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Physiotherapy Treatment for Gangrene Wound Patients Using Transcutaneous Electrical Nerve Stimulation (Tens) and Interferential Current (IFC) at the Miftachul Munir Medika Clinic Surabaya

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Abstrak

Diabetes mellitus is included in the disease of the silent killer where most sufferers realize when the disease starts to get worse, when the disease starts to worsen, there will be some complications between the complications is diabetic retinopathy, diabetic nephropathy, neuropathy. The problem that often arises in people with diabetes mellitus is the wound of diabetes mellitus which can be caused due to vascular disorders, nervedisorders and the presence of infection, if the wound is not taken seriously, it will be a source of amputation. Electrical stimulation has been used to improve chronic wound healing in the United States for almost four decades, Transcutaneous Electrical Nerve Stimulation (TENS) and Interferential Current (IFC) including electrical stimulation that can help in healing wounds including diabetic wounds. ***The purpose*** *of this study was to determine the differences in the effect of wound healing due to diabetes mellitusby the intervention of Transcutaneous Electrical Nerve Stimulation (TENS) and Interferential Current (IFC).* ***The research method*** *used in this study was quasi experimental with research design pretest and posttest without control. The populationof this study were all 4 patients who arrived at di klinik miftachul munir medika surabaya during November 2021-desember 2021 as many as 4 people according to thecriteria of inclusion and exclusion where 2 people were given TENS and 2 people weregiven IFC intervention. This research was conducted twice a week for 4 weeks and measured using the Bates-Jansen Wound Assessment Tools scale. The results of this study were 2 people who were given TENS experienced wound healing of 13.5% while 2 people given IFC experienced wound healing of 34%. The difference in wound healingin this study was 20.5%. It can be concluded that IFC is good in the process of wounds healing due to diabetes Miletus.*

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1. INTRODUCTION

A. Background

Diabetes mellitus is a heterogeneous group of disorders characterized by increased blood glucose levels or hyperglycemia. Insulin, a hormone produced by the pancreas, controls glucose levels in the blood by regulating its production and storage (Brunner & Suddarth 2002).

According to FKUI (2007), it is known that diabetes is a hereditary disease. This means that if parents suffer from diabetes, their children will likely suffer from diabetes too. This is true, but hereditary factors alone are not enough, other factors are needed which are called risk factors or trigger factors, for example, a viral infection (in type 1 DM), obesity or wrong eating patterns, taking medication that can increase blood glucose levels. , the aging process, stress and others.

According to the International Diabetes Federation (IDF), in 2015 there were 415 million (8.8%) DM sufferers worldwide and it is predicted that this number will

continue to increase to 642 million (10.4%) DM sufferers in 2040. Meanwhile, the estimated number of DM sufferers DM in Indonesia is estimated at 10 million which places Indonesia in the 7th highest position in the world along with China, India, the United States, Brazil, Russia and Mexico (IDF, 2015).

According to Sudoyo (2006) Diabetic Foot Gangrene is still a public health problem. The results of treatment for diabetic foot are often disappointing for both managing doctors and people with DM and their families. Diabetic feet often end in disability and death. In Indonesia it is still a complicated problem and not managed optimally. Therefore, in 2005 the International Diabetes Federation adopted the theme "year of the diabetic foot" considering the importance of developing diabetic foot management (Tetty, 2011).

