pressure data were obtained from medical records. Univariate analysis and the Mann–Whitney test were performed using SPSS version 27.

Results and Discussion: Most respondents had ineffective control of random blood glucose (55.2%), controlled blood pressure (57.1%), and good quality of life (63.8%). Mann–Whitney analysis showed significant associations between random blood glucose, blood pressure, and quality of life ($p = 0.001$). These findings indicate that metabolic and blood pressure control are important determinants of patients' perceived health status.

Implications: Healthcare providers should strengthen insulin monitoring, patient education, adherence support, and the integration of diabetes–hypertension management.

Originality: This study simultaneously evaluates insulin effectiveness, blood pressure control, and quality of life among patients with T2DM and hypertension in a hospital-based setting in Indonesia.

Keywords: type 2 diabetes mellitus; insulin therapy; hypertension; quality of life; random blood glucose; EQ-5D-5L

1. Introduction

Diabetes Mellitus is classified as a chronic metabolic disease that develops over the long term and shows a consistent increasing trend in incidence globally, with data showing that the number of individuals with diabetes has sharply increased, from 108 million in 1980 to 422 million in 2014, along with a rising prevalence in the global adult population from 4.7% to 8.5% (World Health Organization, 2016). Data collected in the 2021 edition of the International Diabetes Federation's Diabetes Atlas show that Indonesia ranks fifth in the world in terms of the number of people with diabetes, with an estimated 10.6 million people (Carracher et *al.,* 2018). The prevalence of diabetes in Central Java is recorded at 1.6% based on medical diagnosis. It increases to 2.1% based on blood sugar level tests, while in Kudus

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Regency it is recorded at 1.4%, or about 18,329 patients (Central Java Health Office, 2024; Kudus Regency Health Office, 2023). This condition indicates that diabetes is a serious public health problem; thus, efforts need to be enhanced to improve early detection, control risk factors, and strengthen basic health services at various regional levels.

The most commonly diagnosed type of diabetes accounts for 95% of all diabetes cases, namely Type 2 Diabetes Mellitus (T2DM) (Indonesian Endocrinology Association, 2021). This disease is characterized by insulin resistance and impaired insulin secretion by pancreatic β cells. Insulin becomes the primary treatment option when oral medications are no longer effective at controlling blood sugar levels. Proper use of insulin can lower blood glucose levels and prevent long-term complications, with success rates being highly influenced by patient adherence and medical supervision (Rosner & Roman-Urrestarazu, 2018; Wulan et *al.,* 2024). Metabolic problems in individuals with type 2 diabetes are often accompanied by hypertension, experienced by 46.57% of patients, especially individuals over 50 years old with obesity (Ayutthaya & Adnan, 2020). The combination of these two diseases worsens metabolic status, increases the risk of long-term complications, and reduces patients' quality of life (Haryati & Tyas, 2022). Quality of life is a very important indicator for assessing the success of chronic disease management. Costa et *al.,* (2021) state that quality of life (QoL) measures the extent to which individuals feel well-being and life satisfaction in various aspects related to health. Physical condition, adaptability, social interaction, and mental balance also play a role in this. Chronic diseases such as diabetes affect all of these aspects, depending on treatment effectiveness and the patient's ability to adapt (Teli, 2017). The success of treatment is measured not only by a decrease in blood sugar levels but also by an improvement in overall quality of life.

Various studies indicate a correlation between therapy success and the quality of life of patients with Type 2 Diabetes Mellitus (T2DM). The study by Erawati & Wahyuningwulan (2024) reported that 85.48% of patients used a combination of insulin with 100% medication accuracy and 93.55% dose appropriateness, emphasizing the importance of rational insulin use for optimal clinical outcomes. Miftah & Solehati (2023) stated that most patients have a moderate quality of life, particularly in the psychological and environmental domains, indicating ongoing challenges in maintaining quality of life despite regular therapy. Siswanti et *al.,* (2025) stressed the importance of continuous education and therapy monitoring to improve patient understanding and adherence to treatment. Various studies report that insulin therapy can control blood glucose levels in patients with Type 2 Diabetes Mellitus (T2DM) (Rosner & Roman-Urrestarazu, 2018; Erawati & Wahyuningwulan, 2024). Studies that specifically examine the impact of insulin therapy on the quality of life of patients with comorbid hypertension are still relatively limited. Optimal blood glucose control has been proven to reduce the risk of complications and improve patients' clinical conditions (Hudatul Umam et *al.,* 2020; Miftah Hudatul Umam & Tetti Solehati, 2023). This study aims to analyze the correlation between insulin therapy and the quality of life of patients with type 2 diabetes mellitus and hypertension in outpatient services at RSI Sunan Kudus, as a basis for developing clinical pharmacy practices focused on improving patients' quality of life.

Based on the background description presented, this study aims to examine the correlation between insulin therapy and quality of life among type 2 diabetes mellitus patients with comorbid hypertension who are receiving outpatient care at Sunan Kudus Islamic Hospit*al.,* The researcher's interest in this topic arose from direct observations showing that many type 2 diabetes patients with hypertension are undergoing insulin therapy but have not achieved optimal glycemic control and face challenges in maintaining their quality of life. This condition motivates researchers to study the correlation between insulin therapy and patients' quality of life as part of efforts to improve the

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standards of patient-centered clinical pharmacy services. An initial survey conducted in October 2025, using data from Sunan Kudus Islamic Hospital for the period July to September 2025, showed that the total number of visits by diabetes mellitus patients was 487.

The remainder of this paper is organized as follows. Section 2 provides a literature review and hypothesis development. Section 3 presents the research method and design. Section 4 provides the results and discussion. Section 5 presents Concluding Remarks and Recommendations.

2. Literature Review and Hypothesis Development

2.1 *Type 2 Diabetes Mellitus with Comorbid Hypertension*

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and impaired insulin secretion, leading to persistent hyperglycemia. According to the World Health Organization, this condition contributes significantly to increased global morbidity and mortality due to complications such as cardiovascular disease, nephropathy, neuropathy, and retinopathy. In clinical practice, T2DM is frequently accompanied by hypertension, defined as a blood pressure ≥140/90 mmHg by the Indonesian Endocrinology Society. The coexistence of these conditions accelerates atherosclerosis and endothelial dysfunction, thereby increasing the risk of coronary heart disease, stroke, and kidney damage. Pathophysiologically, insulin resistance is associated with increased sympathetic nervous system activity and sodium retention, which contribute to elevated blood pressure. T2DM with comorbid hypertension therefore requires a comprehensive therapeutic approach to prevent long-term complications and mortality.

