



Long Relationship of Suffering with Knowledge of Handling Hyperglycemia in Sufferers Type 2 Diabetes Mellitus in the Work Area Suwawa Health Center

Fira Destiany Karama¹, Ita Sulistiani^{2*}, Ibrahim Suleman³

¹Mahasiswa Program Studi Ilmu Keperawatan UNG

^{2,3}Dosen Program Studi Ilmu Keperawatan UNG

*Email: itasulistiani@ung.ac.id

Article Info

Article history:

Received 12 Oct, 2025

Revised 21 Dec, 2025

Accepted 05 Jan, 2026

Keywords:

Type 2 Diabetes Mellitus,
Hyperglycemia, Long
Suffering, Knowledge,
Treatment

ABSTRACT

Type 2 diabetes mellitus is a chronic disease that requires long-term management and is at risk of causing acute complications such as hyperglycemia. The treatment of hyperglycemia depends not only on medications, but also on the patient's knowledge in managing the disease. This study aims to determine the relationship between the length of suffering and the knowledge of handling hyperglycemia in patients with type 2 diabetes mellitus in the working area of the Suwawa Health Center. This study uses a descriptive design correlative with a cross sectional approach. The total sample was 75 respondents who were selected using the Proportional Simple Random Sampling technique. The results showed that 44 people (58.7%) of respondents who had suffered for a long <time for 5 years (58.7%), the majority had less knowledge (49.3%), while 7 people (9.3%) were knowledgeable. Respondents with a 5-year \geq of suffering were 31 people (41.3%), most of them had good knowledge (40.0%), and only 1 person (1.3%) was poorly knowledgeable. Based on the spearman rank test, a value of $p = 0.000$ ($p < 0.05$) was obtained, so that there was a significant relationship between the length of suffering and the knowledge of hyperglycemia management in patients with type 2 diabetes mellitus in the work area of the Suwawa Health Center. It is hoped that health facilities can improve education from the beginning of diagnosis and maintain continuous education programs so that patient knowledge continues to develop.

INTRODUCTION

Diabetes Mellitus (DM) is a chronic condition characterized by high blood sugar levels. This occurs due to the inability of the pancreas to produce enough insulin or the body's inability to use insulin effectively. Insulin is an important hormone produced by the pancreas and serves to help break down glucose into energy that can be used by the body's cells (Kriswiastiny et al., 2022).

People with diabetes mellitus are at high risk of experiencing serious health problems that can be life-threatening, as well as potentially lowering quality of life and increasing mortality. This can be seen from the increase in the number of cases of diabetes mellitus from year to year, which shows the need for more attention to the management and prevention of this disease (Priambodo) et al., 2023). According to International Diabetes Federation (IDF) In 2021, the number of people with diabetes mellitus in the world currently reached 537 million people aged 20 to 79 years. The global diabetic population is expected to increase to 643 million by 2030 and 783 million by 2045 (IDF, 2021).

Indonesia is ranked fifth in the world with 19.47 million people with diabetes. With a population of around 179.72 million, the prevalence of diabetes in Indonesia reaches 10.6%. (IDF, 2021). Data from the Gorontalo Provincial Health Office in 2024 shows that the three districts with the highest number of people with diabetes mellitus in Gorontalo Province are Bone Bolango Regency with 3,574 people, Boalemo Regency with 2,212 people and Gorontalo Regency with 2,114 people. The total number of people with diabetes mellitus in Gorontalo Province is 10,735 people. Data from the Bone Bolango Regency Health Office shows that the

number of people with diabetes mellitus at the Suwawa Health Center will be 248 people in 2024. Based on medical record data, the number of people with diabetes mellitus at the Suwawa Health Center showed a significant increase from year to year. In 2021, there were 138 patients, this number increased to 140 in 2022, then to 208 in 2023, and reached 297 patients in 2024.

This increase in the prevalence of diabetes mellitus is often triggered by lifestyle changes, obesity, stress, unhealthy diet, and lack of physical activity. These various factors can cause the risk of hyperglycemia, which is a medical condition characterized by an increase in blood sugar levels that exceed the normal limit ($>200\text{mg/dL}$) so that it becomes a characteristic of several diseases, especially diabetes mellitus (Prastiwi, 2021). The higher the sugar level in the blood, the more it can cause the onset of diabetes mellitus (Hawari, 2022).

