International Journal of Medicine and Health (IJMH)
Vol.3, No.1 March 2024
E-ISSN: 29621178- P-ISSN: 2962-0880, Page 07-20
DOI: https://doi.org/10.55606/ijmh.v3i1.2854

Description Of Diabetic Wound Treatment With Hydrogel In Pedis Care Malang City

Triska Dama Yanti[1], Abdul Hanan[2], Lucia Retnowati[3], Eddi Sujarwo[4], Susi Milwati[5]
[1-5]Poltekkes Kemenkes Malang
Coresponding Author: abdulhananmolla@gmail.com

Abstract. *The hydrogel's optimum hydration ability can lyse slough and necrotic tissue (autolytic debridement ability). This study aims to determine the description of diabetic wound care using hydrogel as a modern dressing in the development of BWAT scores. The research design uses a case study method and consisting of 2 samples with grade II-III diabetic ulcers at Pedis Care Malang. The results of the study on subject I obtained the BWAT score on the first treatment was 33 and on the sixth day of treatment was 26, in subject II the first treatment was 37 and on the sixth day of treatment was 25, showed a decrease in the BWAT score, which means that diabetic ulcer healing progressed. The healing process of diabetic ulcer wounds is also influenced by the nutrients that enter the body, one of which is protein which plays a role in cell formation. The researcher's advice for both subjects is that they are expected to be able to maintain wound moisture with sustainable modern dressings until the wound is declared healed and increase nutrition as a supporting factor for wound healing.*

Keyword: *diabetes mellitus, ulcus diabetic, hydrogel, modern dressing*

INTRODUCTION

Diabetes mellitus arrived moment This become problem health main throughout world , because cases are increasing increase . American Diabetes Association [ADA] (2015) cited from Khoirunisa , et al (2020) maintenance medical in a way sustainable needed for diabetes mellitus chronic with various way that can be reduce risk multi outside factors control glycemic . On diabetes mellitus sufferers who have chronic or chronic patient often experience wound on the wrong leg One the shape that is wound ulcer diabetes . Handlers who don't appropriate on wound ulcer diabetes can worsen circumstances wound until can done amputation . Method healing on wound ulcer with hydrogel as a modern dressing Wrong One choice For speed up healing wound compared to with method conventional other .

International Diabetes Federation (IDF) (2017), report on In 2017 around 425 million people suffered from DM and predicted increase to 629 million people in 2045. A total of 10.3 million Indonesian people are diagnosed with DM and ranks 6th in the world . More of 150 million resident world on in 2016 suffered from diabetes and almost a quarter risky own ulcer diabetes with details about 25% of cases ulcer diabetes impact on organ amputation , 40% of cases ulcer diabetes can prevented with take care good wound . And 60% of cases ulcer diabetes related tightly with neuropathy peripheral . Estimated that risk DM patients experience complications Diabetic foot ulcers are 15%.

Received January 09th, 2024; Accpted February 10th, 2024; Published March 30th, 2024
*Abdul Hanan, abdulhananmolla@gmail.com

Enhancement the number of DMs resulted increasing complications of diabetes, viz ulcer diabetes . Report from IDF (2017) in Khoirunisa , et al (2020) that incident that happened Diabetic foot ulcers are on the rise up to 25% throughout life patient , where foot ulcers occur in 15-25% of people suffering from DM. Ulcer diabetes is something type DM complications resulting chronic by exists insufficiency vascular And neuropathy (Supriadi , 2017). Poor prognosis from condition the is infection that occurs reason main leg amputation . According to Basri (2019), achieved healing more wounds Good is objective main management ulcer diabetes (Basri , 2019).

Handling wound gangrene on the feet of diabetes mellitus sufferers need get handler more intensive . Maintenance Modern wounds are believed more effective from maintenance conventional (using gauze sterile) which is a lot used At home Sick . Research conducted by Kristiano conclude that maintenance Modern wounds (modern wound dressing) affect expression of transforming growth factor beta 1 (GTF pi), interleukin 1 and 6 (In werna Nontji et al., 2015). Modern dressing is capable For maintain environment balanced humidity _ with surface wounds , choosing the right dressing can guard humidity such as films, hydrogels, hydrocolloids, foams, alginates, and hydrofibers (Broussard, 2013).

