

IMPLEMENTATION OF DIABETES DIET EDUCATION AND FOOT EXERCISE TO INCREASE KNOWLEDGE LEVEL AND REDUCE BLOOD SUGAR LEVELS IN DIABETES MELLITUS PATIENTS IN THE TLOGOSARI PUSKESMAS AREA, KULON SEMARANG

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ABSTRACT

Diabetes mellitus is pancreas disorder which can't produce any insulin as needed body. Diabetes diet education and legs exercise are one of combination non pharmacology therapy which safe for increase knowledge level and decrease blood sugar level in diabetes mellitus sufferer. This study's aim is to determine the description of the applicaton of diabetes diet education and legs exercise toward knowledge level and blood sugar level in diabetes mellitus sufferer trough a family nursing care approach. This type of research is descriptive with a case study approach. Subject used a number of 2 people with criteria age 40-75 years old, can verbal communication, don't have any physical disorder, and GDS is between 160-240 mg/dL. Knowledge level and GDS measurement using questionnaire sheet and glukometer. Diabetes diet education for 1 day and legs exercise intervention for 3 consecutived days. The results of data analysis showed that subject I experienced a increase in knowledge level score from 12 (enough) to 18 (good) and decrease in blood sugar level from 208 mg/dL (high) to 191 mg/dL (high), subject II experienced a increase in knowledge level score from 9 (less) to 16 (good) and decrease in blood sugar level from 182 mg/dL (high) to 169 mg/dL (high). The result of this case study concluded that there were increase of knowledge level and decrease of blood sugar level in diabetes sufferer. Diabetes diet education and legs exercise are reccomended as nursing intervention in diabetes management because they are able to increase knowledge level and decrease blood sugar level significantly and easily applied.

Key Words: *Diabetes Mellitus, Blood Sugar Level, Knowledge Level, Diabetes Diet Education, Legs Exercise.*

1. INTRODUCTION

Family is a group of people who are united by a bond of marriage, birth, and adoption who interact and communicate with each other in the roles of husband, wife, father, mother, child, brother and aim to create, maintain culture, and enhance physical, mental, emotional development. , as well as the social status of each family member. (1) Families have the potential to experience problems in family growth and development as well as family problems that are at risk or are vulnerable to health problems. The family life cycle has predictable stages just as individuals go through stages of continuous growth and development.

The optimal level of public health can be developed as a form of health effort for the entire community which includes efforts to increase (promotive), prevention (preventive), healing (curative) and recovery (rehabilitative) that are comprehensive, integrated and sustainable. There needs to be attention in this treatment effort, nurses carry out nursing care by paying attention to someone thoroughly both physically, mentally, socially and spiritually, where nurses must try to improve the quality of service in the growth and recovery process, especially for someone with endocrine system disorders, especially diabetes. Mellitus. (2)

A person with diabetes mellitus is someone who has a disorder in the pancreas that cannot produce insulin according to the body's needs, resulting in an increase in blood sugar levels that exceed normal. (3) The amount of sugar levels that exceed normal or above average will cause abnormalities in the body related to the pancreas and insulin hormone. (4) The older a person is, the activity will also decrease so that the function of pancreatic beta cells also decreases in producing the hormone insulin. (5)

Diabetes mellitus is a disease characterized by an increase in blood sugar levels. Blood sugar levels are sugars in the blood that come from dietary carbohydrates that are stored in the form of glycogen in the liver and skeletal muscles. (6) Blood sugar levels in people with diabetes mellitus can be said to be abnormal if >200 mg/dL. This situation is the result of a progressive decrease in insulin secretion against the background of insulin resistance. (7) Abnormal blood sugar levels and can be given diabetes diet education intervention and foot exercises according to the results of research conducted by Ernauli Meliyana and Mila Nofiana (2019) is 160-240 mg/dL. (6) Random blood sugar levels throughout the day may vary which will increase after eating and will return to normal within 2 hours. (8)

Diabetes mellitus in Indonesia based on a report from the International Diabetes Federation (IDF) in 2019 was ranked 7th in the world out of the top 10 countries with the highest diabetes mellitus, namely 10.7 million. This number will continue to increase until 2030, namely 13.7 million. (9) The number of people with diabetes by age according to the International Diabetes Federation (IDF) report in 2019 was 9.3% or 463.0 million at the age of 20 - 79 years, while people with diabetes mellitus aged 66 - 99 years amounted to 19.3 % or 135.6 million. (9) The incidence of diabetes mellitus based on Basic Health Research (Riskesmas) was 8.5% in 2018. (10) Based on a report from the Indonesian Ministry of Health's Data and Information Center in 2018 the number of people with diabetes mellitus categorized by age was in the range of age 55 - 64 years by 6.3% and 65 - 74 years by 6.03%. (11) The prevalence of diabetes in Central Java in 2018 was 2.1%. (12) The incidence of diabetes mellitus in Semarang City in 2018 was the 2nd non-communicable disease after hypertension with a total of 47248 cases. (13) The prevalence of diabetes mellitus at the Semarang City Health Service in 2020 was 96.2% with a total of 29068 cases. . The prevalence of diabetes mellitus at the Tlogosari Kulon Health Center in 2020 was 65.6% with a total of 1109 cases.

The number of people with diabetes is increasing every year, and if diabetes mellitus is not treated immediately, it can cause complications (complications) in the organs of the body. Complications of diabetes basically occur in all blood vessels throughout the body. Complications that can occur are stroke, blindness, coronary heart disease, chronic kidney disease, wounds that are difficult to heal to amputation, and neurological diseases and are susceptible to infection. Blood sugar levels can be controlled to remain normal, namely by various treatment efforts, both in the form of good food planning, the use of drugs to lower blood glucose levels including oral drugs and insulin, as well as physical activities that must be maintained. (14)

The role of health workers, especially the role of family nurses in overcoming cases of diabetes mellitus so that it does not increase, is to be able to act as a health monitor, service provider for sick family members, coordinator of health services and family health nursing, facilitator, health educator, extension worker. as well as consultants. (15) The role of nurses in the family realm can provide a role as an educator. Educators in this case are teaching how to manage diabetes mellitus, through monitoring and controlling blood sugar levels, regulating food diets. (16) The role of nurses is very large in providing rehabilitation programs and facilitating the learning of the disease process. (1)

The role of nurses in facilitating learning of the disease process is to provide information about diabetes mellitus. Providing information about diabetes mellitus is included in the four pillars of diabetes mellitus control, namely by maintaining blood sugar concentrations close to normal every day if carried out properly such as health education about diabetes mellitus, medical nutrition therapy, physical exercise, and pharmacological treatment. (17)