2.2 *Effectiveness of Insulin Therapy in Type 2 Diabetes Mellitus Patients*

Insulin therapy is indicated in patients with Type 2 Diabetes Mellitus (T2DM) when glycemic control is not achieved through lifestyle modification and oral antihyperglycemic therapy. According to the American Diabetes Association, insulin exerts its effects by enhancing peripheral glucose uptake and suppressing hepatic glucose production. The effectiveness of insulin therapy is evaluated based on the attainment of glycemic targets, including random blood glucose levels and HbA1c parameters. Therapeutic success is influenced by appropriate dosing, correct injection technique, proper rotation of injection sites, patient adherence, and structured education provided by healthcare professionals. In patients with comorbid hypertension, optimal glycemic control reduces the risk of microvascular complications and contributes to blood pressure stability as well as the prevention of macrovascular complications. The effectiveness of insulin therapy therefore represents a key indicator in the clinical management of patients with T2DM.

2.3 *Quality of Life of Type 2 Diabetes Mellitus Patients with Hypertension*

Quality of life is a multidimensional construct reflecting an individual's perception of physical, psychological, social, and environmental health-related conditions. In patients with Type 2 Diabetes Mellitus (T2DM) and hypertension, quality of life often declines due to the burden of long-term therapy, the risk of complications, and impaired physical function. Quality of life is commonly assessed using the EQ-5D-5L instrument developed by the EuroQol Group, which evaluates five dimensions: mobility, self-care, usual activities, pain or discomfort, and anxiety or depression. Evidence indicates that effective glycemic control achieved through insulin therapy is associated with improved quality-of-life scores, as

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patients experience reduced symptoms, a lower risk of complications, and a greater sense of health security. The effectiveness of insulin use is therefore closely associated with quality of life, particularly in patients with comorbid conditions that require integrated, continuous management.

3. Research Method

This quantitative study employed an observational-analytical approach to examine relationships among variables without intervention. The population comprised patients with T2DM and comorbid hypertension receiving insulin therapy at Sunan Kudus Islamic Hospital. A baseline survey in October 2025 recorded approximately 487 visits by diabetes patients between July and September 2025. Primary data were collected from eligible respondents through structured interviews using the EQ-5D-5L questionnaire. Participants received information about the study and signed informed consent forms before completing the questionnaire under researcher supervision. Secondary data were obtained from medical records after hospital authorization and ethical approval. These data included demographic characteristics, duration of T2DM and hypertension, insulin use, injection type and frequency, Random Blood Glucose (RBG), and blood pressure. RBG was used to assess insulin effectiveness, and blood pressure was used to assess hypertension control. All data were coded to protect confidentiality.

Data were analyzed using SPSS version 27. Processing included editing, coding, entry, and cleaning. Univariate analysis described respondent characteristics, insulin effectiveness, and quality-of-life categories using frequencies and percentages. Bivariate analysis examined the association between insulin effectiveness and quality of life. Normality was tested using Kolmogorov–Smirnov, while variance homogeneity was assessed with Levene's Test. Because the data were ordinal and did not meet the assumptions of parametric tests, the Mann–Whitney test was used to compare quality of life across insulin-effectiveness categories. Statistical significance was set at $p \leq 0.05$, indicating a significant association, whereas $p > 0.05$ indicated no association. The results were interpreted to explain the clinical relationship between glycemic control and quality of life in patients with T2DM and hypertension.

4. Results and Discussion

4.1 Analysis Results

4.1.1 *Validity Test*

Table 1. Results of the EQ-5D-5L Questionnaire Validity Test (Quality of Life)

Question	Calculate r value	Table r Value	Information
P1	0.659	0.306	Valid
P2	0.680	0.306	Valid
P3	0.699	0.306	Valid
P4	0.621	0.306	Valid
P5	0.641	0.306	Valid

Source: *primary data, 2026*

Based on the results of the validity test of the EQ-5D-5L questionnaire on questions 1-5 listed in Table 1 using SPSS version 27 and the product-moment correlation technique, the r value obtained for each point compared with the r table at a significance level of 10% with a sample size of 30 is 0.306.

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4.1.2 Reliability Test

Table 1. Questionnaire Reliability Test Results

Cronbach's Alpha	Reliability Coefficient	Number of Questions	Information
0.80	0.967	5	Very Reliable

Source: *primary data, 2026*

The results of the reliability test, as shown in Table 2, indicate that the questionnaire is reliable, with a Cronbach's alpha of 0.967, which exceeds 0.80.

4.1.3 Univariate Analysis

4.1.3.1 Respondent Characteristics

Analysis of the 105 respondents revealed that the majority were aged 46–60 years (84; 80.0%), while 21 (20.0%) were aged 30–45 years. Female respondents outnumbered male respondents (76; 72.4% vs. 29; 27.6%), indicating that the majority of patients with type 2 diabetes and comorbid hypertension undergoing insulin therapy at RSI Sunan Kudus in this study were women. The most common highest level of education was elementary school (42 respondents; 40.0%), followed by junior high school (35 respondents; 33.3%), senior high school (21 respondents; 20.0%), and diploma/bachelor's degree (7 respondents; 6.7%), indicating that the majority had a basic education. Occupational characteristics showed that the majority.

Table 2. Results of Respondent Characteristics Analysis

Respondent Characteristics	Number of Respondents (n=105)	Percentage (%)
Age		
30-45 years	21	20.0
46-60 years	84	80.0
Gender		
Man	29	27.6
Woman	76	72.4
Education		
Elementary School	42	40.0
Junior High School	35	33.3
Senior High School	21	20.0
Diploma/ Bachelor's Degree	7	6.7
Work		
Private employees	11	10.5
civil servant	3	2.9
Self-employed	21	20.0
Housewife	46	43.8
Laborer	16	15.2
Police	1	1.0
Farmer	5	4.8
Doctor	1	1.0
Lecturer	1	1.0
Long-term Suffering from Type 2 Diabetes Mellitus and Hypertension		
<5 years	104	99.0
>5 years	1	1.0
Duration of Insulin Use		
1-6 months	70	66.7

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Respondent Characteristics	Number of Respondents (n=105)	Percentage (%)
7-12 months	35	33.3
Frequency of Insulin Injections		
1 time	77	73.3
2 times	11	10.5
3 times	17	16.2
Types of Insulin		
Glargine (long-acting)	64	61.0
Aspart (rapid acting)	28	26.7
Premix degludec + aspart (long-acting)	13	12.4

Source: *primary data, 2026*

Most respondents had experienced T2DM and hypertension for less than five years (104; 99.0%), while only one respondent (1.0%) had a duration exceeding five years. Insulin use was predominantly 1–6 months (70; 66.7%), followed by 7–12 months (35; 33.3%), indicating that most patients were in the early- to intermediate-treatment phase. Most respondents administered insulin once daily (77; 73.3%), followed by three times daily (17; 16.2%) and twice daily (11; 10.5%). Insulin glargine was the most frequently used type (64; 61.4%), followed by insulin aspart (28; 26.7%) and premixed degludec–aspart insulin (13; 12.4%). These patterns may affect treatment adaptation, adherence, and glycemic control.

