

Research Article

Reliability of ankle brachial index in patients with neurological deficits on ischemic episode of the limbs following Burgers exercises: open labelled clinical trial

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Received: 15 June 2016

Accepted: 02 July 2016

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ABSTRACT

Background: Peripheral arterial disease (PAD) is associated with significant morbidity and mortality and is an important marker of subclinical coronary heart disease. In some studies it has been found that surgical intervention alone or physical training alone does not provide good results. Aim of the study was to assess the reliability of ankle brachial index in patients with neurological deficits on ischemic episode of limbs following Burgers exercises.

Methods: It was an open labelled clinical trial. Total 35 patients of both male and females were included in this open labelled clinical trial. Two measuring technique ABI and VAS, one exercise program, unsupervised home exercise program and patients advice was part of procedure. Intervention was given at 1st day, 3rd month and 6th month.

Results: The study proves that VAS, ABI showed statistical significant difference when analyzed between 1st day to 3rd month, 1st day to 6th month and 3rd month to 6th month with ' p ' value <0.0001.

Conclusions: Physical therapy in the form of Burger's exercise with life style modification is significant in improving quality of life in the form of reducing severity of claudication pain and improving walking distance. Therefore the present study concludes that ABI is a reliable, simple, safe and standard gold diagnostic tool in assessing ischemic episode of the limbs in patients with neurological deficits following burgers exercises.

Keywords: Ankle brachial index, Neurological deficits, Ischemia, Burgers exercises

INTRODUCTION

Peripheral artery disease (PAD) is an important healthcare problem in developed nations, associated with considerable morbidity and mortality.

It results from obstruction of large peripheral arteries, exclusive of the coronary and intracranial cerebrovascular system, most commonly due to atherosclerosis. Most typically, it is referred to in relation to the lower limbs.¹ Other studies have corroborated these findings, showing up to a twofold to fourfold increased risk of mortality in patients with intermittent claudication, predominantly

from cardiovascular disease.² Patients can be stratified into groups according to symptom severity. One half of all PAD patients older than 55 years are asymptomatic. Of the symptomatic patients, approximately 40% experience intermittent claudication, and 10% have critical limb ischemia. There is also considerable overlap between PAD, cerebrovascular disease (CVD) and coronary artery disease (CAD), with the presence of PAD being associated with and increased risk of CVD and CAD and their consequences.³⁻⁵ People with PAD have 4-5 times greater risk of dying from a cardiovascular disease event compared to those without, and a 2-3 times greater all-cause mortality.^{6,7}

Several population-based studies based on predominantly white European populations have found the prevalence of PAD to be between 6% and 18% over the age of 55 years.⁸⁻¹⁰ The prevalence rises with age and has been found to be approximately 20% in people over 70 years of age and up to 60% in the over 85 age group.¹¹

In age- and gender-adjusted logistic regression analyses, black race/ethnicity current smoking diabetes hypertension hypercholesterolemia, and low kidney function were positively associated with prevalent PAD. Elevated fibrinogen and C-reactive protein levels were also associated with PAD.²

South Asians living in the United Kingdom have a higher mortality for ischemic heart disease than Europeans and Blacks have a higher CBVD mortality in both sexes. However studies both in the United Kingdom and India suggest PAD prevalence is lower in South Asians than in Caucasians in general population, diabetic and CAD cohorts.^{12,13}

Initial therapy is preventive for all patients with a focus on aggressively controlling modifiable traditional risk factors for coronary artery disease and PAD. Smoking cessation, controlling elevated blood pressure and blood glucose, losing excess body fat, exercise, treating hyperlipidemia with statins, and the use of antiplatelets are crucial first steps in the management of the PAD patient. Revascularization is reserved for the very symptomatic patient or those with critical limb ischemia.

In some studies it has been found that surgical intervention alone or physical training alone does not provide good results. If the above two are combined in treatment of patients there used to be better results with respect to symptom free walking distance (SFWD) and maximal walking distance.

