

Effectiveness Foot Massage Towards ABI (Ankle Brachial Index) in Patients at Risk of Diabetic Ulcus: *A Systematic Review*

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ABSTRACT

Foot ulcers will be at risk of amputation. Preventive measures of diabetes mellitus ulcers can maintain blood viscosity by maintaining stable blood sugar levels, maintaining smooth blood circulation with massage interventions. The purpose of writing this systematic review is to determine the effectiveness of foot massage on peripheral circulation status in patients at risk of diabetic ulcer. To determine the effect of foot massage therapy on patients at risk of diabetic ulcer. The study was systematically identified by searching the database through the keyword "Foot Massage AND Ankle Brachial Index AND Diabetic ulcer". Search results found Scopus (12,024=4588=1), google scholar (3033=919=6), and Pro Quest (20=1), ebsco (4880=1424=1). Eligible articles are selected according to; inclusion criteria. This systematic review article related to the effective intervention of foot massage against ABI in patients at risk of diabetic ulcer and was published in English and Indonesian based on the last 5 years of study. Foot Massage therapy that is given regularly and continuously will produce a good Ankle Brachial Index value. Foot Massage increase the value of ABI which makes the ulcers risk smaller.

Keywords: Diabetic Ulcer; Foot Massage; Ankle Brachial Index

1. INTRODUCTION

Diabetic peripheral neuropathy is a complication that will be experienced by almost all people with type 2 diabetes mellitus (T2DM). Nonpharmacological therapy that can be applied to relieve diabetic peripheral neuropathy complaints is foot massage.[1] Type 2 diabetes mellitus can cause various complications, including microangiopathy and macroangiopathy. Retinopathy, nephropathy, and neuropathy are part of the microvascular, and macrovascular damage such as coronary arteries, cerebrovascular damage, and damage to the peripheral blood vessels in the legs, due to peripheral circulation to the legs experiencing problems, ulcers in the area of the legs can appear as a result of this[2]

Diabetic ulcers are a chronic complication that is often experienced by people with T2DM, characterized by infection, ulceration, damage to the skin tissue of the feet, nerve disorders, and peripheral vascular disorders.[3] The results of reflexology research and controlling blood sugar levels increase the angle brachial index (ABI).[4]

Indonesia is the fifth country with the highest number of DM sufferers in the world.[5] The incidence of diabetic ulcers is 15-25% in T2DM patients who have a history

of ulcers and 19-34% in patients who do not have a history of ulcers.[6] The prevalence of amputations is 30% , and the mortality rate after one year of amputation was 14.8%.[7] Most of these amputations were initiated by impaired peripheral perfusion resulting in diabetic ulcers that were difficult to heal. Diabetic ulcers are a complication that is difficult to completely cure, and a poor healing process can lead to infection and gangrene, this can lead to more severe consequences, such as the need for amputation of the lower extremities, or even cause death in T2DM sufferers.

Treatment of physical disorders in patients with diabetic ulcers has been considered successful, partly because of the intolerable clinical symptoms, long-term hospitalization history, and the large economic burden.[8] Diabetic ulcers caused by neuropathy generally have normal ABI values, but if the incidence of ulcers caused by neuropathy is accompanied by angiopathy, the Abi value will also change along with impaired peripheral blood circulation in the leg area. with a decrease in the ABI value due to tissue ischemia, the ulcer will get worse.[9]

Massage is one of the complementary therapies that combine various techniques in nursing.[10] The author is interested in digging deeper into the level of effectiveness of foot massage on peripheral perfusion in diabetics. This is supported by research related to the effect of foot massage on increasing peripheral perfusion in diabetics which have been widely studied.

2. METHOD

The literature you are looking for is research articles for the last 5 years (2017 -2021). Research articles in English and Indonesian were selected from indexed electronic databases, namely Scopus (12,024 = 4588 = 1), Google Scholar (3033 = 919 = 6), Pro Quest (20=1), and Ebsco (4880=1424=1) Writing article search results following protocols and rules using checklists and Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA) flowcharts.

