ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 11, Issue, 09, pp.7095-7097, September, 2019

DOI: https://doi.org/10.24941/ijcr.36472.09.2019

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

THE INFLUENCE OF COMPRESSION BANDAGE ON LOWER EXTREMITY CIRCULATION DISORDERS IN THE HEALING PROCESS OF DIABETIC FOOT WOUND AT THE WOUND CARE CENTER, MEDAN

[1]Jefri Banjarnahor, [2]Imam Budi Putra, [3]Asrizal, [4]Ridha Dharmajaya and [5]Rosina Tarigan

[1] Master Program Nursing, Faculty of Nursing, Universitas Sumatera Utara, Medan, Indonesia
[2,4]Lecturer, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia
[3,5]Lecturer, Faculty of Nursing, Universitas Sumatera Utara, Medan, Indonesia

ARTICLE INFO

Article History:
Received 18th June, 2019
Received in revised form
13th July, 2019
Accepted 26th August, 2019
Published online 30st September, 2019

Key Words:
Diabetes Mellitus,
Compression Bandage,
Diabetic Foot wound.

Corresponding author:
Jefri Banjarnahor

ABSTRACT

Background: diabetic foot ulcer is an open wound on the surface of the skin that occurs due to an injury to the soft tissue of the foot. Diabetic ulcers can also result in tissue death and if not treated properly and intensively, ulcers can cause gangrene. **Objects:** to identify the influence of compression bandage on lower extremity circulation in diabetic foot wound patients. **Methods:** The study design used quasi experimental with one group pretest and posttest with a sample size of48 respondents, taken by consecutive sampling. Data was collected using ankle brachial index and Bates-Jensen Wound Assessment Tool. Data analysis used Paired T-test. **Results:** statistical test results using paired t-test obtained p-value 0.000<0.05 which means that there was an influence of compression bandage on lower limb circulation interference in the process of healing diabetic foot injuries. **Conclusion:** Administration of compression bandages for patients with diabetes mellitus for healing diabetic foot injuries. This intervention is one of the modality therapy options to improve circulation in the lower extremities.

Citation: Jefri Banjarnahor, Imam Budi Putra, Asrizal et al. **2019.** "The influence of compression bandage on lower extremity circulation disorders in the healing process of diabetic foot wound at the wound care center, medan", *International Journal of Current Research*, 11, (09), 7095-7097.

INTRODUCTION

Diabetes mellitus is an open wound on the surface of the skin that occurs due to injury to the soft tissue of the foot, the formation of fissures between the toes or in areas of dry skin and can also be caused by the formation of a callus. In its development, diabetic ulcers can also cause tissue death and if not treated properly and intensively, ulcers can cause gangrene (Smeltzer, Bare, and Hinkle, 2010). Diabetic foot ulcers can be caused by various factors including high and uncontrolled blood glucose levels, the presence of peripheral neuropathy or peripheral arterial disease, biomechanical pressure and vascular supply (lack of smooth circulation of the extremities) (Boike, Maier and Logan, 2017). Diabetic foot ulcers are one of the main adverse complications and are most common in people with diabetes mellitus. Frykberg, *et al*. (2006) said that 10-25% of diabetes mellitus patients have diabetic foot ulcers. Neuropathy and vascular disorders are the main factors that contribute to the incidence of injuries. The International of Diabetic Federation (IDF, 2015) said that the global prevalence rate of people with diabetes mellitus in 2014 was 8.3% of the total world population, and this figure is increasing every year. Indonesia is the 7th highest country with 8.5 million people with diabetes mellitus.