So it is essential to assess the reliability of ankle brachial index in patients with neurological deficits on ischemic episode of limbs following Burgers Exercises

METHODS

The eligible population of the study composed of 35 adult participants, clinical diagnosed with acute peripheral arterial disease of the limb. Sample size was calculated based on the past hospital records for the last three years.

Inclusion criteria

It includes patients suffering from ischemic neurological damage having mild pain while walking, skin changes such as pallor, shiny appearance of the skin, decreased skin temperature, absent pulses in lower extremities and acute on chronic presentation like: sever pain on walking relatively shorter distance, sensory neurological disturbances such as paraesthesia, decreased tolerance to hot or cold temperature, Oedema in the distal segments.

Exclusion criteria

Patients with gangrene, necrosis of peripheral parts of the limbs, unstable angina, acute MI, uncontrolled hypertension, neuropathies of unknown origin like myopathies, metabolic disease conditions and neoplasm. Written informed consent was taken from all the participants. The protocol of the study was approved by the Institutional Review Board.

Study design

This study was an Open labelled clinical trial where intervention was given at 1st day, 3rd month and 6th month. The period was divided into 3 parts: baseline assessment, follow up assessment at 3rd month and 6th month was done. They were assessed for pain intensity using VAS, ABI.

Intervention

Two measuring techniques (ABI & VAS), one exercise program, unsupervised home exercise program and patients advice was part of the procedure. Burger - Allen exercises were administrated to patients. These exercises are repeated six to seven times at each setting and done several times a day. It was done in the following steps:

Step 1: Support leg in an elevated position at 60 to 90° for 30 to 180 seconds or until blanching of the extremity occurs. The patient was instructed to actively dorsiflex and planter flex the ankle throughout the procedure.

Step 2: Allow feet to dangle over the edge of the bed for 2 to 5 minutes or as long as it takes to produce hyperaemia, then add 1 minute. Total time should not exceed 5 minute.

Step 3: Place legs in a horizontal position for 3 to 5 minutes.

Following advice was given to the patient to quit tobacco consumption and alcohol use. Regular exercise such as walking three times daily for 15 to 30 minutes, walking 10 steps further when the pain begins then resting until pain disappears before continuing. This guide line is given by Dutch College of General Practitioners. Along with this diet advice was given such as eat healthy with a restricted cholesterol intake as a home remedy¹⁴⁻¹⁶

Outcomes

The outcome measures in this study were VAS, ABI. Pain score of the patients involved in this study were recorded by using the Visual Analogue Scale (VAS). ABI is a ratio of ankle systolic pressure to brachial systolic pressure. The systolic pressure of the lower extremity was measured by positioning a Pneumatic Cuff around the ankle above the malleoli. Colour Doppler probe was placed on the anterior tibial or (posterior tibial or

dorsalispedis) for flow detection. The cuff pressure was gradually inflated until flow signals disappeared. Cuff pressure was then deflated and the pressure at which the flow signals appeared was taken as the ankle systolic pressure. The brachial systolic pressure was measured with the cuff is tied to upper arm, inflated until flow signals disappeared. Slowly the pressure was released and the pressure at which flow signals appeared was taken as the brachial systolic pressure.

Statistical analysis

Statistical analysis for the present study was done using (SPSS) version 21. Mean, standard deviation, paired and unpaired 't' test, were used. VAS was compared using Wilcoxon matched paired test. Probability values <0.05 were considered statistically significant and probability values <0.001 were considered highly significant.

RESULTS

There were 32 males (91.43%) and 03 females (8.57%) participated in this study. The side affected and habits are given in table 1. Minimum age of the participants in the study was 35 years (Table 1 and 2) and maximum age was 65 years with mean age of 54.23 ± 7.55 . Mean height was $160.83 \text{cm} \pm 6.74 \text{ cm}$ and mean weight was $62.29 \pm 7.52 \text{ kg}$. The improvement seen in outcome measures is

mentioned in Table 3. Here VAS showed statistical significance when compared from 1st day to 3rd month, 1st day to 6th month and 3rd month to 6th month with p value <0.0001. Similar trend was seen in ABI when compared from 1st day to 3rd month, 1st day to 6th month and 3rd month to 6th month with ' p ' value < 0.0001.

