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Effect of Compression Bandage on the Healing of Diabetic Foot Ulcers: A Scooping Review

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ABSTRACT
Compression Therapy is a non-invasive application in the treatment of leg wounds. Bandage that is not done will cause lower leg edema when the swollen exudate is retained on the surface of the wound which will result in maceration of the skin around the wound, in cases of venous blood vessels there is a high risk of plasma leakage and venous thrombosis and cross infection of the factor. external so that healing can prolong the healing of diabetic foot wounds. Pressure dressings are implemented to improve the healing process of diabetic foot wounds which can stabilize venous pressure in the legs so that it can accelerate the circulation of blood vessels again, with a bandage pressure value (20-40 mmHg). Objective: This study aims to determine how the effect of pressure dressing on the process of healing diabetic foot injuries. Methods: This study is a scooping review. Research sources were taken from several databases, with the keywords Compressions Bandage OR Diabetic Foot Ulcer OR ABI and Quantitative. From the PubMed, EBSCO, ProQuest and Elsevier databases found all 455,414 journals. Screening of all journals using PRISMA starting from identification, screening, eligibility and inclusion, obtained a whole database of 14 journals that meet the inclusion criteria. Result: The compression dressings have been shown to improve the healing process of diabetic foot wounds, improve venous blood flow, reduce leg edema and lower the ankle brachial index.

Keywords: *Compressions bandages 1, ankle brachial index 2, diabetic foot ulcer 3*

1. INTRODUCTION

Diabetes Mellitus (DM) has long been a serious global health problem with sufferers increasing every year. According to the World Health Organization, the number of DM sufferers increases from 108 million in 1980 to 422 million in 2014. The prevalence of DM sufferers in the world between the ages of 18 years and over increased from 4.7% in 1980 to 8.5%, (1). According to data published in the International Diabetic Federation, it is stated that there are 425 million people with diabetes in the world. Diabetes sufferers in Indonesia have increased significantly at the age of 20-79 years and are in 6th place for the last five years, the prevalence of diabetes from 6.9 percent in 2013 has increased 8,5%, (2).

Compressions Therapy are management for wound healing management by reducing venous pressure so as to increase venous return which can reduce blood pressure in systemized superficial veins, compression dressings can also accelerate venous blood return to the heart by increasing the flow of deep veins which can reduce oedema by applying a pressure difference between the capillaries and tissues, (3). Bandages that are applied under high pressure are more effective than bandages with low pressure, but there is no significant comparison between application in several types of high pressure, (4)

Types of compression dressings are the first bandage pressure between 14-17 mmHg, the second bandage pressure between 18-24 mmHg, the third bandage pressure between 25-35 mmHg, high bandage pressure to 60 mmHg, (5). Pressure dressings can be applied in a number of techniques to cover all pressure using bandages, stockings, and intermittent pneumatic compression. The application of a compressive dressing will provide a very different pressure difference to the bandage with a four layer system of bandages and stockings creating low to high pressure depending on the type of bandage to be used. Pressure dressings can also be applied to vein and arterial wounds, stockings can also be used to regulate venous pressure and prevent diabetic foot wounds with impaired venous blood circulation, (6).

2. REVIEW METHOD

The first step of searching for literature was carried out in November 2019. Researchers searched for data sources using several databases such as PubMed, EBSCO, ProQuest and Elsevier. The keywords used were "Diabetic Foot Ulcer AND Compressions Therapy AND Compression Bandage AND Ankle Brachial Index AND Quantitave". Researchers provide a year limit for finding sources of related journals, between 2015-2020, aiming to get valid sources that are in accordance with the times.

2.1. Method

2.1.1. Exclusion criteria

This publication is unlike letters to, abstracts, full paper, and editorials.

2.1.2. Literature Search

The literature search was conducted in December 2015.

Researchers search for data sources using several databases such as PubMed, EBSCO, ProQuest and Elsevier. The keywords used are "Compression Bandage Our ABI and Diabetic Foot Ulcer and quantitative". Researchers provide limitations for searching related journals, namely between 2015 - 2019, with the aim of finding valid sources that are not out of date and in accordance with the times.