Hydrogel has Unique gel particles . That can increase activity organization, this produce phenomenon Good debridement And growth on same time . Method This No only prevent damage on normal tissue but also not will cause bleeding and pain moment speed up the debridement process (Chen MH, 2010). Besides That with ability Optimal hydration hydrogel can melyse slough network and necrotic by therefore hydrogel has ability autolytic debridement. The hydrogel content itself is hydrophilic polymer each other related capable absorbs water in large volumes without damage structure material . (Bordbar S, 2011).

Based on description on writer interested For discuss case ulcer diabetes millitus And make as base Writing Work Proposals Write Scientific entitled " Image Experience Diabetic Wound Care With Using Hydrogel as a Modern Deep Dressing Development of BWAT Scores in Clinics " Pedic Wound Care , Malang City".

METHOD

Design study This use method study studies case qualitative In study This researcher will describe giving hydrogel as a modern internal dressing development wide wound on patient ulcer diabetes at Pedis Care Malang. The subjects of this research were two careful subjects with diabetic ulcer problems at the Pedis Care Clinic in Malang. With research subject criteria as follows: Type 2 diabetes mellitus patients with *modern wound care hydrogel dressings* at Pedis Care Malang 1), Diabetes mellitus patients with grade II-III diabetic ulcers

2), Patients with cooperative diabetic ulcers 3), Patients who are willing to be respondents in the study 4)

DISCUSSION

Data processing used in study This is technique nonstatistical that is data processing with No use analysis statistics , but with analysis qualitative On generally , kind processing the data in a way narrative sourced from focus studies And in accordance goals that have been applied.After data obtained from observation wound with tool measure BWAT then done data analysis with data processing for wide wound diabetes mellitus patients with ulcer diabetes in a way descriptive narrative , Processing of data taken from results observations made to respondents .

In studies case this data is presented in form textural that is presentation of data in the form writing or narrative is used for required data simple conclusion as well as in table For presentation of existing data classified , on study This form results observation wide wound with BWAT (Bates-Jensen Wound Assessment Tool).

Studies case This involve two respondents as subject study . Subject I (Mrs. W) and subject II (Mrs. S). second subject studies case This given explanation about Meaning And objective study . Subject willing sign informed consent form as proof that subject has agree For participate in study . Researcher do contract time for 3 weeks with 6 meetings .

a) Subject 1

Subject 1 patient Mrs. W, 58 years old , came to Pedis Care with the main complaint of a wound on his right leg at the back of the calf . The beginning of the injury to Mrs. W appeared in June 2022 in the form of a lump without itching which then erupted and widened into an open wound, within one week the wound reached more than 12 cm x 6 cm, when he was examined at the hospital he complained of weakness and the wound contained a lot of colored slough tissue. yellow with wounds reaching the tendons, GDP examination results reached 450 mg/dl. After KRS, the patient chose to seek treatment at Pediscare with complaints of an open wound with an area of 12 cm x 6 cm with depth reaching the tendon, 90% yellow slough and 10% bright red granulation, the wound was painful on a scale of 5, cavities (+), inflammation (+) , smell (+).

Was carried out on February 16 2023, Mrs. W has been suffering from diabetes since 2022 . Composmentis consciousness examination results , BP: 1 4 0/90 mmHg, Temperature: 36.5˚ C , Pulse: 85x/minute, rr: 20x/minute. GDA: 150 mg/dl , the patient had a diabetic wound in the right rear calf . BWAT score value 3 3, wound feels painful , pain scale 2 , o dor (+) ,

Inflammation (+) . The wound measures 8.5 cm x 4 cm, the depth is visible with the loss of the entire thickness of the skin including damaged or necrotic subcutaneous tissue, the edges of the wound are clear, do not merge with the base of the wound, are thick, there is no undermaining, there is no necrotic tissue, the type of exudate is serous, There is a lot of exudate, the color of the wound edges is white, there is no swelling or edema, there is no induration, the granulation tissue is bright red 70%, *slough* 30%, there is no irritation on the skin around the wound. Past medical history is diabetes with GDA 450 mg/dl. There is no history of disease in the family, either hereditary or contagious.

b) Subject 2

Subject 2 patient Mrs. S, 62 years old , came to Pedis Care with the main complaint of a wound on his right leg in the calf . The beginning of the injury to Mrs. S appeared in December 2022 with abrasions that felt itchy, the wound was scratched by the patient and pus appeared. Mrs. S went to the doctor for an examination and was given topical drug therapy in the form of itching ointment. When he came to Pedis Care in February 2023, the wound area was 3 x 3 cm accompanied by 95% yellow slough and 5% bright red granulations. The wound was painful , pain scale 3, odor (+) , Inflammation (+) .

