



## Systematic Review

**A Systematic Review of Foot Exercises with Group Support to Improve the Foot Health of Diabetes Mellitus Patients**Rohmatul Faizah<sup>1</sup>, Ferry Efendi<sup>1</sup>, Suprajitno Suprajitno<sup>2</sup><sup>1</sup>Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia<sup>2</sup>Department of Nursing, Poltekkes Kemenkes, Malang, East Java, Indonesia**ABSTRACT**

**Introduction:** Foot problems are a process and complication in patients with diabetes mellitus (DM). Foot complications can be prevented by routine foot exercises. Group support is needed to increase the routine of foot exercise. The effects of foot exercise can be seen by measuring the Ankle Brachial Pressure Index and foot sensation. The objective of this systematic review was to identify the prevention of DM foot complications in an easy way so then he patient can do it independently.

**Methods:** The method used in this study was a systematic review focused on 2015 – 2019 using the PRISMA method. The literature was obtained from Scopus, Science Direct and Proquest. The results found 25 items of literature on foot exercise which was reduced to 4 studies on preventing damage to the feet of DM patients through routine foot exercise. The literature of this study is supported by 3 other studies that state that foot health can also be used to examine the foot's blood circulation status and sensation.

**Results:** These results have been presented concerning 7 studies regarding special group support in the form of exercise therapy for patients with DM. This study explains the prevention of foot complications through foot exercise. Group support is needed provide motivation to conduct routine foot exercise.

**Conclusion:** Foot exercise can accelerate the blood circulation as can be seen by the Ankle Brachial Pressure Index score and the increase in the neurological system of the foot through foot sensation status.

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**INTRODUCTION**

A group of problems that is often found in patients with diabetes mellitus (DM) is foot problems. This problem is a form of microvascular complication.(Shaw & Cummings, 2012) The foot status points to consider include circulatory status and neurological status.(Ji, Bai, Sun, Ming, & Chen, 2015) Upon observing the world data, the number of DM patients in the world totals 123 million people and it is estimated that the number will increase by 40% in 2045. DM patients recorded with foot complications make up 60% and 20% of them also experience complications in the form of foot infections.(IDF, 2017) In Indonesia, DM patients have

increased by a percentage of 2.4%, while in 2011, it was 8.5%. In 2015, it was 10.9%.(Risquesdas, 2018)

The basis of the management of DM therapy is divided into 2, namely pharmacological and nonpharmacological therapy. In this discussion, the patient can be directed to the therapies that can be done independently at home. Exercise therapy is an option. The exercise therapy that can have a direct impact on foot problems as it in the form of foot exercise.(Sheehan & Ulchaker, 2011; Taddei et al., 2018) Foot exercises are a series of movements that are arranged systematically that can provide support to improve the diabetic's foot problems.(Taddei et al., 2018) The benefits of routine foot exercise include improving blood circulation, increasing muscle