2.1.3. Inclusion criteria

The following inclusion criteria were used for the selection of studies for this literature review:

a. Research should be related to bandage compression in diabetic foot ulcer patients
b. This study can provide information about all the compressive dressings for diabetic foot wound patients
c. The full text of the study below must be available in English and Indonesian.
d. Journals are searched from 2015 - 2019

3. DATA SELECTION ANALYSIS

The search for journals is carried out through the PubMed, EBSCO, ProQuest and Elsevier databases and the journal will be extracted by the researcher and determined independently. Journal titles and abstracts stored in an international database will be searched using existing keywords. From the PubMed database, there were 14,776 journals, EBSCO found 313,940, Cochrane found 683, Elsevier found 1,919 and ProQuest 124,096. From the overall database, only 14 journals that met the inclusion criteria filtering using PRISMA, the identification of journals from 2015-2019 were found 69,297 then screening based on the title was filtered again based on abstract and exclusion criteria found 57,486 in re-screening based on full-text found 11,407 later reviewed again with a full review of the journals found 404 journals then filtered again with a critical review found 14 journals. Each database is searched using the same keywords, namely Compressions Bandage AND Compression Therapy AND Diabetic Foot Ulcer AND Ankle Brachial Index AND Quantitative.

4. ARTICLE SEARCH

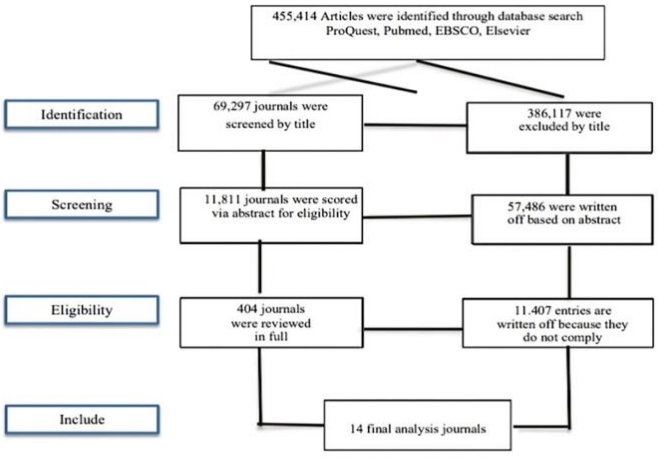

Figure 1. Article search proses

5. DISCUSSION

5.1. Wound Healing

The healing process for diabetic foot wounds that apply wound assessment experiences a significant healing process in wounds that occur with venous or arterial circulation problems, (7). The abnormalities of diabetic foot wounds experienced by diabetic patients can cause different wound healing times, depending on the assessment of the wound size, the wound depth, the infection (biofilm, contamination, the critical contamination and infection, the fluid exudate, the oedema, the amount of granulation tissue, the amount of epithelialization, the dead tissue covering the wound bed, the blood sugar and deformity of the feet of patients with diabetic foot wounds, (8). It can be seen from the characteristics of patients who received wound assessment treatment and four-layer bandage compressive dressing therapy, the healing process increased by 19% , (9).

The oedema causes fluid imbalance that can become moisture in the wound condition, therefore it slows down the process of the wound granulation and epithelialization, to accelerate the process of the epithelialization in the diabetic foot wounds requires a balance of moisture on the wound surface or moist, (10). The moisture balance will increase the angiogenesis process. Diabetic foot injuries can result in autonomic neuropathy in diabetic patients resulting in the increased shunting of blood flow which has an impact on increasing venous blood pressure in the legs so that it can control oedema. If there is a decrease in the diffusion of oxygen and nutrients in diabetic patients with wounds, it slows down the healing process, (11). Pressure dressings can accelerate the healing of diabetic wounds with problems in venous blood circulation in the legs, knowledge of therapy must be carried out with standards to patients because it can positively affect the quality of life and reduce health care costs,(12).

Diabetic foot wounds are caused by prolonged hyperglycaemia resulting in reactive carbonyl and carbonyl compound reactions and non-enzymatic glycosylation between proteins, degradation of protein glycosylation which greatly impacts the healing process of diabetic foot wounds, (13). The wound healing process occurs in the migration of fibroblasts, the proliferation and expression of extracellular matrix proteins which then become a complex mechanism consisting of 3 phases of wound healing, namely the inflammatory phase is the stage of cleaning from microorganisms, the granulation phase occurs when new blood vessels become proliferative, and the epithelialization phase, the differentiation / wound closure phase, is characterized by a reduction in size, (14). Nurses can help improve the wound care process for wound healing, analyse the problem of complications that can arise and delay the healing process, educate the patient on the factors that will be at risk, and support proper patient self-care practice from the examination, assessment of diabetic foot, evaluating including location, size, shape, depth, oedema, exudate, infection, and the basic quality of the wound, (15)