When the assessment was carried out on February 3 2023 , he had a history of diabetes . The patient complained that the wound did not heal on the right calf. Composmentis consciousness examination results , BP: 1 5 0/90 mmHg, Temperature: 36.5˚ C , Pulse: 85x/minute, rr: 20x/minute. GDA: 130 mg/dl. patient. The BWAT wound score was 37, the wound was painful , pain scale 3, odor (+) , inflammation (+) . The wound measures 3 cm x 3 cm, the depth is visible with the loss of the entire thickness of the skin including damaged or necrotic subcutaneous tissue, the edges of the wound are clear, merged with the base of the wound, there is no undermaining, there is necrotic tissue, the type of exudate is serous, there is a lot of exudate, the color of the edges of the wound white, no swelling or edema, no induration, bright red granulation tissue 10%, *slough* 90%, there is irritation on the skin around the wound. Past medical history , namely diabetes. There is no history of disease in the family, either hereditary or contagious.

Table 1 Characteristics of Research Subjects

Information	Subject 1	Subject 2
Name (initials)	Mrs. W	Mrs. S
Gender	Woman	Woman
Age	58	62
Work	Retired	IRT
education	S2	SENIOR HIGH SCHOOL
Religion	Islam	Islam
Address	Malang city	Malang city
Marital status	Death divorce)	Marry

Study Focus Data

1. **Subject I**

Figure 1 Treatment of First Meeting and Second Meeting Subject I

Figure 2 Treatment of the Third Meeting and Fourth Meeting Subject I

Figure 3 Treatment of the Fifth Meeting and Sixth Meeting Subject I

Subject I, patient Mrs. W, 58 years old, came to Pedis Care with the main complaint of a wound on the right leg at the back of the calf. The patient eats animal protein foods such as tofu and tempeh and rarely consumes animal protein. On the first day of treatment GDA 150 mg/dl. The patient is taking medication for diabetes and hypertension.

Based on the results of observations on day 1, a total score of 33 was obtained . Based on each assessment item contained in Betes Jensen, it appears that all layers of skin are missing, subcutaneous damage or necrosis, does not reach the fascia, yellowish necrotic tissue is attached but easily removed, the edges appear to be fused with the base of the wound, covered by granulation tissue with the production of exudate Serosa (watery, watery, clear) moderate, 90% red granulation, no cavities, no induration, and no edema, <25% of the wound is covered by epithelial tissue. Observations at the second meeting GDA 147 mg/dl, obtained a total score of 32. Changes on the second day of treatment of necrotic tissue in the form of white/grey necrotic tissue that is easy to remove.

In the third treatment the GDA was 131 mg/dl and the fourth treatment was 144 mg/dl, a score of 29 was obtained. Changes in the exudate type were erosanguineous (watery, watery, pale red or pink) with a smaller amount of exudate . In addition to reducing the amount of exudate, progress in epithelialization was seen with 25% of wounds covered with epithelial tissue .

In the fifth treatment with a GDA of 140 mg/dl, a score of 29 was obtained and in the sixth treatment the GDA was 135 mg/dl with a total BWAT score of 26. The length of the wound decreased by ±0.5 cm, there was no necrotic tissue. Epithelialization is irregular, pink in color, as much as 25% of the epithelial tissue in the wound .