Health education about diabetes mellitus can be given to someone with ignorance and lack of knowledge about diabetes mellitus. The expected goal is to increase a person's level of knowledge about diabetes mellitus, so the author wants to provide health education about diabetes mellitus. (18)

Health education is an effort to influence individuals, groups, or communities to carry out healthy lives in the form of independent nursing interventions to help clients, both individuals, groups, and communities in overcoming their health problems through learning activities in which nurses act as educators. The purpose of providing information related to health education is the application of education in the health sector to provide or improve the knowledge, attitudes, and practices of individuals, groups or communities in maintaining and improving their own health. (17)

One of the most important information for people with diabetes mellitus is in the form of nutritional information, management and control of blood sugar levels and prevention of complications in people with diabetes mellitus. Provision of nutritional information has an impact on client decisions in dietary behavior that can improve how to choose good and quality nutritional needs, behavioral changes that include changes in knowledge, changes in attitudes and changes in action, so that clients can maintain a 3 J diet (Schedule, Amount and type) which will have an impact on lowering blood sugar levels in people with diabetes mellitus. (6,17)

Maintaining a diet in people with diabetes mellitus is very important and no less important is regular exercise that has been recommended for people with diabetes mellitus. The types of sports that are safe to do are swimming, walking, resistance training / weight training, and leg exercises. (5)

Sports or gymnastics is one part of non-pharmacological management that can help control blood sugar levels in people with diabetes mellitus. (11) Leg gymnastics is an activity or exercise performed by patients with diabetes mellitus to lower blood sugar levels, prevent injuries and help improve peripheral blood circulation. (11,19) Diabetes mellitus foot exercise has many benefits for both patients with neuropathy and those who have not. Among them can strengthen small muscles, calf muscles, and thigh muscles, as well as overcome the limitations of joint motion that are often experienced by people with diabetes mellitus. This exercise is done with the aim of strengthening small muscles and preventing injuries to the legs. (10)

During exercise, muscles contract, causing the membrane's permeability to glucose to increase and resulting in reduced insulin resistance. The recommended leg exercise for adults is 30 minutes at least 3-4 times a week while for children and adolescents it is 60 minutes. Leg exercises can be done in various positions such as sitting, standing or lying down. (20)

The mechanism of change (decrease) in blood sugar levels after doing leg exercises is caused by metabolic changes that are influenced by exercise duration, exercise weight, plasma insulin levels, blood sugar levels, ketone levels, and body fluid balance. When doing leg exercises, the body requires energy, so that initially inactive muscles become active due to the increased need for glucose. This sensitivity lasts a long time, even until the practice is over. During physical exercise, there will be an increase in blood flow which causes more insulin receptors to be available and the receptors become more active, resulting in an increase in the use of glucose by active muscles, which in turn causes a decrease in blood sugar levels. (21)

Based on the results of research conducted by Ernauli Meliyana and Mila Nofiana (2019) that before being given health education as many as 12 respondents, 4 respondents (33%) were in the sufficient category, 8 respondents (66.7%) were in the poor category. Then the results of the study after being given health education about the diabetes diet showed that the level of health knowledge of the 12 respondents was 4 respondents (33.3%), in the good category, 8 respondents (66.7%) in the sufficient category. (6) The results of research conducted on 12 respondents, showed that blood sugar levels before diabetic foot exercise were 7 respondents (58.3%) in the very high category with blood sugar levels ranging from 240 - 300 mg / dL. After doing diabetic foot exercise, 12 respondents (100%) were in the high category with blood sugar levels ranging from 160 – 240 mg/dL. (6)

Based on the results of research conducted by Suratun Haryono, Eros Siti Suryati and Raden Siti Maryam (2018) that the average GDS score for the intervention group before giving health education was 258 gr/dL, while the average GDS after being given education was health is 176 gr/dL. (18) Based on the results of research conducted by Nuraeni and I Putu Dedy Arjita (2019) that before the implementation of the Foot Gymnastics, 26 respondents (100%) had blood sugar levels 180 mg / dL. The results of the analysis after the leg exercise were 14 respondents (53.8%) had blood sugar levels of 80 – 144 mg/dL and 12 respondents (42.6%) had blood sugar levels of 145-179 mg/dL. (21)

Based on this background, the authors are interested in implementing diabetes diet education and foot exercises on blood sugar levels in people with diabetes mellitus.

2. LITERATURE REVIEW

2.1. Family Concept

The understanding of the family is very varied according to the orientation that is used as the basis for its definition, the following is the definition of family:

1. Opinions that adhere to interactional theory view the family as an arena for personality interaction to take place. Meanwhile, those who are oriented to the social system perspective view that the family is the smallest social part consisting of a set of components that are highly dependent and influenced by internal structures and other systems. (22)
2. Spradley and Allender (1996) suggest that the family is one or more individuals who live together, so that they have emotional bonds and develop social bonds, or mothers and children. (22)
3. The family is part of society whose role is very important to form a healthy culture. The family is used as a service unit because family health problems are interrelated and influence each other between family members and will also affect the families around them or the community. (15)

2.2. The Role of Nurses in Family Nursing

In providing family health nursing care, there are several roles that can be performed by nurses, including: (15)

1. Introduction to health (health monitor), Nurses help families to recognize deviations from normal conditions regarding their health by analyzing data objectively and making families aware of the consequences of these problems in family development.
2. Service providers to sick family members, by providing nursing care to sick family members. Often the first contact with the family begins with the presence of a sick family member either through direct discovery or referral. Coordinator of health services and family health nursing, which has a role in coordinating family health services, both in groups and individually.
3. Facilitator, namely by making health services easily accessible to families and helping to find solutions.
4. Health educators, namely to change family behavior from unhealthy behavior to healthy behavior.
5. Extension workers and consultants, whose role is to provide guidance on basic nursing care in the family. In providing nursing care to families, nurses cannot work alone but work in teams and work together with other professions to achieve good Family Nursing Care.