Diabetes mellitus is a group of metabolic disorders characterized by increased blood glucose levels (hyperglycemia) due to defects in insulin secretion, insulin action or both (Smelzel and Bare, 2015). Diabetes mellitus is a group of diseases or metabolic disorders characterized by hyperglycemia that occurs due to abnormalities in urine secretion, insulin action, or both (ADA, 2013)

Diabetes Mellitus (diabetes) is a disease with an increase in blood glucose above normal. Where levels are regulated by the insulin hormone produced by the pancreas (Shadine, 2010)

Diabetic foot complications are the most common cause of amputation based on non-traumatic events. The risk of amputation is 15-40 times more frequent in DM sufferers compared to non-DM sufferers. Complications due to diabetic foot cause the length of stay for DM sufferers to be longer. More than 25% of DM sufferers treated are due to diabetic foot. Most diabetic foot amputations start from skin ulcers. If early detection and adequate treatment is carried out, it will be possible to reduce the incidence of amputation (Eva, 2008)

2. LITERATURE REVIEW

A. Diabetes mellitus

is a group of disorders heterogeneous characterized by an increase in blood glucose levels or hyperglycemia. Insulin, a hormone produced by the pancreas, controls glucose levels in the blood by regulating its production and storage (Brunner & Suddarth 2002).

In diabetes mellitus sufferers, if it persists for a long time, it will develop chronic complications consisting of macrovascular and microvascular. Macrovascular occurs in large blood vessels while microvascular occurs in small blood vessels (Sudoyo, 2009). Macrovascular complications occur due to blockages in large blood vessels such as the heart and brain. Meanwhile, microvascular complications occur due to blockages in small blood vessels, consisting of complications of diabetic retinopathy, where there is damage to the blood vessels in the retina, diabetic nephropathy, where kidney complications occur, and neuropathy which causes foot ulcers (Wardani, 2014).

In 2010, the National Health Service (NHS) in the UK spent approximately £650 million on the management of diabetic foot wounds and amputations. In the United States, 33% of total health care expenditures of $116 billion for diabetes mellitus are on wound management (Hunckler & de Mel, 2017). Diabetes mellitus wounds are triggered by high blood sugar levels, which cause blood vessels to weaken, resulting in neuropathy. Neuropathy can cause a decrease in pain sensation and

proprioception, resulting in increased continuous pressure which results in injury (Yazdanpanah, 2015)

B. Etiology

According to Smeltzer 2015 Diabetes Mellitus can be classified into 2 clinical categories, namely:

1. Insulin dependent Diabetes Mellitus (TYPE 1 DM)

a. Genetic

Generally, diabetics do not inherit type 1 diabetes but instead inherit a predisposition or a genetic tendency towards developing type 1 diabetes. This genetic tendency is determined in individuals who have a certain type of HLA antigen (Human Leucocyte Antigen). HLA is a collection of genes responsible for transplantation antigens & immune processes. (Smeltzer 2015 and bare,2015)

b. Immunology

In type 1 diabetes there are the fact that there is an autoimmune response. This is an abdominal response where antibodies are directed at the body's normal tissue by reacting to tissue that it considers foreign tissue. (Smeltzer 2015 and bare,2015)

c. Environment

Certain viruses or toxins can trigger an autoimmune process that causes beta cell destruction. (Smeltzer 2015 and bare,2015)

2. Non-insulin dependent diabetes mellitus (TYPE II DM)

According to Smeltzel 2015, the exact mechanism that causes insulin resistance and impaired insulin secretion in type II diabetes is still unknown. Genetic factors play a role in the development of insulin resistance.

Risk factors:

- ✓ Age (insulin resistance tends to increase over the age of 65)
- ✓ Obesity
- ✓ Family history.

C. According to PERKENI, the symptoms and signs of DM can be classified into 2, namely:

1) Acute symptoms of DM

Symptoms of DM varies from person to person, and may not even show any symptoms until a certain time. Initial symptoms shown include:

a) Excessive hunger or eating a lot (polyphagia) In diabetes, because insulin has problems with the entry of sugar into the body's cells, less energy is produced, which is why people become weak. Therefore, the body tries to increase food intake by causing feelings of hunger so that there is a feeling of always wanting to eat

b) Often feeling thirsty (polydipsia)

With a lot of urine coming out, the body will lack water or become dehydrated. To overcome this, thirst arises so that people want to drink all the time and want to drink sweet drinks. Sweet drinks will be very detrimental because they make sugar levels higher.