The most common symptoms of hyperglycemia are increased thirst, frequent urination, fatigue, blurred vision, dry mouth and sometimes headaches. If not treated properly, this condition can cause serious damage to the body's systems, especially to nerves and blood vessels. Hyperglycemia can also result in complications that can worsen the health condition of people with diabetes mellitus and cause death if not treated properly, so there is a need for appropriate and appropriate hyperglycemia treatment (Prastiwi, 2021).

Treatment of hyperglycemia often includes the application of lifestyle modifications and the implementation of food management practices, such as a balanced diet, regular physical activity, weight loss, adequate sleep, medications, and blood sugar checks and control (Alexandra et al., 2023). Factors that can affect individuals in the treatment of hyperglycemia are knowledge factors, emotional factors, motivational factors and experience or long suffering. The knowledge factor can influence the implementation of diabetes mellitus management to control their blood sugar levels and prevent chronic complications. The better the patient's knowledge, the more accurate their actions will be in handling the disease. In addition, the long-term factor of suffering from diabetes mellitus also has a great influence on the handling of this disease. Patients who have suffered from diabetes mellitus for a long time are likely to learn from their experiences, so they can do better self-care (Saqila & Muflihatin, 2021).

Long suffering from pain is the period of time that a person has experienced suffering from a particular disease, which can include the period from the time of diagnosis of the disease to a specific time at the time the assessment or study was conducted. The longer a person suffers from diabetes mellitus, the greater the chance of suffering from chronic hyperglycemia which will eventually lead to complications of diabetes mellitus (Hartono & Ediyono, 2024). According to Selano's (2023) research, the longer the duration of diabetes, the worse blood sugar control will be in patients with type 2 diabetes, so it is important to pay attention to blood sugar control in patients who have had diabetes for a long period of time. This includes efforts to raise awareness of the good management of diabetes mellitus and the importance of maintaining good blood sugar control, as well as monitoring and controlling the complications associated with diabetes mellitus.

An initial survey conducted by interviewing five patients with type 2 diabetes mellitus showed. Of the five patients, three of them had been suffering from diabetes for 3-6 years, they were only taking medication, without maintaining a good diet or exercising regularly. Meanwhile, the other two patients who had diabetes for less than 2 years, relied only on diet control but rarely exercised and often did not take medication regularly.

RESEARCH METHODS

This study is a quantitative research with a cross-sectional research design. The research site was carried out in the Work Area of the Suwawa Health Center, on March 10-18, 2025. Sampling uses the Proportional Simple Random Sampling technique. The population in this study is all patients with type 2 diabetes mellitus at the Suwawa Health Center which totals 297 people, and the sample obtained is 75 people with diabetes mellitus divided into 6 villages in the Suwawa Health Center Working Area. The instrument used was a questionnaire. The data analysis used in this study is univariate analysis to describe each variable presented in the form of frequency and percentage distribution and bivariate analysis using the spearman rank test..

RESULTS

Respondent Characteristics

Table 1. Frequency distribution of respondents by age

No.	Age	N	%
1.	Final Dewas	10	13,3
2.	Early Elderly	26	34,7
3.	Late Elderly	21	28,0
4.	Manula	18	24,0
Total		75	100

Source: Primary Data, 2025

Based on table 1, it shows that the age of the most respondents in this study is 46-55 years old with a total of 26 respondents (34.7%), while the least is found at the age of 36-45 years with a total of 10 respondents (13.3%).

Table 2. Frequency distribution of responses based on gender

No.	Gender	N	%
1.	Male	15	20,0
2.	Women	60	80,0
Total		75	100

Source: Primary Data, 2025

Based on table 2, it shows that the respondents in this study were mostly female with a total of 60 respondents (80.0%) and male respondents amounted to 15 respondents (20.0%).