2.3. Diabetes Mellitus

Diabetes mellitus is an imbalance in blood sugar levels due to disturbances in the insulin hormone in which the body does not have the ability to produce enough insulin for its needs, or the patient is unable to produce insulin at all, or the patient is able to produce enough insulin but the cells cannot receive the insulin. because the receptors that function as insulin catchers have decreased function. Insulin is a hormone produced by the pancreas, precisely in the beta cells of the islets of Langerhans. (25)

The body that experiences disturbances in these hormones will automatically experience disturbances in the balance of sugar levels. Blood sugar level if it is more than 200 mg/dl on blood sugar examination or blood sugar level 2 hours after loading glucose/sugar, or fasting blood sugar (GDP) level of more than 126 mg/dl is a positive sign that a person has diabetes mellitus. (25)

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia that occurs due to defects in insulin secretion, insulin action or both. Chronic hyperglycemia in diabetes is associated with long-term damage, dysfunction or failure of several organs of the body, especially the eyes, kidneys, nerves, heart and blood vessels. (7)

2.4. THE CONCEPT OF BLOOD SUGAR LEVELS

Blood sugar level is the level of glucose in the blood where the concentration of blood sugar or serum glucose level is tightly regulated in the body. Glucose that flows through the blood is used as the main source of energy for the body's cells. Blood sugar is made up of carbohydrates that come from food, which are stored as glycogen in the liver and skeletal muscles. (26) Blood sugar levels are influenced by various enzymes and hormones, and the most important is the hormone insulin. Factors that support the release of insulin are food in the form of glucose, mannose and vagal stimulation of class drugs. (20)

2.4.1. Types of Blood Sugar Checks

There are several types of examination of blood glucose levels, namely blood glucose levels during, fasting, 2 hours after eating (2 hours PP) and oral glucose tolerance test (OGTT):

1. Blood glucose when

Instant blood sugar is a measurement of blood glucose regardless of mealtime. Blood glucose can increase after eating, stress, or diabetes mellitus. Normal values range from 70 mg/dL to 125 mg/dL. Blood sugar when 200 mg / dL can be categorized as high blood glucose, each laboratory has its own benchmark for blood sugar levels. (26)

2. Fasting blood glucose

Fasting blood glucose is a blood glucose test that is done after fasting for 8-10 hours. (20) This fasting blood sugar level describes the level of glucose produced by the liver. The normal value is less than 100 mg/dL. Fasting blood glucose 126 mg/dL can be categorized as high fasting blood glucose. (26)

3. Blood glucose 2 hours after eating

Blood glucose 2 hours after eating is an examination of glucose levels exactly 2 hours after eating. This test illustrates the effectiveness of insulin in transporting glucose to cells. Normal values range from 100 mg/dL to 140 mg/dL.

2.5. DIABETES DIET EDUCATION CONCEPT

Health education is a process by which people can increase control over and improve individual health. (36) Diet settings are very important, usually patients should not consume too much sweet food and are required to eat on a regular schedule. Diabetics tend to have high cholesterol levels, therefore people with diabetes mellitus are advised to limit the amount of saturated fat in their diet. The best way to lower cholesterol is to control blood sugar levels and weight. (37)

2.5.1. The Purpose of Diabetes Mellitus Diet Education

The purpose of health education is to increase the community's ability to maintain and improve their health, both physically, mentally and socially so that they are economically and socially productive. (36) The purpose of diet education for people with diabetes mellitus is to help patients improve their eating and exercise, so they can gain better metabolic control by understanding the following: (38)

1. Maintain near normal blood glucose levels by balancing food intake with insulin, oral glucose-lowering drugs and physical activity.
2. Achieve and maintain normal serum lipid levels. Provides sufficient energy to maintain or achieve a normal body weight.
3. Avoid or treat acute complications using insulin such as hypoglycemia, short-term and long-term complications and problems associated with physical exercise

2.6. THE CONCEPT OF FEET GYSMS

Leg gymnastics is one of the exercises that can be done by patients with diabetes mellitus, which can increase the strength of the calf and thigh muscles, prevent deformities and overcome the limitations of joint motion. (40) This foot exercise can also increase blood circulation to the feet and prevent injuries to the feet of people with diabetes mellitus. (25) Diabetes mellitus foot exercise is an activity or exercise performed by patients with diabetes mellitus that can reduce the degree of neuropathy. (41)

3. RESEARCH METHODOLOGY

3.1. Case Study Subject

The subjects of this case study were two people with inclusion criteria:

1. Diabetics who can communicate verbally
2. People with diabetes mellitus who can interact socially
3. Patients with diabetes mellitus who do not have any physical disorders
4. People with diabetes mellitus who can read
5. Patients with diabetes mellitus who are willing to be respondents
6. GDS: 160-240 mg/dL
7. Age: 40-75 years old

Subject Exclusion Criteria:

1. Patients with diabetes mellitus with complications
2. Patients with diabetes mellitus who are obese
3. People with diabetes mellitus who can't read
4. People with diabetes mellitus who are not willing to be the subject
5. Patients who withdrew
6. Patients with diabetic ulcers
7. GDS > 250 mg/dL

3.2. Study Focus

The application of providing diabetes diet education and foot exercises to increase the level of knowledge and reduce blood sugar levels in people with diabetes mellitus

3.3. Data Collection Method

Data collection is a process of approaching the subject and the characteristics of the subject needed in the case study, the steps of data collection depend on the plans and techniques used by the researcher.

Data collection steps:

1. Explain the purpose, objectives and timing of the case study to the Tlogosari Kulon Public Health Center and the area where the research will be conducted.
2. Measuring blood sugar levels to determine subjects that fit the inclusion and exclusion criteria.
3. Requesting the consent of the subject with proof of signature on the informed consent.
4. Ask the subject to fill out a self-identity questionnaire.
5. Explain the diabetes diet education procedure and foot exercises that will be applied to the client.
6. Measure the client's level of knowledge by providing a pre-test questionnaire to be filled out on the first day by the client before being given diabetes mellitus diet education.
7. Implementing diabetes mellitus diet education for 1 day for 91 minutes to clients and accompanied by family.
8. Measure the client's level of knowledge by providing a post test questionnaire to be filled out after being given diabetes mellitus diet education.
9. Implementing diabetes mellitus foot exercises on the second day, namely by doing foot exercises 2 times a day every morning and evening for 3 consecutive days accompanied by the client's family, where the time required is 30 minutes for each foot exercise.

10. Measuring blood sugar levels on the 3rd day after doing diabetes mellitus foot exercise which is the fourth day after the treatment of diet education and diabetes mellitus foot exercise.
11. Processing and analyzing data on the average change in the level of knowledge after being given health education about diabetes mellitus diet.
12. Processing and analyzing data on average changes in blood sugar levels after 3 days of giving diabetes mellitus exercise.

