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*Original Research Article*

# A Study to Assess the Effectiveness of Buerger Allen Exercise to Prevent Risk of Diabetic Foot by Improving Lower Extremity Perfusion among Clients With Type-2 Diabetes Mellitus in Selected Hospitals at Villupuram District, Tamilnadu

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## ABSTRACT

**Background:** Diabetes is a global health problem; it is a chronic disease and is now growing as an epidemic in both developed and developing countries. People with diabetes develop foot ulcers because of neuropathy, vascular insufficiency, and impaired wound healing. Studies suggested that, Asian patients had more evidence of micro and macro vascular complication. The prevalence of micro and macro vascular complications more in Asian are 66.4% and it is 44.2% more than European populations. Among these macro vascular complications accounts for 27.8%. Diabetes is an important risk for Lower extremity arterial disease (LEAD). LEAD in DM compound by the presence of peripheral vascular disease neuropathy and suspects for infections. Mortality rate is increases patient with LEAD, particular of foot ulceration, or gangrene .Three year survival rate of amputation is < 50%.

**Objectives:** 1. To assess the lower extremity perfusion among client with Type 2 Diabetes mellitus in experimental and control group, before and after the administration of Buerger Allen exercise. 2. To assess the effectiveness of Buerger Allen exercise to prevent risk of diabetic foot by improving lower extremity perfusion among clients with Type-2 Diabetes mellitus in experimental group. 3. To compare the lower extremity perfusion to prevent risk of diabetic foot between the experimental and control group.4.To find out the association between lower extremity perfusion with selected demographic variables among experimental and control group.

**Methods:** Quasi experimental research design was selected. 60 samples (experimental 30, control 30) selected by using non-probability purposive sampling technique. The data were collected using demographic variables, clinical variables and ABI score devised by the investigator for 30 minutes for each participant in both the experimental and control group**.** After the pretest, only the experimental group was administered Buerger Allen Exercise twice a day for 5 days with the interval of six hours. The control group was allowed to follow the regular activities in the hospital. After 5 days, the post test was conducted by using ABI score devised by the investigator for both the groups.

**Result:** The findings of the study showed that in experimental group the post test mean score was 0.921 with S.D of 0.083 and in the control group, post test mean value is 0.734 with SD is 0.063.The calculated paired 't' test value 4.97.

**Conclusion:** The Study concluded that that the Buerger Allen exercises is an effective intervention in improving lower leg perfusion among clients with Type II DM.

***Keywords:*** Diabetes Mellitus, Buerger Allen exercise, Lower Extremity Perfusion.

## INTRODUCTION

**"Kick Out Diabetic Foot by Exercise"**

Healthy life is the valuable gift of an individual, if a person is healthy enough according to me he is the richest person in his own world. But there are certain disease condition which affects the normal life pattern of many people in our existing world, such as heart problems, neurological problems, orthopedic problems, metabolic disorders especially diabetes mellitus etc among which diabetes is one of the important health issue in today world which may affect the entire life pattern of an individual. Diabetes is a global health problem; it is a chronic disease and is now growing as an epidemic in both developed and developing countries.

The diabetes mellitus is group of metabolic disorder which is due to lack of insulin production, lack of insulin action or both. Type 2 diabetes mellitus is the common form of diabetes constituting 90% the diabetes population. Diabetic foot is a major cause of disability, reduced quality of life, prolonged hospitalization, financial loss, lower limb amputation and mortality rate. People with diabetes develop foot ulcers because of neuropathy, vascular insufficiency, and impaired wound healing.

The acute and chronic complication of diabetes is the major cause of hospital admission. Studies suggested that, Asian patients had more evidence of micro and macro vascular complication. The prevalence of micro and macro vascular complications more in Asian are 66.4% and it is 44.2% more than European populations. Among these macro vascular complications accounts for 27.8%.

## NEED FOR THE STUDY:

Diabetes is an important risk for Lower extremity arterial disease (LEAD). LEAD in DM compound by the presence of peripheral vascular disease neuropathy and suspects for infections. Mortality rate is increases patient with LEAD, particular of foot ulceration, or gangrene .Three year survival rate of amputation is < 50%.