4.1.3.2 *Results of Univariate Analysis of Insulin Use Effectiveness Variables*

The next frequency distribution is the random blood glucose category. This study found that the largest number of respondents was in the ineffective category, namely 58 (55.2%), followed by the quite effective category with 29 (27.6%), while the smallest number was in the effective category, namely 18 (17.1%). This indicates that the majority of T2DM patients with comorbid hypertension in this study were in the ineffective random blood glucose category, illustrating that random blood glucose control among most respondents was still not optim*al.* The frequency distribution of blood pressure in this study shows that the largest number of respondents had controlled blood pressure (60 respondents (51.7%), while 45 respondents (42.9%) had uncontrolled blood pressure. Consistent with the results of the previous random blood glucose category, which found that the majority were ineffective, these data indicate that although most respondents had controlled blood pressure, blood sugar control remained suboptimal. This condition indicates that the management of T2DM and hypertension requires a more comprehensive approach so that both parameters can be controlled simultaneously.

Table 4. Results of Random Blood Glucose and Blood Pressure Analysis

Independent Variable	Number of Respondents (n=105)	Percentage (%)
Random Blood Glucose		
Effective	18	17.1
Quite Effective	29	27.6
Ineffective	58	55.2
Blood pressure		
Controlled	60	51.7
Not controlled	45	42.9

Source: *primary data, 2026*

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4.1.3.3 Results of Univariate Analysis of Quality of Life Variables

Table 3. Quality of Life Analysis Results

Quality of Life	Number of Respondents (n=105)	Percentage (%)
Good	67	63.8
Currently	35	33.3
Bad	3	2.9

Source: *primary data, 2026*

The following frequency distribution illustrates the respondents' quality of life. The research data shows that the majority of respondents (67 people) had a good quality of life, while the smallest number were in the poor quality of life category (3 people) (2.9%). Respondents with a moderate quality of life numbered 35 people (33.3%). These results indicate that the majority of T2DM patients with comorbid hypertension in this study had a good quality of life. However, there were still respondents with a moderate and poor quality of life who required attention in managing their disease.

4.1.4 Normality Test

Based on the normality test results table, the Kolmogorov-Smirnov test was used because the number of respondents was 105. The random blood glucose, blood pressure, and quality of life variables each had a significance value of 0.001, indicating that the data were not normally distributed because the significance value was ≤ 0.05. Based on the results of the normality test, a nonparametric test, namely the Mann-Whitney test, was required for the subsequent analysis.

Table 4. Normality Test Results

Kolmogorov-Smirnov			Shapiro-Wilk		
Category	**Number of Respondents**	**Significance**	**Category**	**Number of Respondents**	**Significance**
Random Blood Glucose	105	0.001	Random Blood Glucose	105	0.001
Blood pressure	105	0.001	Blood pressure	105	0.001
Quality of Life	105	0.001	Quality of Life	105	0.001

Source: *primary data, 2026*

4.1.5 Homogeneity Test

Table 5. Homogeneity Test Results

Category	Levene Statistics	Significance
Quality of Life	98.577	0.001

Source: *primary data, 2026*

The homogeneity test results with Levene's test showed a Levene Statistic value of 98.577 with a significance of <0.001, indicating that the variance between groups is not homogeneous because the significance value is ≤ 0.05.

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4.1.6 Correlation Between Insulin Therapy and Quality of Life Patients with Type 2 Diabetes Mellitus (T2DM) and Hypertension at Sunan Kudus Islamic Hospital

Table 6. Mann-Whitney Test Results for Respondent Characteristics with Quality of Life

Mann-Whitney Test of Respondent Characteristics with Quality of Life			
Respondent Characteristics	**Mean Rank**	**Mann-Whitney**	**p-value (Asymp. Sig)**
Age			
1. 30-45 years	15.00	84,000	0.001
2. 46-60 years	117.00	2562,000	0.001
Gender			
Man	19.00	116,000	0.001
Woman	113.00	2318,000	0.001
Education			
Elementary School	25.00	164,000	0.001
Junior High School	92.00	1037,000	0.001
Senior High School	114.00	42,000	0.001
Diploma/ Bachelor's Degree	109.00	0,000	0.001
Work			
Private employees	10.00	44,000	0.001
civil servant	76.50	91,500	0.213
Self-employed/business	114.00	42,000	0.001
Housewife			
Laborer	128.50	0,000	0.001
Police	113.50	0,000	0.001
Farmer	106.00	0,000	0.084
Doctor	108.00	0,000	0.001
Lecturer	106.00	0,000	0.042
	106.00	0,000	0.042
Long-term Suffering from DMT 2 and HT			
1. < 5 years	56.50	416,000	0.001
2. > 5 years	85.50	20,500	0.214
Duration of Insulin Use			
1. 1-6 months	69.00	2345,000	0.001
2. 7-12 months	102.50	717,500	0.001
Frequency of Insulin Injections			
1. 1 time/day	72.50	2579.500	0.001
2. 2 times/day	90.00	205,000	0.001
3. 3 times/day	112.50	25,500	0.001
4. 4 times/day	-	-	-

Source: *primary data, 2026*

The results of the analysis show that age is significantly related to quality of life, with the 46–60-year age group having a mean rank of 117.00 (p = 0.001), indicating a better quality of life compared to the 30–45-year age group with a mean rank of 15.00. Gender also shows a significant relationship, with women having a mean rank of 113.00 (p = 0.001), indicating that their quality of life is better than that of men, who have a mean rank of 19.00. The high school group had the highest mean rank of 114.00 (p = 0.001), indicating a better quality of life compared to the elementary, junior high, and diploma/bachelor's groups. Based on the type of work, homemakers have a mean rank of 128.50 (p = 0.001), indicating that their quality of life is better than that of other types of work. Duration of T2DM and hypertension were also significantly associated, with respondents with a duration of less than 5

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years having a mean rank of 56.50 (p = 0.001), which was lower than that of those with more than 5 years. Duration of insulin use showed significant differences in the 7–12-month group, with a mean rank of 102.50 (p = 0.001), indicating a better quality of life compared with 1–6 months of use. The frequency of insulin injections three times per day had the highest mean rank of 112.50 (p = 0.001), indicating a better quality of life compared with once- and twice-daily frequencies.