3.4. Location and Time of Case Study

The case study was conducted in the Tlogosari Kulon public health center for 2 weeks, 12-24 April 2021

3.5. Data Analysis and Presentation

The case study data analysis used descriptive analysis. Descriptive analysis is a problem solving procedure by describing the current state of the object based on the facts as they are, then analyzed and interpreted, the method used to analyze the data by describing the data that has been collected to make a conclusion. This data processing was carried out by measuring the level of knowledge about the diabetes diet and blood sugar levels before and after the diabetes diet education intervention and foot exercises were carried out to increase knowledge about the diabetes diet and reduce blood sugar levels in people with diabetes mellitus. The data is then processed with averages and the data is presented using tables to determine changes in blood pressure that occur.

4. RESULTS AND DISCUSSION

4.1. Overview of Case Study Subjects

Subject I

A family study with subject I diabetes mellitus was conducted on April 16, 2021, and the identity of subject I was Mrs. N, 53 years old, female, work as a housewife, subject is Muslim, elementary school education, ethnic Javanese, Indonesian, address Tlogosari Kulon Village.

Subject I obtained data that subject I felt often hungry so that in 1 day the subject could eat 4-5 times, often urinated more than 8 times per day, tingling in the legs, subject I had these complaints since 1 month ago. Subject I said that he had diabetes mellitus because he liked to consume sweet foods and drinks and lacked exercise. Subject I knew that he had a history of diabetes mellitus since 3 years ago, namely in 2019 and had been given medication. Subject I often eats and drinks sweets, and does not regularly take medication, at that time Subject I felt continuous hunger and was accompanied by weakness, and tingling in the legs so that Subject I asked for help from the family to accompany Subject I to the Puskesmas to check his sugar levels and so that receiving medication, subject I's family said that they had never known complementary therapy for diabetes mellitus. The results of the assessment of the level of knowledge before being given the intervention of subject I 9 (less). Subject I did not know what normal blood sugar levels were during and during fasting, the time interval between main meals (complete meals) and snacks, and the amount, type, recommended diet schedule for people with diabetes mellitus and forms of secondary diabetes prevention. mellitus.

Subject I's family is included in the nuclear family type because it is under one roof consisting of husband, wife, and children. Relationships in the family are well established if there is a problem in the family they always solve it together. The relationship between subject I's neighbors is harmonious when the researcher asks subject I's house, the neighbor immediately takes the researcher to subject I's house and assists when the researcher conducts an assessment of subject I. Subject I's family has been able to take advantage of health facilities actively, namely by checking sick family members to the hospital. Puskesmas every month and are able to take active preventive measures, namely by participating in maintaining the diet of the sick family, so that the subject I family is in the category of independent family level III.

The results of the physical examination of subject I using weight scales, height measuring and glucometer obtained weight data of 70 kg, height 155 cm, BMI 29.1 (obesity I) blood sugar 208 mg/dL (height), the subject complained of weakness, a lot of urination, and tingling in the legs, for now the subject is not taking the usual drugs and is not doing other complementary therapies related to diabetes mellitus

Subject II

A family study with diabetes mellitus subject II was conducted on April 16, 2021, and the identity of subject II was Mrs. A, age 63 years, female gender, housewife occupation, subject is Catholic, junior high school education, ethnic Javanese Indonesia, address Tlogosari Kulon Village.

Subject II complained of sometimes tingling in the legs, subject II said he had no previous history of diabetes mellitus but subject II had a family history of diabetes mellitus, namely his mother. Subject II did not know if subject II also had diabetes mellitus, and when the researcher checked blood sugar levels, subject II and his family found out that subject II's blood sugar levels were high. The results of the

assessment of the level of knowledge before being given intervention by subject II 12 (enough). Subject II did not know what normal blood sugar levels were during and during fasting, the time interval between main meals (complete meals) and snacks, and the amount, type, recommended diet schedule for people with diabetes mellitus, as well as general symptoms of diabetes mellitus. people with diabetes mellitus.

The type of family subject II is Extended Family or a large family where the subject lives with her husband and grandson, their relationship is very good, the grandson always helps the subject's homework and vice versa the subject always guides and loves his grandson. Subject II's family received the researcher's arrival to provide health services, but subject II's family had not been able to reveal the health problems experienced by his family members and subject II's family had not been able to actively utilize health facilities so that subject II's family was included in the category of independent family level I. Relationships between neighbors also well established, subject II often gathers with his neighbors when even just talking.

The results of the physical examination showed that subject II used a weight scale, height gauge and glucometer, subject II complained of sometimes tingling in the legs, the subject was 155 cm tall and weighed 73 kg, BMI 30 (obesity II) blood sugar 182 mg/day. dL (high). Currently, subject II does not take drugs or other therapies for diabetes mellitus.

4.2. Presentation of Study Focus Results

The results of measuring the level of knowledge before giving education on diabetes mellitus diet and foot exercises. Initial assessment of the level of knowledge and blood sugar levels of the subject can be seen in table 1

Table 1 The results of measuring the level of knowledge of subjects I and II before the diabetes mellitus diet education intervention was carried out

Subject	Score
Subject I	12
Subject II	9

The results of the initial assessment of the level of knowledge showed that both subjects had a knowledge deficit. Furthermore, to clarify table 4.1 the results of the initial assessment of the knowledge level of subject I and subject II with observation before education. Observations made with the application of diabetes mellitus diet education can be illustrated in diagram 1 as follows

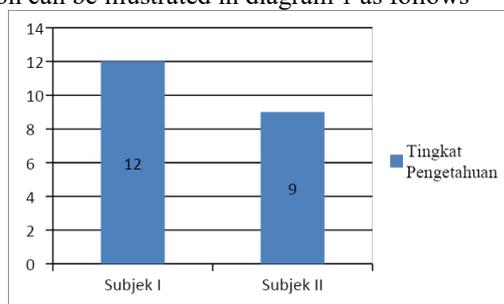


Chart 1 The results of measuring the level of knowledge of subject I and subject II before the diabetes mellitus diet education intervention was carried out

Based on table 1 and diagram 1 shows the results of the initial assessment of the knowledge level score of subject I 12 (enough) and subject II 9 (less) indicating a knowledge deficit about diabetes mellitus diet.