**Bichat, et al., (2012) stated** that Ankle brachial index (ABI) is a simple method to screen peripheral arterial disease (PAD) and to evaluate cardiovascular (CV) prognosis in the general population. It requires a hand-held Doppler probe to measure, but it can be done also with an automatic device. ABI is an effective tool for clinical practice or clinical studies. However, in diabetic patients, it has some specific caveats. Sensitivity of the standard threshold of 0.9 appears to be lowering diabetic patients with complications. Moreover, highly frequent arterial medial calcifications in diabetes increase ABI. It has been demonstrated that measurements >1.3 are well correlated with both an increased prevalence of PAD and CV risk. Therefore, ABI threshold of less than 0.9 and more than 1.3 are highly suspicious for PAD and high CV risk in diabetic patients. However, when there is concomitant clinical peripheral neuropathy or high risk of arterial calcification, the efficiency of ABI seems to be limited. In this case, other methods should be applied, toe pressure, in particular. Thus, the ABI could be used in patients with diabetes, but values should be interpreted with precision, according to the clinical situation.

**Dr S.Aruna and Thenmozhi et.al., (2015)** conducted an experimental study to assess the effectiveness of Buerger Allen exercise for Peripheral arterial disease by using Ankle-Brachial Index at Kuthambakkam village. Pre-test post-test control design was adopted and Non probability purposive sampling technique was used to select the samples. Experimental Research Design with30 samples in experimental group and 30 samples in control group were selected by using random sampling technique at Kuthambakkam village. Peripheral arterial disease and the effectiveness of Allen Buerger exercise was assessed by Ankle Brachial index Scale. The findings of the study revealed that there is a significant improvement in Ankle-Brachial index Score in preventing peripheral arterial disease

among people with Diabetes Mellitus in experimental group after receiving Allen Buerger exercise at the level of P<0.05 and there is s significant association between the duration of diabetes mellitus and the pretest score of ABI. Study participants got benefited by Allen Buerger exercise in preventing Peripheral Arterial Disease.

**STATEMENT OF THE PROBLEM:**

A study to assess the effectiveness of Buerger Allen exercise to prevent risk of diabetic foot by improving lower extremity perfusion among clients with Type-2 Diabetes mellitus in selected hospitals at Villupuram district, Tamilnadu.

**OBJECTIVES:**

- To assess the lower extremity perfusion among client with Type 2 Diabetes mellitus in experimental and control group, before and after the administration of Buerger Allen exercise.
- To assess the effectiveness of Buerger Allen exercise to prevent risk of diabetic foot by improving lower extremity perfusion among clients with Type-2 Diabetes mellitus in experimental group.
- To compare the lower extremity perfusion to prevent risk of diabetic foot between the experimental and control group.
- To find out the association between lower extremity perfusion with selected demographic variables among experimental and control group.

**HYPOTHESES:**

- $H_1$- There will be a significant difference between pretest and posttest interventional scores regarding lower extremity perfusion among patient with type 2 diabetes mellitus of experimental group .
- $H_2$- There will be a significant association between posttest interventional score with selected demographic variables among patient with type 2 diabetes mellitus in experimental and control group.

**DELIMITATIONS:**

The study is limited to client

- Who has type 2 diabetes mellitus,
- Whose age is 30 years and above,
- Who is available during data collection,
- Whose ABI score is between 0.5-0.9.

## MATERIALS AND METHODS

**Research approach:** Quantitative Research approach

**Research design:** Quasi experimental two group pre-test post-test designs.

**Setting of the Study:** Kaliappa Diabetic Hospital Gingee and Dr.Thambirajah Diabetic Hospital Tindivanam.

**Target population:**

The target Population of the study consists of clients with type 2 diabetes mellitus

**Accessible population:**

The accessible population of the study includes all the clients who were having Type II DM and who came to Kaliappa diabetic Hospital (Gingee) and Dr.Thambirajah Diabetic Hospital (Tindivanam).Villupuram district.

**Sample:**

The samples for this study were clients with Type II DM who fulfilled the sample selection criteria and who were assigned to the experimental and control group.

**Sample size:**

The sample size consists of 60, Type II DM patient selected for 30 in experimental group and 30 in control group.

**Sampling technique:**

Sampling technique adopted for this study was non probability purposive sampling technique for the selection of samples in experimental and control group

**DESCRIPTION OF THE TOOL:**

The tool consists of three sections,

**Section A: Assessment of demographic variables:**

Demographic variables consisted of age, gender, education, occupation, family type, residence, specific habits, dietary pattern, genetic influence, exercise.