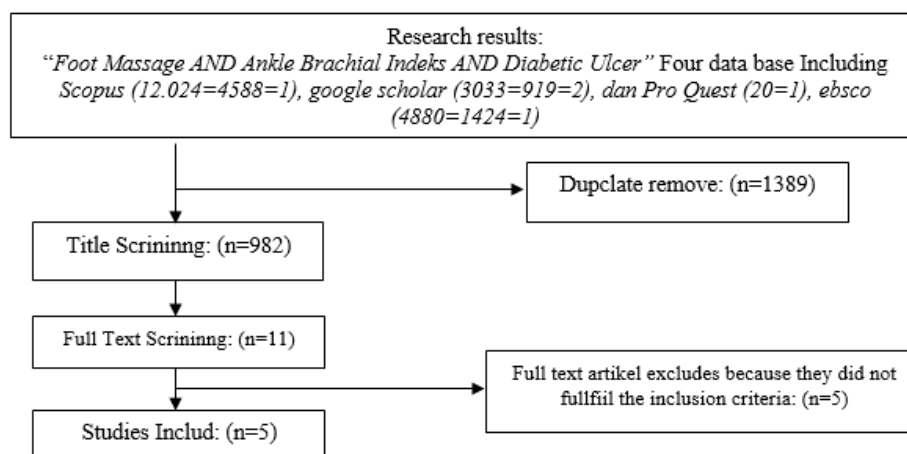


Figure 1. Flowchart of the Articles Selected for the Systematic Review and the Selection Process Using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyzes)

2.1. Search Strategy

The literature search was conducted in July 2022. The strategy used to find articles were using the PICOS framework. Articles are identified with the keywords “Foot Massage AND Ankle Brachial Index AND Diabetic Ulcer” by restricting 2017-2021 in English and Indonesian, full-text articles, to get relevant articles.

Table 1. The PICOS format of this study

Criteria	Inclusion	Exclusion
Population	Patients with diabetes mellitus	Articles that are not full-text, do not focus on patients with diabetes mellitus
Intervensi	Foot massage	Not following the intervention given
Outcome	Decreased Ankle Brachial Index score	-
Time	2017 – 2021	Outside the specified time limit
Study design	RCT, experimental and Clinical observation study	Systematic review, Literature Review
Language	English and Indonesian	Apart from English and Indonesian

2.2. Inclusion / Exclusion Criteria

The inclusion criteria of this article are foot massage intervention on peripheral circulation status in patients at risk of diabetic ulcers. The articles taken are from the last 5 years using RCT, Experimental and Clinical observation study methods. The purpose of this study was to examine the effectiveness of foot massage on peripheral circulation status in diabetic ulcer risk patients in detail so that articles without full text and not explaining the effect of foot massage on peripheral circulation status in diabetic ulcer risk patients were excluded, with study limits 2017-2021. The search results obtained 9 selected articles from 19,957 articles found in the database that matched the inclusion and exclusion criteria.

2.3. Study Selection

There were 19,957 articles identified. Research with duplicate characteristics was deleted and 9,063 articles were left for a feasibility review. Articles were filtered based on the identification of the title, and 9 articles were obtained. The full-text article due diligence test left 5 research articles for review.

2.4. Data Extraction

The data extracted from the 5 articles used as information included demography, study design, outcome measures, sample size, evaluation instruments used in the study, country of origin, and year of publication.

3. RESULT

Table 2. Review of articles on ABI

Author, Country	Design, Sample, Instrument	Result
Sunarti, Resti Anggraeni. (2018), Indonesia [11]	Pre-Eksperimental Designs 21 Respondents Observation sheet	The combination of DM Foot Gymnastics and Foot Massage is Effective Against Brachial Ankle Values Index (ABI) in Type 2 Diabetes Mellitus Patients at Ungaran Hospital, Semarang Regency with P Value = 0.016 (A = 0.05), An increase in ABI Average Value of 0.12 mmHg.
Jumari, Bambang Suryadi. (2020), Britain [12]	Quasi experiment 60 Respondents Observation sheet	Significant ABI Values Between Acupressure (P = 0.000), Foot Exercise (P = 0.001) and Combination of Acupressure and Foot Exercise (P = 0.000). Acupressure and DM Gymnastics Are Effective Interventions to Increase ABI Values in Type 2 Diabetes Mellitus Patients.
Sidik Annas Sumeru, Galih Noor Alivian, Arif Imam Hidayat. (2020), Britain [13]	True experiment 60 Respondents Observation sheet	Giving light massage intervention 3 times has not been able to reduce the ankle-brachial index score in tuberculosis patients.
Isni Hijriana, Miniharianti. (2021) Indonesia [14]	Quasi experiment 40 Respondents Observation sheet	a. The difference between pre and post-foot massage intervention and lower. Movement of the extremity joints from the ABI value, for (p=0.00). b. The conclusion is a foot massage and lower extremity joint movement exercises can increase the ABI value if done continuously
Saadet Can Cicek, Seyma Demiro, Dilek Yilmaz, Sedat Yildiz (2021), Turkey [4]	Quasi experiment 48 Respondents Observation sheet	Foot reflexology exercises can be useful for improving glycemic control and diabetic peripheral neuropathy in the elderly with diabetes.