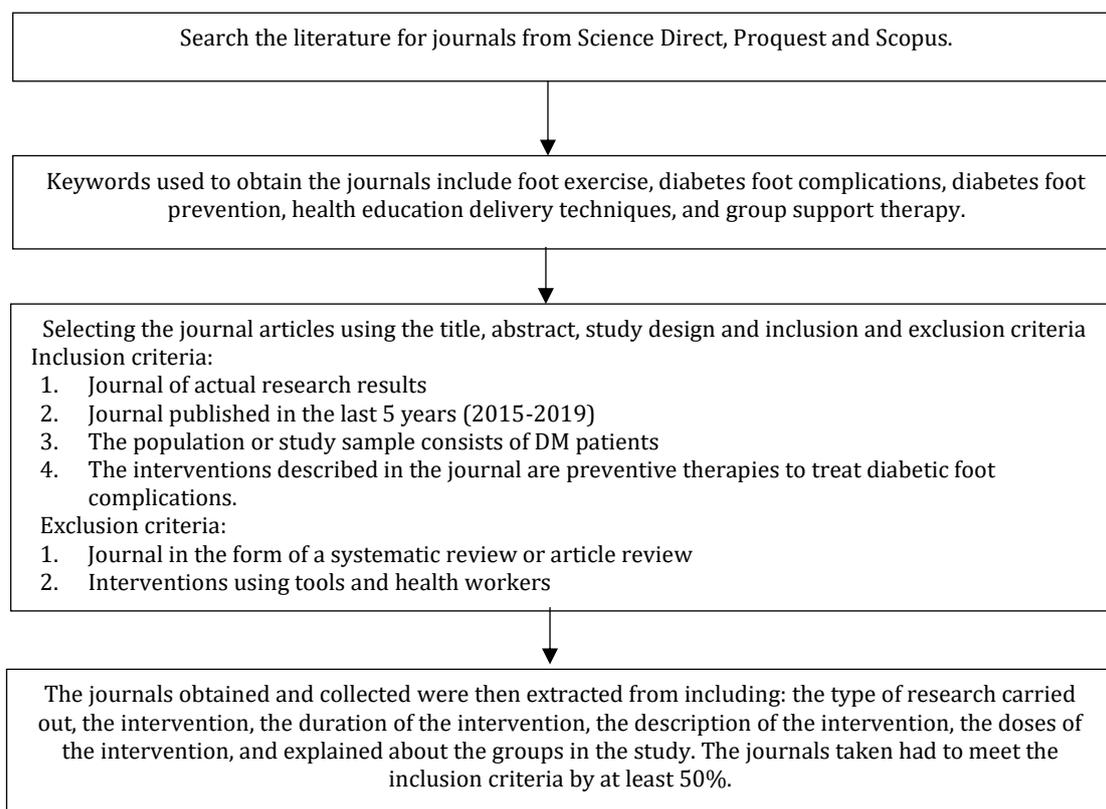


Diagram 1. Method of the systematic review

strength, improving neurological status, and preventing diabetic foot complications.(Ji et al., 2015) These benefits can be seen by measuring the Ankle Brachial Index to determine the status of the blood circulation, while the neurological status can be seen by assessing the foot sensation.(Shaw & Cummings, 2012; Watkins, 2016)

The techniques used for providing foot exercise education also need attention. Recommendations from a variety of literature are used to mobilize support from the fellow sufferers of DM. This technique is called group support. Group support has been proven to increase understanding and participation when carrying out several activities including foot exercises.(Due-christensen, Hommel, & Ridderstråle, 2016; Shomaker et al., 2017) Therefore in this article, the review discusses foot exercises and group support based on the results of the previous studies. The objective of the systematic review was to identify techniques used to prevent DM foot complications in an easy manner in a way that the patient can do independently.

## MATERIALS AND METHODS

Making this article review used the PRISMA method.

### Strategy for searching studies

The data was obtained using electronic media to access international journals. The data search was conducted from August 2019 to February 2020. The journal databases used in this article review were Scopus, Science Direct and Proquest. Keywords used

to obtain the journals included foot exercise, diabetes foot complications, diabetes foot prevention, health education delivery techniques, and group support therapy.

### Study selection

When selecting the journal articles, the title and abstracts of the articles found were used. The design of the article used referred to the actual research if it was not in the form of a systematic review or article review. The PRISMA method recommends using inclusion and exclusion criteria. The inclusion criteria compiled included the following. 1. A journal with actual research results. 2. A journal published in the last 5 years (2015-2019). 3. The population or study sample consists of DM patients. 4. The interventions described in the journal are preventive therapies for diabetic foot complications. The exclusion criteria included 1. journals in the form of a systematic review or article review and 2. interventions using either tools and/or health workers.

