



Relationship of Self-Care Based on Orem Theory to the Risk of Peripheral Neuropathy in Diabetic Patients Type 2 Mellitus at the Tilongkabila Health Center

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ABSTRACT

This study aims to find out how the relationship between self-care and the risk of peripheral neuropathy in patients with type 2 diabetes mellitus at the Tilongkabila Health Center. This type of research is quantitative using a correlational design, which aims to find out whether there is a relationship between two or more variables with the approach used, namely cross-sectional. Based on the results of the study, obtained from 74 respondents, it shows that most of the respondents have good self-care, namely 50 respondents (67.6%), followed by respondents with sufficient self-care as many as 11 respondents (14.9%), and less self-care as many as 13 respondents (17.6%). The results of neuropathy screening examination using monofilament found that as many as 41 respondents (55.4%) were not at risk of developing peripheral neuropathy, while 33 respondents (44.6%) were at risk of peripheral neuropathy. There was a statistically significant relationship between self-care based on Orem's theory and the risk of peripheral neuropathy in patients with type 2 diabetes mellitus at the Tilongkabila Health Center, with a p-value of 0.043 ($p < 0.05$).

INTRODUCTION

Non-communicable diseases (NCDs) are one of the main causes of premature death in various parts of the world today. This trend shows a shift in disease patterns from the dominance of infectious diseases to NCDs that lasts for a long time (Fajriah *et al.*, 2023). One of the NCDs that contributes significantly to the number of illnesses and deaths is diabetes mellitus (WHO, 2024). DM is a group of metabolic diseases characterized by hyperglycemia due to impaired insulin secretion, insulin action, or both (Putri *et al.*, 2024).

DM is affected by various factors such as age, genetics, lack of physical activity, obesity, stress, modern lifestyle, as well as the use of certain medications. These factors can cause serious damage to various body systems, particularly to nerves and blood vessels. This disease is often unaware by the sufferer, they realize when they have experienced complications. Therefore, diabetes mellitus is often referred to as *Silent Killer* (Juwaria & Priyanto, 2021).

The prevalence of people with diabetes mellitus continues to increase in various countries. *International Diabetes Federation Year 2025* noting that by 2024 there will be around 589 million adults in the age range of 20-79 years suffering from diabetes mellitus. By 2050, it is estimated that the number of people with diabetes mellitus will jump to 853 million cases. Based on data SKI in 2023, in Indonesia itself, the prevalence of diabetes mellitus based on doctor's diagnosis in the population of all ages was 877 thousand cases.

Data from Gorontalo Provincial Health Office (2025) gathering from all health centers in the Gorontalo Province area in 2025, there are around 22,087 patients diagnosed with diabetes mellitus. If you look further at Bone Bolango Regency, Bone Bolango Regency Health Office (2025) reported that there were 2,251 cases of diabetes mellitus in 2025. Similar conditions were found in the study area, where the Tilongkabila Health Center (2025) recorded as many as 280 patients registered as diabetics.

The high number of people with diabetes mellitus will certainly cause many adverse effects of complications. Complications of diabetes mellitus can be hyperglycemia, hypoglycemia, macrovascular disorders affecting large blood vessels, coronary artery disease, microvascular disorders affecting small blood vessels, diabetic retinopathy, nephropathy, as well as peripheral neuropathy that affects the extremities. Neuropathy is the most common complication of diabetes mellitus, which affects the nerves of the extremities, especially in the legs (Latipah & Apriyanti, 2022).

Globally, the prevalence of diabetic peripheral neuropathy according to IDF (2017) ranges from 16%-66%. The incidence of diabetic peripheral neuropathy tends to be higher in women, which is 26.4% compared to men who reach 20.0% (Arista *et al.*, 2019). The prevalence of diabetic peripheral neuropathy in Indonesia is recorded at a high rate of 58.0%, which makes it one of the countries with the highest incidence rate in the Southeast Asian region (Waruwu & Wahyu, 2024). Based on these data, we can see that the incidence of peripheral neuropathy is quite high.

American Diabetes Association (ADA) in 2025, emphasizing that the prevention of peripheral neuropathy in diabetic patients includes blood glucose control, weight monitoring, serum lipid management, and blood pressure management. However, such interventions will not be effective if *Self-care* fewer patients. Letta *et al.* (2022) mentioning that many patients rely only on medication consumption to control diabetes, but neglect other aspects such as healthy diet, foot care, exercise, and blood sugar level monitoring. This condition can ultimately increase the risk of long-term complications, including peripheral neuropathy. This is the handling and prevention of DM complications proposed by Indonesian Endocrinology Association (2021)

Seeing that many patients are still neglected and find it difficult to apply these aspects, a structured and theory-based approach is needed. This approach is needed to help diabetic patients improve their self-care skills. Commonly used approaches in nursing practice are *Self-Care Theory* by Dorothea Orem. Through *Self-Care Deficit Theory*, Orem views the individual as an active agent in his or her self-care, both as the perpetrator and the recipient of the action. According to Orem *Self-Care* can improve human functions and their development in the social order (Martinez *et al.*, 2021).

Orem explained that the ability of individuals to perform *Self-care* Influenced by three types *Self-care requirements* (self-care requirements) which are the main components of the theory *Self-care* by Orem. Orem explains why and how individuals take care of themselves. The three components include *Universal self-care requirements* or universal needs such as eating, drinking and resting, *developmental self-care requisites* or related to individual needs and development, and *Health Deviation Self-Care Requirements* or needs due to health irregularities such as illness or injury (Maryani *et al.*, 2025).

Several previous studies have highlighted the importance of the practice *Self-care* in the management of diabetes and the prevention of its complications. Study by Letta *et al.* (2022) emphasizing that most diabetic patients have not fully implemented consistent self-care practices. In addition, research by Indriani *et al.* (2019) shows a significant relationship between *Self-care* with the incidence of peripheral neuropathy, where the patient is *Self-care* Less, at greater risk of developing complications of peripheral neuropathy. However, the research has been carried out since 2019 so further studies that are more actual are needed to strengthen scientific evidence and adjust to the current conditions.

Based on the results of an initial survey conducted at the Tilongkabila Health Center, from 280 patients with diabetes mellitus, the researcher asked 3 people randomly. One of the three people who had been interviewed, said that he felt tingling in the leg area and was lazy to maintain his diet, the second person said that he still rarely exercised because he was too busy and tired of doing his homework, another person felt tingling in the soles of his feet even though he had controlled his diet and paid attention to the condition of his feet, this condition showed that *self-care* management. In these patients, it is still lacking and the patient is at risk of developing peripheral neuropathy.

Similar research by Akmal *et al.* (2022) found that management *Self-care* The bad ones are closely related to the incidence of peripheral neuropathy in patients with diabetes mellitus, but have not been associated with a specific approach to nursing theory. Therefore, this study tries to relate the concept of *Self-Care* from Dorothea Orem, so that it is expected to provide a more comprehensive nursing perspective in understanding the relationship between *Self-care* with a risk of peripheral neuropathy in patients with diabetes mellitus.

RESEARCH METHODS

This type of research is quantitative using a correlational design, which aims to find out whether there is a relationship between two or more variables with the approach used, namely *Cross-sectional*, where data collection is done only at one specific time (Suleman *et al.*, 2024). This method is used because this study aims to find out the relationship between *Self-care* based on Orem's theory with the risk of peripheral neuropathy in patients with diabetes mellitus at the Tilongkabila Health Center which will be measured at the same time. The location of this research has been carried out in the Tilongkabila Health Center Working Area. The time for this research has been carried out from November 4 to 12, 2025.