4. DISCUSSION

Patients with T2DM often experience complications in the peripheral arteries. This complication occurs due to decreased blood circulation to the lower extremities due to a buildup of sugar levels in the blood.[15] Foot massage has a good effect on diabetics in preventing ulcers. Combination therapy given by massaging the feet on a regular basis is highly recommended to prevent complications.[11] Foot massage can promote adequate blood circulation to the foot capillaries and block pain receptors that cause tingling in the extremities of diabetics.[16]

The ABI value is used as a standard for measuring success. from foot massage therapy can be seen before and after therapy is given. DM patients who received foot

massages experienced a significant decrease in ABI scores and were very effective in maintaining sensation in the patient's feet.[11][17] The ABI test is performed as a form of detection and is recommended for the assessment of people at risk for diabetic ulcers.[18] Diabetic ulcers due to neuropathy usually have a high ABI. However, if the neuropathic ulcer is accompanied by angiopathy, the ulcer grade may increase according to the severity of tissue ischemia. The lower the ABI value, the greater the ulcer severity value.

Factors that affect ABI at rest are, 1) Age: decreases with age due to stiffness in arteries 2) Height: A taller person will have a higher ABI than a short person as a consequence of an increase in TDS with greater distance from the heart. 3) Gender: women have a lower ABI than men 4) Ethnicity: blacks have a lower ABI than whites.[19]

Continuous therapy is expected to reduce the number of complications, especially diabetic ulcers, which can affect the patient's body image.[17] The ABI value after the foot massage intervention was 7 people (35.00%), borderline or limited perfusion was 11 people (55.00%) and 2 people were normal (10.00%). Respondents with normal ABI were 11 people (55.00%), borderline were 9 people (45%) and no patients had circulation disorders [14], Jabal Ghafur School of Health Sciences.

In Ramadhan et al's study, routine diabetic foot exercises carried out for 21 days (3 weeks) gave good results to improve blood circulation to the periphery. Practice started at 08.00 AM and then continued with a foot massage. Sufferers benefit from regular diabetic foot exercises and foot massages. The perceived results are reduced pain, inhibited nerve damage, controlled blood sugar levels, and improved blood circulation to the peripheral arteries of the legs. This study proves that complications experienced can be detected early with ABI, and then follow-up can be carried out in the form of intervention planning, implementation, evaluation, and training that is carried out on an ongoing basis regularly. [20].

Significant changes in the ABI value prove that this therapy needs to be used as a complementary therapy. During the treatment process, people with diabetes are undergoing in addition setting the diet and pharmacological therapy. Other studies are in line with the results of this study and support and recommend foot massage therapy that is effective at ABI.[11] Footstep therapy modalities from the research that have been analyzed show excellent effectiveness in patients.[21] This therapy will be more successful by continuing to follow a regular diet and pharmacological therapy.4 This therapy can also be considered a new approach in the management of diabetic patients in reducing the risk of diabetes complications that prevent amputation.12.

Foot massage and foot exercise gave very good results for smooth peripheral circulation which was carried out for three days and ABI values in patients with Type 2 DM. [22]–[24] The implementation of foot massage can be carried out routinely by diabetics independently with the guidelines of the foot message management book to avoid mistakes in doing massage. [23], [25] Foot messages that are routinely carried out three times per week increase the ABI value and this impact also reduces the risk of ulcers in diabetic patients, this is because blood circulation to the periphery is smoother. [24], [26].

5. CONCLUSION

Foot massage therapy has a good effect on diabetic patients in facilitating blood flow to the leg capillaries. This can reduce the risk of ulcer complications that can lead to amputation in its severity. Control that can be seen is through Abi's assessment after therapy is given. Therapy that is given regularly and continuously will result in a good Abi value. Foot massage therapy can be used as a combination of several other therapies to maintain maximum effectiveness.

6. ACKNOWLEDGMENTS

This paper is structured as a form of learning and more in-depth evidence from the results of the application of footstools and ABI assessment to determine the risk of developing diabetic ulcers in patients with DM. The results of the ABI obtained can be important data in developing a treatment and prevention plan as early as possible to prevent ulcers from occurring.

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