4.3. Discussion

Based on the results of the research on the application of diabetes mellitus diet education and diabetic foot exercises to increase the level of knowledge and reduce blood sugar levels in patients with diabetes mellitus, it was found that the age of subject I was 53 years, and subject II was 63 years. The age of the two subjects is no longer said to be young, and the age of subject II is already included in the category of elderly, said to be elderly (geriatric age) is age above 60 years. (43) With age, there is a greater risk of developing type 2 diabetes mellitus because the number of productive beta cells will also decrease, so that the body's ability to metabolize glucose will decrease which has an impact on decreasing insulin production from beta cells. (26) It is proven by the research of Nur Isnaini and Ratnasari 2018 which states that the higher a person's age, the greater the incidence of type two DM. (27)

In addition to age, a factor that can affect diabetes mellitus is gender. The results of the study show that both subjects are female, a woman is more at risk of suffering from diabetes mellitus due to hormonal and metabolic factors, that women experience menstrual cycles and menopause which contribute to making the distribution of increased body fat very easy to accumulate due to this process. (27) It is proven by the

2019 research by Pitrida Girsang which states that the risk of developing diabetes mellitus is mostly in female respondents. (44)

Another factor that causes diabetes mellitus is family history, the study data states that subject II is someone who has a family history of diabetes mellitus. Parents or siblings if they have diabetes mellitus, it is estimated that around 40% are born to parents who suffer from diabetes mellitus and approximately 60% - 90% of identical twins are people with diabetes mellitus. (26) Heredity is very influential on the occurrence of diabetes mellitus. The offspring of people who have diabetes mellitus are more likely than the offspring of people who are not diabetic. Statistics on heredity: (14) If one parent has type 2 diabetes mellitus, the probability of getting the disease is 15%. If both parents have type 2 diabetes mellitus, there is a 75% chance of getting diabetes. If your sibling has diabetes, the chances of getting it are about 10%. It is proven by the research of Rara Warih Gayatri 2019 which states that there is a significant relationship between family history of diabetes mellitus and the incidence of type 2 diabetes mellitus (45).

Another factor of diabetes mellitus is lifestyle. The results of the study stated that subject I liked to consume sweet food and drinks, and subject II always ate food (carbohydrates) in large portions. A lifestyle that often consumes fast food (junk food), sweet foods, lack of exercise and soft drinks and sweet drinks is a triggering factor for type 2 diabetes mellitus (25) This condition is evidenced by research by Nur Isnaini and Ratnasari 2018 states that there is a relationship between diet and the incidence of type 2 diabetes. (27) One's occupation or profession can also be a factor in causing a person to suffer from diabetes mellitus, both subjects are housewives where their mobility is less than other occupations such as sportsmen. Occupation/Profession determines a person's mobility or movement. Little activity will affect body weight and the accumulation of body fat so that it can reduce the working ability of the insulin hormone in delivering sugar or glucose into cells so that blood sugar will increase. (25) This condition is in line with the results of the 2019 study by Nonita Sari and Agus Purnama which stated that there was a relationship between low physical activity and the incidence of type 2 diabetes mellitus (46).

Obesity is also a factor in the occurrence of diabetes mellitus, BMI of subject I 29.1 (obesity I), subject II (obesity II). The increase in body mass index is influenced by lifestyle factors such as being overweight or not exercising is closely related to the development of type two diabetes and the effect of body mass index on diabetes mellitus can be caused by a lack of physical activity and high consumption of protein, carbohydrates and fats which are factors risk of obesity. This condition can cause an increase in fatty acids or Free Fatty Acid (FFA) in the cells. This increase in FFA will cause a decrease in glucose uptake into the plasma membrane, and will cause insulin resistance in muscle and adipose tissue. This is evidenced by the research of Nur Isnaini and Ratnasari 2018 which states that there is a relationship between BMI and the incidence of type two DM. (27)

In addition to the factors above, the level of education can also cause a person to suffer from diabetes mellitus. The education level of subject I is elementary school and subject II is junior high school. A high level of education usually has knowledge about health so that people will have awareness in maintaining health. (28) This condition is in line with the results of research conducted by Nur Isnaini and Ratnasari 2018 which states that the educational factor shows that there is an influence between education and the incidence of DM. (27)

The above factors are risk factors that cause a person to suffer from diabetes mellitus. Someone who suffers from diabetes mellitus can be seen from early signs, subject I at the beginning of suffering from diabetes mellitus is complaining of weakness, increased appetite 4-5 times per day, and urinating a lot more than 8 times per day, as well as tingling in the legs. . Subject II did not know that he had diabetes mellitus, but subject II felt frequent hunger and itching and tingling in the legs. Clinical manifestations or signs and symptoms in diabetes mellitus are polyuria/lots of urination, polydipsia/lots of drinking, polyphagia/lots of eating, weight loss, blurred vision, tingling in the legs and priority, and erectile dysfunction. (25)

According to previous theoretical studies, it has been explained that diabetes mellitus diet education and diabetic foot exercises can increase the level of knowledge of a diabetic patient to change a healthier lifestyle by paying more attention to the 3 J's, namely type, amount, schedule of food to be consumed. Leg exercise can reduce blood sugar levels, during physical exercise there will be an increase in blood flow, causing more available insulin receptors and receptors to become more active, resulting in an increase in the use of glucose by active muscles which in turn will affect the decrease in blood glucose levels. (21)

Before the intervention of diabetes mellitus diet education and diabetes foot exercise was conducted, the researcher conducted an assessment of the knowledge level score before the intervention was given to the two subjects with the provided questionnaire sheet. Subject I Mrs. N 12 (enough) and a score of subject knowledge level II Ny. A 9 (less). Subject I did not know what normal blood sugar levels were during and during fasting, the time interval between main meals (complete meals) and snacks, and the amount, type, recommended diet schedule for people with diabetes mellitus and forms of secondary diabetes prevention.

mellitus. Subject II did not know what normal blood sugar levels were during and during fasting, the time interval between main meals (complete meals) and snacks, and the amount, type, and schedule of the diet taken.

recommended for people with diabetes mellitus, as well as general symptoms in people with diabetes mellitus. (34) Families with good economic status are more easily fulfilled than families with low economic status, this will affect the need for information. (34) Information is the whole meaning, it can be interpreted as notification of someone there is new information about something that provides a new cognitive foundation for the formation of attitudes towards it. Suggestive messages are carried by the information if the direction of a certain attitude. This approach is usually used to use public awareness of an innovation that affects behavior change, usually used through mass media. (34)

In addition to assessing the level of knowledge, the researchers also measured the blood sugar levels of the two subjects before the diabetes mellitus foot exercise intervention was carried out with a glucometer. Blood sugar levels before the intervention was given, subject I was 208 mg/dL (high), and subject II was 182 mg/dL (high). There are differences in blood sugar levels of the two subjects, of course there are factors that influence high blood sugar levels, namely lack of dietary knowledge, control of food intake, and lack of exercise, as well as increasing age. (32)

Diet knowledge is a very important factor in controlling one's blood sugar levels. A good level of knowledge will be directly proportional to the diet carried out which has an impact on controlling food intake with the aim of controlling sugar levels in a person. (32) Food intake can affect the increase in blood sugar levels as a result of foods that are high in energy or rich in carbohydrates and low in fiber can interfere with the stimulation of pancreatic beta cells in producing insulin, (32) foods that contain lots of energy that enter the body The drug should be used for exercise so that it does not accumulate in the body and cause obesity which can interfere with the work of insulin receptors. (25) Regular exercise can reduce the occurrence of insulin resistance so that insulin can be used better by the body's cells. Exercise can also be used as a fat burner in the body which has an impact on weight loss for obese people, there are factors that affect a person's physical movement, namely work and age. Increasing age affects the physical and decreases the function of body organs which will have an impact on the consumption and absorption of nutrients.

