IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

ANALYZING THE EFFECTIVENESS OF BUERGER ALLEN EXERCISES AS A TREATMENT MODALITY FOR PERIPHERAL ARTERY DISEASE IN TYPE II DIABETIC PATIENTS: A RESEARCH STUDY IN SELECTED HOSPITALS IN INDORE

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Abstract

The present study was aimed to analyzing the effectiveness of buerger allen exercises as a treatment modality for peripheral artery disease in type ii diabetic patients : a research study in selected hospitals in Indore . Objectives of the study were to assess the level of peripheral artery disease among experimental and control group To evaluate the effectiveness of Buerger Allen Exercise in Experimental group , to compare the pre- test level score of PERIPHERAL ARTERY DISEASE in experimental and control group , to compare the post-test level score of PERIPHERAL ARTERY DISEASE in experimental and control group and to find out the association between the level of PERIPHERAL ARTERY DISEASE with selected demographic and clinical variables among type II diabetic clients in the experimental group. The theoretical framework of the study was based on King's theory of goal attainment. Quasi experimental nonrandomized control group design was used for the study. There were two hundred samples were selected by purposive sampling technique and data were analysed and interpreted based on descriptive and inferential statistics. The findings of the study revealed that among one hundred type II diabetes mellitus patients with peripheral artery disease in the experimental group during pretest 78% (78) of them were having moderate level of peripheral artery disease and remaining 22% (22) of them were having severe level of peripheral artery disease. Whereas in post test 8% (8) of them were having normal level of Peripheral artery disease,70% (70) of them having mild level of peripheral artery disease and remaining 22% (22) having moderate level of peripheral artery disease. In the control group among 100 type II diabetes mellitus patients with peripheral artery disease during pretest 57% of them were having moderate level of peripheral artery disease and 43% (43) having severe level of peripheral artery disease. Whereas in post test 57% of them were having moderate level of peripheral artery disease and 43% (43) had severe level of peripheral artery disease. A paired 't' test was done to find out the effectiveness of Buerger Allen exercise. It was found that there is statistically significant difference between the pretest and post test scores (86.947 , P=0.00001). Hence it is revealed that Buerger Allen Exercise was found to be very effective in increasing the ABI score of Type II Diabetes Mellitus Patients diagnosed with Peripheral artery disease. Chi-square was to be done to find out the association between the ABI scores with selected demographic and clinical variables. There was no association between ABI scores with selected demographic and clinical variable except occupation. The findings of the present study revealed that there was an increase in the ABI

score of type II Diabetes Mellitus patients diagnosed with Peripheral artery disease after the administration of Buerger Allen Exercise.

Key Words: Peripheral artery disease, Buerger Allen Exercise, ABI Score, Type II Diabetes Mellitus Patients.

INTRODUCTION

Diabetes mellitus is a condition when the body is unable to control the level of sugar inthe blood. It is a chronic medical condition in which the body is unable to produce enough of the hormone insulin or is unable to use the insulin it produces effectively. This results in elevated levels of glucose in the blood, which can lead to serious healthcomplications, such as heart disease, stroke, kidney failure, blindness, and nervedamage. The pancreas produces the hormone insulin, which functions as a key to allowglucose from food to enter the body's cells and be used as fuel. Blood glucose is produced in the body from all diets that include carbs. Insulin facilitates the uptake of glucose by cells. Hyperglycemia, or elevated blood glucose levels, result from an inability to make or use insulin effectively. Long-term high glucose levels are linked totissue and organ failure as well as physical harm to the body. Patients with diabetes mellitus cannot maintain normal levels of glucose in their blood. Symptoms of diabetesinclude increased thirst and hunger, fatigue, frequent urination, weight loss, and slow wound healing.