Based on the results of the normality and homogeneity tests, the data are not normally distributed, and the variances between groups are not homogeneous, so the bivariate statistical test used is the Mann-Whitney test. According to Table 9, of the 105 respondents, the majority—67 people (63.8%) reported a good quality of life, followed by 35 people (33.3%) in the moderate category and 3 people (2.9%) in the poor category. The random blood glucose variable showed that the largest number of respondents—58 people (55.2%) fell into the ineffective category. Among the "ineffective" random blood glucose group, the largest proportion of quality of life was in the "good" category, with 36 people (34.3%), followed by the 'moderate' category with 22 people (21.0%), and no one was found in the "poor" category. The moderately effective random blood glucose group comprised 29 people (27.6%), with 20 (19.0%) having good quality of life, 6 (5.7%) having moderate quality of life, and 3 (2.9%) having poor quality of life. The effective random blood glucose group consisted of 18 people (17.1%) and was dominated by good quality of life (11 people, 10.5%), with no cases in the poor quality of life category. The blood pressure variable showed that 60 respondents (57.1%) were in a controlled condition. The group with controlled blood pressure was characterized by a higher quality of life, comprising 41 people (39.0%), while in the group with uncontrolled blood pressure, 26 people (24.8%) had good quality of life. These data indicate that a good quality of life was more common among respondents with controlled blood pressure. In contrast, in the random blood glucose category, the distribution of quality of life remained varied. The results of the Mann-Whitney test showed a U value of 2759.500 for the random blood glucose variable and 5212.500 for the blood pressure variable, with a p-value of 0.001 (p < 0.05). This indicates that H_0 is rejected and H_1 is accepted.

Table 7. Correlation Between Insulin Therapy and Quality of Life in Patients with T2DM and Hypertension

Quality of Life							
Variables	**Variables**	**Variables**	**Variables**	**Variables**	**Variables**	**Variables**	**Variables**
Random Blood Glucose	Effective	11(10.5)	7 (6.7)	0 (0.00)	18 (17.1)	2759.500	0.001
	Quite Effective	20 (19.0)	6 (5.7)	3 (2.9)	29 (27.6)		
	Ineffective	36 (34.3)	22 (21.0)	0 (0.0)	58 (55.2)		
	Total	67 (63.8)	35 (33.3)	3 (2.9)	105 (100)		
Blood Pressure	Controlled	41 (39.0)	17 (16.2)	2 (1.9)	60 (57.1)	5212.500	0.001
	Not controlled	26 (24.8)	18 (17.1)	1 (1.0)	45 (42.9)		
	Total	67 (63.8)	35 (33.3)	3 (2.9)	105 (100)		

Source: *primary data, 2026*

According to Table 7, of the 105 respondents, the majority—67 people (63.8%) reported a good quality of life, followed by 35 people (33.3%) in the moderate category and 3 people (2.9%) in the poor category. The random blood glucose variable showed that the largest number of respondents—58 people (55.2%) fell into the ineffective category. Among the "ineffective" random blood glucose group, the largest proportion of quality of life was in the "good" category, with 36 people (34.3%), followed by

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4.2 Discussion

4.2.1 *Validity and Reliability Test*

The research instruments were tested for validity and reliability to ensure accuracy and consistency in measuring the variables. Validity aims to assess the accuracy and precision of the instrument in measuring the construct, so that the data produced is accurate and can be trusted. Valid instruments can reduce measurement errors and improve the quality of research results (Sugiyono, 2023). Validity testing of five items of the EQ-5D-5L questionnaire using Product Moment correlation with SPSS version 27 shows an r table of 0.306 in 30 respondents with a significance level of 10%, while r count P1–P5 are respectively 0.659; 0.680; 0.699; 0.621; and 0.641, so that all items are declared valid because r count exceeds r table. Reliability testing aims to assess the consistency and stability of an instrument in measuring research variables. A higher Cronbach's alpha value indicates better internal consistency between items (Sugiyono, 2023). The reliability test results yielded a Cronbach's alpha of 0.967, which falls within the 0.80–1.00 range and is categorized as highly reliable, indicating very strong internal consistency. These results align with research Tondok et *al.,* (2021) which reported a Pearson correlation of ≥0.60 ($p < 0.001$) and a Cronbach's alpha of 0.799 on the Indonesian version of the EQ-5D-5L, thus declaring it valid and reliable Susanto et *al.,* (2018) in the Manuntung Scientific Journal with a Pearson correlation value of >0.23 and Cronbach's alpha >0.60, so the EQ-5D instrument is suitable for measuring the quality of life of chronic disease patients.

4.2.2 *Univariate Analysis*

4.2.2.1 *Respondent Characteristics: Age*

The age classification in this study followed the Indonesian Ministry of Health (2009), categorizing individuals aged 30–45 years as early adults and those aged 46–60 years as late adults, approaching pre-elderly status. Most respondents were aged 46–60 years, comprising 84 individuals (80.0%). This group is more vulnerable to Type 2 Diabetes Mellitus (T2DM) because aging reduces pancreatic β-cell function and increases insulin resistance, thereby impairing glucose metabolism. The risk of T2DM generally increases after the age of 40 due to metabolic and hormonal changes. Visceral fat

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accumulation, reduced muscle mass, physical inactivity, unhealthy diets, stress, and long-term smoking further worsen insulin resistance. In women, declining estrogen levels during perimenopause and menopause also increase central adiposity and insulin resistance. Hypertension and dyslipidemia are also more common in middle age and are closely associated with metabolic syndrome. Fewer respondents were aged 30–45 years because insulin sensitivity and pancreatic β-cell function are generally better maintained in early adulthood. Individuals in this group are also less likely to have accumulated long-term metabolic risks, such as central obesity, hypertension, and dyslipidemia. These findings support previous studies showing that age is a major risk factor for T2DM and hypertension. Bellary et al. (2021) and Suastika et al. (2012) reported a higher risk of T2DM and cardiovascular disease after the age of 45, while Mozaffarian et al. (2009) emphasized the cumulative effects of lifestyle-related risk factors during middle age. Therefore, individuals aged 46–60 years are the most vulnerable to developing T2DM accompanied by hypertension.

4.2.2.2 *Respondent Characteristics: Gender*

The sex distribution analysis showed that most of the 105 respondents were female, comprising 76 individuals (72.4%). This indicates that patients with type 2 diabetes mellitus (T2DM) and comorbid hypertension undergoing insulin therapy at RSI Sunan Kudus were predominantly women. Women are more susceptible to T2DM because declining estrogen levels during perimenopause and menopause increase insulin resistance and hyperglycemia risk. Postmenopausal changes in fat distribution toward abdominal or visceral accumulation also contribute to metabolic syndrome. In addition, a history of gestational diabetes increases the risk of developing T2DM later in life by approximately 7–10 times. Other contributing factors include age ≥45 years, lower physical activity, and a higher prevalence of obesity. These findings are consistent with Kautzky-Willer et al. (2016), who reported increased insulin resistance and cardiometabolic risk among postmenopausal women due to hormonal changes. Peters et al. (2014) similarly found that women with diabetes have a higher cardiovascular disease risk than men, indicating greater susceptibility to metabolic and vascular complications.