Table 1: Distribution of samples by gender, sides affected and habits.

Factors	No of Samples	% of Samples
Gender		
Male	32	91.43
Female	3	8.57
Sides affected		
Left	23	65.71
Right	12	34.29
Habits		
No habit	3	8.57
Smoking	12	34.29
Chewing and smoking	3	8.57
Smoking and alcohol	13	37.14
All	4	11.43
Total	35	100.00

Table 2: Mean, SD, minimum and maximum of age, height, weight, BMI and duration of illness.

Variables	Minimum	Maximum	Mean	Std. Dev.	Median
Age	35.00	65.00	54.23	7.55	56.00
Height (cm)	152.00	177.00	160.83	6.74	160.00
Weight (KG)	45.00	78.00	62.29	7.52	62.00
BMI	17.10	36.00	24.45	3.75	25.00
Duration	6.00	15.00	10.78	2.35	11.00

Table 3: VAS, ABI outcome.

Visual Analogue Scale (VAS) scores at 1 st day, 3 rd month and 6 th months by Wilcoxon matched pairs test							
Time points	Mean	SD	Mean Diff.	SD Diff.	% of change	Z-value	P-value
1 st day	7.02	1.32					
3 rd month	6.25	1.29	0.77	0.73	10.98	4.0145	0.00001*
1 st day	7.02	1.32					
6 th month	5.22	0.96	1.80	0.72	25.62	5.1431	0.00001*
3 rd month	6.25	1.29					
6 th month	5.22	0.96	1.03	0.71	16.44	4.5998	0.00001*
Ankle brachial index (ABI) scores at 1 st day, 3 rd month and 6 th months by paired t test							
1 st day	0.74	0.06					
3 rd month	0.75	0.06	-0.01	0.01	-1.74	-11.1706	0.00001*
1 st day	0.74	0.06					
6 th month	0.77	0.05	-0.03	0.01	-3.37	-23.6854	0.00001*
3 rd month	0.75	0.06					
6 th month	0.77	0.05	-0.01	0.01	-1.60	-10.9696	0.00001*

DISCUSSION

The aim of the present study was to assess the reliability of ankle brachial index in patients with neurological deficits on ischemic episode of limbs following burgers exercises.

The results of the present study stated that there will be improvement in clinical parameters / long term outcomes in patients with neuropathy/ neurological deficits following acute / acute on chronic ischemic limb episode, who have selected for physiotherapy and rehabilitation. In present study, therapy was on the first day, follow up of third month and then sixth month. Home program was explained to the participants. There is significant decrease in pain score between 1st day to 3rd month and that of 6th month which suggests that burgers exercise helps in reducing pain in patients with PAD.

In the present study, score of ABI improved gradually from 1st day to the analysis of 6th month. So the study suggests that burgers exercise performed several times in a day and regular exercise such as walking three times daily can help to improve ankle brachial index in patients with PAD. Present study also concludes that claudication pain distance improved in patients with PAD so ABI can be used as gold standard method to diagnose and assess severity of PAD in the legs. The burgers exercise and daily walking for 15- 30 minutes helps in reducing claudication symptoms in patients with PAD.¹⁴

The limitation of this study is the small sample size; hence the results cannot be generalized. In the future similar type of study can be done but including individuals who have PAD with diabetes, since diabetes is on the rise in our country and find out measures to reduce the level of disability associated with it.

ACKNOWLEDGEMENTS

Authors would like to thank the entire participant and his colleagues for their constant support for this study.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Ganesh BR, Kothiwale VA. Reliability of ankle brachial index in patients with neurological deficits on ischemic episode of the limbs following Burgers exercises: open labelled clinical trial. *Int J Res Med Sci* 2016;4:3440-3.