### Data Extraction and Appropriate Quality

Assessment Data extraction was done by discussing the compilers of the article. The journals were obtained and collected and then their information was then extracted including the type of research carried out, the intervention, the duration of the intervention, the description of the intervention, the doses of the intervention, and explaining about the involved groups in the study. A proper quality assessment of the articles or journals was done by giving a score based on the inclusion criteria that had

Table 1. Journal Search Results on The Topic Foot Exercise and Group Support for Diabetes Mellitus Patients

Title, Author and Year of the Journal	Types of Research	Explanation of the Research Results
(Ji et al., 2015)	Eksperimental	Foot exercise combined with music can significantly ( $p > 0.05$ ) improve the adherence to foot exercise behavior. This increase can improve blood circulation in the body.
(Taddei et al., 2018)	Randomized Control Trial	The results obtained from the evaluation after 8 weeks of a foot exercise intervention include the incidence of foot injury lessened by 28% and the functions of the feet increased by 97%. Biomedical details also showed an improvement.
(Henni et al., 2018)	Restrospective Analysis	Walking exercises done by DM patients can improve the value of their Ankle Brachial Index (ABI) score by an average of $>0.9$ and it can also reduce the risk of PAD (peripheral arterial disease).
(Alqahtani et al., 2018)	Cross-sectional Study	Exercise can increase the value of ABI according to the results of the analysis ( $p = 0.04$ ).
(Takahara, Fujiwara, Katakami, & Sakamoto, 2014)	Restrospective Analysis	The risk factors that can affect the reduction in ABI and TBI include age, the duration of DM and BMI as proven by the results of significance being $p < 0.05$ .
(Shomaker et al., 2017)	Randomized Control Trial	Interventions given in the form of group therapy can increase attendance, reduce depression and stress, and stabilize blood sugar.
(Due-christensen et al., 2016)	Pilot Study	Group interventions can significantly improve HbA1c ( $p = 0.0001$ ), and fellow DM patients can exchange their experiences.
(Dadgostar, Firouzinezhad, Ansari, & Younespour, 2016)	Randomized Clinical Trial	Exercise interventions in groups carried out for 6 weeks can reduce body fat, improve the physical health of DM patients, and for 12 weeks, it can significantly reduce HbA1c ( $p < 0.05$ ).
(Vangeepuram, Carmona, Arniella, Horowitz, & Burnet, 2015)	Pilot Study	Focus group discussions can increase the patient's understanding when providing education, especially concerning the prevention of diabetes and other health problems.
(Hasneli & Amir, 2019)	QuasyEksperimental	The giving of an Apiyu massage intervention can improve the sensitivity of both the right and left legs ( $p = 0.011$ ). It can also significantly reduce the blood sugar level ( $p = 0.001$ ).
(Alonso-domínguez, Recio-rodríguez, & Patino-alonso, 2019)	Randomized Control Trial	Exercise interventions in DM patients can reduce stiffness in the foot ( $p > 0.05$ ) according to multiple parameters (CAVI / Cardio ankle vascular index and lower extremity pulse pressure). Men get more influence than women.
(Mohammad Ali Morowatisharifabad, Abdolkarimi, Asadpour, & Fathollahi, 2019)	Deskriptive Study	Group support can increase the DM patient's compliance with exercise and physical activity by 1.17 times.
(Juil, Rowlands, & Maindal, 2018)	Cross-sectional Study	Social motivation can be an important form of support when dieting, and in physical activity adherence, especially for DM patients.
(Mouslech et al., 2018)	QuasyEksperimental	Group-based education programs can significantly influence the reduction of HbA1c, decreasing the incidence rate of hyperglycemia, increasing adherence, and changing habits for the better.
(Rebecca et al., 2018)	QuasyEksperimental	The provision of diabetes mellitus care services significantly increases awareness in relation to the care and exercise connected to physical activity.

been prepared. If it met the criteria then it was given a value of one (1). If it did not meet the criteria then it was given a value of zero (0).

## RESULTS

The results obtained from the search for research journals in Scopus, Science Direct and Proquest using the keywords 'foot exercises, diabetic foot complications, diabetes foot prevention, health education delivery techniques, and group support therapy' resulted in hundreds of journals. This was narrowed down by adding the criteria of being published in the last 5 years (2015-2019). After

being selected, there were only 15 journals. An explanation of each journal is displayed in Table 1.

