Health Education On Nutrition Pattern Management For Patients With Type 2 Diabetes Mellitus

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Abstract

Diabetes Mellitus (DM) is a group of metabolic disorders characterized by chronic hyperglycemia due to defects in insulin secretion or insulin action. The global prevalence of DM continues to rise, with Type 2 Diabetes Mellitus (T2DM) being the most common form. Effective management of T2DM involves both pharmacological and non-pharmacological strategies, with nutritional therapy playing a pivotal role in maintaining blood glucose levels. Structured nutrition education has proven beneficial in enhancing dietary habits and improving glycemic control in T2DM patients. This study aimed to evaluate the impact of health education on nutritional restrictions in T2DM patients at the Pakuan Baru Public Health Center, Jambi City. The study employed a descriptive case study design, using a nursing care approach that included assessment, diagnosis, planning, implementation, and evaluation. A single participant, Mrs. Y, diagnosed with T2DM, was selected based on specific inclusion criteria. The study utilized a pre- and post-test questionnaire to measure the patient's knowledge of nutritional restrictions. Before the intervention, Mrs. Y demonstrated limited knowledge of appropriate dietary practices for managing T2DM. Following a structured health education session, the patient's knowledge significantly improved, as indicated by an increase in test scores from 46.6% to 80%. The findings suggest that personalized health education can effectively enhance patients' understanding of dietary restrictions, leading to improved self-management of T2DM. This highlights the importance of incorporating health education into routine care for chronic conditions like diabetes. Future research should explore the long-term effects of such educational interventions and expand the sample size to further validate these findings.

Keywords: Diabetes Mellitus, Type 2 Diabetes, Nutritional Education, Health Education, Blood Glucose Control, Self-Management.

INTRODUCTION

Diabetes Mellitus (DM) is a group of heterogeneous metabolic disorders characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Under normal physiological conditions, glucose derived from food circulates in the bloodstream, with blood glucose levels regulated primarily by insulin, a hormone produced by the pancreas. The pancreas maintains glucose homeostasis through the regulation of glucose production and storage. In individuals with diabetes, either the pancreas fails to produce sufficient insulin, or the body's cells become resistant to its effects, resulting in elevated blood glucose levels (Mustofa et al., 2022).

DM is classified into four major types: Type 1 DM, Type 2 DM, Other Specific Types, and Gestational DM. Type 1 DM is caused by autoimmune destruction of pancreatic beta cells, leading to absolute insulin deficiency. In contrast, Type 2 DM—the most prevalent form—occurs due to insulin resistance coupled with a relative insulin secretory defect. This condition is often associated with obesity, sedentary lifestyle, increasing age, certain medications, and genetic predisposition. In obese individuals, insulin becomes less effective at facilitating glucose uptake in the liver, skeletal muscle, and adipose tissue (LeMone et al., 2016).

The global prevalence of DM has shown a consistent upward trend, with the World Health Organization (WHO) reporting approximately 422 million people worldwide affected as of recent years. Diabetes-

related mortality is projected to increase significantly, particularly in low- and middle-income countries (Ningsih & Rahma, 2018). In Indonesia, DM is a growing public health challenge, with the International Diabetes Federation (IDF) ranking the country seventh globally in terms of diabetes prevalence. The 2013 Basic Health Research (Riskesdas) reported an increase in national prevalence from 5.7% in 2007 to 6.9%, or approximately 9.1 million individuals (Solekhah & Sianturi, 2020). The IDF also estimated that by 2020, there would be 8.2 million people in Indonesia living with diabetes among adults over 20 years of age (Haryono et al., 2018).Data from the Jambi City Health Department in 2023 highlights a similarly concerning trend at the local level. Among the 20 public health centers in the city, Pakuan Baru recorded the highest number of DM cases, with 2,228 patients, followed closely by Simpang IV Sipin with 2,200 patients.

