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THE EFFECT OF BUERGER ALLEN EXERCISE ON PERFUSION OF PERIPHERAL TISSUES IN PATIENTS WITH DIABETES MELLITUS: LITERATURE REVIEWS

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ABSTRACT

Diabetes mellitus is not treated immediately can cause ineffective peripheral tissue perfusion. Ineffective peripheral tissue perfusion can lead to lower extremity amputation. Buerger allen exercise can improve ineffective peripheral tissue perfusion with an indicator of increasing the value of the ankle brachial index (ABI). This literature study aims to explore the intervention of Buerger Allen exercise on the ineffectiveness of peripheral tissue perfusion in patients with diabetes mellitus. This study uses a literature review method with 3 databases, namely Proquest, Google Scholar, and PubMed with a total of 6 articles reviewed with the PICOS framework criteria. The criteria for the articles used are those published from 2016 to 2021 amounting to 2,445 articles, then a selection is made based on duplicate titles, PICOS and critical appraisal to 6 articles. The administration of Buerger Allen exercise greatly affects the increase in the value of the ankle brachial index (ABI) as an indicator of the effectiveness of peripheral tissue perfusion in patients with diabetes mellitus. All reviewed articles show the same results. Buerger allen exercise can increase oxygen in the blood vessels so that it can be an alternative therapy that can be given to people with diabetes mellitus to improve ineffective peripheral tissue perfusion.

Kata Kunci:

Buerger Allen Exercise;
Perfusi Jaringan Perifer;
Diabetes Mellitus

ABSTRAK

Diabetes mellitus yang tidak segera ditangani dapat menyebabkan ketidakefektifan perfusi jaringan perifer. Ketidakefektifan perfusi jaringan perifer dapat berisiko terjadinya amputasi ekstremitas bawah. Buerger allen exercise dapat memperbaiki ketidakefektifan perfusi jaringan perifer dengan indikator peningkatan nilai ankle brachial index (ABI). Studi Literatur ini bertujuan mengeksplorasi intervensi buerger allen exercise terhadap ketidakefektifan perfusi jaringan perifer penderita diabetes mellitus. studi ini menggunakan metode literature review dengan 3 database yaitu Proquest, Google Scholar, dan PubMed. Kriteria artikel yang digunakan adalah yang diterbitkan tahun 2016 sampai 2021 berjumlah 2.445 artikel, kemudian dilakukan seleksi berdasarkan judul duplikat, PICOS dan critical appraisal menjadi 6 artikel. Pemberian buerger allen exercise dengan rata-rata durasi 15 menit / hari selama 15 hari menunjukkan pengaruh yang signifikan terhadap peningkatan nilai ankle brachial index (ABI) sebagai indikator dari keefektifan perfusi jaringan perifer pada penderita diabetes mellitus. Buerger allen exercise dapat meningkatkan oksigen di pembuluh darah sehingga bisa menjadi terapi alternatif yang dapat diberikan kepada penderita diabetes mellitus untuk memperbaiki ketidakefektifan perfusi jaringan perifer.

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INTRODUCTION

Diabetes mellitus is the most common non-communicable disease and the leading cause of death worldwide (WHO, 2021). Diabetes mellitus is a disease characterized by increased blood glucose (blood sugar) levels due to the body's inability to release or use insulin adequately (Suryati *et al*., 2019). A common complication in diabetic patients is ineffective peripheral tissue perfusion (Nadrati *et al*., 2020) . This disorder can cause people with diabetes mellitus to be at risk of lower extremity

amputation due to lack of management and care for diabetes which results in infection and incurable foot ulcers appearing (Radhika *et al*., 2020).