Data Analysis

Univariate Analysis

Univariate analysis is a data analysis technique that is carried out on one variable separately, without connecting it with other variables. This analysis is often referred to as descriptive analysis or descriptive statistics, with the aim of providing an overview of the conditions or phenomena being studied (Sarwono & Handayani, 2021). In the univariate analysis, this statistical method is used to identify the distribution and frequency of respondent characteristic data (demographic data), independent variables *Self-care* based on Orem theory which includes 3 components, namely USCR (*Universal Self-Care Requirements*), DSCR (*Developmental Self-Care Requirements*), HDSCR (*Health Deviation Self-Care Requirements*), and risk-dependent variables of peripheral neuropathy in patients with type 2 diabetes mellitus.

Bivariate Analysis

Bivariate analysis is a data analysis technique used to examine the relationship or difference between two variables, namely independent variables and dependent variables (Sarwono & Handayani, 2021). Bivariate analysis in this study was carried out to determine the relationship between *Self-care* based on Orem's theory with the risk of peripheral neuropathy in patients with type 2 diabetes mellitus. This analysis uses the *Chi-Square*, to see the relationship between two categorical variables, so that it can be known whether or not there is a statistically significant relationship between independent variables *Self-care* which is ordinal scale with nominal peripheral neuropathy risk dependent variables.

RESULTS

Characteristics of Respondents by Age

Table 1 Respondent Characteristics Based on Respondent Age

Yes	Age	Frequency	
		Quantity (n)	Introduce yourself (%)
1	36-45 Years (Late Adult)	11	14.9
2	46-55 Years (Early Seniors)	30	40.5
3	56-65 Years (Late Seniors)	18	24.3
4	>65 Years Old (Senior)	15	20.3
Total		74	100

Source: Primary Data, 2025

Based on table 1, it can be seen that based on age, most of the respondents are aged 46-56 years with a total of 30 respondents (40.5%).

Characteristics of respondents based on length of DM

Table 2 Characteristics of respondents based on length of DM

Yes	Long Suffering from DM	Frequency	
		Quantity (n)	Introduce yourself (%)
1	< 1 Year	6	8.1
2	1-5 Years	64	86.5
3	> 5 Years	4	5.4
Total		74	100

Source: Primary Data, 2025

Based on table 2, it can be seen that based on the length of suffering from DM, most of the respondents suffered from 1-5 years as many as 64 respondents (86.5%).

Characteristics of Respondents Based on GDP (Fasting Blood Sugar)

Table 3 Characteristics of Respondents Based on GDP (Fasting Blood Sugar)

Yes	GDP (Fasting Blood Sugar)	Frequency	
		Quantity (n)	Introduce yourself (%)
1	Controlled	23	31.1
2	Uncontrolled	51	68.9
Total		74	100

Source: Primary Data, 2025

Based on table 3, it can be seen that respondents have uncontrolled GDP, which is 51 respondents (68.9%).

Characteristics of Respondents Based on Comorbidity Disease

Table 4. Characteristics of Respondents Based on Comorbidity Disease

Yes	Authoritative Diseases	Frequency	
		Quantity (n)	Introduce yourself (%)
1	None	25	33.8
2	Hypertension	26	35.1
3	Gout	6	8.1
4	Cholesterol	3	4.1
5	Heart	1	1.4
6	Hypertension, Gout	4	5.4
7	Uric acid, cholesterol	4	5.4
8	Hypertension, Gout, Cholesterol	5	6.8
Total		74	100

Source: Primary Data, 2025

Based on table 4, it can be seen that based on comorbidities, most of the respondents had hypertensive comorbidities, namely 26 respondents (35.1%).

Characteristics of Respondents Based on Length of Participation in Prolanis

Table 5 Characteristics of Respondents Based on Length of Participation in Prolanis

Yes	Long Join Prolanis	Frequency	
		Quantity (n)	Introduce yourself (%)
1	< 2 Years	25	33.8
2	≥ 2 years	49	66.2
Total		74	100

Source: Primary Data, 2025

Based on table 5, it can be seen that based on the length of time they have been in prolanis, most of the respondents have followed prolanis for ≥ 2 years as many as 49 respondents (66.2%).

Characteristics of Respondents Based on Companions to Prolanis

Table 6 Characteristics of Respondents Based on Companions to Prolanis

Yes	Companion to Prolanis	Frequency	
		Quantity (n)	Introduce yourself (%)
1	Alone	53	71.6
2	Husband/Wife	7	9.5
3	Mother/Child	8	10.8
4	Friends	6	8.1
Total		74	100

Source: Primary Data, 2025

Based on table 6, it can be seen that most of the respondents came to prolanis themselves as many as 53 respondents (71.6%).

Univariate Analysis

Based on research conducted on DM patients in the Tilongkabila Health Center Area, Bone Bolango Regency, a univariate analysis for *self-care* was carried out based on Orem theory and the risk of peripheral neuropathy presented in the form of a table.

Distribution of Respondents Based on Orem Theory Self-Care

Table 7 Distribution of Respondents Based on Orem Theory Self-Care in Type 2 Diabetes Mellitus Patients at the Tilongkabila Health Center

Yes	Self-Care Based on the Orem Theory	Frequency	
		Quantity (n)	Introduce yourself (%)
1	Good	50	67.6
2	Enough	11	14.9
3	Less	13	17.6
Total		74	100

Source: Primary Data, 2025

Based on table 7, it shows that *self-care* based on Orem theory is mostly in the good category, namely as many as 50 respondents (67.6%).

Distribution of Respondents by Risk of Peripheral Neuropathy

Table 8 Distribution of Respondents Based on the Risk of Peripheral Neuropathy in Type 2 Diabetes Mellitus Patients at the Tilongkabila Health Center

Yes	Risk of Neuropathy	Frequency	
		Quantity (n)	Introduce yourself (%)
1	No Risk	41	55.4
2	Risky	33	44.6
Total		74	100

Source: Primary Data, 2025

Based on table 8, it can be seen that some of the respondents who are not at risk of peripheral neuropathy are as many as 41 respondents (55.4%).

Bivariate Analysis**The Relationship of Self-Care Based on the Orem Theory with the Risk of Peripheral Neuropathy in Type 2 Diabetes Mellitus Patients at the Tilongkabila Health Center.****Table 9 Analysis of the Relationship between Self-Care Based on Orem Theory and Risk of Peripheral Neuropathy in Type 2 Diabetes Mellitus Patients at the Tilongkabila Health Center**

Yes	Self-Care Based on the Orem Theory	Risk of Peripheral Neuropathy				Total		p-value
		No Risk		Risky		N	%	
		N	%	N	%			
1	Good	28	56	22	44	50	67.6	.43
2	Enough	9	81.8	2	18.2	11	14.9	
3	Less	4	30.8	9	69.2	13	17.6	
Total		41	55.4	33	44.6	74	100	

Source: Primary Data, 2025

Based on table 9, it shows that out of 50 respondents in the good *self-care* category, there are 28 respondents (56%) who are not at risk of peripheral neuropathy, and 22 respondents (44%) are at risk of peripheral neuropathy. In the *self-sufficient care* category of 11 respondents, there were 9 patients (81.8%) who were not at risk of peripheral neuropathy, and 2 respondents (18.2%) were at risk of peripheral neuropathy. Meanwhile, of the 13 respondents in the *self-care* category lacking, as many as 4 respondents (30.8%) were not at risk and 9 respondents (69.2%) were at risk of peripheral neuropathy.