Table 3. Frequency distribution of respondents by last education

No.	Final Education	N	%
1.	SD	24	32,0
2.	Junior High School	20	26,7
3.	High School	21	28,0
4.	College	6	8,0
5.	No School	4	5,3
Total		75	100

Source: Primary Data, 2025

Based on table 3, it shows that the last education of the most respondents was elementary school with 24 respondents (32.0%) and the fewest were not in school with 4 respondents (5.3%). These results show that many of the respondents in this study still have relatively low education.

Table 4. Distribution of respondent frequencies by occupation

No.	Jobs	N	%
1.	PNS	5	6,7
2.	Labor	9	12,0
3.	Self-employed	10	13,3
4.	Farmer/Farmer	6	8,0
5.	IRT	36	48,0
6.	Not Working	9	12,0
Total		75	100

Source: Primary Data, 2025

Based on table 4, it shows that the most dominant job is IRT as many as 36 respondents (48.0%), while the least respondent job is civil servant with 5 respondents (6.7%).

Univariate Analysis

Table 5. Frequency distribution of respondents based on length of time with type 2 diabetes mellitus

No.	Long Suffering	N	%
1.	< 5 Years	44	58,7
2.	≥ 5 Years	31	41,3
Total		75	100

Source: Primary Data, 2025

Based on table 5, it can be seen that the frequency based on the length of time respondents suffered from type 2 diabetes mellitus for <5 years as many as 44 respondents (58.7%) and 5 years as many as 31 respondents (41.3%).

Table 6. Distribution of respondent frequency based on knowledge of hyperglycemia management in patients with type 2 diabetes mellitus

No.	Hyperglycemia Handling Knowledge	N	%
1.	Less	38	50,7
2.	Good	37	49,3
Total		75	100

Source: Primary Data, 2025

Based on table 6, it can be seen that of the 75 respondents studied, respondents who had a low level of knowledge of hyperglycemia handling were 38 respondents (50.7%) and respondents who had a good level of knowledge of hyperglycemia handling were 37 respondents (49.3%).

Bivariate Analysis

Table 7. Analysis of the relationship between long-term suffering and knowledge of hyperglycemia management in patients with type 2 diabetes mellitus in the working area of the Suwawa Health Center

No.	Long Suffering from Diabetes Mellitus	Hyperglycemia Handling Knowledge				Total		p Value
		Less		Good		n	%	
		N	%	N	%			
1.	< 5 Years	37	49,3	7	9,3	44	58,7	0,000
2.	≥ 5 Years	1	1,3	30	40,0	31	41,3	
Total		38	50,7	37	49,3	75	100	

Source: Primary Data 2025

Based on table 7, out of 75 respondents, most of the highest number suffered from diabetes mellitus for less than 5 years, namely 44 respondents (58.7%). Of this group, 37 respondents (49.3%) had knowledge of handling hyperglycemia in the poor category, and 7 respondents (9.3%) were in the good category. Meanwhile, in the old group suffering more than or equal to 5 years, there were 31 respondents (41.3%), as many as 1 respondent (1.3%) had knowledge in the poor category, and 30 respondents (40.0%) in the good category.

The results of the statistical test using the spearman rank test showed that there was a significant relationship between the length of time of suffering from diabetes mellitus and the knowledge of hyperglycemia management (p value = 0.000).

DISCUSSION

Long Suffering from Type 2 Diabetes Mellitus in the Working Area of the Suwawa Health Center

Based on the results of a study on the length of suffering from type 2 diabetes conducted on 75 patients in the work area of the Suwawa Health Center, the results were obtained that most of the respondents had a period of less than 5 years of suffering from type 2 diabetes mellitus, namely 44 respondents (58.7%). Meanwhile, respondents who suffered from type 2 diabetes mellitus for ≥ 5 years were 31 respondents (41.3%).

These results suggest that this condition can be caused by several factors. One of the factors is the increasing public awareness in conducting regular health checks, both through routine check-ups at health facilities, and through early detection programs that are actively carried out by health workers at health centers. Promotive and preventive programs promoted by the government also play an important role in increasing public knowledge about the importance of early detection of non-communicable diseases, including type 2 diabetes mellitus.