According to the International Diabetes Federation (IDF), an estimated 463 million people worldwide aged 20-79 years are living side by side with diabetes mellitus in 2045 and this number will increase to 700 million. Indonesia is ranked seventh with the highest incidence of diabetes in the world with a total of 10.7 million sufferers after China, the United States, Pakistan, Brazil and Mexico (IDF, 2021). According to Riset Kesehatan Dasar (RISKESDAS) (2018), the prevalence of diabetes mellitus based on a doctor's diagnosis in the age range of 55-64 years occupies the highest position at 6.3%, and at the age of 65-74 years is 6.0

Diabetes mellitus that is not treated promptly can cause serious complications such as gangrene, impaired peripheral tissue perfusion of the lower extremities, and a slow wound healing process caused by interference or blockage of peripheral blood flow in the lower extremities (Saputra *et al*., 2020). Ineffective perfusion of peripheral tissues occurs due to decreased oxygen levels in the blood, thus failing the transportation of nutrients and oxygen to the capillary network due to increased blood viscosity due to high blood sugar (Nadrati *et al*., 2020). Ineffective peripheral tissue perfusion in patients with diabetes mellitus can result in the appearance of incurable foot ulcers, thereby increasing the risk of lower extremity amputation (Radhika *et al*., 2020). Indonesia has a 15% risk of developing diabetic ulcers, 30% of amputation complications, 32% mortality rate and 80% of diabetic ulcers is the most common hospital treatment for diabetes mellitus (Efendi *et al*., 2020).

The main goal of managing ineffective peripheral tissue perfusion in diabetes mellitus is to increase tissue circulation in the peripheral area. Pharmacological treatment that can be given is insulin therapy and oral hypoglycemic drugs (Nopriani & Saputri, 2021). Meanwhile, one of the non-pharmacological treatments is by doing physical exercises/gymnastics such as foot exercises, acupressure, warm water foot soaks, ROM (Range Of Motion) and buerger allen exercise (Mataputun *et al*., 2020). Buerger allen exercise itself was coined by Leo Buerger in 1924 and then modified by Arthur W. Allen in 1931 (Nadrati *et al*., 2020) . Buerger allen exercise is a form of active exercise that is done by applying gravity to the feet, so that each step of the exercise needs to be done regularly and is an exercise that can be done individually, doesn't have to be done in groups, and doesn't take a long time (Suryati *et al*., 2019). The choice of buerger allen exercise as a non-pharmacological therapy that can be given to patients with diabetes mellitus with ineffective peripheral tissue perfusion is because it is simpler and more effective. This is evidenced by research conducted by Sari *et al*., (2019) where researchers compared the effectiveness of buerger allen exercise and foot exercises to ABI values in people with type 2 diabetes mellitus and got the result that buerger allen exercise was more effective than foot exercises (Sari *et al*., 2019).

The role of nurses in preventive efforts is to carry out foot assessments to find out if there are peripheral vascular disorders in the foot area, so that the incidence of diabetic foot ulcers can be prevented, one of which is by measuring ABI and monitoring ABI values (Nadrati & Supriatna, 2021). In addition, if peripheral vascularization disorders have occurred, efforts can be made to deal with them by providing independent nurse interventions, one of which is in the form of exercise, namely the provision of buerger allen exercise to increase peripheral vascularization (Nadrati & Supriatna, 2021). This is also in line with another study conducted by Suryati *et al*., (2019) which also showed that buerger allen exercise had an effect on foot sensitivity, the average difference before and after buerger allen exercise was -2.846 with a p value of 0.000 (<0,05).