The results of this cross-tabulation were analyzed using the SPSS (*Statistical Package for the Social Sciences*) version 26 application. The results of the statistical test using the chi-square test obtained a p-value value = 0.043 which means ($p < 0.05$). This shows that there is a statistically significant relationship between *self-care* based on the Orem theory and the risk of peripheral neuropathy in patients with type 2 diabetes mellitus at the Tilongkabila Health Center.

DISCUSSION**Self-Care Based on Orem Theory in Type 2 Diabetes Mellitus Patients at the Tilongkabila Health Center**

Based on research that has been conducted on type 2 DM patients at the Tilongkabila Health Center regarding *self-care* based on Orem theory, it shows that the ability to *self-care* in type 2 diabetes mellitus patients is in the good category for most of the respondents, namely as many as 50 respondents (67.6%). These findings show that the majority of type 2 DM patients have adequate ability to carry out *self-care* independently. Good *self-care* in type 2 DM patients reflects the individual's ability to manage *self-care* needs on an ongoing basis in response to the chronic disease condition experienced. These conditions do not occur separately, but are influenced by the fulfillment of the *self-care* component, namely *Universal Self-Care Requisites* (USCR), *Developmental Self-Care Requisites* (DSCR), and *Health Deviation Self-Care Requisites* (HDSCR).

Self-care as a whole is formed from the ability of individuals to meet basic *self-care* needs properly or what are called *Universal Self-Care Requisites* (USCR), such as meeting air needs, fulfilling nutrients from eating and drinking, independence in elimination and personal hygiene, physical activity and rest, ability to interact with others, prevention of harm, and development and social relationships in patients with type 2 diabetes. Respondents with good *self-care* also showed good adaptability to the aspect of *Developmental Self-Care Requisites* (DSCR) which reflects that respondents in general have been able to do good *self-care* influenced by the ability to facilitate in supporting development and adaptation in their development to type 2 DM disease optimally.

In the *Health Deviation Self-Care Requirements* (HDSCR) aspect in the category of good *self-care*, it shows that most of the respondents are in good HDSCR. The dominance of the HDSCR category both in the *self-care* group shows that aspects of health change or deviation are components that contribute strongly to the formation of *self-care* as a whole. These findings also show that patients who have good *self-care* tend to be able to carry out *self-care* actions well, such as when they are sick, fall or injured, when they are unable to do activities, when they have visual impairments, and when they experience intellectual impairment in the management of type 2 DM continuously.

Based on the description above, these three aspects form the individual's overall ability to meet *self-care* needs well. The results of the research were dominated by categories *Self-care*. It is well illustrated that the majority of type 2 DM patients at the Tilongkabila Health Center have adequate *self-care* skills in managing their disease as a whole and are able to apply it in daily life. This condition is in line with research conducted by Basir *et al.* (2022) which states that *Self-care* is a key component in the management of diabetes mellitus, where most patients show activity *Self-care* good. This is supported by the theory by Orem (2001) that emphasizes that individuals with the ability to *Self-care* who are good are able to meet their *self-care* needs independently and consciously carry out *self-care* in response to the chronic disease conditions they

experience.

Factors that can affect *Self-care* good someone Among them are age, education, job, length of time in Prolanis, and companions when coming to Prolanis. From the results of the study, it can be seen that most of the respondents' ages are in the 46-55 years category (early elderly), namely as many as 30 respondents (40.5%) with the category *Self-care* the most dominant are *Self-care* good, namely 25 respondents (83.3%). These findings show that most of the patients with type 2 Diabetes Mellitus at the Tilongkabila Health Center in the early elderly group still have good self-care skills. This condition is in line with research conducted by Basir *et al.* (2022) that DM patients in the early elderly age group show a level of *Self-care* which is better than the elderly. The study explained that in the early elderly, physical and cognitive abilities are still adequate to support the implementation of self-care. This is supported by the theory Orem (2001), that the ability to *Self-care* influenced by the individual's ability to meet the demands of self-care. In the early elderly group, these abilities are still balanced with the demands of self-care due to chronic diseases, so that patients can still do self-care independently.

Based on educational factors, the results showed that most of the respondents had an elementary education level, namely 43 respondents (58.1%) and dominated by respondents with *Self-care* 26 respondents (52%). According to Aulia & Daryaman (2025), the level of education affects an individual's understanding of chronic disease management and the application of behaviors *self-care*. However, these results are not in line with the study because in this study most of the respondents with elementary education still showed *Self-care* in the good category. This is because it can be from the long-term factor of suffering from DM, or often following prolanis. This condition is supported by research conducted by Sustainable *et al.* (2025), that type 2 DM patients with low levels of education can still demonstrate the ability to *Self-care* which is good if you get health education that is continuous and easy to understand. This condition shows that diabetes self-management education programs such as Prolanis are able to improve their ability to *Self-care* patients significantly, regardless of the level of formal education possessed.

Other influencing factors *Self-care* good someone, namely work. From the results of the study, the majority of respondents were IRT (Housewives), namely 56 respondents (75.7%) with 40 respondents (71.4%) of whom had *Self-care* good. This is in line with research by Rahman (2023) that the dominant occupational group in patients with type 2 Diabetes Mellitus was housewives, where the majority of patients in the study carried out self-care activities independently in the context of their daily routine. This suggests that work that does not coexist with formal working hours may be related to ability in behavior *Self-care* which is good in type 2 DM patients. The results of this study are supported by the theory Orem (2001), that the work is included in the *Basic Conditioning Factors* that affects *self-care agency*. In housewives, the demands of relatively more flexible work allow individuals to have greater abilities so as to support the formation of *Self-care* which is better.

The length of participation in Prolanis also affects *Self-care* good patients. The results showed that most of the respondents followed prolanis for ≥ 2 years as many as 49 respondents (66.2%) with 30 respondents (60%) having *Self-care* good. These findings show that the majority of type 2 DM patients have a long enough experience in participating in Prolanis activities carried out by the Tilongkabila Health Center. This is supported by research Noviyantini *et al.* (2020), that various activities in Prolanis, such as periodic health check-ups, reminders of routine visits, and education, are aimed at increasing the knowledge of diabetics in managing their disease so that it can reduce the risk of complications.

In addition, the results of the study also showed that most of the respondents came to prolanis themselves, namely as many as 53 respondents (71.6%) with most also having *Self-care* The good ones were 38 respondents (76%). These findings show that the majority of patients have a good level of independence in accessing health services and actively participating in the management of their disease. This condition can be understood because type 2 DM patients have generally undergone the disease for a long period of time, so that adaptations and habits are formed in carrying out routine health control. These results are supported by research Susanti *et al.* (2023), namely type 2 DM patients who regularly participate in health education and assistance programs show a good level of self-care independence, including in accessing health services without dependence on others.

Based on the results of the study, it was also found that as many as 11 respondents (14.9%) were in the category of *sufficient self-care*. These findings suggest that individuals are able to perform most self-care activities, but are not optimal and still require support or education in certain aspects. In respondents with sufficient *self-care* categories, most had good *Universal Self-Care Requisites* (USCR). This shows that DM patients with sufficient *self-care* are generally able to meet basic daily needs, such as eating and drinking, maintaining personal hygiene, getting enough rest, doing physical activity, and preventing danger.