2. Subject II

No	Items	Date/score					
		2/16/23	20/2/23	23/2/23	27/2/23	2/3/23	6/3/23
	Measure the Size of the Wound	**2**	**2**	**2**	**2**	**2**	**2**
1.	Wound Depth	**3**	**3**	**3**	**3**	**3**	**3**
2.	L Edge Wound Edge	**2**	**2**	**2**	**2**	**2**	**2**
3.	Te Tunnel/GOA	**1**	**1**	**1**	**1**	**1**	**1**
4.	Ti Necrotic Tissue	**3**	**3**	**2**	**2**	**2**	**1**
5.	Amount of Necrotic Tissue	**2**	**2**	**2**	**2**	**2**	**1**
6.	Types of Exudates	**4**	**4**	**3**	**3**	**3**	**3**
7.	J Amount of Exudate	**4**	**4**	**3**	**3**	**3**	**3**
8.	Skin color around the wound	**2**	**2**	**2**	**2**	**2**	**1**
9.	Peripheral widespread edema	**1**	**1**	**1**	**1**	**1**	**1**
10.	Parent Peripheral Tissue	**1**	**1**	**1**	**1**	**1**	**1**
11.	Ja Granulation tissue	**3**	**3**	**2**	**2**	**2**	**2**
12.	Epithelialization Ep	**5**	**5**	**4**	**4**	**4**	**4**
	TOTAL SCORE	**33**	**33**	**32**	**29**	**29**	**29**
	SIGNATURE						

Subject II p patient Mrs. S, 62 years old , came to Pedis Care with the main complaint of a wound on his right leg in the calf . The GDA result on the first treatment was 130 mg/dl. The patient consumes enough protein by eating more egg whites, the patient takes diabetes medication (*glibenclamide*) and hypertension medication (amlodipine) once a day.

Figure 4. Treatment of First Meeting and Second Meeting Subject II

Based on the results of the first treatment observation , a total score of 37 was obtained . Based on each assessment item contained in Betes Jensen, it appears that all layers of skin are missing, subcutaneous damage or necrosis, does not reach the fascia, yellowish necrotic tissue is attached but easily removed, 90% of the wound surface is covered with necrotic tissue, the

edges appear to be fused with the base wound, covered with granulation tissue with production of serous exudate (watery, watery, clear) in large quantities, 10% bright red granulation, no cavities, no induration, and no edema, <25% of the wound is covered with epithelial tissue. In the second treatment with GDA 133 mg/dl, total BWAT score 35, changes occurred, namely the adherent yellowish necrotic tissue reduced to 70%, bright red granulations 30 % .

Figure 5 Treatment of the Third Meeting and Fourth Meeting of Subject II

The results of the third treatment observation showed that the GDA was 129 mg/dl, the total score was 31, visible yellowish necrotic tissue attached to 50%, granulation tissue 50% with the production of serous exudate (watery, watery, clear) in large quantities, no cavities, no induration, and no edema. On the fourth treatment, GDA was 120 mg/dl and total BWAT score was 28, epithelialization began to appear with 25% of the wound covered with epithelial tissue.

Figure 6 Treatment of the Fifth Meeting and the Sixth Meeting Subject II

The results of the fifth treatment observation were GDA 126 mg/dl and a total BWAT score of 27 was obtained, visible adherent yellowish necrotic tissue reduced to 10%, granulation tissue 50% with minimal production of serous exudate (thin, watery, clear), no cavities. , no induration, and no edema. Epithelialization is seen reaching 50% of the wound covered with epithelial tissue. On the sixth treatment GDA was 120 mg/dl with a total BWAT score of 25,

DISCUSSION

Items	Date/score					
	03 /2/2	06/2 / 2	09 / 2 /2	12 /2/2	15 / 2 /2	2/18 /2
Wound Size	2	2	2	2	2	2
Wound Depth	3	3	3	3	2	2
T edge Wound	3	3	2	2	2	2
Tunnel/GOA	1	1	1	1	1	1
Tip e Necrotic Tissue	3	2	2	2	2	1
Amount of Necrotic Tissue	5	4	2	2	2	1
Types of Exudates	4	4	4	3	3	3
Amount of Exudate	4	4	3	3	3	3
Skin color around the wound	2	2	2	2	2	2
Peripheral Edema	1	1	1	1	1	1
Peripheral Tissue Induration	1	1	1	1	1	1
Granulation Tissue	3	3	2	2	2	2
Epithelialization	5	4	4	4	3	3
TOTAL SCORE	**37**	**35**	**31**	**28**	**27**	**25**
SIGNATURE						

Demographic Characteristic Analysis

In the analysis of demographic characteristics including age, gender, education, length of time suffering from DM and blood glucose values for each respondent in the study. Ages over 45 years and above are the age that is susceptible to suffering from diabetic ulcers. This is in line with research by Rukmi and Hidayat (2018) in Khoirunisa, et al (2020), stating that diabetic ulcers occur with increasing age, physiologically the body's function decreases due to the aging process. Decreased function of the pancreatic gland causes less than optimal control of glucose in the blood and results in macroangiopathy which can reduce blood circulation to the extremities which triggers the appearance of diabetic ulcers. In this research case study, the ages of the respondents were in the elderly group, namely 58 years and 62 years. Therefore, the theory that states that the elderly are vulnerable to suffering from DM is in line with this case study. The appearance of diabetic ulcers on both of the subject's feet was influenced by decreased blood circulation, especially in the extremities of the feet due to age.