Research shows that nutritional problems in the elderly mostly have problems of excess nutrition and overweight/obesity that trigger degenerative diseases including diabetes mellitus. (32)

The diabetes mellitus diet education intervention was given on the first day of this case study, April 16, 2021 at the residence of each subject, with a duration of 91 minutes for each application of the intervention to the subject. The implementation of diabetes mellitus diet education certainly involves the participation of the family, in its implementation, subject I is accompanied by his child and subject II is accompanied by his grandson until the implementation of diabetes mellitus diet education is completed.

After being given the diabetes mellitus diet education intervention for 91 minutes, there was an increase in the knowledge level score of the two subjects, subject I increased to 18 (good) with an increase of 6, subject II increased to 16 (good) with an increase of 7. The increased knowledge was about blood sugar levels. normal blood sugar during and during fasting, and the amount, type, diet schedule of patients with diabetes mellitus, as well as forms of secondary prevention of diabetes mellitus. Subject II experienced an increase in the level of knowledge to 16 (good), the increased knowledge was about normal blood sugar levels during and during fasting, and the number, type, diet schedule of people with diabetes mellitus, as well as general symptoms of people with diabetes mellitus. There was a difference in the increase in knowledge level scores in the two subjects due to several reasons

factors, namely the level of education, (34) the last education of subject I is elementary school and subject II is junior high school, the level of education affects a person's maturity in thinking and receiving information. Education is a basic effort to become a personality and ability inside and outside school and lasts a lifetime. (34)

This foot exercise intervention was carried out on the second day of this case study, April 17, 2021, at the residence of each subject. The intervention was carried out 2 times a day, namely in the morning and evening with a duration of 30 minutes for each implementation. The implementation of this intervention certainly involves the participation of the family, subject I is accompanied by his child, subject II is accompanied by his grandson. Implementation in the morning on the first day the two subjects were accompanied by researchers and their families, in the afternoon the two subjects were only accompanied by their families during the leg exercise. The 2nd day of the implementation of foot exercises in the morning and evening, the two subjects were only accompanied by their families. The implementation of foot exercises in the morning on the 3rd day both subjects were only accompanied by their families, and in the afternoon they were accompanied by researchers and their families. Mastery of the foot exercise movement

of subject I is very good and in accordance with the SOP. Subject II mastery of leg exercise movements is still not optimal and not in accordance with the SOP, in its implementation subject II often forgets the sequence of movements, there are some movements that are lost due to forgetting, and there are calculations that do not match the foot movements.

After being given a foot exercise intervention, there was a decrease in blood sugar levels in both subjects, namely subject I, it fell to 191 mg/dL (height) with a total decrease of 17 mg/dL. Subject II dropped to 169 mg/dL, with a total decrease of 13 mg/dL. There are differences in the number of decreases in the two subjects which are influenced by the different types of food consumed and the accuracy of movements in leg gymnastics. The type of food consumed can affect the increase in blood sugar levels as a result of foods that are high in energy or rich in carbohydrates and low in fiber that can interfere with the stimulation of pancreatic beta cells to produce insulin, (32) foods that contain a lot of energy that enter the body. should be used for exercise so that it does not accumulate in the body and cause obesity which can interfere with the work of insulin receptors. (25) Subject I was able to control his food intake by reducing sugary eating and drinking, and was able to reduce the amount of carbohydrates consumed, while subject II said that his desire to eat a lot was still great, so sometimes he still occasionally eats large amounts of carbohydrates.

Regular exercise can reduce the occurrence of insulin resistance so that insulin can be used better by the body's cells. Changes in blood glucose levels after doing leg exercises are caused by metabolic changes that are influenced by the length of exercise, the weight of the exercise. When doing leg exercises, the body needs energy, so the muscles that were previously inactive become active, because there is an increase in the need for glucose. This sensitivity will last a long time, even until the practice is over. In physical exercise there will be an increase in blood flow, causing more available insulin receptors and receptors to be more active so that there is an increase in the use of glucose by active muscles which in turn will affect the decrease in blood glucose levels. (21) The process of foot gymnastics of subject I was carried out in a coherent manner in order, no steps were lost, so that the time used was in accordance with the procedure, which was 30 minutes each time doing foot exercises from day 1 to day 3, while subject II took many steps. not done because of forgetting, so the time used is less than 30 minutes.

Subject I's family is included in the nuclear family type because it is under one roof consisting of husband, wife, and children. (23) Relationships in the family are well established if there is a problem in the family they always solve it together. The role of subject I's family in overcoming the problem of diabetes mellitus, the family often reminds subject I to check his health at the Puskesmas, subject I's child is

a nurse also but her job is not in the health sector and many things have been forgotten related to diabetes mellitus, but subject I's child said that she gave little information related to diabetes mellitus to her mother, the family was also active in helping in the process of diabetes mellitus diet education intervention and learning how to do gymnastics the correct foot and in the order that the family can do it themselves at all times. (15.22) Subject I's family has been able to use health facilities actively, namely by checking their sick family members to the puskesmas every month and being able to take active preventive measures, namely by participating in maintaining the diet of the sick family, so that subject I's family is in control. independent family category level III. (24)

The type of family subject II is Extended Family or a large family where the subject lives with her husband and grandson, their relationship is very good, the grandson always helps the subject's homework and vice versa the subject always guides and loves his grandson. (23) The role of the family of subject II in overcoming the problem of diabetes mellitus, the family often reminds subject II to check his health at the hospital, subject II lives with his husband and grandson where his husband is rarely at home due to work, and everyday the subject lives with his grandson. (15.22) The subject's grandson said he did not understand about health problems because he was still a child but the subject's grandson was active in helping in the process of diabetes mellitus diet education intervention and learning how to do leg exercises correctly and in order so that the family could do it themselves. at all times. Subject II's family received the researcher's arrival to provide health services, but subject II's family had not been able to reveal the health problems experienced by his family members and subject II's family had not been able to actively utilize health facilities so that subject II's family was included in the category of independent family level I. (24)