In addition, in the aspect of *Developmental Self-Care Requisites* (DSCR), most respondents with *self-care* are quite in the DSCR category of sufficient. The dominance of the DSCR category is enough to show that most of the respondents have basic adaptive skills, but are not fully stable and consistent to facilitate the development and adaptation in self-development to the type 2 DM disease suffered.

In the aspect of *Health Deviation Self-Care Requirements* (HDSCR), most respondents with *self-care* are quite in the HDSCR category of sufficient. These findings show that DM patients with sufficient *self-care* have taken some health change management measures, such as taking treatment when sick or falling and injured, being aware of the effects or complications of type 2 DM disease in the form of fatigue or inability to move, experiencing visual impairment, but have not been done consistently and thoroughly.

Based on the description above, respondents who have the ability to *Self-care* It is enough to show the ability to meet the needs of self-care but it is not optimal. This reflects that some type 2 DM patients at the Tilongkabila Health Center have *Self-care* which is enough because it is still not consistent in comprehensive self-care. The results of this study are in line with the research conducted by Paisal (2021) dominated by respondents with *Self-care* 38 respondents (54%). According to the theory Orem (2001), category *Self-care* It simply reflects a condition in which the individual's ability to perform self-care is still at a level close to the need, but is not yet fully balanced with the demands of self-care required by the disease condition. In patients with type 2 diabetes, this condition can occur when the individual has understood the importance of self-care, but has not been able to sustainably maintain the behavior in daily life.

Based on the results of this study, there were also 13 respondents (17.6%) who were included in the *category of self-care* lacking. These findings show that some patients are not able to meet their self-care needs according to Orem's theory. However, judging from the aspect of *Universal Self-Care Requirements* (USCR), there are no respondents with *less self-care* in the USCR category lacking. All respondents were in the USCR category of good and adequate, which indicates that the basic needs of self-care in type 2 DM patients have generally been met at the basic level.

In addition, respondents in the *self-care* category are lacking, in the aspect of *Developmental Self-Care Requisites* (DSCR) dominated in the less category. These findings show that individuals do not have adequate abilities to facilitate in supporting the development and self-development of type 2 DM disease as from the results of questionnaire interviews, some of the respondents admitted that they are rarely involved in activities in their living environment.

In the aspect of *Health Deviation Self-Care Requirements* (HDSCR) in the *category of self-care*, most respondents have less HDSCR ability. This shows that a person tends to be low in meeting *self-care* needs related to health conditions or health deviations experienced with type 2 DM disease, such as not recognizing symptoms, not being aware of the effects of falling or injury, not seeking medical treatment when unable to move, experiencing visual impairment, or when experiencing intellectual impairment.

Based on the description above, respondents with the *Self-care* Lack overall indicates an inability to meet self-care needs. This reflects that some type 2 DM patients at the Tilongkabila Health Center do not have *Self-care* adequate. This condition is in line with research conducted by Ferreidooni *et al.* (2024) that *Self-care* The lack does not only occur in one aspect, but as a whole it illustrates the low self-care ability of the respondents. In Orem's theory, this condition describes the occurrence of *Self-Care Deficit*, i.e. the imbalance between an individual's ability to perform an action *Selfcare* and the need *Selfcare* that must be met to maintain health and well-being (Anggeria, 2021).

Based on the description above, it can be concluded that *self-care* based on Orem's theory has important aspects in the management of type 2 DM disease. This is influenced by the basic needs of good self-care such as physical activity and rest, the individual's ability to adapt to changes that occur during the course of the disease, and the management of deviations/changes in health status such as during an injury or fall to minimize the risk of complications. DM patients must be more consistent in maintaining *their self-care* to improve their health by achieving aspects of *self-care* based on Orem's theory. Thus, DM patients who have good *self-care* will be able to take care of themselves and comply with the treatment process to achieve better health.

Risk of Peripheral Neuropathy in Type 2 Diabetes Mellitus Patients at the Tilongkabila Health Center

Based on the research that has been conducted by researchers on the analysis of the risk results of peripheral neuropathy in type 2 DM patients in 74 respondents with *the Monofilament Test* that the researcher has conducted at the time of the study, where it is said that it is risky if the respondent does not feel the monofilament device at >4 points on the soles of the feet, and it is said that it is not at risk if the respondent does not feel the monofilament device at ≤ 4 points or can be felt at all points.

The results of the study found that as many as 33 respondents (44.6%) were at risk of neuropathy. These findings suggest that some of the respondents already have early factors or signs that lead to complications of peripheral neuropathy. From the results of the study, researchers found that some respondents often complained of numbness and tingling in their legs. The condition is a clinical manifestation of peripheral neuropathy. *American Diabetes Association* (2025) mentions that diabetic peripheral neuropathy can develop gradually and often go unnoticed in the early stages, so many patients are at risk before the appearance of obvious clinical symptoms. Therefore, the percentage of patients at risk of neuropathy in this study can be understood as a condition that is commonly found in type 2 DM patients, especially in primary health services, namely health centers.

One of the risk factors for peripheral neuropathy is age, the results of the study found that respondents at risk of developing peripheral neuropathy were in the age group of 46-55 years or early elderly and age >65 years old or elderly. These results are in line with research conducted by Waruwu & Wahyu (2024) showed that most of the respondents at risk of developing peripheral neuropathy were between the ages of 45-59 years. Based on research that has been conducted by Tofure *et al.* (2021), this condition occurs because the aging process is related to the accumulation of damage caused by free radicals, such as increased levels of lipid peroxide as well as changes in enzyme activity, which ultimately lead to tissue damage in the elderly. In addition, the aging process in the elderly also causes a decrease in mitochondrial activity in muscle cells.

Peripheral neuropathy is a chronic complication that is often experienced by type 2 DM patients. This occurs because chronic hyperglycemia in Type 2 DM causes damage to peripheral nerves, namely autonomic, sensory, and motor nerves and then becomes neuropathy. Chronic hyperglycemic conditions will cause the activation of the polyol pathway so that it will increase the levels of sorbitol and fructose that play a role in the formation of *Advance Glycation End Products* (AGEs) which further cause endothelial dysfunction which causes weakening and destruction of the walls of blood vessels (Revelation *et al.*, 2021). This condition is related to the length of suffering from DM, ranging from 1-5 years to more than 5 years, when the patient does not comply with taking medication and also rarely controls his sugar levels regularly in such a span of time, then it can cause the occurrence of chronic hyperglycemia which is a risk factor for a person to experience peripheral neuropathy.

The results of the study found that some respondents who suffered for 1-5 years were at risk of peripheral neuropathy with a frequency of 26 respondents (40.6%). This is of course seen from the questionnaire answers to demographic data, most of the respondents answered the disease they suffered in the span of 1-5 years, there were even some who answered that it had been more than five years. These results are in line with research conducted by Ilmi *et al.* (2020), where most of the respondents suffered from DM for a long time 1-5 years, as many as 36 respondents (83.7%) were at risk of peripheral neuropathy. This condition suggests that the longer a person suffers from diabetes mellitus, the greater the risk of complications in the form of damage to blood vessels throughout the body, which can ultimately aggravate the impaired functioning of vital organs.

Current blood sugar levels or GDP (Fasting Blood Sugar) also affect the risk of peripheral neuropathy. The results showed that most of the fasting blood sugar (GDP) test results in patients with diabetes mellitus ≥ 126 mg/dL (uncontrolled) as many as 51 respondents (68.9%) with 27 respondents (52.9%) at risk of peripheral neuropathy. These results are in line with research conducted by Nursamsiah *et al.* (2025), in 76 respondents, there were 47 respondents (77%) with a GDP of ≥ 126 mg/dL at risk of neuropathy. These results are supported by *American Diabetes Association* (2025), where this condition is caused because neuropathy is one of the severe complications in people with diabetes mellitus and is related to various factors, one of which is glycemic status.