**Section B: Assessment of clinical variables:**

Clinical variables consisted of duration of type 2 diabetes mellitus, causes for diabetes mellitus, method of diagnosis of diabetes mellitus; getting advice from, follow up, source of treatment, type of medication taking for diabetes, associated illness, nail condition, duration of paresthesia in lower extremity.

**Section C: Assessment of ABI Score:**

The ankle-brachial pressure index (ABPI) or ankle-brachial index (ABI) is the ratio of the blood pressure at the ankle to the blood pressure in the upper arm (brachium). The ABI is calculated by dividing the systolic blood pressure at the ankle by the systolic blood pressure in the arm.

**Ankle brachial index = Systolic Blood Pressure at the ankle / Systolic Blood Pressure in the upper arm**

**Interpretation of the score:**

| SCORE | INTERPRETATION |
|---|---|
| 1 | Normal perfusion |
| 0.5-0.9 | Moderately occluded blood vessels |
| <0.5 | Severely occluded blood vessels. |

## RESULTS AND DISCUSSION

**Table 1:** Effectiveness of Buerger Allen exercise to prevent risk of diabetic foot by improving lower extremity perfusion among clients with Type-2 Diabetes mellitus in experimental group.

| Group | Pre test | | Post test | | Paired "t" value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Experimental | 0.710 | 0.08 | 0.921 | 0.083 | **4.97 HS*** ** |

(p < 0.05) **HS=highly significance**

The above table shows that, in experimental group the pretest mean is 0.710 and SD is 0.08, whereas in posttest, the mean is 0.921 and SD is 0.083 and the paired' value score is 4.97. The 't' test value is greater than table value(2.04) which shows ,the Buerger Allen exercise is effective in improving lower extremity perfusion among clients with Type II DM.

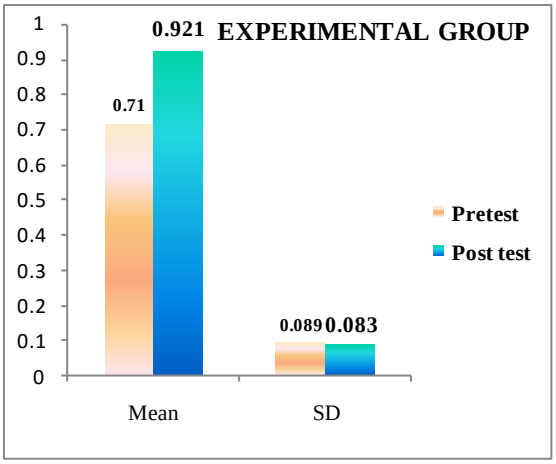


**Figure 1: Percentage wise distribution of mean and SD in pretest and post test in experimental group.**

**Table 2: Comparison of the lower extremity perfusion to prevent diabetic foot between the experimental and control group in the post test.**

| Test | Experimental group | | Control group | | Paired "t" value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Post test | 0.921 | 0.0836 | 0.734 | 0.063 | **4.97 HS*** ** |

(p<0.05) **HS=highly significance**

The above table shows that, in experimental group the post mean is 0.921 and SD is 0.0836, whereas in control group the posttest mean is 0.734 and SD is 0.063 and the paired't' test value is 4.97 which is highly significant.

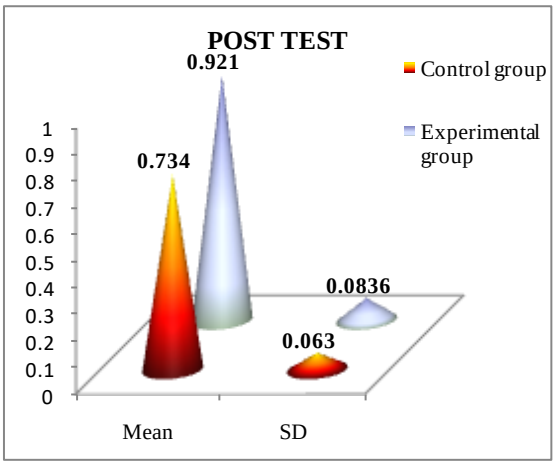


**Figure 2: Percentage wise distribution of posttest mean and SD in both experimental and control group.**

**Table 3: Association between lower extremity perfusion with selected demographic variables among experimental and control group.**