Long suffering from DM is associated with prolonged hyperglycemia which causes the formation of advanced glycosylation end products (AGEs), the formation of free radicals and activation of protein kinase C (PKC). Activation of these various pathways results in a lack of vasodilation, so that blood flow to the nerves decreases along with low myoinositol in cells, which leads to diabetic neuropathy (Waspadji, 2009). In subject I of this case study, the patient suffered from DM which was only discovered when a diabetic ulcer appeared which had been suffering for 1 year. Meanwhile, in subject II, the patient had suffered from DM for 3 years, which is in accordance with the theory that prolonged hyperglycemia causes reduced vasodilation and leads to diabetic neuropathy.

The aim of health education is to change the behavior of people with diabetes and increase compliance which will then improve the quality of life (Basuki, 2011). In this research case study, the level of knowledge of respondents is medium to upper. To optimize efforts to heal diabetic foot ulcers in DM sufferers, counseling or more precisely, health education about DM and its complications is needed.

Imbalance of glucose in the blood causes disturbances in neuropathy which has the potential to cause diabetic wounds (Soewondo, et al., 2013). In line with the opinion of Ose, et al (2018), it is estimated that DM sufferers are at risk of developing diabetic ulcers as a result of blood glucose imbalances which have an impact on neuropathy. According to Steed, et al (2006) in Herniyanti (2013), there are 8 formulation categories for treating diabetic foot ulcers, namely: diagnosis, offloading, infection control, wound bed preparation, dressing selection, surgery, topical agent selection, and recurrence prevention. Infection control can be done one way by maintaining blood glucose levels within normal limits. The results of the blood glucose values of respondents in this study averaged <200 mg/dl, meaning that each respondent in this study had the same opportunity and possibility to achieve optimal wound healing for diabetic foot ulcers .

Description of the Developmental Status of Diabetic Foot Ulcer Wounds Treated Using *Modern Dressing Techniques* Hydrogel

According to Rakhmawati, et al (2020) the length of the wound healing process for diabetic foot ulcers is basically the same as the length of the wound healing process in general, but the healing process for diabetic foot ulcers takes longer in certain phases because there are various kinds of complications such as infection in the wounds and sores have led to a chronic state. This prolongs the inflammatory phase of wound healing because the inflammatory substances in chronic wounds are higher than in acute wounds. Treating diabetic foot wounds requires a long healing time and multidisciplinary therapy such as controlling blood sugar levels and revascularization. According to Wijaya (2017), the aim of selecting modern dressings is to support the wound healing process. Healing with a moist concept is the standard of care for clients with adequate circulation supply to produce granulation tissue, epithelization and mature healing. In optimizing healing of diabetic ulcer wounds using modern dressing methods is an option accompanied by controlling blood sugar.

Hydrogel is a modern dressing that is moist and can be applied to wounds for 21 days. Wound treatment is carried out every 3 days so that the hydrogel dressing technique is carried out 6 times. The way to treat wounds using hydrogel is to clean the wound using 0.9% NaCl or with boiled running water, debride the wound and then clean the wound again using 0.9%

NaCl or with boiled running water, then dry using gauze. then apply the hydrogel to the wound and dress it using a secondary dressing, namely meloline, foam and sterile gauze.

Gitarja (2008) said that necrotic tissue can hinder the wound healing process by providing a place for bacteria. To help healing, debridement is needed. Debridement can be carried out using several methods such as mechanical, surgical, enzymatic, autolysis and biochemical. The most effective way to improve the wound base is the autolysis debridement method (Gitarja, 2008). Suriadi (2007) states that autolysis debridment is a method of shedding necrotic tissue carried out by the body itself with the main condition that the wound must be moist. Moisture is maintained in the wound area to facilitate the autolysis process and remove damaged tissue. In subject I with 30% slough, there was a decrease in the amount of yellowish necrotic tissue after 5 treatments, until on the sixth day no slough was found. In subject II it was found that 90% of the wounds were covered with yellowish necrotic tissue, the amount of necrotic tissue decreased after the first treatment and continued to decrease until the remaining 10%. There was a decrease in the amount of necrotic tissue in the subject's wound due to the autolysis debridement process where the slough will decay, making it easier to remove dead tissue with sterile tools (mechanical debridement).