## DISCUSSION

### Prevention of Diabetes Mellitus Complication

The complications of diabetes mellitus are divided into 2 major groups, namely acute complications and chronic complications. (Shaw & Cummings, 2012) Chronic complications occur over a long period of time ( $> 6$  months) and they are not treated appropriately. Chronic complications come in 2 types, microvascular and macrovascular. Microvascular

complications are the cause of new disorders such as neuropathy, retinopathy, nephropathy and diabetic foot ulcers. Diabetic foot ulcers are often found and are clearly visible where the DM patients have disturbances on their foot. Although not always shaped like wounds, these patients are at a high risk of suffering from injuries to the feet. An injury to the feet of DM patients, if not treated properly, can lead to amputation being performed.(Scobie & Samaras, 2014; Shaw & Cummings, 2012) An explanation of the complications of DM is necessary to better undertake effective measures to prevent these complications. A limitation of the found literature was that no-one discussed the complications of diabetes. Rather, they combine the various complications that can arise.

From the journals obtained and examined according to the theme, the articles previously used were screened according to the inclusion and exclusion criteria. Psychological therapy such as Cancer and Living Meaningfully (CALM) intervention can decrease depression, anxiety, and death-related distress, which can improve the quality of life.

### **Foot Exercise**

Handling DM can be done through physical exercise. Physical exercise can balance food intake and body energy production. Glucose buildup in the body, which is related to the blood circulation, can worsen the condition of DM patients. Therefore it is necessary to schedule regular exercise for DM patients. An easy and lightweight exercise for DM patients is foot exercise. Foot exercise refers to a series of movements arranged systematically focused on the foot for DM patients.(Taddei et al., 2018) Foot exercises can be done routinely 3-4 times a week for 30 minutes.(Perkeni, 2012) Foot exercises have benefits that include increasing the blood circulation, increasing the leg muscle strength, improving foot sensitivity, and preventing complications from diabetic foot ulcers.(Ji et al., 2015) The research that has been done on DM foot exercises explains that foot exercises are an alternative to prevent complications, especially diabetic foot ulcers. Increased blood circulation is assessed by measuring the ankle brachial index parameters and the improved foot sensitivity by assessed by measuring the level of foot sensation or foot response.(Ji et al., 2015; Taddei et al., 2018) The limitation of the literature was that many discussed diabetes exercises instead of foot exercises specifically.

### **Group Exercise**

Group support can be interpreted as information given either verbally or nonverbally from the closest person to the patient.(Rockville, 2015) Group support can also provide motivation shared among people with the same conditions.(Dadgostar et al., 2016) Support comes in 4 forms: emotional, appreciation, instrumental and informative.(Corcoran & Roberts, 2015) Optimal support can be provided by fulfilling

all 4 forms of support. However, only 1 form of support can be given and it can still be interpreted as providing support.(Rockville, 2015) Health interventions with the group support method, especially among DM patients, have been shown to have a positive impact. The most dominant positive impact is improving the adherence to therapy, especially concerning foot exercises. It also can reduce anxiety and control their blood glucose levels. (Dadgostar et al., 2016; Due-christensen et al., 2016; M. A Morowatisharifabad, Abdolkarimi, Asadpour, Fathollahi, & Balaee, 2019; Shomaker et al., 2017) The limitation is that the found literature did not explained the form of group support in detail.

### **CONCLUSION**

Diabetes mellitus is a condition that is a chronic disorder in the body of the sufferer. DM has the potential for complications. A complication that is often seen is foot problems. Foot complications can be prevented by doing proper and easy foot exercises. Foot exercises can have an optimal affect if done routinely 3-4 times a week. The foot exercise needs to be understood correctly by the DM patients. To improve patient understanding, the method of delivering the material must be appropriate. The method that has proven to be effective in terms of increasing understanding is group support or a group approach to therapy. Group interventions can be carried out with the closest people to the patient and fellow DM patients to allow them to share their experiences and information. From the above description, DM patients need to do foot exercises regularly and they need to be given an understanding of the exercise by applying the group intervention / group support method. Group support can be increase their adherence to therapy especially foot exercise.

### **CONFLICT OF INTEREST**

No Conflicts of interest have been declared.

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