Buerger Allen Exercise is one of the main remedial measures to improve the development of circulation of blood in the legs collaterally. Berger-Allen exercise increases upper arm index value and improves lower extremity blood flow in patients with type 2 diabetes. The Buerger Allen Exercise (BAE) is a form of exercise that canbe used to treat PAD . It was first described by Leo Buerger in 1924 and later updated by Arthur Allen as an easy-to-perform and effective low-risk postural treatment optionfor people with arterial insufficiency of the lower extremities. Buerger Allen exercise is an exercise program designed to improve circulation in the legs. It involves repetitivemovements of the ankles and feet, which help to stimulate blood flow throughout the lower limbs. The exercise program is often recommended for people with peripheral artery disease or other circulatory problems. The exercises involve flexing and extending the ankles, drawing circles with the feet, and lifting the toes and heels alternately. It is important to perform the exercise program regularly to maximize its benefits. It is possible to conduct this exercise while seated, standing, or lying down. Additionally, it can be performed with or without resistance bands. The exercise can be done for 10-20 minutes per day, 3-4 times per week. BAE involves walking on a treadmill or other exercise equipment while focusing on controlling the speed, intensity, and duration of the activity. This form of exercise encourages the muscles tocontract and relax, which can help to improve the flow of blood to the affected area. Additionally, BAE can help to improve overall cardiovascular health and reduce the risk of further complications from PERIPHERAL ARTERY DISEASE . These exercises are considered to be importantprophylactic exercises for diabetic patients to improve blood circulation and control diabetic foot problems later on. Buerger's exercise has a number of health benefits, including reducing the symptoms of peripheral neuropathy in diabetics, improving skinpressure perfusion, increasing peripheral circulation, reducing necrosis period, reducing swelling, and improving walking ability. It is also recommended in the post-operative period following orthopedic and gynecological surgeries to improve local blood circulation.

Millions of individuals worldwide are impacted by the global health problem of type2 diabetes. The World Diabetes Federation estimates that 537 million adults worldwidewill have diabetes by 2021, with type 2 diabetes accounting for 90% of all occurrences.Type 2 diabetes is becoming more and more common, especially in low- and middle-income nations. The three nations with the largest populations of diabetics in 2020 were China, India, and the United States. Yet, when looking at the prevalence of diabetes per 100 persons, Tokelau, Nauru, and Mauritius had the highest rates of type2 diabetes. Many health issues, such as cardiovascular disease, kidney disease, nerve damage, and visual issues are linked to type 2 diabetes. In the entire world, it is the main cause of premature mortality and disability. It is crucial to effectively treat type 2 diabetes to avoid complications and enhance the quality of life for those who have the condition.

India is one of the nations with the highest rates of type 2 diabetes worldwide. The World Diabetes Federation estimates that 87 million adults in India currently have diabetes; by 2045, this figure is predicted to rise to 151 million. Type 2 diabetes is becoming more common in India, particularly among urban people. Type 2 diabetes complications include cardiovascular disease, renal disease, and diabetic retinopathy also place a heavy strain on India. In order to address the growing issue of type 2 diabetes in India and lessen the burden of associated complications, effective management and preventative techniques are required. They can include expanding access to healthcare services, encouraging healthy lifestyle choices, and putting in place public health initiatives for the control and prevention of diabetes.

METHODOLOGY

Research design and setting

The present study was conducted by using Quasi Experimental Design (Non- Randomised Control Group Design). The present study was conducted at Index Medical College. This is a 1500 bedded multi-speciality hospital situated in the Indore City Madhya Pradesh . Index Medical College has various departments like General Medicine, Diabetic OP, Outpatient Department, Surgical Outpatient Department, Labour Room, Operation Theatre , Ortho Outpatient Department, Neuro Outpatient Department, Paediatric Outpatient Department, Gynaecology outpatient department, Pulmonology Outpatient department, Haemodialysis Unit, Post Operative Ward, and Intensive Care Units like Medical ICU,SICU,CCU ,Paediatric ICU, Neonatal ICU, Neuro ICU and 24 hrs Casualty.

Sample and sampling technique

Type II Diabetes mellitus patients diagnosed with Peripheral Artery Disease were the samples. The sample size for the present study was 400 Type II Diabetes clients diagnosed withPeripheral Artery Disease. Hundred were included in experimental group and hundredwere under control group. The sample were selected by the using of purposive sampling technique.