4.2.2.3 *Characteristics of Education Respondents*

The analysis of educational level showed that 42 of 105 respondents (40.0%) had completed only primary school, indicating that most had a basic educational background. The high prevalence of T2DM among individuals with lower education may be associated with limited health literacy, preventive behavior, and socioeconomic conditions. Limited health literacy can reduce understanding of healthy diets, physical activity, weight management, and regular blood glucose monitoring. This group may also be more likely to consume foods high in simple carbohydrates and fats and engage in less structured physical activity. Limited access to health information and services, informal employment, and low income may further hinder healthy lifestyle practices and routine medical check-ups. These findings are consistent with Bener et al. (2009), who reported that low education among patients with T2DM and hypertension was associated with poor glycemic and blood pressure control. Berkman et al. (2011) similarly identified low educational attainment as a major predictor of limited health literacy, affecting the ability to understand medical information and manage chronic diseases.

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4.2.2.4 *Respondent Characteristics of Profession*

The occupational analysis showed that among 105 respondents, the majority were housewives (43.8%). This condition may be influenced by interrelated lifestyle, hormonal, and socioeconomic factors. Domestic activities are generally not considered structured physical activity that can improve insulin sensitivity, thereby making physical inactivity a risk factor for T2DM. The risk of obesity may also increase due to frequent consumption of simple carbohydrates. In addition, most homemakers are aged ≥45 years and experience hormonal changes that contribute to increased insulin resistance. Limited health literacy and socioeconomic conditions may further affect prevention and early detection efforts. Private employees exhibited lower quality of life, likely due to workload and work-related stress. In contrast, civil servants and self-employed individuals demonstrated relatively better quality of life, influenced by job stability and flexibility. Laborers, farmers, and police officers experienced a moderate quality of life, associated with workload, occupational risks, and limited access to healthcare. Similarly, doctors and lecturers had moderate quality of life, likely due to professional responsibilities and work-related stress. These findings are consistent with those of Keyes et al. (2005); Robbins et al. (2005); Agardh et al. (2011); and *Setiawan (2021),* which reported that occupational and socioeconomic factors are associated with quality of life in patients with T2DM.

4.2.2.5 *Characteristics of Respondents with Long-Term Type 2 Diabetes Mellitus and Hypertension*

The analysis showed that 104 of 105 respondents had experienced Type 2 Diabetes Mellitus (T2DM) and hypertension for less than 5 years. This predominance may reflect improved early detection through non-communicable disease screening programs. T2DM often develops gradually without early symptoms, while hypertension is commonly known as a "silent disease," causing many patients to become aware of their condition only during routine examinations. Both diseases also share risk factors, including obesity and insulin resistance. Patients with a disease duration of less than 5 years are generally still in the early stages of treatment and regular monitoring, which may explain their higher representation. In contrast, a duration exceeding 5 years is associated with a greater risk of cardiovascular, renal, and neurological complications, reduced daily functioning, psychological burden, and treatment fatigue. These factors may decrease quality of life, particularly when disease management is inadequate. Zheng et al. (2018) and Williams et al. (2018) reported that the risk of complications increases with disease duration. Nevertheless, patients who adhere to treatment, maintain a healthy lifestyle, and attend regular medical follow-ups may still preserve health stability and a good quality of life despite prolonged illness.

4.2.2.6 *Characteristics of Respondents with Length of Insulin Use*

The duration of insulin use was classified as 1–6 months or 7–12 months, based on the standard three-month diabetes therapy evaluation period. The first interval represents the initial phase, while the second reflects continued therapy within the first year (American Diabetes Association, 2024; Davies et al., 2018). Of the 105 respondents, 70 individuals (66.7%) had used insulin for 1–6 months, indicating that most were in the early phase of therapy intensification following inadequate glycemic control with oral antidiabetic drugs. Insulin is generally initiated when oral treatment fails, severe hyperglycemia occurs, or pancreatic β-cell function declines. It may subsequently be continued as long-term maintenance therapy when oral agents are no longer effective (ElSayed et al., 2022; Inzucchi et al., 2015). The predominance of insulin use for less than one year may also reflect relatively recent diagnosis and

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ongoing routine monitoring. Holman et al. (2009) reported a significant reduction in HbA1c within the first 3–6 months after insulin initiation. Similarly, Davies et al. (2018) stated that clinical response is usually assessed within the first three months, followed by dose adjustment for up to six months to achieve glycemic targets.

4.2.2.7 *Respondent Characteristics of Insulin Injection Frequency*

The analysis of insulin injection frequency showed that among 105 respondents, the majority administered insulin once daily (77; 73.3%). This reflects the recommended initial regimen for patients with T2DM and hypertension, which typically involves long-acting basal insulin due to its simplicity, better adherence, and lower risk of hypoglycemia. Commonly used insulins include long-acting agents such as glargine or degludec, which help maintain stable blood glucose levels. Twice-daily injections are generally prescribed for patients requiring tighter glycemic control, often using premixed insulin or a combination of basal and prandial insulin to control both fasting and postprandial glucose levels. In contrast, injections three times daily or more are used in patients with high or unstable hyperglycemia, typically employing a basal–bolus regimen with rapid-acting insulin to control postprandial glucose excursions. These findings are consistent with those of Inzucchi et al. (2015) and Lam (2003), who reported that once-daily basal insulin significantly improves glycemic control and patient adherence, making it an effective strategy for T2DM management.

4.2.2.8 *Respondent Characteristics of Insulin Type*

The analysis of insulin type showed that among 105 respondents, the majority used insulin glargine (64; 61.0%). This is because long-acting basal insulin, such as glargine, is recommended as initial therapy when glycemic control is not achieved with oral agents. Once-daily basal insulin is effective in reducing blood glucose levels, has a stable pharmacokinetic profile with a lower risk of hypoglycemia, and is more practical, thereby improving adherence. Insulin glargine is generally administered in patients with blood glucose levels of approximately 200–250 mg/dL to maintain stable glycemic control throughout the day. Rapid-acting insulin, such as aspart, is used for hyperglycemia ≥250 mg/dL, particularly to control postprandial glucose levels. Meanwhile, premixed insulin (degludec + aspart) is indicated for patients with unstable glycemic control, as it effectively manages both fasting and postprandial glucose levels. These findings are consistent with Swinnen et *al. (2010),* who reported that insulin glargine is effective as basal therapy, providing stable glycemic control in patients with T2DM.