After the two interventions were carried out, the level of independence of the subject I family increased to level IV independent family, namely the family was able to actively utilize health facilities, namely by checking sick family members at the puskesmas every month and being able to take active preventive measures, namely by participating in maintaining the family's diet. who are sick, and are able to take promotive/improvement actions (leg exercises) actively. The level of independence of the subject II family increased to a level II independent family, namely the family was able to express diabetes mellitus health problems correctly and could perform simple treatments as recommended. (24)

5. CONCLUSION

Based on the discussion about changes in the level of knowledge and blood sugar levels in patients with diabetes mellitus, nursing interventions with diabetes mellitus diet education and foot exercises can be concluded as follows:

1. Measuring the level of knowledge before giving education on diabetes mellitus diet, subject I 12 (enough) and subject II 9 (less),
2. Measuring the level of knowledge after providing diabetes diet education, the results showed that subject I was 18 (good), and subject II was 16 (good),
3. There is an increase in the level of knowledge in both subjects after the diabetes mellitus diet education action, subject I there is an increase in the level of knowledge from 12 (enough) to 18 (good), and subject II there is an increase in the level of knowledge from 9 (less) to 16 (good).)
4. Measuring blood sugar levels before giving foot exercises to subject I 208 mg/dL (high) and subject II 182 mg/dL (high),
5. Measurement of blood sugar levels after the application of foot exercises for 3 consecutive days showed the results of subject I 191 mg/dL, subject II 169 mg/dL,
6. There was a decrease in blood sugar levels in both subjects after the foot exercise, subject I decreased blood sugar levels from 208 mg/dL (high) to 191 mg/dL (high), and subject II decreased blood sugar levels from 182 mg /dL (high) to 169 mg/dL (high),
7. There is an increase in the level of family independence in subject I, there is an increase in the level of family independence, namely from an independent family at level III to an independent family at level IV. Subject II from level I independent family became independent family level II.

BIBLIOGRAPHY

1. Mary A. Nies MM. *Keperawatan Kesehatan Komunitas dan Keluarga*. Singapore: Elsevier Inc; 2019.
2. Damhari. *Asuhan Keperawatan Keluarga Pada Keluarga Tn. S Dengan Kasus Diabetes Mellitus Tipe II Di Wilayah Kerja Puskesmas Pekauman Banjarmasin*. 2017;10. Available from: <https://dspace.ups.edu.ec/bitstream/123456789/5224/1/UPS-QT03885.pdf>
3. Ali Maghfuri Tholib. *Buku Pintar Perawatan Luka Diabetes Melitus*. Jakarta: Salemba Medika; 2016.
4. Retno Novitasari. *Diabetes Milletus*. Yogyakarta: Nuha Medika; 2012.
5. Riamah, Awaluddin, Mahyudin. *Efektifitas Senam Diabetes Terhadap Penurunan Kadar Glukosa Darah Pada Pasien Diabetes Melitus Tipe II Di Wilayah Kerja Puskesmas Rumbio Jaya*. J Keperawatan Abdurrab. 2020;4(1):2–6.
6. Meliyana E, Nofiana M. *Pengaruh Edukasi Diet Diabetes Dan Senam Kaki Terhadap Kadar Gula Darah Pada Penderita Diabetes Melitus Di Puskesmas Padurenan*. 2020;2(1).
7. Fakultas Kedokteran Universitas Indonesia. *Penatalaksanaan Diabetes Melitus Terpadu (Panduan Penatalaksanaan Diabetes Melitus bagi Dokter dan Edukator)*. 2nd ed. Jakarta: Balai Penerbit FKUI; 2015.
8. Ana Fitria Nusantara, Sunarto AK. *Pengawasan Anak dengan Diabetes Mellitus Type I sebagai Pencegahan terhadap Kejadian Komplikasi Ketoasidosis Diabetikum*. Sulawesi Selatan: Yayasan Ahmar Cendekia Indonesia; 2019.
9. Atlas IDFD. *Idf diabetes atlas*. 2019;
10. Soelistijo SA, Lindarto D, Decroli E, Permana H, Sucipto KW, Kusnadi Y, et al. *Pedoman pengelolaan dan pencegahan diabetes melitus tipe 2 dewasa di Indonesia 2019*. *Perkumpulan Endokrinol Indones* [Internet]. 2019;1–117. Available from: <https://pbperkeni.or.id/wp-content/uploads/2020/07/Pedoman-Pengelolaan-DM-Tipe-2-Dewasa-di-Indonesia-eBook-PDF-1.pdf>
11. Kemenkes RI. *Hari Diabetes Sedunia Tahun 2018*. Pus Data dan Inf Kementrian Kesehat RI. 2019;
12. Tribun Jateng. *Prevalensi Penderita Diabetes di Jawa Tengah*. In jateng.tribunnews.com; Available from: <https://jateng.tribunnews.com/2018/11/07/prevalensi-penderita-diabetes-di-jawa-tengah-sebesar-21-persen>
13. Yunitasari T, Yuniarti Y, Mintarsih SN. *Efektivitas Edukasi Empat Pilar Penatalaksanaan Diabetes Melitus Terhadap Pengetahuan, Sikap, Dan Perilaku Pasien Prolanis*. J Ris Gizi. 2019;7.
14. Anggota IKAPI. *Upaya Pencegahan Diabetes Tipe 2*. (pengetahuan yang diperlukan semua prang agar sehat dan terhindar dari penyakit diabetes tipe 2 dan penyakit degeneratif lain). Pertama.

Implementation Of Diabetes Diet Education And Foot Exercise To Increase Knowledge Level And Reduce Blood Sugar Levels In Diabetes Mellitus Patients In The Tlogosari Puskesmas Area, Kulon Semarang