Riskesdas (2013) said that there is an increase in the prevalence of people with diabetes mellitus in Indonesia, which was 1.1% in 2007, but this figure increased to 2.4% in 2015 from the total population of Indonesia as many as 250 million people. Meanwhile, based on data from the Kemenkes (2014), the prevalence of diabetes mellitus patients in North Sumatra is 1.8%. The prevalence of diabetics is directly proportional to the incidence of diabetic foot ulcer. According to the Society for Vascular Nursing Organization, a compression bandage is a bandage (saturated bandage gauze roll) that is placed on the surface of the skin with the aim of improving venous circulation, reducing swelling and improving the wound healing process. Steve Thomas (2003) said that compression bandage is the main form of therapy in the treatment of ulcers in the lower leg veins which can cause tissue damage if applied incorrectly. Berliner *et al*. (2003) also showed that compression bandages can stimulate signs of chronic wound healing. Based on the results of the research described above, the researcher is interested in conducting research on what is the value of the Ankle Branchial Index (ABI) which can stimulate the wound healing process in patients with diabetic wounds. Therefore, the researcher raised the title of this research is the Effect of compression bandage

on lower limb circulation in the wound healing process of patients with diabetic foot injuries.

MATERIALS AND METHODS

This was quasi experiment with one group pretest posttest. The respondents were selected by consecutive sampling that amount 48.Inclusion criteria in this study were: 1) patients diagnosed with diabetic ulcers, 2) patients who routinely take diabetes medications prescribed by doctors, 3) are willing to be respondents and have never received the same intervention from researchers or other health professionals, 4) long suffered diabetesmellitus≤15 years, 5) able to communicate verbally well, have good hearing and vision.

While exclusion criteria include: 1) patients who have decreased consciousness during the study, 2) ulcers with clinical symptoms of infection, 3) ulcers resulting from malignancy, neoplastic lesions, radiotherapy, chemotherapy and immunosuppressive use or corticosteroid use, 4) Patients experiencing venous circulation disorders. Data was collected using Ankle Brachial Index (ABI) and Bates-Jensen Wound Assessment Tool. Analysis was to determine differences in the values of the ABI before treatment (pre-test) and after treatment (post-test) using a 2-difference test with statistical analysis of dependent t-test (paired t test) with a significance of $p < 0.05$.

RESULTS

able to communicate verbally well, have good hearing and vision. While exclusion criteria include: 1) patients who have decreased consciousness during the study, 2) ulcers with clinical symptoms of infection, 3) ulcers resulting from malignancy, neoplastic lesions, radiotherapy, chemotherapy and immunosuppressive use or corticosteroid use, 4) Patients experiencing venous circulation disorders. Data was collected using Ankle Brachial Index (ABI) and Bates-Jensen Wound Assessment Tool. Analysis was to determine differences in the values of the ABI before treatment (pre-test) and after treatment (post-test) using a 2-difference test with statistical analysis of dependent t-test (paired t test) with a significance of $p < 0.05$.

RESULTS

Table 1. Percentage of Compression Bandage on Lower Extremity Circulation Disorders (n=48)

ABI *(Ankle Brachial Index)*	compression bandage			
	pre		post	
	f	%	f	%
Normal (1.0-1.2 mmHg)	02	04.2	44	91.7
Venous ulcer disorders (0.8-0.9 mmHg)	46	95.8	04	08.3
Total	48	100.0	48	100.0

Table 2. Percentage of Compression bandage Against the Process of Healing Diabetic Foot Injuries (n=48)

Bates Jensen Wound Assessment Tool	compression bandage			
	pre		post	
	f	%	f	%
Score 1-13 : healthy tissue	04	08.3	35	73.0
Score 13-60 : wound regeneration	32	66.7	09	18.7
Score>60 :degeneration	12	25.0	04	08.3
Total	48	100.0	48	100.0

Table 3. The influence of compression bandage on lower extremity circulatory disorders in the process of healing diabetic foot injuries (n=48)

Compression bandage	n	Mean	Median	Min-Max	*p-value*
Pre-test	48	0.84	0.83	0.73-1.09	0.000
Post-test	48	0.95	0.92	0.75-1.18	

Based on the calculation of ABI (Ankle Brachial Index) that prior to bandage the majority had venous ulcer disorders (0.8-0.9 mmHg) as many as 46 people (95.8%), only 2 people (4.2%) with compression bandage in the normal category (1.0-1.2 mmHg). After the compression bandage was performed, it showed that the majority of ABI values were in the normal category of 44 people (91.7%), and those with venous ulcer disorders were 4 people (8.3%). Based on the table above shows that the process of healing diabetic foot wounds by using the Bates Jensen Wound Assessment Tool that prior to bandage the majority compression with a score of 13-60: wound regeneration as many as 32 people (66.7%), minority score 1-13: healthy tissue as many as 4 people (8.3%).