Management of diabetes requires a multidimensional approach, integrating both pharmacological and non-pharmacological strategies. While pharmacological treatment typically involves oral hypoglycemic agents and insulin therapy, non-pharmacological approaches include physical activity, weight management, and particularly, nutritional therapy. Proper dietary regulation is a cornerstone of DM management and plays a vital role in maintaining blood glucose levels within normal limits (Triyanto, 2014). According to Soelistijo et al. (2015), dietary recommendations for people with diabetes largely align with those for the general population: balanced meals tailored to caloric and nutrient needs. Caloric requirements are typically calculated based on basal needs (25–30 kcal/kg of ideal body weight) and adjusted according to sex, age, physical activity level, and health status.

Structured nutrition education has been shown to improve dietary habits and glycemic control. Simatupang (2020) emphasized that regulating food quantity, timing, and type according to the individual's body mass index (BMI) can significantly enhance diabetes outcomes. Research by Rahmawati (2020) supports this, noting that individuals who follow consistent dietary patterns demonstrate better glycemic control than those who do not. Furthermore, dietary approaches such as those targeting glycemic index (GI) levels can further optimize blood glucose management.

Chronic hyperglycemia, if not effectively managed, can cause progressive damage to blood vessels and vital organs, leading to complications such as cardiovascular disease, kidney failure, stroke, retinopathy, and neuropathy. These complications underscore the importance of preventive and educational strategies in DM management (Thailit et al., 2018).

However, despite the critical role of diet in controlling diabetes, many patients remain unaware of appropriate nutritional guidelines. A preliminary survey conducted by the researcher at the Pakuan Baru Health Center in Jambi City found that out of three interviewed patients, two lacked understanding regarding dietary restrictions for diabetes. This indicates a gap in knowledge and highlights the need for targeted health education interventions aimed at improving patient and family awareness. In response to this issue, the researcher is motivated to conduct a study entitled: **"**Health Education on Nutritional Pattern Restrictions in Type 2 Diabetes Mellitus Patients in the Working Area of Pakuan Baru Public Health Center, Jambi City."

METHODS

This study is a descriptive case study aimed at describing the health education provided on nutritional pattern restrictions for patients with Type 2 Diabetes Mellitus. The research utilized a nursing care approach**,** which encompasses the following stages: assessment**,** nursing diagnosis**,** planning**,** implementation**,** and evaluation**.** This approach allows for a comprehensive and structured intervention in the management of the patients' nutritional needs and overall care.

Research Design and Approach

The study employs a descriptive design to systematically describe and analyze the educational interventions related to nutritional management in patients with Type 2 Diabetes Mellitus. By using

a case study method, the researcher focuses on the in-depth examination of an individual patient's response to health education, exploring their understanding and ability to implement nutritional restrictions aimed at improving blood glucose control.

Population and Sample

The population in this study includes all individuals diagnosed with Type 2 Diabetes Mellitus who are under the care of the Pakuan Baru Public Health Center in Jambi City. The sample for this research was selected based on specific inclusion criteria. The researcher chose one individual from the population of diabetes patients who met the following inclusion criteria: 1)Diagnosis**:** The patient must have a diagnosis of Type 2 Diabetes Mellitus, 2)Location**:** The patient must reside in or be under care within the working area of Pakuan Baru Public Health Center**,** 3)Willingness: The patient must willingly agree to participate in the study as a respondent, 4) Communication**:** The patient must be capable of effectively communicating to facilitate interviews and educational sessions, 5) Literacy**:** The patient must be literate (able to read and write) to engage with the educational materials provided, 6)Complication-Free: The patient should be free from complications associated with Diabetes Mellitus, such as neuropathy, retinopathy, or nephropathy, which might influence the education and intervention outcomes.

Setting and Research Timeline

This study was conducted within the working area of Pakuan Baru Public Health Center, Jambi City. The data collection took place between February 6 and February 14, 2025**.** This setting was chosen due to the high number of diabetes patients registered in the area, making it an ideal location for examining the impact of health education on managing diabetes.