c) Large amount of urine excreted (polyuria)

If the sugar content exceeds the normal value, then blood sugar will come

out with urine, to ensure that the urine that comes out, which contains sugar, is not too concentrated, the body will draw as much water as possible into the urine so that the volume of urine that comes out is large and urinates frequently. If not treated it will Symptoms arise of drinking a lot, urinating a lot, appetite begins to decrease or weight loss quickly (down 5-10 kg within 2-4 weeks), fatigue easily and if not treated quickly, nausea will occur (PERKENI, 2015)

Chronic symptoms of DM disease Chronic symptoms often experienced by DM sufferers (PERKENI, 2015) are:

a) Tingling
b) The skin feels hot or like being pricked by needles
c) Thick feeling on the skin
d) Cramps
e) Gets sleepy easily
f) Blurred eyes
g) Usually change glasses frequently
h) Itching around the genitals, especially in women
i) Teeth become loose and fall out easily
j) Decreased sexual ability
k) And pregnant women often experience miscarriage or fetal death in the womb or with babies with a birth weight of more than 4 kg

D. Wound Washing

Washing aims to remove necrotic tissue, clean wound fluid, remaining dressings used and metabolic waste from the body in wound fluid. Washing can improve, repair and speed up the wound healing process and avoid the possibility of infection. Wound washing is the most important aspect of wound management. It is the basis for a good wound healing process, because wounds will heal well if the wound is clean.

Wound washing techniques include swabbing, scrubbing, showering, hydrotherapy, whirlpool and bathing. Washing using swabbing and scrubbing techniques is not recommended for washing wounds, because it can cause trauma to the granulation tissue and epithelium, and also cause bacteria to be distributed instead of removing bacteria. When scrubbing or rubbing it can cause the wound to become injured, which can increase inflammation (persistent inflammation). showering (irrigation), whirlpool, and bathing techniques are the most frequently used techniques and much research supports these techniques. The advantage of this technique is that with sufficient pressure it can remove colonized bacteria, reduce trauma and prevent cross infection and does not cause trauma to the wound.

E. Debridement

Necrotic is a morphological change indicated by the presence of dead cells caused by progressive enzyme degradation. This is a normal response from the body to damaged tissue.

Necrotic tissue can be divided into 2 forms:

1. Eschar is black, hard, dehydrated, impermeable and sticky to the surface of the wound.
2. Slough-wet, yellow, liquid and not sticky to the wound.

Necrotic tissue can hinder the wound healing process by providing a place for

bacterial growth. To help wound healing, debridement is very necessary. Debridement can be carried out using several methods such as mechanical, surgical, enzymatic, autolysis, and biochemical.

Mechanical debridement is carried out using physiological fluid wound irrigation, ultrasonic laser, and so on, in order to clean necrotic tissue. Enzymatic debridement is carried out by applying exogenous enzymes topically to the surface of the lesion. This enzyme will destroy protein residues. For example, collage nation will release collagen and elastin. Several types of debridement that are often used are papin, DNAs and fibrinolysin. Autolytic debridement occurs naturally when someone has a wound. This process involves macrophages and endogenous proteolytic enzymes which naturally lyse necrotic tissue. Synthetically, hydrogel and hydrocolloid preparations can create optimal environmental conditions for the body's phagocytes and act as agents that lyse necrotic tissue and stimulate the granulation process. Sterilized maggots (Lucilla serricata) are often used for biological debridement. Maggots produce enzymes that can destroy necrotic tissue. Surgical debridement is the fastest and most efficient type of debridement.

The goals of surgical debridement are to:

- evacuate bacterial contamination,
- remove necrotic tissue so that it can speed healing,
- Removes callus tissue,
- reduces the risk of local infection.