METHODS

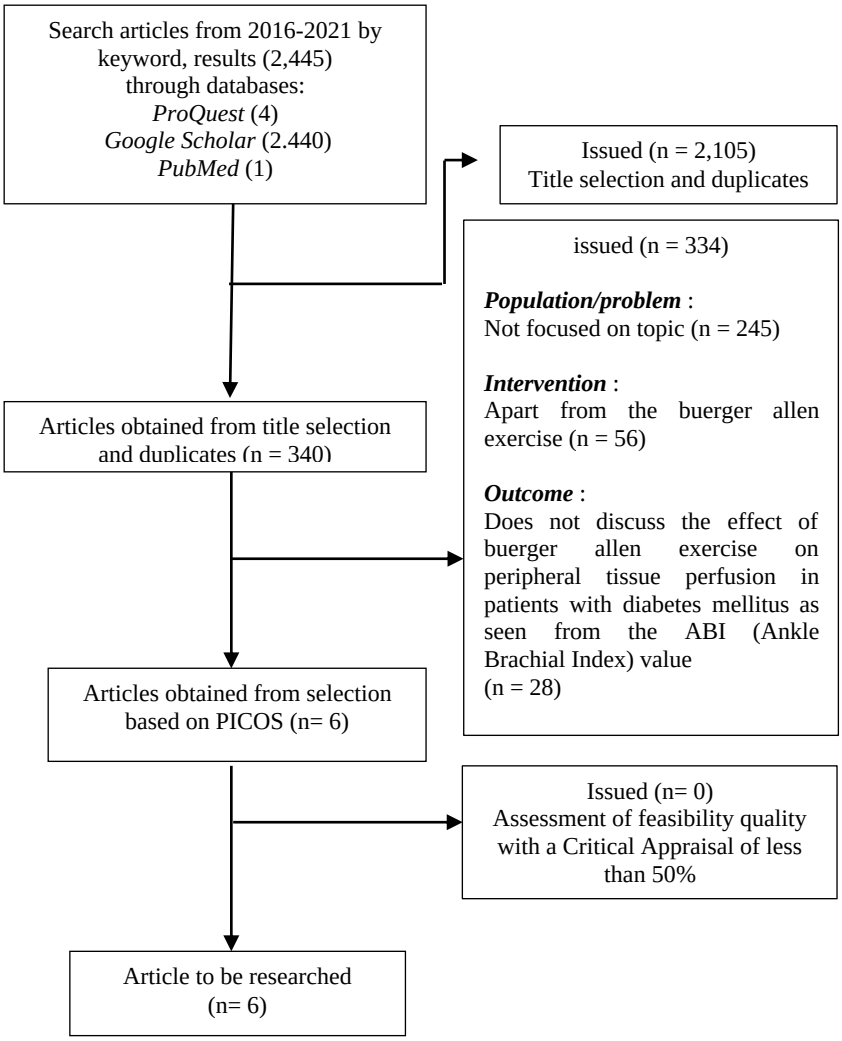
This study uses the literature review method. Search for articles using 3 databases Proquest, Google Scholar, and PubMed with articles published from 2016 to 2021. Keywords used buerger allen exercise “OR” buerger allen exercise “AND” peripheral tissue perfusion “OR” lower extremities perfusion “OR” peripheral perfusion “AND” diabetes mellitus found 4 Proquest articles, 2,440 Google Scholar articles, and 1 PubMed article, so that the total articles obtained from 3 databases were 2,445 articles that matched the keywords. Then a selection is made based on the title, duplicates, and a PICOS assessment is carried out, as well as a critical appraisal that meets the minimum criteria of 50% and is in accordance with the theme of the literature review to get 6 articles.

The inclusion criteria include patients with diabetes mellitus, buerger allen exercise, there is a comparison, the articles obtained analyze the effect of the intervention of buerger allen exercise on the ineffectiveness of peripheral tissue perfusion in patients with diabetes mellitus seen from the ABI (Ankle Brachial Index) value, and all articles with design and types of quasi-experimental research, pre-experimental design and meet the requirements, published nationally and internationally as well as full text.

RESULT

Study Characteristics

Based on the results of an article search in the study entitled "Giving Buerger Allen Exercise Intervention Against Ineffective Peripheral Tissue Perfusion in Patients with Diabetes Mellitus Literature Review" 6 research articles were found. Based on the analysis conducted on 6 articles, it was found that 5 articles used a Quasi experimental design and 1 article used a Pre-experimental design with a pre-post test without control group, most of the data analysis used the Wilcoxon test and paired t-test, and 6 articles analyzed stated that there is a significant increase in the value of the ankle brachial index (ABI) after the administration of buerger allen exercise intervention on the ineffectiveness of peripheral tissue perfusion in patients with diabetes mellitus.



Picture 1. Study Results Search and Selection Diagram

The following are the results of the analysis of the articles displayed in table form as follows:

Table 1. Study Characteristics

Author and Year of Publication	Title	Method (Design, Sample, Variable, Instrument, Analysis)	Result
Walaa El-khanany Zahran, Amira Ahmed Hassanen, Madiha Hassan Nabih, Fady Azmy Kyrillos (2018)	*Effect Of Buerger Allen Exercise On Lower Limb Perfusion Among Patients With Type 2 Diabetes Mellitus*	**D :** *Quasi experimental research design* **S :** 48 respondents **V :** *Buerger allen exercise, lower limb perfusion* **I :** *The Ankle Brachial Index (ABI) scale uses a standard manual sphygmomanometer and a standard hand Doppler* **A :** Uji ANOVA (*analysisof variance)*	The results showed that there was a significant difference in the average ankle brachial index (ABI) between the two groups after doing the Buerger Allen exercise (tp = <0.001).
Hanan Saber A. El-Fattah, Amal F. Garas, Nawal E. Hanna, Naglaa M. Elsayed (2019)	*Effect of buerger exercises on improving peripheral circulation of the lower extremities among patients with type 2 diabetes mellitus at selected university hospital–egypt*	**D :** *Quasi experimental design* **S :** 60 respondents **V :** *Buerger exercises, peripheral circulation* **I :** Skala *Ankle Brachial Index* (ABI) **A :** *Wilcoxon test*	The results of the study stated that after the Buerger Allen exercise intervention, the average ankle brachial index (ABI) score of both legs showed a higher significance value compared to the score before the intervention (p = 0.001).
Siti Nur Hasina, Ima Nadatien, Iis Noventi, Tata Mahyuvi (2021)	*Buerger Allen Exercise* Berpengaruh Terhadap Ketidakefektifan Perfusi Jaringan Perifer Pada Penderita Diabetes Mellitus	**D :** *Quasy Experimental* with *Pre test and post test with control group* **S :** 54 respondents **V :** *buerger allen exercise,* ineffective perifer perfussion **I :** (*Ankle Brachial Index*) with *simple hand held vascular Doppler ultrasound probe* and *Spignomanometer Digital* **A :** uji *t independent* dan uji *t paired*	The results of the study stated that the p value was <0.05, which means that there was a significant difference in the ABI value before and after being given the Buerger Allen exercise intervention in the intervention group and the control group..
Muh. Anwar Hafid, Ilhamsyah Ilhamsyah, La Ode Agustino Saputra, Mutmainnah Sari (2021)	*The effect of buerger allen exercise on the lower extremity peripheral circulation in type 2 diabetic patients*	**D :** *Pre-experimental design* with *pre-post test without control group* **S:** 5 respondents **V :** *buerger allen exercise, lower limb peripheral circulation* **I :** ABI (*Ankle-Brachial Index*) *aneroid*	The results of the study stated that there was an effect of Buerger Allen exercise on peripheral circulation of the lower extremities in type 2 diabetes mellitus patients using the Wilcoxon Signed Rank Test and

		Sphignomanometer and *Vasculer Dopler Ultrasound probe* **A :** *Wilcoxon Signed Rank Test* dan *Paired T-Test*	Paired T-Test where a p value of 0.05 was obtained, which means that there was a significant effect.
Inshrah Roshdy Mohammad, Eman Mawed Fahim, Eman Hessien Heggy (2021)	*Impact of Buerger-Allen Exercises on Foot Perfusion and Pain Level for Diabetic Patients Risk with Peripheral Arterial Disease*	**D :** *Quasi experimental research design* **S :** 100 respondents **V :** *buerger allen exercises, foot perfusion* **I :** *Ankle Brachial Index* (ABI) using *Sphygmomanometer manual standar dan Handheld and standar with probe vaskular 8.0MHZ* **A :** *Pearson correlation* test.	The results of the study stated that there was a statistically significant difference between the study group and the control group in terms of measuring the value of the ankle brachial index (ABI) only after the application of Buerger Allen exercise for six weeks ($p < 0.004$)
Reham Adel Ebada El Sayed, Shimaa Nabil Abd Elsalam, Rasha Mohamed Elmetwaly (2021)	*Effect of buerger- allen exercise on lower extremities perfusion among patients with type 2 diabetes mellitus*	**D :** Quasi-experimental design **S :** 70 respondents **V :** buerger-allen exercise, lower extremities perfusion **I :** Ankle Brachial Index (ABI) scale using a standard manual sphygmomanometer **A :** chi-square test	The results of the study stated that there was a statistically significant relationship between pre and post 2 on both legs $p < 0.001$ and statistical significance was considered at a p value < 0.05, and $p < 0.001$ was considered very significant