Data Collection Instruments

Several instruments were used for data collection to ensure accurate and comprehensive information: 1) Questionnaire Sheet: A structured **q**uestionnaire was used to collect baseline information about the patient's knowledge regarding diabetes and nutritional restrictions. The questionnaire included both closed and open-ended questions designed to assess the patient's understanding of diabetes management, particularly their awareness of dietary restrictions and the potential effects of not adhering to a prescribed diet, 2) Interviews**:** Semi-structured interviews were conducted with the patient to gather in-depth information regarding their current dietary habits, their understanding of diabetes, and how they perceive the educational intervention. These interviews allowed the researcher to explore the patient's personal experience with diabetes management, and their readiness to implement the recommended dietary changes, 3) Leaflet**:** A leaflet was provided as part of the health education material. This leaflet contained clear and concise information on the importance of dietary restrictions for diabetes management, including guidelines for managing blood glucose levels through appropriate food choices, portion control, and timing of meals. The leaflet also emphasized the role of a balanced, low-carbohydrate diet in preventing blood glucose spikes, 4) Educational Sessions: The researcher provided individualized education sessions to the patient, focusing on practical tips for meal planning and food selection. The sessions also addressed common misconceptions about diabetes and nutrition, and offered encouragement for making sustainable lifestyle changes.

RESULTS

Nursing assessment and intervention process the initial nursing assessment was conducted on February 6, 2025, with Mrs. Y as the respondent. The respondent reported that she had been diagnosed with Type 2 Diabetes Mellitus approximately three years ago. She stated that she frequently experienced symptoms such as numbness, loss of appetite, blurred vision, and fatigue. According to the respondent,

there is no family history of diabetes mellitus. The only supporting diagnostic test previously undertaken was a random blood glucose (RBG) test. Currently, she is undergoing insulin therapy.

A nursing diagnosis is a clinical judgment regarding the responses of an individual, family, or community to actual or potential health problems. The purpose of a nursing diagnosis is to establish a common language among nurses, facilitating communication and shared understanding. Based on the assessment conducted on February 6, 2025, the nursing diagnosis established was: knowledge deficit related to the client's inability to understand carbohydrate restriction in the management of Type 2 Diabetes Mellitus.

The intervention was developed in accordance with the objectives of managing the identified priority diagnosis, which were: (1) to increase the patient's understanding of carbohydrate restriction in Type 2 Diabetes Mellitus, (2) to highlight the benefits of health education related to carbohydrate restriction, and (3) to help prevent diabetes-related complications. The nursing care plan included providing health education regarding dietary carbohydrate restriction tailored for patients with Type 2 Diabetes Mellitus.

During the first meeting, the researcher introduced herself and her institutional affiliation, then explained the purpose of the visit. The researcher approached the respondent respectfully and asked for her willingness to participate in the study. After the respondent agreed, she signed the informed consent form, indicating her voluntary participation.

Subsequently, the respondent was asked to complete a pre-test using a questionnaire containing 15 multiple-choice questions. Based on the responses, Mrs. Y correctly answered 7 out of 15 questions, resulting in a score of 46.6 percent. This score indicated a low level of knowledge regarding nutritional restrictions for Diabetes Mellitus patients, especially concerning types of food suitable for individuals with Type 2 DM.

After completing the pre-test, the researcher provided a structured health education session through a lecture method. The session included a question-and-answer segment to clarify the material provided. The entire educational activity lasted approximately 40 minutes. After the session, a leaflet summarizing the key points of nutritional restriction for Type 2 DM was given to the respondent. A follow-up session was scheduled for further evaluation and reinforcement.

During the second session, the researcher inquired about the respondent's current health status and reviewed the previous educational material. Mrs. Y stated that she had started making efforts to adjust her dietary habits in accordance with the education provided. She reported substituting high-carbohydrate foods with alternatives such as boiled potatoes, avoiding excessive fat intake, refraining from eating randomly, and paying closer attention to her meal schedule based on the recommendations given.

In the third session, the researcher began by evaluating the respondent's current condition and revisiting the previously delivered material. A post-test was administered using the same questionnaire as in the pre-test. Mrs. Y correctly answered 12 out of 15 questions, yielding a score of 80 percent. This indicated a significant improvement in the respondent's knowledge about dietary restrictions for Type 2 Diabetes Mellitus after receiving health education.