Other diseases suffered by DM patients also affect the risk of peripheral neuropathy. The results showed that most of the respondents had hypertensive comorbidities, namely 26 respondents (35.1%). This was obtained from the results of the demographic data questionnaire where most patients said they had other comorbidities other than DM in the form of hypertension, gout, and cholesterol. The results of this study are in line with the research conducted by Tofure *et al.* (2021), that the incidence of neuropathy accompanied by hypertension is related to the length of time the patient experiences DM with chronic hyperglycemia conditions. Long-term hyperglycemia causes structural and functional changes in the walls of blood vessels that have an impact on increasing blood pressure. The main dysfunction occurs in the endothelium of the blood vessels, triggering vascular complications.

Based on the description above, it can be concluded that the risk of peripheral neuropathy is influenced by various biological and clinical factors such as age, length of DM, GDP (Fasting Blood Sugar) levels, and the presence of comorbidities, especially hypertension. This condition shows that peripheral neuropathy is a chronic complication that still has the potential to occur even though the patient has received regular health services.

In addition, most of the respondents, as many as 41 respondents (55.4%) did not have the risk of neuropathy. This study shows that the frequency distribution of peripheral neuropathy risk shows that most are not at risk of developing peripheral neuropathy. This is related to the results of the interview, where most of them do physical activity, especially for housewives who often sweep, wash, mop, and cook. In addition, from the results of the interviews, it was also found that most of the respondents were consistent in regulating their diet such as not limiting the consumption of foods containing sugar in the form of cakes, biscuits, and tubers. Respondents are also obedient in taking medication, diligently controlling blood sugar to prolanis, and routinely doing foot care such as when washing feet or drying feet, this is based on the results of interviews conducted by researchers and seen from some respondents who have good foot condition and use footwear when visiting prolanis.

Based on the results of the interview, respondents said that they often do physical activity, maintain their diet, take foot care, obediently take medication, and regularly monitor their blood sugar levels. This is in

accordance with the five pillars of management and prevention of type 2 DM put forward by Indonesian Endocrinology Association (2021), that the five pillars of DM management include education, medical nutrition therapy, physical activity, pharmacological therapy, and blood glucose monitoring, which together play a role in controlling blood glucose levels and preventing the occurrence of chronic complications such as peripheral neuropathy.

The next factor that affects most of the people who are not at risk of developing peripheral neuropathy is that some respondents have had DM for <1 year. These findings indicate that the duration of the disease is an important factor that affects the risk of peripheral neuropathy in patients with type 2 DM. Patients with a relatively short period of DM are less likely to experience long-term exposure to chronic hyperglycemia. Peripheral neuropathy is a progressive complication that develops due to prolonged exposure to high blood glucose levels (Revelation *et al.*, 2021). Therefore, in the early phases of DM disease, peripheral nerve damage generally has not occurred or is still minimal, so the risk of peripheral neuropathy becomes lower (Bima *et al.*, 2023). This explains why respondents with DM for less than 1 year in this study did not show a risk of peripheral neuropathy.

The results of the study showed that most of the respondents were not at risk of peripheral neuropathy reflecting that the condition was inseparable from the Chronic Disease Management (Prolanis) program which was actively followed by most of the type 2 DM patients at the Tilongkabila Health Center. This is evidenced from the results of the study that as many as 49 respondents (66.2%) followed Prolanis for ≥ 2 years. The programs carried out by Prolanis include regular gymnastics, regular blood sugar checks, blood tests for HBA1c which are usually carried out every 3 months for DM patients, and educational counseling programs about DM disease so that patients are able to prevent complications or the risk of peripheral neuropathy. This is in line with research by Noviyantini *et al.* (2020), that various activities in Prolanis, such as periodic health check-ups, reminders of routine visits, and education, are aimed at increasing the knowledge of diabetics in managing their disease so that it can reduce the risk of complications.

The Relationship of Self-Care Based on Orem Theory with the Risk of Peripheral Neuropathy in Type 2 Diabetes Mellitus Patients at the Tilongkabila Health Center

The results of the study based on table 4.15 were obtained from the results of bivariate analysis using the *chi-square* statistical test and obtained the value of *Sig. (2-sided)* = 0.043 which means <0.05 . That is, there is a relationship between independent variables (*self-care* based on Orem theory) and dependent variables (risk of peripheral neuropathy). From these results, it can be assumed that the H0 hypothesis is rejected and the H1 hypothesis is accepted so that there is a meaningful relationship between *self-care* based on the Orem theory and the risk of peripheral neuropathy in type 2 diabetes mellitus patients at the Tilongkabila Health Center.

Based on the results of the research obtained, as many as 50 respondents (67.6%) had *Self-care* well with 28 respondents (56%) not at risk of peripheral neuropathy. These findings suggest that most type 2 DM patients with good self-care abilities tend to be in a more protected condition from the risk of complications of peripheral neuropathy. *Self-care* Good is formed from the fulfillment of all three aspects *Self-care* based on Orem's theory, namely *Universal Self-Care Requirements* (USCR), *Developmental Self-Care Requisites* (DSCR), and *Health Deviation Self-Care Requirements* (HDSCR) (Munandar *et al.*, 2023). This shows that respondents with the fulfillment of comprehensive self-care needs, both in terms of meeting basic daily needs, adaptability to chronic diseases, and managing health conditions and adherence to therapy, play a role in reducing the risk of peripheral neuropathy in type 2 DM patients.

The results of the research are in line with the research conducted by Indriani *et al.* (2019), which shows a significant relationship between *Self-care* with the incidence of peripheral neuropathy in patients with type 2 diabetes mellitus. In his study, patients with *Self-care* The good ones mostly do not have peripheral neuropathy. This is because patients are able to regulate their diet, do physical activity, take foot care, comply with medication, and control blood sugar regularly to remain stable which can reduce the occurrence of complications, especially peripheral neuropathy.

According to Kattang *et al.* (2025), blood sugar control is essential to prevent complications. Long-term chronic hyperglycemia in patients with diabetes mellitus is associated with nerve damage. This condition shows that the implementation of *Self-care* A good one, especially in controlling blood sugar levels, plays a role in reducing the risk of peripheral neuropathy in type 2 DM patients.

It is also supported by the theory Orem (2001) which states that the individual's ability to meet the needs of the individual *Self-care* will affect their health status. Fulfillment *Universal Self-Care Requirements* (USCR) allows individuals to maintain physiological balance through the fulfillment of eating and drinking, physical activity, rest, and harm prevention, *Developmental Self-Care Requisites* (DSCR) helps individuals facilitate development and adapt to changes in living conditions due to chronic illness, while *Health Deviation Self-Care Requirements* (HDSCR) deals with an individual's ability to manage illness, adhere to therapy, and monitor his or her health condition on an ongoing basis. Fulfillment of all three aspects *Self-care* This integrally plays a role in maintaining blood sugar control and preventing the occurrence of chronic

hyperglycemia which is the main factor in peripheral nerve damage, so that the risk of peripheral neuropathy is lower.