4.2.3 *Overview of the Effectiveness of Insulin Therapy in Patients with Type 2 Diabetes Mellitus and Hypertension*

The results of this study involving 105 respondents with T2DM comorbid with hypertension showed that the majority had ineffective Random Blood Glucose (RBG) levels (58 respondents; 55.2%), while most had controlled blood pressure (60 respondents; 51.7%). This finding indicates that glycemic control is more difficult to achieve than blood pressure control, as it is influenced by complex factors such as insulin resistance, dietary patterns, and treatment adherence. In contrast, blood pressure tends to respond more consistently to antihypertensive therapy. Glycemic control is ideally assessed using HbA1c, which reflects average blood glucose levels over the past 2–3 months, with a general target of <7%. In this study, random blood glucose was used because HbA1c data were limited. ElSayed et *al.*,

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(2024); Khunti et *al.,* (2022); Lingvay et *al.,* (2022) reported that many patients with T2DM fail to achieve glycemic targets despite insulin therapy, due to progressive insulin resistance, delayed treatment intensification, and declining pancreatic β-cell function.

4.2.4 *Overview Quality of Life in Patients with Type 2 Diabetes Mellitus (T2DM) and Hypertension*

Univariate analysis showed that among the 105 respondents, the majority (67) had a good quality of life. This favorable outcome may be attributed to the fact that most patients had controlled blood pressure without severe complications, enabling them to maintain independence in daily activities across the EQ-5D-5L dimensions. Optimal management of chronic disease plays an important role in preserving physical function and overall well-being. In addition, adherence to therapy and effective self-management contribute to a positive perception of health despite comorbid conditions. This result is in line with research Zhuang et *al.,* (2020) In Plos One, it was reported that most patients with T2DM had a moderate to good quality of life, especially in cases where the disease was stably managed Trikkalinou et *al.,* (2017) in the World Journal of Diabetes also emphasized that quality of life is greatly influenced by the ability to adapt to the disease and long-term adherence to therapy Gusmão et *al.,* (2009) found that better blood pressure control in hypertensive patients was associated with higher health-related quality of life scores, suggesting that optimal blood pressure control can positively impact dimensions of patients' quality of life. These results are relevant to this study's findings, which showed that the majority of respondents had controlled blood pressure.

4.2.5 *Normality Test*

The results of the normality analysis were conducted on three research variables: random blood glucose, blood pressure, and quality of life in 105 respondents. A sample size>50 people led to the primary interpretation using the Kolmogorov-Smirnov test. All variables showed a significance value of 0.001. This value is ≤ 0.05, so the random blood glucose, blood pressure, and quality-of-life variables are not normally distributed. Abnormal distributions in clinical data can be influenced by variations in respondent conditions, the presence of extreme values, or certain score groupings. Health data often has an asymmetric distribution, thus failing to meet the assumption of normality (Ghasemi & Zahediasl, 2012; Mishra et *al.,* 2019). Kim (2012) states that a significance value <0.05 in the normality test indicates that the data do not follow a normal distribution and require nonparametric analysis. These results form the basis for using the Mann-Whitney test in this study. The Mann-Whitney test is appropriate for non-normal data because it is based on ranks rather than means and standard deviations (Fay & Proschan, 2010; Nachar, 2008).

4.2.6 *Homogeneity Test*

The homogeneity test was conducted using Levene's test for the quality of life variable. The Levene Statistic value was 98.577 with a significance level of <0.001 for 105 respondents, indicating that the results reflect non-homogeneous variance between groups. This condition indicates differences in the distribution of quality-of-life scores between the groups being compared. Levene's test was used to assess the equality of variances before conducting comparative analysis (Kim, 2012). Differences can influence variance inhomogeneity in respondent characteristics and score variations between groups. Inhomogeneity of variance influences the choice of subsequent analysis methods. The use of

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nonparametric tests is more appropriate when the homogeneity assumption is violated, ensuring that the results remain accurate and reflect the characteristics of the research data.

4.2.7 *Correlation Between Insulin Therapy and Quality of Life in Patients with T2DM and Hypertension*

4.2.7.1 *Results of Analysis of Respondent Characteristics Based on Age and Quality of Life*

The Mann–Whitney test showed that age was significantly associated with quality of life ($p = 0.001 < 0.05$), indicating differences between the 30–45-year and 46–60-year age groups. Patients aged 46–60 years had better quality of life, possibly due to greater psychological maturity, life experience, stress-management ability, and awareness of health maintenance. Older patients may also adapt better to chronic illness, have more stable social conditions, and hold more realistic expectations regarding their health, thereby reducing psychological burden. Javanbakht et al. (2012) reported that older patients showed better psychological adjustment to chronic disease and higher Health-Related Quality of Life scores. Similarly, Redekop et al. (2002) found greater emotional stability among older patients with T2DM than among younger adults.

4.2.7.2 *Results of Analysis of Respondent Characteristics Based on Gender and Quality of Life*

The results of the Mann–Whitney test indicated that sex was significantly associated with quality of life ($p = 0.001 < 0.05$), demonstrating a difference in quality of life between male and female groups. Based on the mean rank values, females had a better quality of life than males among patients with T2DM and hypertension. This finding may be attributed to higher treatment adherence, more positive health behaviors, stronger social support, and more adaptive stress management among female patients. These findings are consistent with Redekop et *al. (2002),* who reported that sociodemographic characteristics, including sex, are significantly associated with quality of life in patients with T2DM, with differences observed in several Health-Related Quality of Life (HRQoL) domains between males and females. Similarly, Al Hayek et *al.,* (2014)found that treatment adherence and self-care practices are positively associated with quality of life in patients with T2DM, with females demonstrating better self-care behaviors and medication adherence than males.

4.2.7.3 *Results of Analysis of Respondent Characteristics Based on Education and Quality of Life*

The analysis of educational level showed a significant association with patients' quality of life ($p = 0.001$). The senior high school group demonstrated the highest quality of life in this study, as indicated by the highest mean rank (114.00). Adequate educational attainment contributes to improved health literacy, a better understanding of insulin therapy, an enhanced ability to monitor blood glucose levels, and more informed decision-making, thereby supporting glycemic control and preventing complications. The bachelor's degree group did not demonstrate the highest quality of life, possibly due to greater work demands, higher expectations, and psychosocial stress. In chronic diseases, quality of life is more influenced by coping and adaptation abilities than by formal education. Individuals with a senior high school education may achieve a more optimal balance between health understanding and psychosocial burden. These findings are consistent with Wahyuni & Anna (2014), who reported that educational level is associated with quality of life, with better disease understanding, treatment adherence, and glycemic control contributing to higher quality-of-life scores.

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4.2.7.4 *Results of Analysis of Respondent Characteristics Based on Profession with Quality of Life*

The analysis showed that profession was significantly associated with quality of life (p = 0.001), with homemakers demonstrating a better quality of life. Homemakers tend to have a higher quality of life, possibly due to greater flexibility in managing daily schedules, including dietary patterns, blood glucose monitoring, and adherence to insulin therapy. In contrast, workload may increase stress, which can negatively affect Health-Related Quality of Life (HRQoL) in patients with T2DM. Homemakers generally have better control over their time, allowing for more consistent and structured disease management. These findings are consistent with Wahyuni & Anna (2014), who reported that profession is associated with quality of life in patients with T2DM. Respondents who were not formally employed or were homemakers had a better quality of life than those who were actively employed, likely due to greater flexibility in managing diet, rest, treatment adherence, and routine medical check-ups. Similarly, Khasanah et *al. (2025) found a significant relationship between employment status and quality of life, with jobs characterized by high demands and pressure* associated with lower HRQoL scores due to work-related stress and limited time, which may hinder adherence to diet, physical activity, and insulin therapy.