The results of this educational intervention demonstrate a marked increase in the patient's understanding, as evidenced by the improvement in her post-test score. The findings suggest that structured, personalized health education, combined with accessible educational materials and follow-up, can effectively enhance patients' knowledge and promote better self-care in individuals with Type 2 Diabetes Mellitus. This highlights the importance of incorporating health education into routine nursing care, particularly for chronic illnesses such as diabetes

Table 1. Pre-Post Education Knowledge Results

Responden	Pre	Post
Ny.Y	46,6%	80 %

Based on the results of the pre- and post-intervention questionnaires completed by the respondent, it was found that the patient's level of knowledge increased after receiving health education regarding nutritional restrictions for individuals with Type 2 Diabetes Mellitus. This improvement in knowledge also had a positive impact on the respondent's ability to manage and control her dietary habits more effectively.

DISCUSSION

This study utilized a questionnaire as a measurement tool to assess the respondent's level of knowledge regarding nutritional restrictions. According to Sugiyono (2017), a questionnaire is a data collection technique carried out by presenting a series of written questions or statements to be answered by respondents.

Knowledge is the result of human sensory perception, or an individual's understanding of an object through their senses—sight, hearing, smell, taste, and touch. The effectiveness of this perception process in generating knowledge is influenced by the individual's attention and perception intensity (Massiani, Lestari, & Prasida, 2023).

The findings indicated that prior to receiving health education, the respondent, Mrs. Y, exhibited a low level of knowledge regarding nutritional restrictions for patients with Type 2 Diabetes Mellitus. Health education is a structured process aimed at creating opportunities for individuals to gain knowledge and skills through learning, thereby improving quality of life (Islamarinda et al., 2023). According to Nur Syamsiyah (2017), insulin dysfunction prevents glucose from being properly absorbed by the body's cells. As a result, individuals with Diabetes Mellitus often feel weak, tired, and sleepy. These symptoms may be misinterpreted by the brain as hunger, leading diabetic patients to increase their food intake. Continuous food consumption without dietary control can exacerbate the condition by further elevating blood glucose levels.

The study found a significant relationship between knowledge and adherence to nutritional restrictions. This suggests a direct correlation in which respondents with limited knowledge are less likely to adhere to dietary guidelines. Knowledge acquisition is influenced by individual experiences, environmental exposure, and sociocultural factors. These factors shape perceptions, foster beliefs, and ultimately drive behavior. Diabetic patients who are well-informed are more likely to adopt positive behaviors and preventive measures against complications, while those lacking knowledge may struggle to comply with healthcare recommendations, particularly regarding nutritional restrictions (Wardani, 2021).

Nutritional intake for Diabetes Mellitus patients should be balanced according to their individual energy requirements. According to Sarwono Waspadji (2018), standard dietary energy intake for diabetic patients ranges between 1100 and 2500 kcal/day. Patients with excessive body weight require 1100–1500 kcal/day, those with ideal weight require 1700–1900 kcal/day, and underweight individuals require 2100–2500 kcal/day. The recommended macronutrient composition is 45–65% carbohydrates, 10–20% protein, and 20–25% fat. The use of sugar in food preparation is permissible for patients with controlled blood glucose levels, not exceeding 5% of total energy intake. Alternative sweeteners may be used within safe consumption limits.

After the health education intervention, Mrs. Y demonstrated an improvement in her level of knowledge, now classified as good. This improvement positively influenced her dietary habits, especially in regulating caloric intake as recommended. This played a significant role in helping her manage blood glucose levels, which is essential in preventing complications and enhancing her overall quality of life. These findings align with the study by Massiani et al. (2023), which investigated the correlation between knowledge and dietary compliance among diabetic patients at Kareng Bingkirai Public Health Center in Central Kalimantan. The study reported a P-value of 0.000 (<0.05), indicating a strong relationship between knowledge and dietary compliance. The results suggested that poor dietary compliance among patients with Diabetes Mellitus was primarily caused by inadequate knowledge and difficulty in managing meal schedules, types, and quantities, particularly those high in carbohydrates and glucose.