The most effective way to create a good wound base is the autolysis debridement method. Autolysis debridement is a method of shedding necrotic tissue carried out by the body itself with the main requirement that the wound environment must be moist. In humid conditions, proteolytic enzymes will selectively remove necrotic tissue from the body. When the necrotic tissue softens, it will easily fall off on its own or with the help of surgical or mechanical debridement. Another debridement procedure that is commonly used is the biomechanical method using magots or larvae. The larvae will selectively eat necrotic tissue so that the wound bed becomes red.

F. Dressings

Choosing a dressing is a necessary decision that must be made to repair damage to integumentary tissue. Whether or not the wound is successful in improving depends on the nurse's ability to choose the right, effective and efficient dressing. Purpose of Choosing a Dressing

- Bandages can control the incidence of infection / protect wounds from trauma and bacterial invasion
- Able to Retain Moisture'
- Accelerates the Wound Healing Process,
- Absorbs Wound Fluids
- Comfortable to use, sterile and cost effective.

The latest dressing techniques for diabetic wounds emphasize the moist wound healing method or keeping the wound moist. Wounds will heal quickly if exudate can be controlled, keep the wound moist, the wound is not sticky with compress material, avoids infection and is permeable to gas. The dressing action is an important component in accelerating lesion healing.

The principle of dressing is how to create a moist atmosphere so as to minimize

trauma and surgical risks. Below we will introduce several types of topical therapy materials that can be used to manage diabetic wounds, including calcium alginate, hydrocolloid, hydro active gel, metcovazin, gamgee, polyurethane foam, silver dressing.

G. Calcium Alginate

Derived from seaweed, it can turn into gel if mixed with wounds. This is a type of dressing that can absorb excessive amounts of wound fluid. And its advantage is its ability to stimulate the blood clotting process if minor bleeding occurs as well as a barrier to contamination by pseudomonas.

H. Hydrocolloid

This type of topical therapy functions to keep the wound moist, protect the wound from trauma, and avoid the risk of infection, able to absorb minimal exudate. Good for use on red wounds, abscesses or infected wounds. It comes in the form of thin sheets and paste. The advantage is that it is in the form of a sheet, does not require another dressing on top as a cover, just stick it on and replace it if it leaks.

I. Examples of hydrocolloid products

1. Hydro active gel

This type of topical therapy is capable of shedding tissue necrotic by the body itself. It contains a lot of water, which will make the wound dry because the necrotic tissue becomes moist. Water in the form of a gel will enter between the dead tissue and then swell the necrotic tissue like a corpse's bruise which will then separate healthy tissue from dead tissue. In this soft condition, it is usually easier to carry out surgical debridement or let the body do it itself.

2. Polyurethane Foam

This type of dressing has high absorbency, so it is often used in situations where there is quite a lot of exudate/fluid from the wound and at the base of the wound which is only red in color. Its ability to hold fluid can extend the dressing change time. Apart from that, this dressing also does not require additional dressings, can be applied directly to the wound, and makes the wound base even, especially in hyper granulation.

3. Gamgee, anti-microbial and bacteria-binding dressing

Gamgee is a type of topical therapy in the form of a thick pile of dressing material with quite high absorption capacity and it is claimed that when mixed with wound fluid it can bind bacteria. It is most often used as an additional dressing after the main dressing that sticks to the wound. Some dressings of this type contain antimicrobial and hydrophobic or bind bacteria.

4. Metcovazin

A type of topical therapy with the wocare Clinic patent. Very easy to use because you just need to rub it. Ointment form, white color and packaging. Function to supports autolysis debridement (shedding necrotic tissue/preparing the wound bed to be red) avoiding trauma when removing the dressing, reducing unpleasant odors, maintaining a moist atmosphere and supporting granulation. The advantage is that it can be used for all wound base colors and prepares the wound base to be healthy.

5. Silver dressing

Infectious conditions that are difficult to treat, wounds experiencing a static phase, the base of the wound thickens like forming jelly or what is known as a biofilm, the use of silver dressing is the most appropriate choice. In this situation the

wound experiences severe pain, the exudate can become purulent and give off an unpleasant odor. This dressing is used in 4 x dressing changes where the silver sticks to the wound for at least 5-7 days. with power.

