Efficacy of Compressive Stockings versus Electrical Stimulations in Improving Maximal Walking Distance in Peripheral Vascular Disease Patients– A comparative study

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ABSTRACT

Compressive stockings with Buerger’s exercise provide the required pressure and thereby improve the circulation peripherally. This aids in the reduction of ischaemic pain of the calf muscle in peripheral vascular disease patients. Electrical stimulations with Buerger’s exercise are also believed to reduce pain in the peripheral vascular disease patients by improving the collateral circulation and thereby improving the blood supply.

A study was carried out between both the modalities to know the efficacy of one over the other. A sample of 40 individuals randomly divided into two groups, Group A and Group B, consisting 20 patients each ($n=20$), was involved in the study. At the end of study, statistical significance was achieved for compressive stockings over electrical stimulations in improving the maximal walking distance (MWD) in peripheral vascular disease patients. Inclusion and exclusion criteria along with the accepted clinical procedures were followed for methodology and tests for conducting the study. The MWD and the level of pain on Visual Analog Scale (VAS) were used as the objective and subjective outcome measures, respectively. The statistical significance using the $t$-test was achieved to be $P<0.05$ (value of $t$ at 5% significance and 38 degrees of freedom for the mean was 2.021) for both the outcome measures after calculating their means and standard deviations.

KEYWORDS: Compressive stockings, Buerger’s exercise, Electrical stimulations, Peripheral vascular disease, Maximal walking distance, Pain on VAS levels, t-tests.

INTRODUCTION

Peripheral vascular disease occurs when plaque builds up in the arteries that carry blood to the head, organs and limbs. Plaque is made up of fat, cholesterol, calcium, fibrous tissue and other substances in the blood.

When plaque builds up in the arteries, the condition is called atherosclerosis (ATH-er-o-skler-O-sis)[1]. Over time, it can harden and narrow the arteries. This limits the flow of oxygen-rich blood to the organs and other parts of the body.

Peripheral vascular disease usually affects the arteries in the legs, but it can also affect the arteries that carry blood from the heart to the head, arms, kidneys and stomach. This article focuses on peripheral vascular disease that affects blood flow to the legs.

OVERVIEW

Blocked blood flow to the legs can cause pain and numbness. It also can raise the risk of getting an infection in the affected limbs. It may be hard for the body to fight the infection. If severe enough, blocked blood flow can cause tissue death (gangrene). In very serious cases, this can lead to leg amputation.

If patients experience leg pain when they walk or climb stairs, they must approach the doctor. Sometimes older people think that leg pain is just a symptom of ageing.
However, the cause for the pain could be peripheral vascular disease. The patients must inform the doctor when they feel pain in their legs and discuss whether they should be tested for peripheral vascular disease.

Smoking is the main risk factor for peripheral vascular disease. If a patient smokes or has a history of smoking, the risk for peripheral vascular disease increases up to four times. Other factors, such as age and having certain diseases or conditions, also increase the risk.

OUTLOOK
If patients have peripheral arterial disease, the risk for coronary artery disease, heart attack, stroke and transient ischaemic attack (‘mini-stroke’) is six to seven times greater than the risk for people who do not have peripheral arterial disease. If the patients have heart disease, they have a one in three chance of having blocked leg vessels.

DISCUSSION
The purpose of this study was to determine the effect of a 6-week, short-term, exercise-based Calorie restriction (CR) on the functional capacity measured by the six minute walk test (6MWT) in peripheral vascular disease patients. In this study, we have found that exercise-based CR programme for as short as 4 weeks increases the MWD (maximal walking distance) and decreases the calf ischaemic pain in patients who have undergone stockings + Buerger’s exercise protocol compared with those given electrical stimulations. However, no significant improvements were observed in other measured variables like the blood pressure (BP) at rest, BP in response to 6MWT and heart rate at rest and in response to 6MWT.

In the current study, there was a significant improvement among the participants in the rate of perceived exertion (RPE) score, which is a self-reported subjective tool in the study. Similar findings were previously reported in patients with vascular insufficiency and arterial hypertension[9]. Furthermore, the same author reported that RPE is an indicator of somatic stress[10] and physical work[11].

None of the patients in the study were hypertensive, which may be due to the fact that all the patients were under aggressive medical management for hypertension at rest. Exercise training has been shown to improve the flow-dependant vasodilatation mediated to increase the endothelial release of nitric oxide. Besides, exercise training decreases sympathetic drive and improves parasympathetic drive. All this has favourable effects on the BP. However, in the current study, no significant improvements in the BP at rest or in response to 6MWT were observed [Figure 1]. These observations indicate that 6 weeks of exercise-based CR is not sufficient to enhance BP. Most of the previous studies have reported improvements in BP in response to CR programmes of duration 3 months and above. Moreover, the subdued BP parameters may be due to the aggressive medical management prescribed in the current patient population.

The average distance walked in the 6MWT at visit 1 was 345 ± 92 m. Similar findings were reported in the age-matched population in previous studies in the European population[12]. The current study reported a significant increase in the distance walked in a 6MWT after a 4-week, exercise-based CR programme following the stockings + Buerger’s exercise protocol. The absolute value of average increase in distance is approximately 52 m. Similar findings have been previously reported in larger studies conducted in the European population[12], where the patients were investigated in response to a 2- to 3-week exercise training programme soon after cardiac surgery; hence, the improvement in performance in the 6MWT can be

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taken as consistent with the existing literature in non-Indian population. Therefore, this is the first study, to the best of our knowledge, to report the effect of a 6-week exercise-based training on MWD by a 6MWT in the Indian patients who have peripheral vascular disease.

**CONCLUSION**

It is shown in the present study that the compressive stocking along with Buerger’s exercises protocol leads to earlier and better decrease of pain and improvement of MWD in patients when compared with the electrical stimulations along with Buerger’s exercises protocol. Hence, this study shows that compressive stocking has an edge over electrical stimulation in the treatment of peripheral arterial disease patients.

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**REFERENCES**