5.2. ABI in the application of the compressions ttherapy

Pressure dressing significantly accelerated the healing process compared to the control group. The healing that is achieved by applying four layers of bandages to the diabetic foot wound varies in healing time. Research shows that the type, number, and location of exudate are characteristics of diabetic foot wounds that experience problems with venous flow and are most quickly resolved with a four-layer bandage compression dressing system with a healing period of 12 weeks, (16). This proves that the compression dressing system in diabetic foot wounds with the four layers of bandage has an effect in accelerating the wound healing process, through reducing fluid and oedema in the majority of patients with ABI 0.80 - 0.99. The application of the four-layer bandage therapy was not found in patients who had an ankle brachial index below 0.8 due to pain. Patients with pain were not included in the inclusion criteria for the application of four layers of bandages, (8). Correctly applied compression dressings and pressure control in diabetic foot wounds with arterial problems can lead to increased arterial flow resulting in increased arterial blood flow which can aid in the angiogenesis process and increase the wound healing process from granulation to epithelialization. Brachial (ABPI) increases from 0.54 at the start of treatment to 0.70 using an ankle pressure value> 50mmHg and a bandage using a short stretch material, (17)

The pressure dressings increase the time span in the process of healing diabetic foot wounds with compression dressings, (18).High pressure applied to diabetic foot wounds with oedema or disorders of the venous or arterial blood system with an ABI value between 0.8 - 1.2 and 0.80-0.89 has excellent healing, in patients with an ABI value of 0.5 - 0.79 it is recommended to apply a median pressure which will provide a very significant development of wound healing and an ABI value of 0.36-0.47 does not have progress in healing when under pressure dan adaptive compression dressings are an effective, safe and well-tolerated treatment modality for the treatment of diabetic foot wounds with venous problems and this data shows the level of effectiveness for wound healing for the adaptive compression dressing system, (19)

Significant reduction in oedema of calves and ankles at the end of treatment compared to baseline, circulation was not reduced during the study without significant reduction in ABI, TBI or SPP for both groups proving that pressure dressings on diabetic foot wounds with light pressure can be more effective and safer used in patients with diabetes and diabetic foot wound oedema, (20). Pressure dressing is a non-invasive nursing therapy that can help heal diabetic foot wounds by reducing pressure in the leg veins and increasing venous return, with a four-layer compression dressing technique on the leg where there is a wound with indications of venous problems in the leg to reduce the presence blood pressure in the superficial vein system, thereby increasing venous return to the heart flow by increasing the flow of deep veins so that it can reduce the occurrence of oedema by stabilizing the pressure difference between the blood vessels in the capillaries or tissues which can prevent peripheral oedema and the ABI value becomes normal, (21)

6. RESULT

The result contain the descriptions of the results of the analysis related to the research question. Any research results should be discussed. The discussion contains the meaning of the results and the comparisons with the theories and / or the similar research results. The length of the results of the exposure and the discussion is 40-60% of the length of the article. Diabetic foot wound treatment using four layers of bandages is more effective and improves the healing process of diabetic foot wounds compared to wound care that applies secondary dressings with gauze dressings. Pressure dressings have proven to be very influential in the wound healing process with a period of 12 weeks after the compression bandage therapy, compression dressing therapy has been shown to reduce edema of diabetic foot wounds, normalize the ankle brachial index value and reduce the amount of exudate. This management proves that compressed bandage compression can normalize ankle values brachial index so that the flow of veins and arteries does not interfere with distributing nutrients to peripheral tissues which can accelerate the healing process of diabetic foot wounds.

7. CONCLUSION

The treatment of the diabetic foot wounds using four-layer bandage compression therapy is more effective in accelerating wound healing, preventing edema, improving the wound healing process, and normalizing the ABI value in diabetic foot wound patients compared to wound care using gauze bandages. The results of the literature review will be used as fundamental data for further research in developing different knowledge, methods, skills and techniques in interdisciplinary, effective and comprehensive management of the treatment process to accelerate wound healing and prevent complications of the diabetic foot wounds.

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