6. Patient and family education

Education for patients and families with diabetes is very important. This is because diabetes is a disease that cannot be cured but can be controlled with a healthy lifestyle (eating according to needs and regular exercise) and using oral or insulin.

7. Five Pillars to Health

a. Diet

DM diet requirements should include:

- Improving the general health of sufferers
- Aims for normal body weight
- Normalizes the growth of DM children and DM young adults
- Maintain normal KGD levels
- Suppresses and delays the onset of diabetic angiopathy
- Provide diet modifications according to the patient's condition.
- Attractive and easy to give

b. Exercise

Some of the benefits of regular daily exercise for DM sufferers are:

- Increases insulin sensitivity (glucose uptake), if done every 1 ½ hour after eating, this also means reducing insulin resistance in obese sufferers or increasing the number of insulin receptors and increasing insulin sensitivity with the receptors.
- Prevent obesity if you add exercise in the morning and evening
- Improve peripheral flow and increase oxygen supply
- Increases cholesterol-high density lipoprotein levels
- Muscle and liver glucose levels decrease, so exercise will stimulate the formation of new glycogen
- Lowers cholesterol(total) and triglycerides in the blood due to better burning of fatty acids

c. Education

It is a form of health education for DM sufferers, through various methods or media, for example: leaflets, posters, TV, video cassettes, group discussions, and so on.

d. Blood Sugar Control

Blood glucose levels do not control (GDP > 100 mg/dl and GD2JPP > 144 mg/dl) will result in long-term chronic complications, both macrovascular and microvascular, one of which is diabetic ulcers. So, it is important for patients with DM to adhere to diet.

e. Blood Pressure Control

In people with Diabetes mellitus due to the presence of high blood viscosity will result in decreased blood flow resulting in vascular deficiency so that clients with diabetes need to have their blood pressure checked regularly.

8. Wound care application

a. Assessment: record the patient's history and chief complaints.

b. Prepare the tools needed to assess and treat wounds.
c. Washing hands.
d. Open the wound slowly, avoiding bleeding / trauma to the wound. There is no need to use tweezers to open the bandage, just use gloved hands.
e. The wound is examined carefully according to the method for assessing wounds, don't forget to document exactly what must be written down and take pictures of the wound. If a culture must be taken, adjust it to the procedure for taking the culture.
f. Washing the wound can be done by soaking in warm water or water containing an antiseptic. Be careful when washing the wound so as not to cause trauma, finally, if the wound does not have an infection, you can rinse it with NS 0.9% only or if there is an infection, you can use another antiseptic solution, then rinse it with NS 0.9% or just Feracrylum solution 1 %.
g. Prepare a clean base and start by treating the wound. Change gloves when applying the dressing.
h. Choose topical therapy according to the condition of the wound, for example according to the color of the wound, the shape of the wound, its area and depth, whether it is infected or not.
i. Cover the wound carefully, don't let the wound be visible from the outside, measure the thickness of the gauze or topical material applied to the wound, it must be able to create an optimal wound condition (moisture balance) and support the wound towards repair/healing quickly.
j. If there is edema, do an examination regarding the use of a compression bandage (doppler).
k. Pay attention to the patient's quality of life, avoid patients being unable to carry out their activities after wearing a bandage.
l. Explain to the patient when to return for dressing changes and blood sugar control.
m. Tidy up all tools and pay attention to the disposal of medical waste

9. The role of physiotherapy in diabetic wound patients

a. Physiotherapy problems

- Impairment, namely in the form of pain, decreased muscle strength, and decreased range of joint movement.
- Functional limitation, in the form of interference when squatting, difficulty in good walking patterns
- Disability, namely no disturbance in socializing with society.