Tabel 2. *Buerger Allen Exercise* in Diabetes Mellitus

Penulis dan Tahun Terbit	**Lama Pemberian *Buerger Allen Exercise***	**Tahapan *Buerger Allen Exercise***
Walaa El-khanany Zahran, Amira Ahmed Hassanen, Madiha Hassan Nabih, Fady Azmy Kyrillos (2018)	*Buerger allen exercise was carried out for 2 weeks with 2 sessions per day*.	Consists of 3 phases: 1. The first phase, lie down and lift your legs at an angle of 45-90° and do it for about 2 minutes; 2. The second phase, the patient sits with his feet hanging over the edge of the bed plus plantarflexion, dorsiflexion, internal and external rotation, done for about 5 minutes; 3. The third phase, the patient lies in bed for about 5 minutes with his feet covered with a blanket.
Hanan Saber A. El-Fattah, Amal F. Garas, Nawal E. Hanna, Naglaa M. Elsayed (2019)	*Buerger allen exercise given 2-3 times/day for 15 days with about 12-15 minutes*.	Consists of 3 stages: 1. The patient lies down with the legs elevated to an angle of 45-90°. 2. The patient's position is sitting and the feet hang over the edge of the bed and add flexion, extension, and ankle

		circumduction movements. 3. The patient is lying in bed (horizontal).
Siti Nur Hasina, Ima Nadatien, Iis Noventi, Tata Mahyuvi (2021)	*Buerger Allen exercise was carried out for 6 days as much as 6 sessions/day with a duration of 15 minutes per session.*	Consists of 3 stages: 1. Elevation stage, supine position with leg elevation 45-90° plus dorsiflexion and plantarflexion movements, carried out for 1-2 minutes 2. Lowering stage (sit, feet lowered), sitting position with legs dangling (hanging over the edge of the bed) plus dorsiflexion and plantarflexion movements, carried out for 2-5 minutes; 3. The horizontal stage or resting stage, the supine position with the foot horizontal plus dorsiflexion and plantarflexion of the ankle, is carried out for 5 minutes.
Muh. Anwar Hafid, Ilhamsyah Ilhamsyah, La Ode Agustino Saputra, Mutmainnah Sari (2021)	*Buerger allen exercise was given 6 times to the respondents.*	Does not explain the stages of the buerger allen exercise.
Inshrah Roshdy Mohammad, Eman Mawed Fahim, Eman Hessien Heggy (2021)	*Buerger allen exercise is carried out for 6 weeks with a frequency of 2 times per day for 8-13 minutes*.	Consists of 3 steps: 1. Step 1 elevation, feet raised at an angle of 45-90° and held for 2-3 minutes. 2. Step 2 dependency, the patient's position is sitting with his legs dangling over the edge of the bed for 3-5 minutes; 3. Step 3 horizontally, position the patient supine on the bed for 3-5 minutes.
Reham Adel Ebada El Sayed, Shimaa Nabil Abd Elsalam, Rasha Mohamed Elmetwaly (2021)	*Buerger allen exercise is carried out for 15 days with a frequency of 5-6 times/day for 12-15 minutes.*	Consists of 3 steps: 1. Step 1 height, feet raised at an angle of 45° and done 3-5 minutes. 2. Step 2 dependence, legs lowered / dangle on the edge of the bed with the patient sitting position and carried out 3-5 minutes. 3. Step 3 is horizontal, position the patient lying in bed for 5 minutes by doing dorsiflexion, plantarflexion, and rotation movements.

Based on Table 3, it is known that the results of the analysis of the six articles found that, five articles said that buerger allen exercise in people with diabetes mellitus has 3 stages (elevation stage, descent stage and horizontal stage), and one article did not explain how many stages are given in doing buerger allen exercise.