After bandage the majority of healthy tissue compressed (score 1-13) as many as 35 people (73.0%), minority with a score> 60 (degeneration) as many as 4 people (8.3%). Based on the table above shows that the mean value before the compression bandage is 0.84 and after being given a compression bandage is 0.95. The median value before the compression bandage (pre-test) is 0.83 and after being given a compression bandage (post-test) that is 0.92. Before being given a compression bandage the minimum value is 0.73 and a maximum of 1.09. After being given a compression bandage the minimum value is 0.75 and the maximum is 1.18. Statistical test results using paired t-test obtained p value = 0,000 <0.05 which means that there is an effect of compression bandage on impaired lower limb circulation in the process of healing diabetic foot injuries at the Asri Wound Care Center Medan.

DISCUSSION

Based on the research results of lower extremity circulation in the process of wound healing using the calculation of ABI (Ankle Brachial Index) that prior to bandage the majority had venous ulcer disorders (0.8-0.9 mmHg) (95.8%), only 4.2 % with compression bandage in the normal category (1.0-1.2 mmHg). After compression, the majority of ABI values were normal (91.7%), and those with venous ulcer disorders were 8.3%. Study by Gibbs *et al*. (2013) in patients with type 2 diabetes without complications showed that there was a significant change in the value of ABI, where the exercise resulted in an increase in ABI value accompanied by a decrease in HbA1c and was shown to improve endothelial function so that blood flow to the peripheral better. Other studies by Sanchez *et al*. (2011) showed that in patients with Type 2 DM with peripheral arthery disease, after given exercise intervention and massage therapy, there was an improvement in arterial blood pressure and ABI values. The aim of exercise and massage therapy is the same as the goal of lower limb joint movement exercises, namely to improve blood circulation. Diabetic foot ulcers are a complication in patients with diabetes mellitus and are classified as chronic wounds that are difficult to heal.

Tissue damage that occurs in diabetic foot ulcers is caused by neurological (neuropathy) and vascular disorders in the legs.

The disorder does not directly cause diabetic foot ulcers, but begins with a mechanism of decreased sensation of pain, changes in foot shape, leg muscle atrophy, callus formation, decreased visual acuity and decreased blood flow that carries oxygen and nutrients to the tissues. These changes can occur within a period of approximately 15 years if the condition of hyperglycemia is not controlled (Smeltzer and Bare, 2010). Based on the results of the study showed that the process of healing diabetic foot wounds by using the Bates Jensen Wound Assessment Tool that before the compression was performed majority of diabetic foot injuries with a score of 13-60: wound regeneration (66.7%), minority of diabetic foot injuries with a score of 1-13: healthy tissue (8.3%). After bandage the majority of healthy tissue compresses (score 1-13) (73.0%), a minority with a score> 60 (degeneration) (8.3%).

In line with research conducted by Usiska (2015) the size of diabetic foot ulcer wounds after treatment of modern wound care with hyperbaric therapy as much as 5 times of therapy until the 13th day, the results are obtained that the change in size of the wound becomes reduced with the mean of diabetic foot ulcer wounds to 35.38, evidenced in the results of research with an area of more than 80 cm2, which originally amounted to 2 people reduced to 1 person, 3 more people with an area of size 36-80 cm2, and initially there were no diabetic ulcer patients who had an area wounds of less than 4 cm2 after treatment showed that the wound area of diabetic ulcer patients was reduced to less than 4 cm2 by 2 people. Foot ulcers in diabetic patients must get treatment because there are several reasons, for example to reduce the risk of infection and amputation, improve function and quality of life, and reduce health care costs. The main goal of treating diabetes ulcers as soon as possible is to obtain a cure and prevent recurrence after the healing process. From several studies, it shows that the development of diabetic ulcers can be prevented. The use of effective and appropriate bandage helps the optimal management of diabetes ulcers. Circumstances surrounding the wound must be maintained cleanliness and humidity (Hariani and Perdanakusuma, 2012).