4.2.7.5 *Results of Analysis of Respondent Characteristics Based on Duration of Suffering from DMT 2 and HT with Quality of Life*

The analysis of disease duration in patients with T2DM and hypertension showed a significant association with quality of life, with better outcomes observed in patients with <5 years of disease duration compared with those with >5 years (p = 0.001). Disease duration is significantly related to patients' quality of life, as longer duration increases the risk of chronic complications and functional impairment, thereby reducing the ability to perform daily activities. Complications such as neuropathy, fatigue, and reduced mobility negatively affect both the physical and psychological aspects of quality of life. These findings are consistent with Paris et *al. (2023),* who reported a significant correlation between T2DM duration and quality of life. Patients with a longer disease duration tend to have lower quality of life compared to those with a shorter duration, which is associated with an increased risk of complications and treatment fatigue resulting from long-term chronic disease management.

4.2.7.6 *Results of Analysis of Respondent Characteristics Based on Duration of Insulin Use and Quality of Life*

The Mann–Whitney test indicated a significant association between age and quality of life (p = 0.001), with patients aged 46–60 years reporting better quality of life than those aged 30–45 years. This may reflect greater psychological maturity, stress-management ability, health awareness, adaptation to chronic illness, and realistic health expectations. Consistently, Javanbakht et al. (2012) reported better psychological adjustment and higher Health-Related Quality of Life among older patients, while Redekop et al. (2002) found greater emotional stability in older patients with T2DM.

4.2.7.7 *Results of Analysis of Respondent Characteristics Based on Frequency of Insulin Injections and Quality of Life*

This study found a significant association between the frequency of insulin injections and quality of life in patients with T2DM (p = 0.001). Patients receiving insulin three times daily had better quality of life than those receiving it 1–2 times daily, possibly because intensive therapy provides more stable glycemic

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control and reduces symptoms of hyperglycemia and hypoglycemia. This regimen is generally used in patients with high or unstable blood glucose levels and often involves rapid-acting insulin before meals to control postprandial glucose spikes. Fujita et al. (2018) similarly reported that more frequent insulin administration improves glycemic control, reduces complications, and enhances quality of life. The Mann–Whitney test also showed significant associations between quality of life and both Random Blood Glucose and blood pressure ($p = 0.001$). Better glycemic and blood pressure control may improve physical and psychological health, reduce cardiovascular and diabetes-related complications, and maintain overall health stability. These findings indicate that effective insulin therapy, reflected in metabolic and blood pressure control, is associated with better quality of life, consistent with Trikkalinou et al. (2017), Jing et al. (2018), Ritonga et al. (2025), and Alshayban and Joseph (2020).

5. Concluding Remarks and Recommendation

Type 2 diabetes mellitus with hypertension requires integrated long-term management because poor glycemic and blood pressure control may reduce daily functioning and quality of life. This cross-sectional study examined the association between the effectiveness of insulin therapy, as indicated by control of random blood glucose and blood pressure, and quality of life among 105 purposively selected patients at Sunan Kudus Islamic Hospital. Quality of life was assessed using the EQ-5D-5L, while clinical data were obtained from medical records and analyzed using the Mann–Whitney test. Most respondents had poor glycemic control, whereas the majority had controlled blood pressure and a good quality of life. Significant associations were found between random blood glucose, blood pressure, and quality of life.

The findings indicate that quality of life is influenced not only by insulin use but also by the effectiveness of overall disease management. Glycemic control, blood pressure control, treatment adaptation, and patient characteristics jointly shape perceived health status. Healthcare professionals should therefore strengthen clinical monitoring, insulin evaluation, injection education, adherence support, and coordinated, patient-centered care that integrates medication, diet, physical activity, and self-monitoring. Hospitals should also establish integrated protocols for diabetes and hypertension and conduct routine quality-of-life assessments. The study is original in that it simultaneously examines insulin effectiveness, blood pressure control, and quality of life among Indonesian patients with T2DM and hypertension.

However, the cross-sectional, single-center design, purposive sampling, reliance on random blood glucose rather than HbA1c, and self-reported quality-of-life data limit causal inference and generalizability. Other relevant factors, including adherence, lifestyle, complications, hypoglycemia, psychological status, and socioeconomic conditions, were not fully controlled. Future studies should use longitudinal or multicenter designs and larger probability-based samples, and should include HbA1c, insulin regimens, adherence, complications, lifestyle, and psychosocial variables.

References

Agardh, E., Allebeck, P., Hallqvist, J., Moradi, T., & Sidorchuk, A. (2011). Type 2 diabetes incidence and socio-economic position: a systematic review and meta-analysis. International Journal of Epidemiology, 40(3), 804–818.

Advances in Healthcare Research
Volume 4, Issue 2 (2026). 242-260
DOI: https://doi.org/10.60079/ahr.v4i1.773
OPEN ACCESS
e-ISSN: 2985-9808

Al Hayek, AA, Robert, AA, Al Saeed, A., Alzaid, AA, & Al Sabaan, F.S. (2014). Factors associated with health-related quality of life among Saudi patients with type 2 diabetes mellitus: a cross-sectional survey. Diabetes & Metabolism Journal, 38(3), 220.

Alshayban, D., & Joseph, R. (2020). Health-related quality of life among patients with type 2 diabetes mellitus in Eastern Province, Saudi Arabia: A cross-sectional study. PloS One, 15(1), e0227573.

Anggriani, Y., Rianti, A., Pratiwi, AN, & Puspitasari, W. (2020). Evaluation of insulin use in outpatients with type 2 diabetes mellitus at Hospital X in Jakarta during the 2016-2017 period. Journal of Pharmaceutical & Clinical Sciences, 7(1), 52–59.

Artini, KS, & Listyani, TA (2024). Analysis of cost and therapy effectiveness on the quality of life of outpatients with type 2 diabetes mellitus at Hospital X, Central Java. 8(1), 38–49.