Therefore, the provision of education regarding nutritional restrictions for individuals with Type 2 Diabetes Mellitus is essential for disease management and complication prevention. Patients must also be encouraged to attend routine medical check-ups and engage in regular physical activity to support glycemic control. This conclusion is further supported by research conducted by Dian Sukma Dewi Arimbi et al. (2020) at Rejosari Public Health Center, Riau. Their study examined the impact of health education on motivation to control blood glucose levels among Type 2 DM patients. With a P-value of 0.000 ($P < 0.05$), the study concluded that health education was effective in increasing patients' motivation to manage their blood sugar levels. Increased motivation is directly associated with better glucose regulation, reduced risk of complications, and improved patient well-being.

Several supporting and inhibiting factors were encountered during this study. One of the challenges was aligning the researcher's schedule with that of the respondent, who also had work obligations. However, a significant supporting factor was the cooperation of the local health center staff, who facilitated access to suitable respondents, and the respondent's willingness to actively participate in the study, which contributed to the successful completion of this research

Limitation

The limitations of this study include the use of a relatively simple method, namely the case study method, which restricts the implementation of the research to a predetermined subject. As a result, the findings cannot be broadly generalized. This study is also limited to the aspect of respondents' knowledge alone, without exploring other variables such as attitudes or behaviors of patients in applying dietary restrictions after receiving education. Furthermore, limitations in resources, both in terms of time and cost, resulted in the study not being supported by other healthcare professionals, such as nutritionists and doctors, who could have contributed additional insights into the understanding and implementation of dietary restrictions in a more comprehensive and in-depth manner. Therefore, further research with a broader approach and additional professional support may provide a more comprehensive understanding of the effectiveness of health education for patients with type 2 diabetes mellitus

CONCLUSIONS

Knowledge is crucial for providing information to individuals with diabetes mellitus in managing their lives by consistently maintaining or adjusting their lifestyle to keep blood sugar levels under control and improve their quality of life. The increase in knowledge after education is expected to serve as additional information that can be applied in the daily lives of patients with diabetes mellitus to help prevent complications from the disease.