Tarigan & Pemila (2007) in Herniyanti (2013) stated that humidity can increase epithelialization by 30-50%, collagen synthesis can be increased by 50%, on average re-epithelialization with humidity occurs 2-5 times faster. In subject I, epithelial tissue began to develop after the first treatment, but epithelialization progressed slowly during subsequent wound care observations where the epithelial tissue appeared to have very little development and irregular pink color, until on the sixth day of observation there was 25% epithelial tissue. In subject II, epithelial tissue began to develop after 2 treatments. The epithelial tissue continued to grow until the epithelialization process continued until 70% of the wound was covered by epithelial tissue on the sixth day. In this case study, hydrogel was proven to be able to help the growth of epithelial tissue in wounds, but it requires a long process until the epithelium completely covers the wound.

According to Purnomo (2014), the effectiveness of using hydrogel is 2-3 x better because it tends to approach wound regeneration, this is in accordance with Ismail (2007) who stated that the balance of moisture on the surface of the wound dressing is a key factor in optimizing tissue repair; Eliminates exudate from excessive wounds in chronic wounds which is an important part of the wound surface. Hydrogels with their unique combination of physicochemical properties (excellent absorption capacity for water and biological fluids, soft tissue-like texture, permeability to large and small molecules) and biocompatibility. In addition, according to Chen (2016) in Garini (2021), hydrogel-based dressings have been

proven to be able to absorb up to 1000 grams of wound exudate per gram of dressing. In this case study, both subjects suffered from chronic diabetic ulcers where the wounds had been suffered for more than 3 months. On the first treatment, subjects I and II were given hydrogel dressings, then observations were carried out for the next 3 days, namely on the second day of treatment there had been no reduction in exudate. The amount of exudate decreased in the third treatment, the serosanguineous exudate (watery, watery, pale red or pink) in subjects I and II decreased to less. The decrease in the amount of exudate is the effect of the hydrogel which is able to absorb biological fluids produced by wounds so that it can optimize tissue repair as explained in the previous theory.

According to Waspadji (2009), wound control is a form of wound care effort. The most important principle that must be known is that wounds require optimal or conducive conditions. After good and adequate debridement, the necrotic tissue will decrease and the production of pus from the ulcer will also decrease. This theory is in accordance with this case study where the necrotic tissue and the amount of exudate were reduced after autolysis and mechanical debridement using sterile tools.

The development of diabetic wounds before and after being given modern dressings in type II diabetes mellitus sufferers is due to the working process of hydrogel which maintains and keeps the wound environment moist to facilitate the wound healing process, maintain tissue fluid loss and cell death thereby accelerating wound healing regeneration. However, the wound healing process has several factors that influence it.

According to Yadi (2000) in Efendi, et al (2020), factors that play a role in the length of the healing process for diabetic ulcers include vascularization, age, nutrition, complicated diseases, history of smoking, medication, psychology, etc. (Yadi, 2000). In this case study, the first wound healing factor was age, where the two research subjects were of advanced age, namely 58 years and 62 years. This is in line with research by Rukmi and Hidayat (2018) in Khoirunisa, et al (2020), stating that diabetic ulcers occur with increasing age, physiologically the body's function decreases due to the aging process.

The first wound healing factor is vascularization. The occurrence of hyperglycemia in people with type 2 diabetes mellitus causes blood viscosity to increase. This causes blood flow to decrease in all organs, for example the kidneys, eyes and feet. The most common vascular disorders in type 2 diabetes sufferers are peripheral vascularization, namely the legs and feet. Vascularization is blood flow that carries blood and its components (nutrients and oxygen) from the heart to tissues throughout the body through blood vessels (Sloane, 2004). Decreased peripheral perfusion will initiate tissue hypoxia. The blood sugar levels of the two case study

subjects experienced an imbalance in blood glucose levels where the blood sugar value was above 120 mg/dl. This condition causes oxygen in the tissue to decrease, which will affect the vascular and cellular activity of the tissue. Lack of oxygen and nutrient flow to the wound causes wound healing to take longer.