In addition, it was obtained that from 50 respondents who had *good self-care*, as many as 22 respondents (44%) were at risk of peripheral neuropathy. These findings suggest that *good self-care* does not necessarily completely eliminate the risk of peripheral neuropathy, but rather plays a role in lowering and slowing down the progression of the risk of complications. Although most of the respondents had *good self-care*, there were still respondents who were at risk of peripheral neuropathy which could be explained through the results of interviews by the researchers. Based on the results of the interviews, *good self-care* in these respondents has met the good aspects of USCR and DSCR, but the HDSCR aspect is still lacking related to sustainable disease management. This condition shows that even though respondents have knowledge about the DM they suffer, some respondents tend to ignore the initial symptoms that appear, such as leg cramps, falls, or injuries, without taking further treatment measures or consulting health workers. Respondents think that compliance in taking medication and carrying out other *self-care* behaviors is enough to maintain their health condition. In fact, a lack of response to these symptoms can potentially worsen health conditions and increase the risk of peripheral neuropathy.

According to Gallery *et al.* (2023) This condition can also occur because peripheral neuropathy in diabetes mellitus is a chronic complication that develops gradually due to chronic hyperglycemia, so nerve damage may have occurred prior to the behavior *Self-care* well applied. This is in line with research by Nasibu & Priasmoro (2025), that the longer the duration of the disease, the higher the incidence of neuropathy, which indicates that long-term exposure to chronic hyperglycemia plays an important role in the development of peripheral nerve damage, and that this can occur before the behavior *Self-care* a good one applied consistently.

This is supported by the theory Orem (2001) that states that the ability to *Self-care* Individuals aim to maintain health, life, and well-being, but are not always able to repair pathological damage that has occurred before. In the context of diabetes mellitus, *Self-care* Good acts as an effort to prevent and control complications, but are not curative to damage to organs or tissues that have formed due to a long course of disease.

As a result of the study, it was found that as many as 11 respondents (14.9%) had *sufficient self-care*, consisting of 9 respondents (81.8%) who were not at risk of peripheral neuropathy. These findings show that respondents have implemented most of their self-care practices, but are not optimal. Based on the results of the study, the researcher found that the respondents continued to carry out USCR such as fulfilling basic needs ranging from the fulfillment of oxygen, eating and drinking, elimination and personal *hygiene* independently, light physical activity, as well as carrying out DSCR such as the ability to adapt to the diseases they suffered. *Self-care* skills are categorized as sufficient because some aspects of long-term disease management (HDSCR) have not been fully met, for example early detection of deeply felt symptoms.

However, respondents are still not at risk of developing peripheral neuropathy because of supporting factors such as long-term participation in prolanis which is able to increase individual knowledge in managing their disease, especially to keep blood sugar under control so as to prevent complications (Noviyantini *et al.*, 2020). This is supported by research conducted Rachman & Dwipayana (2020), that good glycemic control was significantly associated with peripheral neuropathy status in type 2 DM patients, which corroborated that *Self-care* Basics such as blood sugar control play a role in lowering the risk of peripheral neuropathy. This condition is in line with the theory *Self-care* by Orem (2001) which states that the ability of individuals to carry out self-care practices, even at a sufficient level, can maintain health and prevent complications if supported by adequate supporting factors.

In addition, it was obtained from 11 respondents with *Self-care* Enough as many as 2 respondents (18.2%) were at risk of peripheral neuropathy. These findings show that respondents have implemented basic self-care practices in the USCR and DSCR aspects, while in HDSCR aspects such as in-depth monitoring of complication symptoms, foot examination during falls or injuries, and consistent blood sugar monitoring have not been fully implemented. Orem (2001) explains that the patient with the ability to *Self-care* who are able to take some precautions, but may not be consistent in all aspects of self-care. Respondents with *Self-care* will affect the risk of peripheral neuropathy. One of the risk factors for peripheral neuropathy is long-term DM suffering. According to Ilmi *et al.* (2020) The longer a person lives with diabetes, the more likely it is that the peripheral nerves will experience progressive chronic damage due to metabolic exposure to the disease.

Based on the results of the study, several respondents have recently participated in the Prolanis program at the Tilongkabila Health Center. They mentioned that initially they participated in the program to accompany family members, but when the examination was carried out, it was found that the respondents' fasting blood sugar (GDP) levels were not controlled or > 200 mg/dL. This condition causes a delayed diagnosis of diabetes mellitus, which the patient may have suffered from for a long period of time, which can affect the risk of peripheral neuropathy. This is supported by research conducted Rachman & Dwipayana (2020), that poor glycemic control is significantly associated with an increased risk of peripheral neuropathy in patients with type 2 DM. Respondents with non-optimal blood sugar control had a higher chance of peripheral nerve damage, despite the practice *Self-care* The foundation has been implemented.

In this study, respondents who had *less self-care* were also found as many as 13 respondents (17.6%) with 4 respondents (30.8%) who were not at risk of peripheral neuropathy. *Self-care* in the less category means that the respondents are still carrying out aspects of USCR adequately, such as meeting basic needs of eating, drinking, personal *hygiene*, and light physical activity. Meanwhile, the aspects of DSCR and HDSCR are still relatively lacking, namely the lack of adaptability to diseases and chronic disease management in a sustainable manner. This condition suggests that although *overall self-care* is lacking, adequate implementation of USCR can provide early protection against the risk of peripheral neuropathy, so that at this stage the respondent remains not at risk.

Based on the results of the study, most of the respondents found that their work as housewives (IRT) was obtained. Some of the respondents are still lacking in *self-care*, such as not controlling their diet, not adhering to sweet food taboos. However, their daily activities such as washing, sweeping, mopping, cooking, and selling can help burn glucose in the body which indirectly supports the stability of blood sugar levels, thus playing a role in reducing the risk of peripheral neuropathy.

This is supported by research conducted by Zuliana *et al.* (2025), that light daily physical activity can increase insulin sensitivity and help the body use glucose for energy, thereby having an impact on lowering or controlling blood sugar levels. The glucose is transferred from the bloodstream to the body's cells when the muscles are active, which indirectly smooths blood flow and lowers the risk of complications such as peripheral neuropathy. This condition is in line with the theory *Self-Care Deficit* Orem (2001) which states that despite the deficit in meeting the needs of self-care, the fulfillment of some basic needs in the USCR aspect in the form of physical activity can provide early protection against complications.

In addition, the results of the study were obtained from respondents who had *less self-care* as many as 13 respondents (17.6%) with 9 respondents (69.2%) at risk of peripheral neuropathy. These findings show that the ability of respondents to carry out basic self-care practices in the USCR aspect, namely the fulfillment of basic needs such as eating, drinking, elimination, personal *hygiene*, and light physical activity is not optimal, in the aspect of DSCR in the form of adaptability to diseases, as well as HDSCR related to long-term disease management, complication monitoring, and early detection of symptoms are still in the poor category. So that it can increase the risk of peripheral nerve damage.

The results of the research are in line with the research conducted by Jump *et al.* (2023), which found that DM patients with behavioral *Self-care* less have a higher risk of peripheral nerve damage. This is because patients often miss routine checkups, do not maintain foot hygiene, and do not comply with therapy, so peripheral nerve damage is more likely to occur. This condition is in line with the theory *Self-Care Deficit* by Orem (2001), which states that if there is a deficit in meeting self-care needs, the patient becomes vulnerable to complications of the disease. In this case, the deficit of self-care that is classified as lacking causes patients to lack to monitor the symptoms of complications, do not routinely perform foot examinations, and long-term disease management is not optimal, so the risk of peripheral neuropathy increases.