Tabel 3. Analysis of the Effect of Buerger Allen Exercises Intervention on Ineffective Peripheral Tissue Perfusion in Patients with Diabetes Mellitus

Penulis dan Tahun Terbit	**Hasil**		
	Pre	***Post***	***P value***
Walaa El-khanany Zahran, Amira Ahmed Hassanen, Madiha Hassan Nabih, Fady Azmy Kyrillos (2018)	Intervention group = 0,74	Intervention group = 0,85, dan fase *follow up* = 0,91	P < 0.001(*pre* and *post*) P = 0.010 (*post* and *follow up*)
	Control group = 0,73	Control group = 0,71, and follow up = 0,76	P = 0.129 (*pre* and *post*) P = 0,001 (*post* and *follow up*)
Hanan Saber A. El-Fattah, Amal F. Garas, Nawal E. Hanna, Naglaa M. Elsayed (2019)	right leg = 0,885	right leg = 1,097	0.0001
	Left leg = 0,937	Left leg = 1,086	0.0001
Siti Nur Hasina, Ima Nadatien, Iis Noventi, Tata Mahyuvi (2021)	Intervention group 0.78	Intervention group 0.99	0.002
	Control group 0.75	Control group 0.70	0,011
Muh. Anwar Hafid, Ilhamsyah Ilhamsyah, La Ode Agustino Saputra, Mutmainnah Sari (2021)	right leg 0.9296	right leg 1,3072	0,043
	Left leg 0.8768	Left leg 1,2478	0,025
Inshrah Roshdy Mohammad, Eman Mawed Fahim, Eman Hessien Heggy (2021)	Intervention group (46.0% mild obstruction, 54.0% moderate obstruction)	Intervention group (20.0% normal, 50.0% mild obstruction, 30.0% moderate obstruction)	P ≤ 0.004
	control group (60.0% mild obstruction, 40.0% moderate obstruction)	control group (64.0% mild obstruction, 36.0% moderate obstruction)	
Reham Adel Ebada El Sayed, Shimaa Nabil Abd Elsalam, Rasha Mohamed Elmetwaly (2021)	Perfusion of right lower extremity 9.00	Perfusion of right lower limb 4.70	< 0.001
	Left lower limb perfusion 9.17	Left lower extremity perfusion 5.00	< 0.001

Based on Table 4, it is known that the results of the analysis of the six articles that have been obtained state that there is a significant increase in the value of the ankle brachial index (ABI) seen from the pre and post intervention Buerger Allen exercise in each article which is different with a p value <0, 05. Giving buerger allen exercise with an average duration of 15 minutes/day for 15 days shows a significant effect on increasing the value of the ankle brachial index (ABI) as an indicator of the effectiveness of peripheral tissue perfusion in patients with diabetes mellitus. So with this it can be concluded that there is an effect of administration of buerger allen exercise intervention on ineffective peripheral tissue perfusion in patients with diabetes mellitus.

DISCUSSION

Patients with diabetes mellitus are said to have an ABI (Ankle Brachial Index) in the normal category if the ABI value is > 0.9, which means that they are free from impaired peripheral tissue perfusion because the blood is still circulating properly without any obstruction in the peripheral blood vessels

so that the need for nutrition and oxygen in the lower extremities can be fulfilled properly (Brunner & Suddarth, 2010 in Darwis, 2020). It is said that the category of mild ABI/mild ischemia/borderline perfusion/perfusion limitation if the ABI value is ≤ 0.6 – 0.8. The symptoms that occur are pain in the buttocks/calf when walking (intermittent claudication) begins to be felt (Radhika et al., 2020; Syah & Oktorina, 2022). Pain arises due to occlusion of blood vessels/blockage of blood vessels which results in the inability of blood flow to meet nutritional needs, especially in the lower extremities when metabolism increases, and the occlusion that occurs is still mild, so to overcome this you can do physical exercises/exercise such as foot exercises (Radhika et al., 2020; Syah & Oktorina, 2022).

The interpretation of the ABI in the category of moderate obstruction/severe ischemia is ≤ 0.5, this occurs due to poor peripheral perfusion because the occlusion begins to elongate so that the heart rate and arterial pressure decrease. This situation causes tissue hypoxia resulting in ischemia of the legs and if there is a wound, wound healing is difficult unless revascularization is carried out (Radhika et al., 2020) . The ABI category of severe obstruction/critical ischemia is interpreted as an ABI value of ≤ 0.4. This is a climactic condition of severe ischemia/moderate obstruction which is manifested by the occurrence of diabetic ulcers and gangrene (Price & Wilson, 2006 dalam Darwis, 2020).