- Jakarta: Balai Penerbit FKUI; 2015.
15. Harnilawati. Konsep dan Proses Keperawatan Keluarga. Sulawesi Selatan: Pustaka As Salam; 2013.
 16. Arfina A. Pengaruh Edukasi Pengaturan Diet Terhadap Perilaku Pengelolaan Diet Pada Penderita Diabetes Melitus Di Kelurahan Agrowisata Kecamatan Rumbai Kota Pekanbaru. *Indones Trust Heal J.* 2019;2.
 17. Luthfiani, Evi Karota NFS. Panduan Konseling Kesehatan Dalam Upaya Pencegahan Diabetes Melitus. Yogyakarta: Cv Budi Utama; 2020.
 18. Suratun Haryono, Eros Siti Suryati RSM. Pendidikan Kesehatan Tentang Diet Terhadap Kepatuhan Pasien Diabetes Mellitus. 2020;7(2):91–6.
 19. Anggriyana Tri Widiyanti AP. Senam Kesehatan (Aplikasi Senam Untuk Kesehatan). 1st ed. Yogyakarta: Nuha Medika; 2010.
 20. Trijayanti LW. Pengaruh Senam Kaki Terhadap Perubahan Kadar Gula Darah Pada Lansia Penderita Diabetes Mellitus Tipe 2 Di Posyandu Mawar Desa Balerejo Kecamatan Kebonsari Kabupaten Madiun. 2019;
 21. Nuraeni IPDA. Pengaruh Senam Kaki Terhadap Penurunan Kadar Gula Darah Pada Penderita Diabetes Mellitus Type II. 2018;(20).
 22. Padila. Buku ajar: Keperawatan Keluarga. Yogyakarta: Nuha Medika; 2012.
 23. Zaidin Ali. Pengantar Keperawatan Keluarga. Fruriolina Ariani, editor. Jakarta: EGC; 2010.
 24. Irma Suswati, Febri Endra Budi Setiawan, Yoyok Bekt Prasetyo AT. Interprofessional Education (IPE) Panduan Tutorial dan Homevisit Kesehatan Keluarga. Malang: Universitas Muhammadiyah Malang; 2018.
 25. Satriya Pranata DUK. Merawat Penderita Diabetes Melitus. Pertama. Yogyakarta: Pustaka Panasea; 2017. 32–37 p.
 26. Simatupang R. Pedoman Diet Penderita Diabetes Melitus. Rahman A, editor. Banten: Yayasan Pendidikan dan Sosial; 2020.
 27. Isnaini N, Ratnasari R. Faktor Risiko Mempengaruhi Kejadian Diabetes Mellitus Tipe Dua. *J Kebidanan dan Keperawatan Aisyiah.* 2018;14(1):59–68.
 28. Isabella V. Mamangkey, Nova H. Kapantow BTR. Hubungan Antara Tingkat Pendidikan Dan Riwayat Keluarga Menderita DM Dengan Kejadian DM Tipe 2 Pada Pasien Rawat Jalan Di Poliklinik Penyakit Dalam BLU RSUP Prof. Dr. D. Kandou Manado. 2014;
 29. Musdalifah, Nugroho PS. Hubungan Jenis Kelamin dan Tingkat Ekonomi dengan Kejadian Diabetes Melitus di Wilayah Kerja Puskesmas Palaran Kota Samarinda Tahun 2019. *Borneo Student Res [Internet].* 2019;1(1):1–5. Available from: <http://journals.umkt.ac.id/index.php/bsr/article/view/479>
 30. I Wayan A.P KN. Empat Pilar Penatalaksanaan Pasien Diabetes Mellitus Tipe 2. *Majority.* 2015;4.
 31. Marsudi LO, Jayanti NE, Melitus D. Pemeriksaan Gula Darah Di Gor Segiri Samarinda. 2020;
 32. Faizal Y. Kadar Gula Darah. 2017;
 33. Sundari PM. Hubungan tingkat pengetahuan dan self management diabetes dengan tingkat stres menjalani diet penderita diabetes mellitus. Vol. 53, *Journal of Chemical Information and Modeling.* 2018.
 34. Shella Aprilia Imron. Hubungan Tingkat Pengetahuan Dan Kepatuhan Diet Dengan Kadar Gula Darah Penderita Diabetes Mellitus Tipe II Rawat Jalan Di Puskesmas Kedungmudu Kota Semarang. 2017;4.
 35. Fauza HA. Hubungan Antara Tingkat Pengetahuan Dan Aspek Perilaku Dengan Status Kontrol Glikemik Pasien Diabetes Melitus Di RSUP Dr. Kariadi. 2017;4.
 36. Arita Murwani. Pendidikan Kesehatan dalam Keperawatan. Yogyakarta: Penerbit Fitramaya; 2014.
 37. Ratna Dewi Pudiastuti. Penyakit Pemicu Stroke (Dilengkapi dengan Posyandu Lansia dan Posbindu PTM). Yogyakarta: Nuha Medika; 2011.
 38. Anggota IKAPI. Penuntun Diet. Sunita Almaster, editor. Jakarta: Gramedia Pustaka Utama; 2012.
 39. Selfi BF, Simbolon D, Kusdalinah K. Pengaruh Edukasi Pola Makan dan Senam terhadap Kadar Gula Darah Pada Penderita DM Tipe 2. *J Kesehat.* 2018;9.
 40. Anik Maryunani. Perawatan Luka (Modern Woundcare) Terlengkap dan Terkini. Penerbit IN MEDIA; 2015.
 41. Brahmantia B, Falah M, Rosidawati I, Aida R, F ND. Pengaruh Snam Diabetik Terhadap Sensitivitas Kaki Penderita DM Di Puskesmas Parungponteng Kecamatan Cibalong Kabupaten Tasikmalaya. 2020;2(2):15–9.
 42. Setyoadi K. Terapi Modalitas Keperawatan pada Klien Psikogeriatik. Jakarta: Salemba Medika; 2011.

43. Infodatin. Situasi Lanjut Usia (LANSIA) di Indonesia. *Drug Ther Bull.* 2016;10(16):63–4.
44. Pitrida G. Faktor Resiko Kejadian Diabetes Melitus Terhadap Pasien Yang Datang Berobat Ke Klinik Asri Wound Medan Tembung Tahun 2019. Koleks KTI D3 Keperawatan [Internet]. 2019;1–12. Available from: <http://poltekkes.aplikasi-akademik.com/xmlui/handle/123456789/2126>
45. Gayatri RW. Hubungan Faktor Riwayat Diabetes Mellitus Dan Kadar Gula Darah Puasa Dengan Kejadian Diabetes Mellitus Tipe 2 Pada Pasien Usia 25-64 Tahun Di Puskesmas Kendal Kerep Kota Malang. *Prev Indones J Public Heal.* 2019;4(1):56.
46. Purnama NS dan A. Aktivitas Fisik dan Hubungannya dengan Kejadian Diabetes Melitus. *Wind Heal.* 2019;2.
47. Satriya Pranata DUK. *Merawat Penderita Diabetes Melitus. Pertama.* Yogyakarta: Pustaka Panasea; 2017.
48. Anggota IKAPI. *Menu 30 Hari & Resep Untuk Diabetes.* Jakarta: PT Gramedia Pustaka Utama; 2011.
49. Rahmawati F. *Perencanaan Diet Untuk Penderita Diabetes Mellitus.* 2011;