Theoretically, the above description can be explained through the concept *Self-Care Deficit Nursing Theory* by Orem (2001). USCR Fulfillment (*Universal Self-Care Requirements*), such as oxygen needs, eating and drinking, adequate physical activity, and adequate rest, play a role in maintaining metabolic balance and helping to control blood glucose levels. Better control of glucose levels can prevent the occurrence of microvascular damage that is the basis for peripheral neuropathy (Galiero *et al.*, 2023). In addition, *Developmental Self-Care Requisites* Helping patients adapt to changing health conditions due to chronic illnesses, so that patients are able to maintain consistent self-care behaviors. Meanwhile, *Health Deviation Self-Care Requirements* plays a role in medication adherence, routine health control, and early detection of complications, all of which contribute to lowering the risk of peripheral neuropathy.

However, the results of this study also show that there are respondents with a good level of *self-care* but remain in the risk category of peripheral neuropathy. This condition suggests that the risk of neuropathy is not only influenced by self-care behavior, but also by other biological and clinical factors such as work that affects physical activity, long suffering from diabetes, blood sugar level control, and prolonged prolactic participation. Therefore, efforts to prevent peripheral neuropathy require a comprehensive approach by paying attention to these various risk factors.

Thus, the results of this study confirm that *self-care* based on the Orem theory has an important role in reducing the risk of peripheral neuropathy in type 2 DM patients. Improving self-care skills needs to be continuously supported through health education, routine monitoring, and continuous assistance by health workers, especially nurses, as part of diabetes management in primary health services, especially in prolans.

CONCLUSION

Based on the results of the study, obtained from 74 respondents, it shows that most of the respondents have good *self-care*, namely 50 respondents (67.6%), followed by respondents with sufficient *self-care* as many as 11 respondents (14.9%), and *less self-care* as many as 13 respondents (17.6%). The results of neuropathy screening examination using monofilament found that as many as 41 respondents (55.4%) were not at risk of developing peripheral neuropathy, while 33 respondents (44.6%) were at risk of peripheral

neuropathy. There was a statistically significant relationship between *self-care* based on Orem's theory and the risk of peripheral neuropathy in patients with type 2 diabetes mellitus at the Tilongkabila Health Center, with a *p-value* of 0.043 ($p < 0.05$).

SUGGESTIONS

It is hoped that the Tilongkabila Health Center can strengthen type 2 diabetes mellitus management services by integrating a *self-care approach* based on the Orem Theory in the education and mentoring program for prolansis patients. In addition, screening for the risk of peripheral neuropathy needs to be carried out regularly using a simple tool in the form of monofilament as an effort to prevent complications and improve the quality of health services for patients with diabetes mellitus.

Patients with type 2 diabetes mellitus are expected to improve their ability to do *self-care* in accordance with the Orem Theory, including fulfilling the needs of self-care independently and sustainably. The optimal implementation of *self-care* is expected to help reduce the risk of peripheral neuropathy and maintain optimal health conditions.

Researchers are further advised to develop this study by adding other characteristics such as patients who have experienced DM complications or not. Then the characteristics of comorbidities can be developed the severity of the disease and the control of the comorbidities experienced. In addition, the suggestion for the next researcher to be able to explore in detail the subjective symptoms felt by the respondents, such as tingling, pain, or burning sensation that can affect daily self-care behavior.

REFERENCES

- Akmal, A., Syarif, H., & Husna, C. (2022). The Relationship Between Patient Characteristics Diabetes Self-Care Management with Diabetic Peripheral Neuropathy in Type 2 DM Patients in Regional General Hospital in Indonesia. *International Journal of Nursing Education*, 14(4), 32–38. <https://doi.org/10.37506/ijone.v14i4.18679>
- Arista, I. G. P., Yasa, I. D. P. G. P., Wedri, N. M., Widastra, I. M., & Rahayu, V. E. S. (2019). Ankle Brachial index (abi) values with Diabetic Peripheral Neuropathy in Type 2 Diabetes Mellitus Patients. *Journal of Nursing Echo*, 12(1), 35–43.
- Asrulla, Risnita, Jailani, M. S., & Jeka, F. (2023). Population and Sampling (Quantitative), as well as the Selection of Key Informants (Qualitative) in a Practical Approach. 7, 26320–26332.
- Aulia, N., & Daryaman, U. (2025). The Relationship between Selfcare and the Quality of Life of Patients with Type 2 Diabetes Mellitus at the Griya Antapani Health Center. *Masada Healthy Journal*, 19(1), 890–898.
- Bodman, M. A., Dreyer, M. A., & Varacallo, M. A. (2025). Diabetic peripheral neuropathy.
- British Columbia Provincial Nursing Skin & Wound Committee with NSWOCs/Wound Clinicians. (2022). Monofilament Testing for Loss of Protective Sensation (LOPS): Procedure. March, 1–4.
- Cucu, S., & Irna, N. (2024). Application of the concept of theoretical model according to orem in non-hemorrhagic stroke nursing care in the inpatient room. *Journal of Future Health*, 3(1), 1–7. https://doi.org/10.53115/19975996_2024_02_083_092
- Bone Bolango Regency Health Office. (2025). Internal Data of Diabetes Mellitus Patients in Bone Bolango Regency in 2025.
- Gorontalo Provincial Health Office. (2025). Internal Data on 10 Diseases in 2025.
- Fajriah, A. S., Pian, G. S. I., Lende, V., & Septianingrum, W. (2023). Efforts to prevent non-communicable diseases through Health Life Style. 5(September), 599–604.
- Febrinasari, R., Sholikah, T., Pakha, D., & Putra, S. (2020). Diabetes Mellitus Pocket Book for the public. https://www.researchgate.net/publication/346495581_BUKU_SAKU_DIABETES_MELITUS_UNTUK_AWAM
- Ilmi, M. Z., Abdurrahman, & Abiyoga, A. (2020). The Relationship Between the Length of Suffering from Type 2 Diabetes Mellitus and the Incidence of Sensory Neuropathy at the Loa Janan Health Center. *Wiyata Journal of Nursing*, 1(1), 1–15.
- Indriani, S., Amalia, I. N., & Hamidah, H. (2019). The Relationship Between Self Care and the Incidence of Peripheral Neuropathy in Type II Diabetes Mellitus Patients at Cibabat Cimahi Hospital 2018. *Bhakti Husada Health Sciences Journal*, 10(1), 54–67. <https://doi.org/10.34305/jikbh.v10i1.85>
- International Diabetes Federation. (2017). Eighth edition 2017. In *IDF Diabetes Atlas*, 8th edition.
- Juwaria, T., & Priyanto, A. (2021). The Relationship of Self Care with Blood Sugar Stability in Type II Diabetes Mellitus Patients. *Journal of Health Sciences*, 10(1), 78–85.
- Kattang, G., Zainuddin, Z., Yusuf, N. R., & Purwanto, E. (2025). Motivation for Blood Sugar Control of DMT2 Patients by Using the Peer Tutoring Website (Sweetech-DM) at the Suwawa Health Center, Bone Bolango Regency. *Mando Care Journal*, 4(1), 28–42. <https://doi.org/10.55110/mcj.v4i1.217>