| S. No | Demographic Variables | Df | Table value | $\chi^2$ value | Level of significant |
|---|---|---|---|---|---|
| 1 | Age | 6 | 12.59 | 0.238095 | No association |
| 2 | Gender | 2 | 5.99 | 0.12987 | No association |
| 3 | Education | 6 | 12.59 | 0.93254 | No association |
| 4 | Occupation | 6 | 12.59 | 1.345756 | No association |
| 5 | Family Type | 2 | 5.99 | 0.634921 | No association |
| 6 | Residence | 6 | 12.59 | 23.92551 | **Significant Association** |
| 7 | Dietary pattern | 2 | 5.99 | 0.918367 | No association |
| 8 | Specific habits | 6 | 12.59 | 56.44762 | **Significant Association** |
| 9 | Genetic influence | 6 | 12.59 | 0.55102 | No association |
| 10 | Exercise | 4 | 9.49 | 1.077098 | No association |

The above table shows that, there is an association between lower extremity perfusion with residence and Specific habits in experimental group.

## DISCUSSION

### MAJOR FINDINGS OF THE STUDY:

The study revealed that in control group, the pretest mean value is 0.720 with SD of 0.077, where as the post test mean value is 0.734 with SD is 0.063. In experimental group, the pretest mean score of lower extremity perfusion was 0.710 with S.D of 0.089 and the posttest mean score was 0.921 with S.D of 0.083.

The effectiveness of Buerger Allen exercise were analyzed using paired 't' test. In experimental group, the pretest mean score of lower extremity perfusion was 0.710 with S.D of 0.089 and the post test mean score was 0.921 with S.D of 0.083. The paired 't' value score is 4.97 and the table value is 2.04, the paired 't' value is greater than table value .This indicates that there was a high statistical difference in the pre and post test level of lower leg perfusion among clients with type II Diabetes Mellitus in experimental group .This shows the effectiveness of Buerger Allen exercise in clients with type II DM in experimental group.

Hence the research hypothesis($H_1$) stated earlier that" There will be a significant difference between pretest and posttest interventional scores regarding lower extremity perfusion among patient with type 2 diabetes mellitus of experimental group after administering Buerger Allen exercise was accepted".

The association was analyzed using Chi-square**.** In experimental group for residence, the table value is 12.59 and chi-square value is 23.92 and for Specific habits, the table value is 12.59 where as chi-square value is 56.44 which indicates there is an association between lower extremity perfusion with residence and Specific habits .Where as in control group, there is no association between lower extremity perfusion with selected demographic variables.

Hence the research hypothesis ($H_2$) stated earlier that "There will be a significant association between posttest interventional score with selected demographic variables among patient with type 2 diabetes mellitus in experimental and control group was accepted".

There is a significant association between lower extremity perfusion with residence and Specific habits in experimental group.

There is no association between lower extremity perfusion with selected demographic variables in control group.

## CONCLUSION

The study shows that the Buerger Allen exercise was an effective intervention in improving lower leg perfusion among clients with Type II Diabetes Mellitus.

## REFERENCES


- India is heading for diabetes explosion-warns global meet: The annual report International diabetes Federation (IDF) 2007-2008
- Suzanne C. Smeltzer, Brenda G. Bare, Brunner and Suddarth's Text book of medical and surgical nursing Assessment of patient with vascular disease

- International Diabetes Federation, Diabetes Atlas, Sixth Edition, 2013
- Buerger, L. (1926) "The Circulatory Disturbances of the Extremities "Annals of Surgery, 83, 157
- Mrs. Vijayabharathi, the effectiveness of Buerger - Allen exercise on wound healing Process among the diabetic foot ulcer patients, international journal of Pharma and bio Sciences (2015) ISSN 0975-6299
- Dr S.Aruna and Thenmozhi P. Effectiveness of Allen Buerger exercise in preventing Peripheral arterial disease among people with type ii diabetes mellitus. Int J Pharm Bio Sci Volume 6 Issue 2, 2015 (April - June), Pages:966-970
- MS.E.Selmar Mellisha. Effectiveness of Buerger Allen Exercise on Lower Extremity Perfusion and Pain among Patients with Type 2 Diabetes Mellitus in Selected Hospitals in Chennai. IJSR. 5(7); July 2016.


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