10. Physiotherapy intervention

a. Exercise therapy
    - Active mobilization

3. METHOD

This research uses a Quasi Experimental approach using a Pre-Test and Post Test Without Control research design. This research was conducted on diabetes mellitus patients who visited the Miftachul Munir Medika clinic in Surabaya during December 2018-April 2019. The sampling technique used purposive sampling, namely samples were taken based on inclusion, exclusion and drop out criteria. In this study, there were 2 groups that were given different interventions, namely, group 1 was given the TENS intervention while group

2 was given the IFC intervention, carried out 2 times a week for 4 weeks and measured using the Bates-Jansen Wound Assessment Tools scale.

CLINICAL STATUS

i. Anamnesis

- Name: Mr. Y
- Age: 58 years
- Address: Klabang Rt 19 Rw 06
- Islam
- Occupation: entrepreneur
- RM Number:

ii. Medical diagnosis

- **Diabetes mellitus**
- **Me:** The patient said there were no complaints during suffering from diabetic wounds on the sole of the right foot, the patient complained of pain in the left foot when uric acid was high
- **Rps:**6 years ago the patient stepped on and a wire penetrated the sole of the foot to the back of the foot. For several days the patient did not feel that there was a wire stuck in the sole of the foot. The patient found out when washing his feet and saw that there was a wire stuck in the foot, then the patient was taken to the hospital. to take the wire, until now the wound is getting worse and difficult to heal.
- **Rpd: in** the same year the patient also suffered a wound on the left leg and it has healed, the patient also had gallstones
- **Rpp:** the patient has hemorrhoids, gout.

iii. Vital signs

- BP: 145/80 mmHg
- ND: 101x/minute
- RR: 21x/minute
- TEMPERATURE: 36

iv. Special Inspection

- **Inspection: static: The** soles of the feet are seen wrapped in bandages, the patient is using a tripod, and edema is visible on the right foot. dynamic: walking patient using a tripod aid,
- **Palpation:**there is no pain when pressed in the wound area and around the wound, there is no difference in temperature between the injured leg and the healthy one, both 36 degrees, there is pitting edema in the area around the wound.
- **Pfgd: active** ROM ankle Full ROM no limitations no pain, active phalanges: 3 toes active Full ROM.
- **Anthropometrics:** the difference between the two feet is 3cm
- **Mmt: normal**
- **Integument:**


- Wound type: Slough (yellow necrotic)

v. Physiotherapy Diagnosis

- **Impairment:** The patient feels pain in the legs at the moment high uric acid, no complaints about injured feet.
- **Functional Limitation:** there are no limitations when moving the injured leg, stepping, squatting and walking.
- **Participation Restriction:** there are no limitations in socializing

vi. Physiotherapy Program

- **Short Term Goals:** maintain mobilization of healthy fingers, ambulation and transfer
- **Long Term Goals:** Ambulation, transfer, increasing functional activity

vii. Physiotherapy Intervention

- **Therapeutic exercise: pamping exercise**8x movements, 3x repetitions, 8x counts, active ROM, isometric exercise. This is done after cleaning the wound before bandaging it.

viii. Evaluation

- There have been no significant changes (anthropometrics)
- Physiotherapist: 1x therapy meeting
- Nursing: good reddish wound

4. RESULTS AND DISCUSSION

A. Results

From the results of research conducted on 4 patients who were given different electrical stimulation, namely 2 patients were given TENS while the other 2 were given IFC, the results for each patient were different. This research was measured using the Bates-Jansen index Wound Assessment Tools (BJWAT) where this scale contains 13 assessment items ranging from wound size, wound depth, wound boundaries, hole in the wound, type of necrosis tissue, amount of necrosis tissue, type of exudate, amount of necrosis tissue, skin color around the wound, tissue that edema, hardening of peripheral tissue, granulation tissue, epithelialization, with a total score of 1-60 where a score of 13 indicates wound regeneration while a score of 60 indicates wound degeneration.