REFERENCES

1. Afriani, dkk. (2020) *Media Edukasi Yang Tepat Pada Pasien Diabetes Mellitus Tipe 2 Terhadap Kepatuhan*https://jurnal.untan.ac.id/index.php/jmkeperawatanFK/article/download/46167/75676589407
2. Analia Wardhani (2021). Hubungan Pengetahuan Dengan Kepatuhan Diet Pada Penderita Diabetes Melitus Di Wilayah Kerja Puskesmas Astambul Tahun 2020. https://jurnalstikesintanmartapura.com/index.php/jikis/article/view/16
3. Arikunto, Suharsimi (2019). P*rosedur Penelitian : Suatu Pendekatan Praktik*, Jakarta Rineka Cipta
4. *Asih*, L. D., & *Widyastiti*, M. (*2016*). *Meminimumkan Jumlah Kalori di Dalam Untuk Memperhitungkan Asupan Makan dan Aktifitas menggunakan Linear Programing. Vol 16 No 1, 38-44.*
5. Budi Suryana, dkk.(2024*). Pendidikan Kesehatan dan Ilmu Perilaku*. Penerbit CV Eureka Media Aksara Purbalingga
6. *Black*, J.M., & *Hawks*, J.H. (*2014*). *Keperawatan Medikal Bedah: Manajemen. Klinis untuk Hasil yang Diharapkan*. Jakarta: Salemba Medika
7. Dewi, N. H., Rustiawati, E., Sulastri, T., Studi, P., Keperawatan, D., Sultan, U., & Tirtayasa, A. (2021). *Analisis faktor-faktor yang berpengaruh terhadap kejadian hiperglikemia pada penderita diabetes mellitus tipe 2 di poliklinik penyakit dalam RSUD Dr Dradjat Prawiranegara Serang*. *Jurnal Ilmiah Keperawatan*, *2*(3). https://jurnal.untirta.ac.id/index.php/jik/article/view/14360
8. Dian Sukma Dewi Arimbi, dkk (2020). *Pengaruh Pendidikan Kesehatan Terhadap Motivasi Mengontrol Kadar Gula Darah Pada Pasien DM Tipe II*. Jurnal Keperawatan Abdurrab, Vol 4 No.1. https://www.neliti.com/id/publications/322449/pengaruh-pendidikan-kesehatan-terhadap-motivasi-mengontrol-kadar-gula-darah-pada
9. Endang Triyanto, dkk (2014). Model Pembedayaan Terpadu Untuk Meningkatkan KepatuhanPasien Diabetes Mellitus. Jurnal Keperawatan Universitas Jenderal Soedirman https://journal.unhas.ac.id/index.php/mkmi/article/download/528/343/777
10. *Febrinasari*, R. P., *Agusti*, T., *Dyonisa, & Stefanus*. (*2020*). *Buku Saku Diabetes Melitus Untuk Awam*. Surakarta: UNS (UNS Press) https://www.researchgate.net/profile/Stefanus-Putra/publication/346495581_BUKU_SAKU_DIABETES_MELITUS_UNTUK_AWAM/links/5fc51ad64585152e9be40e3a/BUKU-SAKU-DIABETES-MELITUS-UNTUK-AWAM.pdf?origin=publication_detail&_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uRG93bmxvYWQiLCJwYWdlIjoicHVibGljYXRpb25Eb3dubG9hZCIsInByZXZpb3VzUGFnZSI6InB1YmxpY2F0aW9uIn19
11. Hasdianah, (2018). *Mengenal Diabetes Mellitus Pada Responden Dewasa dan anak anak dengan solusi herbal*. Nuha Medika Yogyakarta
12. *International Diabetes Federation* (IDF) (2015) Diabetes Atlas. 7th Edition, International Diabetes Federation, Brussels, Belgium. http://www.diabetesatlas.org
13. Islamarinda, Rista, dkk. (2023). *Promosi Kesehatan dan Pendidikan Kesehatan. Kediri: Lembaga Chakra Brahmana Lentera*. ISBN: 978-623-6541-98-2. Promosi Kesehatan Dan Pendidikan Kesehatan - Google Books.
14. Kemenkes RI (2023). *Terapi Nutrisi Medis pada Diabetes Melitus Tipe 2 (Series 1)*. Direktorat Jenderal Pelayanan Kesehatan. https://yankes.kemkes.go.id/view_artikel/2108/terapi-nutrisi-medis-pada-diabetes-melitus-tipe-2-series-1
15. Lemone, Priscilla. (2016). *Buku Ajar Keperawatan Medikal Bedah Edisi 5*. Jakarta: EGC. Team Editorial Advisory Board Asia
16. *Manurung*, R., *Bolon*, C.M., & *Manurung*, N. (*2017*). *Asuhan Keperawatan Sistem Endokrin dilengkapi Mind Mapping dan Asuhan Keperawatan NANDA NIC NOC*
17. Massiani, Lestari, dan Prasida (2023). *Kepatuhan Diet Dan Kadar Gula Darah Pada Pasien Diabetes Melitus Tipe 2 Di Puskesmas Kereng Bangkirai: Studi Cross-Sectional* *https://journal.universitaspahlawan.ac.id/index.php/jkt/article/view/33406*