Inclusion Criteria

- Diabetic Clients Diagnosed with Peripheral Artery Disease
- Age >45 years.
- Diabetic Clients Diagnosed with Peripheral Artery Disease
- Age >45 years.
- Willing to participate in this study.
- Available during the study period.

Exclusion Criteria

- Diagnosed with foot ulcer or foot gangrene.
- Critically ill
- Not willing to participate in this study.

Development of a tool

The development of tools in research plays a crucial role in advancing scientific investigations, improving efficiency, and enabling breakthrough discoveries. Tools in research can refer to various instruments, technologies, software, or methodologies designed to facilitate data collection, analysis, experimentation, and communication. After an extensive review of literature, discussion with the experts and with the investigators personal and professional experience, ABI score is selected to assess the level of PERIPHERAL ARTERY DISEASE among Type II Diabetes Mellitus.

After the formulation of research problem and the initial work up on the research design, the preparation of a valid and reliable tool stands strongly as a best measure tocollect data from the samples. The researcher took the following steps to develop the tool as a research instrument: Review of literature on T2DM, Suggestions and guidance from the experts, Making a blueprint of the questionnaire, Construction of the questionnaire, Content validity and Reliability, Pilot study. The Development of the tool was a step-by-step process. The researcher first performed a review of literature to gain insight regarding the research problem.Different methods and tools used for conducting similar type studies were evaluated which helped the researcher in development of tool for this study.

Description of the tool

Section A: Socio Demographic Proforma
Section B : Clinical Variables
Section C : Ankle Brachial Index Score

Plan for data analysis

Data analysis methods included the use of descriptive and inferential statistical techniques such frequency distribution, inferential statistical analysis (mean, median, mode), standard deviation, chi square, and 't' test, as well as data presentation in the form of tables, graphs, and diagrams.

Descriptive Statistics- Frequency and percentage distribution used to analyze the selected demographic variable. Mean and standard deviation is used to assess the level of lower extremityperfusion.

Inferential Statistics- Paired ‘t’ test was used to assess the effectiveness of Buerger Allen exercise on level of lower extremity perfusion. The lower extremity perfusion post-test results were compared to the chosendemographic factors using the chi square test.

Ethical Consideration

- The ethics committee granted consent.
- The medical centre's administration granted permission.
- Patients were protected from harm.
- Confidentiality was maintained.

RESULTS

Table 1: Frequency and percentage distribution of level of peripheral artery disease among patients diagnosed with type II diabetes mellitus in experimental and control group.

(N=200 + 200)

Pre-test					Post-test			
Peripheral artery disease level	**Experimental group**		**Controlgroup**		**Experimental group**		**Control group**	
	F	%	F	%	F	%	F	%
Normal	0	0	0	0	8	8	0	0
Mild	0	0	0	0	140	70	0	0
Moderate	156	78	114	57	44	21	114	114
Severe	44	22	86	43	0	0	86	43

The table shows frequency and percentage distribution of level of peripheral artery disease among patients diagnosed with type II diabetes mellitus in experimental and control group.

Among 200 type II diabetes mellitus patients with peripheral artery disease in the experimental group during pre-test 78% (156) of them were having moderate level of peripheral artery disease and remaining 22% (44) of them were having severe level of peripheral artery disease. Whereas in posttest 8% (16) of them were having normal level of Peripheral artery disease,70%(140) of them having mild level of peripheral artery disease and remaining22% (44) having moderate level of peripheral artery disease.

Among 200 type II diabetes mellitus patients with peripheral artery disease in the control group during pre-test 57% of them were having moderate level of peripheral artery disease and 43% (86) had severe level of peripheral artery disease. Whereas in posttest 57% of them were having moderate level of peripheral artery disease and 43% (86) had severe level of peripheral artery disease.

Table 2: Mean, Standard deviation, Mean difference, t value, p value of ABI Score in the experimental group.