Treatment of non-pharmacological therapy that can be given to patients with diabetes mellitus to prevent obstruction from getting worse is by doing physical activity/exercise (Mataputun *et al*., 2020). Physical exercise/exercise for people with diabetes mellitus is needed, because during physical exercise the energy used is glucose and free fatty acids, and what needs to be considered in physical exercise for people with diabetes mellitus is the frequency, intensity, duration of time and type of exercise (Tarwoto dkk, 2012;Negara & Chrismilasari, 2022).

Based on the six articles analyzed, it was shown that buerger allen exercise was effective in increasing the value of the ankle brachial index (ABI) as an indicator of the effectiveness of peripheral tissue perfusion with an average duration of giving buerger allen exercise for 15 minutes every day for 15 days. Research conducted by El-Fattah *et al*., (2019) states that buerger allen exercise is effective in increasing lower extremity circulation in patients with type 2 diabetes mellitus, this is indicated by the fact that after the intervention is given the average ankle brachial index (ABI) value of both legs (right leg = 1.097, left leg = 1.086) which showed a higher significance value compared to the average value before the intervention (right leg = 0.885, left leg = 0.937) with a p value of 0.0001. The results of this study are in line with the research of Hasina *et al*., (2021), that buerger allen exercise is effective in increasing peripheral blood vessel vascularization as shown by the average ankle brachial index (ABI) value in the right intervention group (pre test = 0.78, post test = 0.99) and the right control group (pre test = 0.75, post test = 0.70) with p value = 0.002, p value = 0.011 in the intervention and control groups, respectively. Research conducted by Hafid *et al*., (2021), also strengthens this fact that buerger allen exercise has been shown to significantly increase peripheral circulation of the lower extremities in patients with type 2 diabetes mellitus by increasing the ankle brachial index (ABI) value and obtaining a p value < 0.05.

Buerger allen exercise can increase the ABI value which is an indicator to determine a person's peripheral tissue perfusion. The increase in peripheral perfusion is caused by changes in gravity (leg elevation, foot drop, and sleeping on your back) in the lower extremities accompanied by muscle contractions through dorsiflexion and plantarflexion movements of the ankles (Salam & Laili, 2020). Apart from that, it also has a vasodilating effect on the blood vessels in the leg area (Suryati *et al*., 2019; Zamaa *et al*., 2021). This is in line with research conducted by Hafid *et al*., (2021), which revealed that buerger allen exercise stimulates an increase in peripheral circulation through dorsiflexion and plantarflexion foot movements that are carried out regularly and continuously. Giving buerger allen exercise with an average duration of 15 minutes/day for 15 days showed a significant effect on increasing the value of the ankle brachial index (ABI) as an indicator of the effectiveness of peripheral tissue perfusion in patients with diabetes mellitus.

The first stage of the buerger allen exercise is a change in gravity with an elevation leg angle of 45˚-90˚ causing an increase in blood flow to the heart caused by emptying of the veins and an increase in right atrial flow (Chang *et al*., 2016; Sari *et al*., 2019). The second stage is a decrease (sit, feet lowered) with the position of the feet hanging over the edge of the bed, gravity at this stage plays a role in increasing blood flow from the heart to the ends of the feet (Sari *et al*., 2019). The third stage is horizontal/rest, namely lying in bed, this can improve blood flow or reperfusion of the legs when the

effects of gravity begin to decrease (Chang *et al*., 2016; Hafid *et al*., 2021). Muscle contractions caused by dorsiflexion and plantarflexion of the ankle can also help train tendons and joint strength to avoid contractures and leg deformities (Chang *et al*., 2016; Hafid *et al*., 2021). In several studies it was shown that the buerger allen exercise showed a significant effect on increasing the ankle brachial index value after being carried out for 15 days, which was carried out for 15 minutes per day.

CONCLUSIONS

Buerger allen exercise significantly increases peripheral tissue perfusion in patients with diabetes mellitus with an average administration of 2 weeks / 15 days. The mechanism for increasing the ABI value is caused by the movements performed in the buerger allen exercise increasing peripheral tissue perfusion, vasodilating the blood vessels in the legs so as to improve circulation, and being able to train the strength of the foot and ankle joints. The increase in the therapeutic effect obtained is influenced by the duration of administration, adherence/consistency and each stage is carried out sequentially, so diabetics must do it continuously.

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