The second factor is nutrition, nutrition and food intake greatly influence wound healing. Poor nutrition will slow down the wound healing process and even cause wound infections. Required and important nutrients are amino acids, fats, carbohydrates, vitamins (C, A, B complex, D, K, E) zinc, iron, magnesium and water. Hayu (2013) in Hastuti, et al (2022) in his research stated that protein will greatly influence the wound healing process because replacing damaged tissue will really require protein for the process of regenerating new cells. Protein is responsible as a substance for building blocks of muscle and body tissue, but cannot be stored by the body, so for the wound healing stage a daily protein intake is needed (Supiati, 2015). In this case, subject I reduced protein intake because he experienced abnormal urea levels as a sign of kidney disease. The lack of protein affected the wound healing process, characterized by slow growth of epithelial tissue. In the sixth treatment, 25% of the epithelium covered the wound. In subject II who consumed food with balanced nutrition, namely sufficient carbohydrates, protein from animal and vegetable sources, vitamins from fruit and vegetables and replaced sugar intake specifically for diabetes mellitus sufferers, rapid epithelial growth occurred after the first treatment and growth continued until the sixth treatment of the epithelium closed. 70% injury.

CONCLUSION

Based on the results of the research and discussion described in the previous chapter, it can be concluded that the development of diabetic ulcers after *modern dressing treatment* with hydrogel for 3 weeks is:

1. In subject I, there was a change in the score on the first day from a score of 33 to 26 on the sixth day. The changes included components of wound assessment according to Betes Jensen, including a reduction in the size of the wound , the amount of exudate and necrotic tissue. Changes occurred in the percentage of granules and epithelialization , but they were not significant or progressed slowly.
2. In subject II there was a change in the score on the first day from a score of 37 to 25 on the sixth day . Tissue changes that occur in several components of wound assessment according to Betes Jensen include a reduction in wound size , the amount of exudate and necrotic tissue **,** and significant development of granulation tissue and epithelium.

From these two case study subjects, it can be concluded that hydrogel is able to reduce BWAT scores by taking into account wound healing factors over a relatively long period of time.

BIBLIOGRAPHY

Adriani, A, &Mardianti, T 2016, *'Penggunaanbalutan modern (hydrocoloid) untukpenyembuhanluka diabetes mellitus TIPE II'*, JurnalIpteksTerapan, http://103.111.125.15/index.php/jit/article/view/392-711 Diakses pada 06-11-2022

Ake, J., & Sugianto. (2016). *Pertumbuhan Jaringan Re_Epitelisasi Perawatan Luka Menggunakan Balutan Luka hdrocolloid dan Nacl + Gauze pada Penderita Ulkus Diabetik.JIKKHC*, *01*(01). http://jurnal.borneo.ac.id/index.php/borticalth/article/view/401Diakses pada 04-12-2022

Basri, H. M. (2019). Pengalaman Pasien DM Tipe 2 Dalam Melakukan Perawatan Ulkus Diabetik Secara Mandiri. 19–29.https://ejournal.annurpurwodadi.ac.id/index.php/TSCD3Kep/article/download/70/78 Diakses pada 20-11-2022

Fanani, A (2020). *Hubunganfaktorrisikodengankejadian diabetes mellitus.*JurnalKeperawatan, download.garuda.kemdikbud.go.id,

Gitarja,WS. *Perawatan Luka, Student Handbook*. CWCCA. 2017. Accessed at: www.wocare.org. ISBN:978 602 14691 2 5. Cetakan ke-6http://download.garuda.kemdikbud.go.id/article.php?article=1719079&val=10904&title=THE%20RELATIONSHIP%20OF%20RISK%20FACTORS%20WITH%20DIABETES%20MELLITUSDiakses pada 06-11-2022

Hastuti, P, Masini, M, Ayuningtiyas&Idhay , R. (2022). *PutihTelurAyam Kampung EfektifMenyembuhkan Luka Perinium*. Jurnal Sains kebidanan, ejournal.poltekkes-smg.ac.id,https://ejournal.poltekkessmg.ac.id/ojs/index.php/JSK/article/view/8465Diakses pada 16-5-2022