This research is in line with research conducted by Andayani (2023), These results illustrate that the majority of patients are still in the early stages of the disease journey, so early disease management interventions are still very important to prevent further complications.

The results of the above study show that most patients with type 2 diabetes mellitus are indeed diagnosed in a span of less than 5 years. This condition generally reflects the success of the early detection and screening programs carried out by the government and health workers in primary service facilities such as health centers and hospitals. This early detection is an important step to prevent the worsening of the condition and reduce the incidence of long-term complications.

In addition, the characteristics of the respondents also provide an overview that can explain the length of time they have been suffering from type 2 diabetes mellitus. The majority of respondents were in the age group

of 46–55 years (34.7%). This age is included in the category of late adulthood, where awareness to carry out health checks begins to increase, so that diabetes diagnoses are more often established in that age range. This can be one of the reasons why most respondents have had a DM for less than 5 years. In terms of gender, this study is dominated by women (80%). Women tend to be more proactive in health checkups, so they have a better chance of being diagnosed earlier than men. Meanwhile, the education level of the majority of respondents was elementary school (32%). Low education is generally related to limited understanding of health, but the existence of early detection programs in health centers allows this group to be diagnosed early. These three factors, age, gender, and education together contribute to the high proportion of patients with type 2 diabetes mellitus for less than 5 years.

However, it is still found that the proportion of patients who have suffered from type 2 diabetes mellitus for more than 5 years is still found, as reported by the study Erdaliza et al. (2024), by 43.5% and research Khoiriyah & Sayuti (2024), which found that most of the respondents were within the range of 6–10 years of diabetes mellitus, indicating that some patients still experience delays in the diagnosis or treatment of the disease. This can be due to low awareness of individuals to carry out regular check-ups, non-compliance in health control, or limited access to health services in some areas.

The longer a person suffers from type 2 diabetes mellitus, the increased risk of chronic complications such as diabetic retinopathy, diabetic nephropathy, peripheral neuropathy, and cardiovascular complications. Therefore, it is not enough to treat type 2 diabetes mellitus with early detection, but it needs to be followed by education, lifestyle management, strict blood sugar control, and regular health control to prevent complications. (Khoiriyah & Sayuti, 2024)

According to Xavier (2023), the longer a person suffers from a disease, the longer the opportunity to learn about the disease and be more experienced in dealing with various problems that arise related to the disease, so they tend to have a good quality of life. The length of the duration of diabetes suffered is balanced with a healthy lifestyle, thus creating a good quality of life so that it can prevent or delay long-term complications. Factors that affect the length of time you suffer from diabetes mellitus include coping mechanisms.

Diabetics with a long time have better coping mechanisms or adapt to the condition of their disease. People with diabetes mellitus for a long time better understand and adjust to the circumstances experienced both psychologically, physically, and environmentally. In addition, sufferers will be better able to control and anticipate things that may happen related to their disease (Widiyawati & Sumrahadi, 2024).

Knowledge of Hyperglycemia Handling in Patients with Type 2 Diabetes Mellitus in the Working Area of the Suwawa Health Center

Based on the results of the study, it was found that of the 75 respondents studied, most of the respondents had a low level of knowledge of handling hyperglycemia in the low category, namely 38 respondents (50.7%), while the remaining 37 respondents (49.3%) had a good level of knowledge of handling hyperglycemia. Thus, it can be said that most of the type 2 DM patients in the work area of the Suwawa Health Center still have a suboptimal level of knowledge of handling hyperglycemia.

Respondents who fall into the category of lack of knowledge about the treatment of hyperglycemia generally have a limited understanding of the symptoms, causes, and ways to prevent them. Most have never received counseling in person or find the information they receive difficult to understand. This low knowledge has an impact on non-compliance in diet, physical activity, drug use, and regular checkups, thus increasing the risk of complications. In addition, age and memory factors also affect their low understanding.

The results of this study are in line with the research conducted by Andriani & Handayani (2023), at the Jambon Ponorogo Health Center, which shows that before being educated, most patients have a low level of knowledge, with a knowledge score of <60%. After being given educational interventions in the form of lectures, videos, and leaflets, 80% of respondents experienced an increase to the good knowledge category with a score of >80%. This means that proper education has been proven to significantly improve patient knowledge.