(N = 200+200)

	Pre-test		**Post-test**		**Mean difference**	**'t' value**	**'p' value**
	Mean	**SD**	**Mean**	**SD**			
Peripheral artery disease Level	0.553500	0.0513529	1.00	0.2	0.4465	86.947	0.00001*

Table 2 reveals that mean post-test level of peripheral artery disease (M+_SD2=1.00+_0.2) was higher than the mean pre-test level of peripheral artery disease (ABI Score) M1 +_SD1=0.05535+_0.05135) with

mean difference (MD) 0.4465 and obtained t value 86.947(p=0.00001) was significant. Hence null hypothesis(HO1) was rejected, and research hypothesis was accepted. It was inferred that Buerger Allen Exercise was effective in reducing the level of PERIPHERAL ARTERY DISEASE among type II Diabetes Mellitus clients diagnosed with Peripheral artery disease.

Table 3: Mean ,Standard deviation, Mean Difference, and t value of ABI Score among type II Diabetic mellitus patients diagnosed with Peripheral ArteryDisease in experimental and control group.
(N = 200 + 200)

Group	Mean	SD	Mean difference	't' value	'p' value
Experimental	0.4475	0.1486	0.3863	8.820	0.00001*
Control	0.0612	0.062			

Table 3 reveals mean, standard deviation, t value and p value of the ABI Score of experimental and control group according to pre-test and post-test.

The results revealed that the mean difference between pre-test and post-test ABI Scoreof experimental groups (M+_SD1=0.4475+_0.1486) and control group (M0+_SD2=0.0612+_0.062) differed with a significant Mean Difference. MD=0.3863,t=8.820(p=0.0001) were significant at p<0.05,hence null hypothesis (H2)was accepted. It was inferred that Buerger Allen Exercise was effective in reducing level of Peripheralartery disease among type II diabetes mellitus diagnosed with peripheral artery disease.

DISCUSSION

Among 200 type II diabetes mellitus patients with peripheral artery disease in the experimental group during pre-test 78% (156) of them were having moderate level of peripheral artery disease and remaining 22% (44) of them were having severe level of peripheral artery disease.Whereas in post-test 8% (16) of them were having normal level of Peripheral arterydisease,70% (140) of them having mild level of peripheral artery disease and remaining 22% (44) having moderate level of peripheral artery disease.

Among 200 type II diabetes mellitus patients with peripheral artery disease in the control group during pre-test 57% of them were having moderate level of peripheralartery disease and 43% (46) had severe level of peripheral artery disease.Whereas in post-test 57% of them were having moderate level of peripheral artery disease and 43% (86) had severe level of peripheral artery disease. **Dr.Rajesh Rajan et al (2022) :** Amputation and vascular complications are muchmore likely in those with diabetes mellitus (DM) and PERIPHERAL ARTERY DISEASE . Even without clinical coronary artery disease, patients with diabetes are more likely to develop PERIPHERAL ARTERY DISEASE . Compared to non-diabetics, those with diabetes mellitus had a 4-fold higher incidence of PERIPHERAL ARTERY DISEASE and death. According to estimates, 75% of diabetics with PERIPHERAL ARTERY DISEASE have no symptoms. When symptoms do exist, claudication or rest discomfort is most frequently one of them. 50% of people with critical limb ischaemia and about30% of claudication patients both had diabetes mellitus. Regardless of risk factors,the European Association for the Study of Diabetes recommends regular screeningfor all diabetes patients. It is noteworthy that around 15% and 45% of diabetics develop PERIPHERAL ARTERY DISEASE within 10 or 20 years, respectively.

The mean post-test level of peripheral artery disease (M±SD2=1.00±0.2) was higher than the mean pre-test level of peripheral artery disease (ABI Score) M1±SD1=0.05535±0.05135) with mean difference (MD) 0.4465 and obtained t value 86.947(p=0.00001) was significant. Therefore, the research hypothesis (H02) was supported, and the null hypothesis (H01) was rejected. It was inferred that Buerger Allen Exercise was effective in reducing level of Peripheral artery disease among typeII diabetes mellitus patients.