Association, W. M. (2013). World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. JAMA, 310(20), 2191–2194. https://doi.org/10.1001/jama.2013.281053

Ayutthaya, SS, & Adnan, N. (2020). Risk Factors for Hypertension in Patients with Type 2 Diabetes Mellitus. Journal of Public Health Sciences, 9(02), 60–71. https://doi.org/10.33221/jikm.v9i02.512

Beauchamp, T., & Childress, J. (2019). Principles of Biomedical Ethics: Marking Its Fortieth Anniversary. In The American journal of bioethics: AJOB (Vol. 19, Issue 11, pp. 9–12). https://doi.org/10.1080/15265161.2019.1665402

Bellary, S., Kyrou, I., Brown, J.E., & Bailey, C.J. (2021). Type 2 diabetes mellitus in older adults:

ElSayed, N.A., Aleppo, G., Bannuru, R.R., Bruemmer, D., Collins, B.S., Ekhlaspour, L., Hilliard, M.E., Johnson, E.L., Khunti, K., & Kushner, R.F. (2024). 8. Obesity and Weight Management for the Prevention and Treatment of Type 2 Diabetes: Standards of Care in Diabetes–2024. Diabetes Care, 47.

Erawati, E., & Wahyuningwulan, F. (2024). Description of Insulin Use in Outpatients with Type 2 Diabetes Mellitus at Madiun City Hospital in 2022. Attamru Scientific Journal of Pharmacy, 5(1), 44–50. https://doi.org/10.31102/attamru.2024.5.1.44-50

Fay, M. P., & Proschan, M. A. (2010). Wilcoxon-Mann-Whitney or t-test? On assumptions for hypothesis tests and multiple interpretations of decision rules. Statistical Surveys, 4, 1.

Fujita, N., Yamamoto, Y., Hayashino, Y., Kuwata, H., Okamura, S., Iburi, T., Furuya, M., Kitatani, M., Yamazaki, S., & Ishii, H. (2018). Real-life glycemic control in patients with type 2 diabetes treated with insulin therapy: A prospective, longitudinal cohort study (Diabetes Distress and Care Registry at Tenri [DDCRT 9]). Journal of Diabetes Investigation, 9(2), 294–302.

Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: a guide for non-statisticians. International Journal of Endocrinology and Metabolism, 10(2), 486.

Gusmão, J.L. de, Mion, DJ, & Pierin, A.M.G. (2009). Health-related quality of life and blood pressure control in hypertensive patients with and without complications. Clinics (Sao Paulo, Brazil), 64(7), 619–628. https://doi.org/10.1590/S1807-59322009000700003

Hall, J. E. (2016). Guyton and Hall Textbook of Medical Physiology, Jordanian Edition E-Book. Elsevier Health Sciences.

Haryati, AI, & Tyas, TAW (2022). Comparison of HbA1c Levels in Type 2 Diabetes Mellitus Patients with and Without Hypertension at Duri Regional General Hospital, Mandau, Bengkalis, Riau. Journal of Medicine and Health, 18(1), 33. https://doi.org/10.24853/jkk.18.1.33-40

Health, P. (2022). 1. Improving Care and Promoting Health in Populations: Standards of Medical Care in Diabetes—2022. Diabetes Care, 45(January), S8–S16. https://doi.org/10.2337/dc22-S001

Herdman, M., Gudex, C., Lloyd, A., Janssen, M., Kind, P., Parkin, D., Bonsel, G., & Badia, X. (2011). Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). Quality of Life Research, 20(10), 1727–1736. https://doi.org/10.1007/s11136-011-9903-x

Holman, RR, Farmer, AJ, Davies, MJ, Levy, JC, Darbyshire, JL, Keenan, JF, & Paul, SK (2009). Three-year efficacy of complex insulin regimens in type 2 diabetes. New England Journal of Medicine, 361(18), 1736–1747.

Advances in Healthcare Research
Volume 4, Issue 2 (2026). 242-260
DOI: https://doi.org/10.60079/ahr.v4i1.773
OPEN ACCESS
e-ISSN: 2985-9808

Hudatul Umam, M., Solehati, T., & Purnama, D. (2020). Overview of Quality of Life of Patients with Diabetes Mellitus at Wanaraja Community Health Center. Kusuma Husada Health Journal, January, 70–80. https://doi.org/10.34035/jk.v11i1.419

Id, N. W., Thuraisingham, A., & Id, A. J. (2023). The association between symptoms of gastroesophageal reflux disease and perceived stress: A countrywide study of Sri. 1–14. https://doi.org/10.1371/journal.pone.0294135

Inzucchi, S.E., Bergenstal, R.M., Buse, J.B., Diamant, M., Ferrannini, E., Nauck, M., Peters, A.L., Tsapas, A., Wender, R., & Matthews, D.R. (2015). Management of hyperglycemia in type 2 diabetes, 2015: a patient-centered approach: update to a position statement of the American Diabetes Association and the European Association for the Study of Diabetes. Diabetes Care, 38(1), 140–149.

Javanbakht, M., Abolhasani, F., Mashayekhi, A., Baradaran, H.R., & Jahangiri noudeh, Y. (2012). Health related quality of life in patients with type 2 diabetes mellitus in Iran: a national survey.

Jing, X., Chen, J., Dong, Y., Han, D., Zhao, H., Wang, Related factors of quality of life of type 2 diabetes patients: a systematic review and meta-analysis. Health and Quality of Life Outcomes, 16(1), 189. https://doi.org/10.1186/s12955-018-1021-9

Kahn, S. E. (2003). The relative contributions of insulin resistance and beta-cell dysfunction to the pathophysiology of Type 2 diabetes. Diabeologia, 46(1), 3–19. https://doi.org/10.1007/s00125-002-1009-0

Kautzky-Willer, A., Harreiter, J., & Pacini, G. (2016). Sex and gender differences in risk, pathophysiology and complications of type 2 diabetes mellitus. Endocrine Reviews, 37(3), 278–316.

Keyes, C.L., Michalec, B., Kobau, R., Zahran, H., Zack, M.M., & Simoes, E.J. (2005). Social Support and Health-Related Quality of Life Among Older Adults--Missouri, 2000. MMWR: Morbidity & Mortality Weekly Report, 54(17).

Khasanah, M., Siswanti, H., & Mardiana, SS (2025). Factors Associated with Quality of Life in Patients with Type 2 Diabetes Mellitus. Dm, 243–251.

Kim, H.-Y. (2012). Statistical notes for clinical researchers: assessing normal distribution (1). Restorative Dentistry & Endodontics, 37(4), 245–248.

Yen, FS, Wei, JCC, Chiu, LT, Hsu, CC, & Hwu, CM (2022). Diabetes, hypertension, and cardiovascular disease development. Journal of Translational Medicine, 20(1), 1–12. https://doi.org/10.1186/s12967-021-03217-2

Zheng, Y., Ley, S. H., & Hu, F. B. (2018). Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. Nature Reviews Endocrinology, 14(2), 88–98.

Zhuang, Y., Ma, Q.-H., Pan, C.-W., & Lu, J. (2020). Health-related quality of life in older Chinese patients with diabetes. PloS One, 15(2), e0229652.

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