18. *Mubarak W* iqbal, *Chayatin* N (2009). Ilmu Kesehatan Masyarakat: Teori Dan Aplikasi.
19. Mustofa, dkk(2022)**.** *Penerapan Senam Kaki Terhadap Kadar Glukosa Darah Pada Pasien Diabetes Melitus di Wilayah Kerja Puskesmas Purwosari Kec. Metro Utara Tahun 2021* https://jurnal.akperdharmawacana.ac.id/index.php/JWC/article/view/295
20. Ningsih & Rahmah (2018). *Faktor- Faktor Yang Berhubungan Dengan Kepatuhan Diet Pada Pasien Diabetes Mellitus Tipe 2. Jurnal Ilmiah Keperawatan Hang Tuah Surabaya*, Vol 15 https://journal.stikeshangtuahsby.ac.id/index.php/JIKSHT/article/download/71/75/265
21. *Nursalam.* (*2021*). *Manajemen Keperawatan Aplikasi dalam Praktik Keperawatan. Profesional Edisi* 3. Salemba Medika
22. Perkeni (2021). *Pedoman Pengelolaan dan Pencegahan Diabetes Mellitus Tipe 2 di Indonesia 2021* https://pbperkeni.or.id/wp-content/uploads/2021/11/22-10-21-Website-Pedoman-Pengelolaan-dan-Pencegahan-DMT2-Ebook.pdf
23. *Potter & Perry*. (*2017*). *Buku Ajar Fundamental Keperawatan : Konsep, Proses dan. Praktik Volume I*. Elsevier Australia
24. Rahmawati. (2020). *Studi Literatur Proses Asuhan Gizi Terstandar Pada Pasien Diabetes Melitus Tipe 2* Prosiding Seminar Nasional https://ejurnal.poltekkesmanado.ac.id/index.php/prosiding2023/article/view/2002/1216
25. *Rees,* A., *Levy,* M., & *Lansdown,* A. (*2017*). *Clinical endocrinology and diabetes at a glance.* John Wiley & Son
26. *Risca Dwi, dkk (2023). Promosi dan Prilaku Kesehatan. Penerbit CV Eureka Media Aksara Purbalingga*
27. Rumiris Simatupang (2020). *Pedoman Diet Penderita Diabetes Mellitus*, Penerbit Yayasan Pendidikan dan Sosial Indonesia Maju, Banten
28. *Santoso* (*2011*). *Serat Pangan (Dietary Fiber) Dan Manfaatnya Bagi. Kesehatan. Aslib* Proceedings 22(11): 35–40. Alfiani, Fina et al.
29. Siti Maimunah, dkk. (2023*). Dukungan Keluarga Terhadap Kejadian Gangren Pada Penderita Diabetes Mellitus.* Jurnal Penelitian Perawat Profesional. https://jurnal.globalhealthsciencegroup.com/index.php/JPPP/article/download/1450/1160/
30. Soelistijo, Soebagijo dkk. (2015). *Konsensus Pengelolaan dan Pencegahan Diabetes Melitus.* Tipe 2 di Indonesia 2015. Jakarta:
31. *Solekhah Solekhah, Sondang Ratnauli Sianturi (2020). Dukungan Keluarga Meningkatkan Kepatuhan Diet Pasien Diabetes Mellitus Tipe 2* https://jurnal.usk.ac.id/INJ/article/view/19786
32. Sonta Imelda (2018). *Faktor-faktor Yang Mempengaruhi Terjadinya Diabetes Mellitus di Puskesmas Harapan Raya*. Scientia Journal https://www.neliti.com/id/publications/286563/faktor-faktor-yang-mempengaruhi-terjadinya-diabetes-melitus-di-puskesmas-harapan
33. *Syaifuddin*, (2016) *Anatomi Fisiologi* untuk Keperawatan dan Kebidanan, *Jakarta*: *Kedokteran EGC*, ... Penerbit *Buku Kedokteran EGC Jakarta*.
34. Tim pokja SDKI DPP PPNI (2016). *Standar Diagnosis Keperawatan Indonesia.* Jakarta: Dewan Pengurus Pusat Persatuan Perawat Nasional Indonesia.
35. *Walker, R. (2020*). *The Diabetes Handbook: Understand and Manage Type 1 and. Type 2 Diabetes* (D. Kindersley (ed.)). Dorling Kindersley Limited
36. *Wijaya*,A.S & *Putri* Y. (*2013*). *Keperawatan Medikal Bedah (Keperawatan. Dewasa) Teori dan Contoh Askep*. Yogyakarta: Nuha Medika
37. Waspadji, S. (2018*). Menyusun Diet Berbagai Penyakit Berdasarkan Daftar Bahan Penukar*. Jakarta:Falkultas Kedokteran Universitas Indonesia.
38. *Waspadj* Sarwono; *Sukardji*, Kartini; *Suharyati*; (*2015*). *Penuntun diet dan terapi Gizi*. Jakarta FKUI