The mean difference between pre-test and post-test ABI Score of experimental groups (M±SD1=0.4475±0.1486) and control group (M0±SD2=0.0612±0.062) differed with asignificant Mean Difference**. Bolaji O Oyelade (2012):** 219 diabetic patients between the ages of 50 and 89 were the topic of cross-sectional descriptive research. A pre-tested questionnaire was given to the subjects, and the ankle-brachial index (ABI) was measured. Peripheral artery disease was deemed to be present when the ankle-

brachial indexwas less than 0.90. The findings indicated a 52.5% overall prevalence of PERIPHERAL ARTERY DISEASE . While asymptomatic PERIPHERAL ARTERY DISEASE was more common (71.3%), symptomatic PERIPHERAL ARTERY DISEASE was more common (28.7%). Age, sex, and marital status all showed significant relationships with PERIPHERAL ARTERY DISEASE (p 0.05), among other connections. The ankle-brachial index was demonstrably more accurate in detecting PERIPHERAL ARTERY DISEASE than clinical techniques such a history of intermittent claudication and the presence or absence of pedal pulses. The research study came to the conclusion that diabetic people in the southwest of Nigeria had a comparatively high prevalence of PERIPHERAL ARTERY DISEASE . It's noteworthy a larger percentage was asymptomatic. Furthermore, a clearly more objectiveevaluation of PERIPHERAL ARTERY DISEASE compared to both intermittent claudication and missing pedal pulses shows the good benefit of using ABI in the identification of PERIPHERAL ARTERY DISEASE.

RECOMMENDATIONS

- For improved generality, the study might be repeated with bigger sample sizes.
- A similar study can be conducted by including the patients who was attending NCDclinicals.
- The study can be conducted by using Pre experimental one group pre-test post-testdesign.
- A similar study can be conducted on the basis of follow ups and re-assessment.
- A comparative study may be conducted to evaluate the effectiveness of Buerger Allen Exercise with other non-pharmacological measures for improving the level of lower extremity perfusion.
- To evaluate nurses' attitudes and understanding of various forms of exercise for peripheral vascular disease, descriptive research might be carried out.
- A longitudinal study can be done on the patients with diabetes to elicit the effectiveness of Buerger Allen Exercise.
- The study can be conducted for different samples and in different settings there by findings can be generalized.

Future Scope

- Research on vascular health: Conducting studies to further understand the impact of diabetes on vascular health and the efficacy of the Buerger Allen exercise in improving circulation in diabetic patients.
- Personalized exercise programs: Developing tailored exercise programs that incorporate the Buerger Allen exercise as a therapeutic tool to improve blood flowin the limbs of diabetic patients.
- Improved patient monitoring: Integrating technology and wearable devices to monitor and record the results of the Buerger Allen exercise, allowing healthcare professionals to track the progress of patients and make informed decisions regarding their treatment plans.
- Rehabilitation and wound healing: Exploring the use of the Buerger Allen exercisein diabetic patients with peripheral arterial disease (PERIPHERAL ARTERY DISEASE) or diabetic foot ulcers to promote circulation, accelerate wound healing, and enhance overall rehabilitation outcomes.
- Telemedicine applications: Utilizing telemedicine platforms to remotely guide and monitor patients performing the Buerger Allen exercise, allowing healthcare providers to reach a larger patient population and improve accessibility to exercisetherapy for diabetes management.
- Combined interventions: Investigating the effectiveness of combining the BuergerAllen exercise with other therapies, such as medication, nutritional interventions, and lifestyle modifications, to optimize overall diabetes management and vascularhealth.
- Long-term follow-up studies: conducting longitudinal research to evaluate the long-term consequences of adding the Buerger Allen exercise to diabetes patients'treatment regimens, including its influence on lowering the risk of cardiovascular events and enhancing quality of life.
- Education and awareness: Raising awareness among healthcare professionals and patients about the potential benefits of the Buerger Allen exercise for diabetes mellitus patients, promoting its inclusion in standard care guidelines and diabetes management programs.

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