- Letta, S., Aga, F., Assebe Yadeta, T., Geda, B., & Dessie, Y. (2022). Self-care practices and correlates among patients with type 2 diabetes in Eastern Ethiopia: A hospital-based cross-sectional study. *SAGE Open Medicine*, 10. <https://doi.org/10.1177/20503121221107337>
- Martínez, N., Connelly, C. D., Pérez, A., & Calero, P. (2021). Self-care: A concept analysis. *International Journal of Nursing Sciences*, 8(4), 418–425. <https://doi.org/10.1016/j.ijnss.2021.08.007>
- Maryani, L., Supriadi, Suhamdani, H., Kurnia, A., Wilandika, A., Riyana, A., Widyastuti, D., Nugraha, D., Murtiningsih, Suyati, Sakti, B., Safrudin, M. B., Putro, D. U. H., Xaverius, W. F., Yunus Adhy Prasetyo, Zulkarnain, Syabariyah, S., Suwandewi, A., Sianturi, S. R., ... Sihombing, F. (2025). *Basic Concepts of Nursing Textbook (AIPViKI Curriculum 2022)* (F. Sihombing (ed.)). CV Eureka Media Aksara. <https://books.google.co.id/books?id=7BGREQAAQBAJ>
- Mirian, A., Aljohani, Z., Grushka, D., & Florendo-Cumbermack, A. (2023). Diagnosis and management of patients with polyneuropathy. *CMAJ. Canadian Medical Association Journal*, 195(6), E227–E233. <https://doi.org/10.1503/CMAJ.220936>
- Nursamsiah, D., Dinarwulan, Kawuryan, U., & Wuriyani. (2025). The Relationship of Fasting Blood Sugar with the Incidence of Neuropathy in Type II Diabetes Mellitus Patients. *Journal of Nursing and Health Research*, 2(3), 109–114. <https://doi.org/10.71203/jrkk.v2i3.37>
- Orem, D. E. (1971). *Nursing: Concepts of Practice*. McGraw-Hill. <https://books.google.co.id/books?id=xxZtAAAAMAAJ>
- Orem, D. E. (2001). *Nursing Concepts of Practice* (6th ed.). Mosby.
- Pahria, T., Pitara, T., & Affirmsari, Ek. (2022). Factors that affect self-care in Heart Failure patients. *Journal of Forikes Voice Health Research*, 13(4), 886–893.
- Paisal, A. (2021). Overview of Self Care in Patients with Diabetes Mellitus According to Orem Theory in the Working Area of the Batunadua Health Center, Padangsidempuan City in 2021. In *Journal of Nursing Research*.
- Pamungkas, R. A., & Usman, A. M. (2021). A Practical Guide to Diabetes and Neuropathy Risk Screening. In I. Listiyawati & K. R. MN (Eds.), *Practical Guide to Diabetes and Neuropathy Risk Screening* (Vol. 1). CV KHD Production.
- Perkeni. (2021). Guidelines for the Management and Prevention of Type 2 Diabetes Mellitus in Indonesia 2021. in the Indonesian Endocrinology Association.
- Tilongkabila Health Center. (2025). Internal Data of Diabetes Mellitus Patients at the Tilongkabila Health Center in 2025.
- Putri, A. A., Junando, M., & Sukohar, A. (2024). Review Article: Pathophysiology and Pharmacological Therapy of Type 2 Diabetes Mellitus in Geriatric Patients. *Medical Sciences*, 2(5), 142–147.
- Rachman, A., & Dwipayana, I. M. P. (2020). Prevalence and relationship between glycemic control and diabetic peripheral neuropathy in patients with type II diabetes mellitus at Sanglah Hospital. *Udayana Medical Journal*, 32(3), 167–186. <https://doi.org/10.24843.MU.2020.V9.i4.P13>
- Rachmantoko, R., Afif, Z., Rahmawati, D., Rakhmatiar, R., & Nandar Kurniawan, S. (2021). Diabetic Neuropathic Pain. *JPHV (Journal of Pain, Vertigo and Headache)*, 2(1), 8–12. <https://doi.org/10.21776/ub.jphv.2021.002.01.3>
- Rahman, Z. (2023). The Effect of Health Education on Self-Care of Type 2 Diabetes Mellitus Patients. *Scientific Journal of Nursing*, 9(3), 577–581.
- Rizal, R., Shandy, V. R., Rusdi, M. S., & Afriyeni, H. (2024). A Study of Patient Satisfaction with Pharmaceutical Services at the Outpatient Pharmacy of Sungai Dareh Hospital. *Journal of Exact Scientific Research and Assessment*, 03(02), 58–67.
- Saltar, L., Sahar, J., & Rekawati, E. (2023). Self-Care Behavior, Self-Efficacy and Quality of Life of Patients with Type 2 Diabetes Mellitus with Symptoms of Peripheral Neuropathy. *Journal for ReAttach Therapy and Developmental Diversity*, 6(9s SE-Articles), 799–809. <https://jrtd.com/index.php/journal/article/view/1642>
- Indonesian Health Survey. (2023). Indonesian Health Survey 2023 in Numbers. In Ministry of Health of the Republic of Indonesia. <https://www.badankebijakan.kemkes.go.id/hasil-ski-2023/>
- Susanti, N., Nursalam, & Nadatien, I. (2023). The Effect of Education and Support Group Based on Self Care Theory on Compliance, Independence of Foot Care and Blood Glucose Levels in Type 2 Diabetes Mellitus Patients. 8(1), 21–29.
- Takahashi, K., Takeishi, C., Tsutsumi, C., Nakao, T., Sato, Y., Uchizono, Y., Nunoi, K., Tabira, Y., & Shimizu, Y. (2025). Exploring the relationship between self-care agency and quality of life in adults with diabetes: A cross-sectional study. *Plos One*, 20(7 July), 1–12. <https://doi.org/10.1371/journal.pone.0326783>
- Tandra, H. (2020). From Diabetes to Feet (Vol. 21, Issue 1, pp. 1–9).
- Tarihoran, D. M., Samosir, B., & Husada, Stik. N. (2024). The relationship between foot self care and peripheral neuropathy in diabetes mellitus in the working area of the Poriaha Health Center, Central Tapanuli District. *Journal of Scientific Horizons*, 3(12), 3617–3624.

- Tofure, I. R., S, H. L. B., & Eka, A. (2021). Characteristics of Patients with Diabetic Peripheral Neuropathy at the Neurological Polyclinic of Dr. M. Haulussy Ambon Hospital in 2016-2019. *Molucca Medica*, 14(2), 97–108.
- Wahyuni, N. P. A., Antari, G. A. A., & Yanti, N. L. P. E. (2021). Overview of the Level of Peripheral Neuropathy in Type 2 Diabetes Mellitus Patients at Wangaya Hospital. *Community of Publishing in Nursing (COPING)*, 9(2), 188–194. <https://doi.org/https://doi.org/10.24843/coping.2021.v09.i02.p09>.
- Waruwu, M. I. S., & Wahyu, A. (2024). A long association of suffering with the incidence of diabetic peripheral neuropathy in women of productive age in the working area of the Puskesmas Often Medan Melvin. *Excellent Midwifery Journal*, 6, 104.
- WHO. (2024a). Diabetes. World Health Organization. <https://www.who.int/news-room/fact-sheets/detail/diabetes>
- WHO. (2024b). Noncommunicable diseases. World Health Organization. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
- Zuliana, E., Rusnoto, & Sukesih. (2025). The Relationship between Sleep Quality, Medication Compliance, and Physical Activity with Blood Sugar Levels of Diabetes Mellitus Patients at Kaliwungu Kudus Health Center. *Journal of Tambusai Education*, 9, 5926–5937.