The low level of knowledge in patients with type 2 diabetes mellitus is also influenced by the level of education. In this study, the majority of respondents with less knowledge came from the primary education group (32.0%). Low levels of education limit the understanding of the disease suffered, including effective treatment methods and the importance of lifestyle changes as part of diabetes management. The results of this study are in line with the research conducted by Najah et al. (2023), which found that most respondents with a recent level of elementary education had little knowledge about the management of diabetes mellitus. Low education affects the way of thinking in responding to health problems, thus increasing the possibility of ineffective treatment.

Patients' knowledge of diabetes mellitus is an important factor that can help patients carry out diabetes management throughout their lives. A low level of knowledge can result in less than optimal diabetes management, such as irregular diet, low physical activity, non-compliance with medication, and rarely conducting health checkups.

In contrast to respondents who had less knowledge, respondents with a good level of knowledge generally had longer experience in medicine and showed a more proactive attitude towards their health conditions. Some of them have experienced a severe hyperglycemia condition, so it is a turning point to find more information about how to treat it. Respondents in this group tended to have strong family support, as well as a communicative relationship with health workers, so they found it easier to ask questions and receive explanations. They also use information media to participate in health counseling, so that they are able to understand and remember the educational material well. Personal motivational factors, especially in respondents who are actively working or being the backbone of their families, are also important factors that encourage them to have better knowledge about the treatment of hyperglycemia.

The results of this study are in line with a study by Majore et al. (2025), at the Mangaran Health Center, which showed that most of the respondents (71.4%) had good knowledge of diabetes mellitus management, including hyperglycemia control. The high level of knowledge in patients is closely related to exposure to health education, involvement in counseling programs, and the patient's willingness to implement enforcement practices. These results are consistent with the findings in this study, where respondents with good category knowledge also showed higher motivation in managing their health conditions independently.

Long-Term Relationship of Suffering with Knowledge of Hyperglycemia Treatment in Patients with Type 2 Diabetes Mellitus in the Working Area of the Suwawa Health Center

Based on the results of the study, it showed that of the 75 respondents studied, the highest number was found in the group of long suffering from type 2 DM for less than 5 years, namely 44 respondents (58.7%). Of the 44 respondents, as many as 37 respondents (49.3%) had a level of knowledge of handling hyperglycemia in the low category, while 7 respondents (9.3%) had knowledge in the good category. Meanwhile, in the old group suffering from type 2 diabetes mellitus ≥ 5 years, there were 31 respondents (41.3%). Of the 31 respondents, as many as 1 respondent (1.3%) had knowledge of handling hyperglycemia in the low category, and as many as 30 respondents (40.0%) had knowledge in the good category.

Based on the results of the statistical test (spearman rank), a p-value = 0.000 ($p < 0.05$) was obtained, then H_0 was rejected and H_1 was accepted. These results show that there is a significant relationship between the length of suffering and the knowledge of hyperglycemia management in patients with type 2 diabetes mellitus in the working area of the Suwawa Health Center.

These findings suggest that patients with a duration of <5 years tend to have low knowledge. This can be explained because in the early stages of diabetes, patients are in the process of adjusting to the diagnosis, have not received much intensive education, and have minimal experience dealing with hyperglycemia symptoms. Education from health workers is often not fully accepted or understood, while some patients are still passive and only administer medication. This condition is in line with research by Shirley et al. (2023), which shows that inadequate education can result in patients' lack of understanding in managing their disease, thereby increasing the risk of complications.

In contrast to 7 respondents (9.3%) who also had diabetes mellitus <5 years old but already had knowledge in the good category. This can be caused by several factors, including intensive education that is usually provided by health workers in the early stages of diagnosis, high motivation to prevent complications, and easy access to information sources through digital media, health counseling and the diabetic patient community. Other supporting factors such as higher education levels, relatively younger ages, and positive family or environmental support also affect their understanding. This is in line with the research of Hardita (2024), who found that knowledge level has a significant relationship with the psychological condition of type 2 diabetes mellitus patients, where higher knowledge contributes to a decrease in diabetic distress. The findings reinforce the results of this study that patients with a duration of diabetes mellitus < 5 years can have good knowledge, because in the early phase of diagnosis patients generally receive intensive education from health workers and have higher motivation to learn about the disease.