Herniyanti, H (2013). *Gambaran Status Luka Ulkus Kaki Diabetik Yang DirawatMenggunakan Teknik Modern Dressing Hydrocolloid Dan Teknik Konvensional Gauze Pada Pasien Diabetes Melitus*, repository.unhas.ac.id, http://repository.unhas.ac.id/id/eprint/15824/1/--herniyanti-5003-1-skripsi-i.pdfDiakses pada 14-5-2022

Kementerian Kesehatan RI. (2018). *Riset Kesehatan Dasar*. In Badan Penelitian dan Pengembangan Kesehatan. http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf Diakses pada 06-11-2022

Khoirunisa, D, Hisni, D, & Widowati, R, (2020). *Pengaruh modern dressing terhadap skor penyembuhan luka ulkus diabetikum: Jurnal Penelitian dan Pemikiran Ilmiah Keperawatan*, jurnal.unissula.ac.id, http://jurnal.unissula.ac.id/index.php/jnm/article/view/12967Diakses pada 06-11-2022

Khoirunisa, D, Hisni, D, &Widowati, R Pengaruh modern dressing terhadapreratakorpenyembuhanlukaulkusdiabetikum. *academia.edu*, https://www.academia.edu/download/80619309/pdf.pdfDiakses pada 07-01-2022

Khoirunisa, D, Hisni, D, &Widowati, R. (2020). *Pengaruh modern dressing terhadapskorpenyembuhanlukaulkusdiabetikum:*JurnalPenelitian dan pemikiranilmiah, jurnal.unissula.ac.id, http://jurnal.unissula.ac.id/index.php/jnm/article/view/12967 Diakses pada 15-5-2022Diakses pada 10-5-2022

Luh Titi Handayani. (2016*). Studi Meta Analisis Perawatan Luka Kaki Diabetesdengan Modern Dresing.* The Indonesian Jurnal Of Health Sciene, http://jurnal.unmuhjember.ac.id/index.php/TIJHS/article/viewFile/133/83Diakses pada 07-01-2022

Nabila, N. P., Efendi, P., Kesehatan, P., Kesehatan, K., & Keperawatan, J. (2017). Proses Penyembuhan Luka Ulkus Diabetikum dengan Metode *Modern dressing* di Klinik Maitis Efrans Wound. 146–151. https://jurnal.poltekkes-kemenkesbengkulu.ac.id/index.php/jmk/article/view/336Diakses pada 06-11-2022

Ose, MI, Utami, PA, & Damayanti, A (2018). Efektivitasperawatanlukateknikbalutan wet-dry dan moist wound healing pada penyembuhanulkusdiabetik. *Journal of Borneo Holistic*, jurnal.borneo.ac.id, http://jurnal.borneo.ac.id/index.php/borticalth/article/view/401 Diakses pada 17-11-2022

Purnomo, SEC, Dwiningsih, SU (2014). *EfektifitasPenyembuhan Luka MenggunakanNacl 0, 9% dan Hydrogel Pada Ulkus Diabetes Mellitus di RSU Kota Semarang*, jurnal.unimus.ac.id, https://jurnal.unimus.ac.id/index.php/psn12012010/article/view/1136Diakses pada 13-12-2022

Raharjo, SB, Suratmin, R, & ... (2022). *PERAWATAN LUKA ULKUS DIABETIKUM: TINJAUAN LITERATUR*. Journal keperawatan. download.garuda.kemdikbud.go.id, http://download.garuda.kemdikbud.go.id/article.php?article=3016480&val=27245&title=PERAWATAN%20LUKA%20ULKUS%20DIABETIKUM%20TINJAUAN%20LITERATURDiakses pada 07-01-2022

Wijaya, I. M. S. (2018). *Perawatan Luka dengan Pendekatan Multidisiplin*. Yogyakarta: ANDI.https://opac.perpusnas.go.id/DetailOpac.aspx?id=1110862Diakses pada 06-11-2022

Yusra, S (2015). *Perawatanluka kaki diabetik pada pasien diabetes mellitus di cindara wound care center Jepara.*JurnalProfesiKeperawatan (JPK), jurnal.akperkridahusada.ac.id, http://jurnal.akperkridahusada.ac.id/index.php/jpk/article/view/17Diakses pada 06-11-2022