Based on the results of the study showed that there is an effect of compression bandage on the interference of lower extremity circulation in the process of healing diabetic foot wounds at the Wound Care Center in Medan, p = 0,000 <0.05. Foy and Teresa (2014) in their research also explained that in addition to wound care using appropriate bandages, care for circulation in the injured limb area also needs to be done, such as the use of compressive bandages (compression bandage) which aims to help smooth lymphatic flow and provide strength at the vein hydrostatic pressure. Van Gent *et al*. (2006) in his study also said that multilayer compression bandage can restore blood pressure backflow, thus accelerating the wound healing process by up to 73%. Proper wound care is needed to prevent the occurrence of amputation complications such as wound care with moisture balance techniques, debridement and systemic hyperbaric oxygen therapy (Hunt, 2007). Schulitz, (2005) states that a moist environment will accelerate the process of epithelialization and to create a moist environment can be done by using a semi occlusive, full occulisive and impermeable bandage.

Conclusion

There was a influence of compression bandage on lower extremity circulation disorders in the process of healing diabetic foot wound in the Wound Care Center (Asri Wound Care Center) Medan, p=0.000 <0.05. Administration of compression bandages for patients with diabetes mellitus for healing diabetic foot injuries. This intervention is one of the modality therapy options to improve circulation in the lower extremities.

REFERENCES

Berliner E., Ozbiligin B., Zarin D. A. 2003. A Systemetic review of pneumatic compression for treatment of chronic venous insufficiency and venous ulcers.*Journal of Vascular Surgical*, 37: 539-44.

Boike A., Maier M. and Logan D. 2017. Prevention and treatment of leg and foot ulcers in diabetes mellitus.www.clevelandclinicmeded.com.

Frykberg *et al*. 2006. Diabetic foot disorders: A clinical practice guideline. *Journal of Foot Ankle Surgical*, 39 (5 Suppl): S1-60.

Gibbs, B. B., Dobrosielski, D.A., Althouse, A.D. and Stewart, K.J. 2013. Effect of Exercise Training on Ankle-Brachial Index in Type 2 diabetes. Atherosclerosis. 230: 125-130. doi: 10.1016/j.atherosclerosis.2013.07.002.

Hariani and Perdanakusuma. 2012. Perawatan Ulkus Diabetes. Jurnal Universitas Airlangga: Rekonstruksi and Estetik, 1(1).

Hunt, K.T. (2007). Wound Healing. In: Doherty MG. Current Surgical Diagnosis and Treatment. 12th Ed., McGraw-Hills, USA.p75-87

IDF. 2013. *IDF Diabetes Atlas Sixth Edition, International Diabetes Federation 2013*.http://www.idf.org/sites/ default/files/EN_6E_Atlas_Full_0.pdf diaksestanggal 4 Januari 2014**.**

Kemenkes. 2014. Infodatin Pusat Data danInformasi Kementerian Kesehatan RI. www.depkes.go.id › infodatin › infodatin-diabetes.

Riskesdas. 2013. Badanpeneliti and an pengem bangankeseha tankementeriankesehatanritahun 2013. http://www.depkes.go.id/ resources/download/general/ Hasil%20 Riskesdas%202013.

Sanchez, A. M. C., Pen˜arrocha, G. A. M., Castanys, B. F. F., Gamez, G.G, and Rubio. 2011. Connective tissue reflex massage for type 2 diabetic patients with peripheral arterial disease: randomized controlled Trial. Evid Based Complement Altern Med. 2011;2011:804321.

Schultz, G.S. 2005. The Physiology of Wound Bed Preparation. Dalam: Granick MS, Gamelli RL, penyunting. Surgical Wound Healing and Management. Switzerland: Informa Healthcare; h. 1 -16.

Smeltzer S. C., Bare B. G., Hinkle J. L. and Cheever K.H. 2010. *Textbook of medical surgical nursing*. Philadelphia :Wolter Kluwer Lippincott William and Wilkins.

Usiska, Y. S. 2015. Pengaruh Metode Rawat Luka Modern dengan Terapi Hiperbarikpada Pasien Diabetes Mellitus. https://repository.unej.ac.id/bitstream/handle/123456789/65577/102310101066.pdf?s

****