In contrast, as many as 30 respondents (40.0%) who had suffered from diabetes mellitus for 5 years or more had knowledge in the good category. This is quite logical considering that the longer a person suffers from diabetes, the more experience they have in dealing with various conditions, including episodes of hyperglycemia. This experience is often a powerful source of learning, especially if accompanied by regular education from health workers. Respondents in this group generally have participated in counseling, periodic check-ups at health centers, or even been involved in community activities such as diabetes mellitus classes. In addition, a good relationship with health workers and awareness of the importance of self-management are factors that strengthen their knowledge.

Meanwhile, of the 31 respondents who had had diabetes mellitus for 5 years or more, only 1 person (1.3%) still had knowledge in the deficient category. This is influenced by special factors such as advanced use, decreased memory, limited access to information, or lack of social support. These findings suggest that the duration of suffering from diabetes mellitus does not always go hand in hand with increased knowledge, especially if it is not followed by active involvement in the health education process.

The division of the old category suffers into 0-4 years and ≥ 5 years is based on methodological and theoretical considerations. Clinically, the first five years are considered an important phase of the course of a critical disease, where the risk of complications begins to increase and the patient has gone through various stages of adaptation. In addition, the use of the year limit is in line with research by Andriani & Handayani (2023), which states that after five years of suffering, experience, knowledge, and the risk of complications tend to increase meaningfully.

According to Astuti (2023) research, experience that has been gained indirectly will also increase a person's knowledge, so the more experience, the higher the knowledge they have. This is in line with the stated by Hartono & Ediyono (2024), that the longer you suffer from a disease, the more experience you have to manage it. Therefore, it is important for healthcare facilities to provide more intensive and continuous education to patients who have recently been diagnosed with type 2 diabetes mellitus. A well-designed educational program can help patients understand how to manage hyperglycemia and raise their awareness of the importance of disease management. Thus, it is expected that patients can take proactive steps in maintaining their health and preventing more serious complications in the future.

CONCLUSION

Most of the respondents have suffered from type 2 DM for less than 5 years, namely 44 respondents (58.7%), and a small number of respondents have suffered from type 2 DM for ≥ 5 years, namely 31 respondents (41.3%).

Most of the knowledge of hyperglycemia handling in the work area of the Suwawa Puskesmas has a level of knowledge of handling hyperglycemia in the poor category, namely 38 respondents (50.7%), while the remaining 37 respondents (49.3%) have a level of knowledge of handling hyperglycemia in the good category.

There is a relationship between the length of suffering and knowledge of hyperglycemia management in patients with type 2 diabetes mellitus in the work area of the Suwawa health center based on the results of the spearman rank correlation test, a p-value of $0.000 < 0.05$ was obtained.

ADVICE

Educational Institutions

It is hoped that it can provide input for practitioners and add information in the field of nursing, especially to become the basis of new knowledge for students about the long-standing relationship between suffering and knowledge of handling hyperglycemia in patients with type 2 diabetes mellitus in the working area of the Suwawa Health Center

Health Agencies

It is hoped that this research will be an input to the Puskesmas so that it can develop science regarding the treatment of Diabetes Mellitus

Next Researcher

It is hoped that the next researcher can describe the results of this study and make input to conduct better research, a larger sample and take into account other variables related to diabetes mellitus.