Table 1 Summary of research results

TENS			**ICF**		
BEFORE	AFTER	RESU	BEFORE	AFTER	RESU

		LTS			LTS
38	32	15%	50	32	36%
37	32	12%	48	32	32%
AVERAGE	13.5%		AVERAGE	34%	

From the research results measured using BJWAT above, it shows that 2 people given TENS experienced wound healing of 13.5%, while 2 people given IFC experienced wound healing of 34%. The difference for differences in wound healing in this study was 20.5%. So IFC is better in the process of healing wounds caused by diabetes mellitus, according to research by Shahroki et al., 2014. The use of IFC can speed up wound healing and reduce their size because IFC is considered a deeper form of electrical stimulation compared to TENS and is a safe method without side effects. side.

B. Wound Washing

Washing aims to remove necrotic tissue, clean wound fluid, remaining dressings used and body metabolism residues in wound fluid. Washing can improve, repair and speed up the wound healing process and avoid the possibility of infection. Wound washing is the most important aspect of wound management. It is the basis for a good wound healing process, because wounds will heal well if the wound is clean.

C. Debridement

Mechanical debridement is carried out using physiological fluid wound irrigation, ultrasonic laser, and so on, in order to clean necrotic tissue. Enzymatic debridement is carried out by applying exogenous enzymes topically to the surface of the lesion. This enzyme will destroy protein residues. For example, collage nation will release collagen and elastin. Several types of debridement that are often used are papin, DNAse and fibrinolysin. Autolytic debridement occurs naturally when someone has a wound. This process involves macrophages and endogenous proteolytic enzymes which naturally lyse necrotic tissue. Synthetically, hydrogel and hydrocolloid preparations can create optimal environmental conditions for the body's phagocytes and act as agents that lyse necrotic tissue and stimulate the granulation process. Sterilized maggots (Lucilla serricata) are often used for biological debridement. Maggots produce enzymes that can destroy necrotic tissue. Surgical debridement is the fastest and most efficient type of debridement.

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F. Exercise Therapy

Exercise Therapy is defined as a treatment for body movement to correct impairment disorders, improve musculoskeletal function or maintain a good condition. Exercise therapy can be aimed at someone who experiences activity limitations or for specific movements in muscle groups of the human body. Exercise therapy can be given in general and must be routine to achieve or restore the patient's functional abilities to the peak point of optimal conditions (Lieberman, 2009).

Exercise therapy is given in order to achieve goals to improve/restore the ability to ambulate, contract muscles, tendons and fascia, mobilize joints, increase blood circulation, increase lung capacity, improve coordination and balance, reduce rigidity, provide a relaxing effect, and increase muscle strength. (strength) and muscle endurance (endurance). Apart from that, exercise therapy in the form of relaxation can have the effect of reducing pain, both directly and breaking the cycle of pain spasms. Light and slow movements stimulate the proprioceptor which is the activation of large diameter afferent fibers. This will result in the closing of the spinal gate (Mardiman, 2001).

5. CLOSING

A. CONCLUSION

Diabetes mellitus is a heterogeneous group of disorders characterized by increased blood glucose levels or hyperglycemia. Insulin, a hormone produced by the pancreas, controls glucose levels in the blood by regulating its production and storage.

Wound washing techniques include swabbing, scrubbing, showering, hydrotherapy, whirlpool and bathing. Washing aims to remove necrotic tissue, clean wound fluid, remaining dressings used and the body's metabolic waste in wound fluid.

By providing exercise by physiotherapy, it will maintain and maintain movement mobilization in patients who suffer from diabetic wounds.

B. SUGGESTION

1. Patients with diabetic wounds still need to be given appropriate exercise therapy so that the healing process improves by using appropriate and adequate physiotherapy modalities.
2. Patients with diabetic wounds, in addition to undergoing regular therapy, are advised to reduce activities that can make the wound worse.

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