BIBLIOGRAPHY

- Alexandra, F., Frethernety, A., Trinovita, E., Fatmaria, & Ysrafil. (2023). Antihyperglycemia Medicinal Plant Intervention in Peat as a Complementary Therapy (In Vivo, In Vitro and In Silico Drug Design Approach). Makassar: Pt. Nas Media Indonesia.
- Andayani, F. (2023). Length of Suffering and Quality of Life of Type 2 Diabetes Mellitus Patients at X Hospital Bekasi City, West Java. *Journal of Voice Health Research Forikes*, 14.
- Andriani, W., & Handayani, D. (2023). Knowledge in controlling blood sugar levels in patients with type 2 diabetes mellitus (DMT2). *Journal of Public Health*, 12 (1).
- Astuti, L. (2023). Knowledge and lifestyle in patients with type 2 diabetes mellitus at Siti Khadijah Islamic Hospital Palembang. *Journal of Scientific Research*, 5 (2).
- Erdaliza, E., Mitra, M., Rany, N., Harnani, Y., & Abidin, R. (2024). Risk factors associated with complications of type 2 diabetes mellitus. *Journal of Community Health*, 3 (10).
- Hardita, R. N. (2024). The Relationship between Knowledge Level and Self Management and Stress Level of Type 2 Diabetes Mellitus Patients in Adult Age at Hospital. M Djamil. Andalas University.
- Hartono, & Ediyono, S. (2024). The relationship between education level, long suffering from illness and the level of knowledge of the 5 pillars of diabetes mellitus management in the working area of the Sungai Durian Health Center, Kbu Raya Regency, West Kalimantan. *Journal Of Tscs1kep*, 9(1), 49-58.
- Hawari, M. I. (2022). Test of Anti-Hyperglycemia Effect of Soursop Leaf Extract (*Annona muricata* L.) Against the Histology of the Liver of Mice (*Mus Musculus* L.) Which is glucose-induced. Bandar Lampung: University of Lampung.
- International Diabetes Federation. (2021). IDF Diabetes Atlas 10th Edition. International Diabetes Federation.
- Khoiriyah, K., & Sayuti, S. (2024). Long Relationship of Suffering with Quality of Life in Patients with Type II Diabetes Mellitus in Rw 002 Pondok Jaya Village, Sepatan District, Tangerang Regency. *Journal of*

- Health Sciences, 7 (2).
- Kriswiastiny, R., Sena, K. Y., & Hadiarto, R. (2022). Long association of suffering from diabetes mellitus and blood sugar levels with creatinine levels in patients with type 2 diabetes mellitus. *Medical Profession Journal Of Lampung* , 12.
- Majore, O. N., Sarwan, & Djalil, R. H. (2025). The relationship between patient knowledge and hyperglycemia prevention behavior in people with diabetes mellitus. *Journal of Public Health Sciences Research*, 3 (3).
- Najah, S. W. (2023). Long Relationship Suffers With The Level Of Knowledge Of Dm Sufferers About Diabetes Mellitus In Prolanis Balen Bojonegoro. *Istek Icsada Bojonegoro*.
- Prastiwi, M. I. (2021). Overview of Hyperglycemia and Hypoglycemia Knowledge in Patients with Diabetes Mellitus at the Karangpandan Health Center. Surakarta: University of Muhammadiyah Surakarta.
- Priambodo, N., Kriswiastiny, R., & Fitriani, D. (2023). Long association of diabetes mellitus and blood sugar levels with quality of life in patients with type 2 diabetes mellitus. *Mecal Profession Journal Of Lampung* , 11.
- Saqila, R. L., & Muflihatin, S. K. (2021). The Relationship of Knowledge and Self-Management in Patients with Type II Diabetes Mellitus in the Working Area of the Palaran Health Center, Samarinda City. *Borneo Student Research*, 2 (2), 872-878.
- Sari, R., & Prasetyo, A. (2023). The Effect of Education on the Knowledge of Type 2 Diabetes Mellitus Patients. *Journal of Public Health*, 2 (14).
- Selano, M. (2021). A long-standing relationship with the self-management of patients with diabetes mellitus. *Journal Of Bionursing* , 5 (1), 150-156.
- Widiyawati, & Sumrahadi. (2024). An Overview of Old Suffering and Quality of Life in Diabetic Mellitus Patients in Rw 10, Tugu Village, Depok City. *Keris Husada Health Scientific Journal*, 8 (1).
- Xavier, J. (2023). Hubungan supported by family and long suffering with adherence to treatment for patients with diabetes mellitus at Dr. Gondos Suwarno Ungaran Hospital. Semarang: Widya Husada University Semarang.
-