A STUDY TO ASSESS THE EFFECTIVENESS OF BUERGER ALLEN EXERCISES ON LEVEL OF LOWER EXTREMITY PERFUSION AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS IN TERTIARY CARE HOSPITAL, BATHINDA PUNJAB

Mujasam Rasool[1], Arshid nazir[2], Shridhar K.V[3],

mujasamrasool1143@gmail.com

ABSTRACT:

Buerger's exercises or Buerger-Allen exercises were proposed by Leo Buerger and modified by Arthur Allen. The value of these exercises had frequently been emphasized by Allen, and many medical experts considered them as important adjuvant treatment and postoperative care for circulatory disturbances in the extremities. The mechanism of Buerger's exercises use gravitational changes in positions that are applied to the smooth musculature of vessels and to the vascular. Gravity helps alternately to empty and fill blood columns, which can eventually increase transportation of blood through them. The exercises involve the individual lying flat in bed with the legs elevated at 45 degrees until blanching occurs or for a maximum of 2 minutes. The patient then sits on the edge of the bed with the feet hanging down. Further exercises include dorsiflex, plantarflex, then inward and outward movement of the feet, followed by flexing and extending of the toes. This phase is maintained for a minimum of 2 minutes or until rubor has appeared. Finally, the individual lies supine with the feet covered with a warm blanket lasting 5 minutes. The whole cycle is repeated 3 to 6 times each session, and the complete sequence is repeated 2 - 4 times a day. The research design adopted was quasi experimental pre-test post-test design with control group. The study was conducted in tertiary care hospital Bathinda Punjab. Non-Probability Convenience sampling technique was adopted to select the desired sample. The sample size was 60. The data was collected using Ankle brachial pressure index (ABPI) to assess the lower extremity perfusion using hand held Doppler among patients with type 2 diabetes and administering buerger Allen exercise to only experimental group after obtaining consent from participants . The collected data were analyzed by using both descriptive and inferential statistical methods. The finding of the present study revealed that the pre interventional level of lower extremity perfusion was 0.75 with SD +/-0.130 for experimental group and 0.72 with S.D +/- 0.123 for control group and the mean score for Post interventional level of lower extremity perfusion among patients with type 2 diabetes mellitus was 0.79 with SD+/-0.128 for experimental group and 0.72 with SD+/- 0.125 for control group. In the present study paired and unpaired test was done to compare between pre test and post test to compute the mean lower extremity perfusion among patients with type 2 diabetes mellitus. The paired t test value was 6.092 higher than the table value (P<0.001) in experimental group and 0.000 in control group.

An unpaired t test conducted to see whether the observed difference in Pre test mean scores of experimental and control group was statistically significant. The observed t value of 0.930 was less than table value indicating the difference in pre – test mean scores between the groups was not statistically significant. However the observed mean difference in post test scores of experimental and control group was statistically significant. The observed t value of 2.268 was higher than that of table value at level(P<0.001) of significance.

Keywords: Effectiveness, buerger Allen exercise, lower extremity perfusion, type 2 diabetes mellitus

INTRODUCTION

Diabetes mellitus is a group of metabolic diseases in which a person has high blood sugar, either because the pancreas does not produce enough insulin, or because cells do not respond to the insulin that is produced. This high blood sugar produces the classical symptoms of polyuria, polydipsia, and polyphagia.[1]

Diabetes is a major metabolic disorder worldwide. The global burden and prevalence of diabetes are rapidly increasing in many countries. World Health organization (WHO) revealed that the dramatic increase of diabetes in low and middle economic status country, like India. Mostly 90 % of people are affected with type 2 diabetes, unlike type 1 diabetes who can't produce insulin at all, type 2 diabetes patients can produce insulin but that is not adequate to break down the entire glucose molecule. Diabetes mellitus has increased the risk of peripheral vascular diseases by causing endothelial and smooth muscle cell dysfunction in peripheral arteries. The risk of developing lower extremity peripheral vascular disease is proportional to the severity and duration of diabetes. Most of the complications are preventable. It requires a lifelong commitment to staying healthy, maintaining weight, exercising, taking medications, as prescribed by a doctor. Exercise is the fundamental principle for preventing the peripheral vascular diseases among diabetes patients. One of the exercises is Buerger Allen exercise is an active postural exercise of the feet and legs for preventing peripheral vascular disease and promoting collateral circulation in lower extremities.[2]

Peripheral arterial disease is more frequent in those with diabetes mellitus. Epidemiological evidence confirms the association between diabetes mellitus and the increased prevalence of peripheral arterial disease. Individuals with diabetes mellitus have a two to fourfold increase in the rate of peripheral arterial disease.[3]

People with long standing Diabetes mellitus develop complication of Peripheral Arterial Disease. Peripheral Arterial Disease leads to grave complication like gangrene in the lower limbs.[4]

The most common symptom is muscle pain in the lower limbs on exercise. In diabetes, pain perception may be blunted by the presence of peripheral neuropathy. Therefore, a patient with diabetes and peripheral arterial disease is more likely to present with an ischemic ulcer or gangrene than a patient without diabetes. The use of ankle-brachial-pressure index in the clinic and bedside provide a measure of blood flow to the ankle. This could help early detection, initiate early therapy and may thus reduce the risk of critical limb ischemia and limb loss.[5]

Buerger's exercises or Buerger-Allen exercises were proposed by Leo Buerger and modified by Arthur Allen. The value of these exercises had frequently been emphasized by Allen, and many medical experts considered them as important adjuvant treatment and postoperative care for circulatory disturbances in the extremities. The mechanism of Buerger's exercises use gravitational changes in positions that are applied to the smooth musculature of vessels and to the vascular. Gravity helps alternately to empty and fill blood columns, which can eventually increase transportation of blood through them. The exercises involve the individual lying flat in bed with the legs elevated at 45 degrees until blanching occurs or for a maximum of 2 minutes. The patient then sits on the edge of the bed with the feet hanging down. Further exercises include dorsiflex, plantarflex, then inward and outward movement of the feet, followed by flexing and extending of the toes. This phase is maintained for a minimum of 2 minutes or until rubor has appeared. Finally, the individual lies supine with the feet covered with a warm blanket lasting 5 minutes. The whole cycle is repeated 3 to 6 times each session, and the complete sequence is repeated 2 - 4 times a day.[6]

AIM

To study the effectiveness of buerger allen exercises on level of lower extremity perfusion among patients with Type 2 Diabetes Mellitus.

MAJOR FINDINGS:

In the experimental group Age wise distribution showed 1 (3.3%) of the respondents were in the age group of up to 30-35 years, 0 (0%) respondents were in the age group of 36-40, 0 (0%) respondents were in the age group of 41 – 45 years, 7 (23.3%) respondents were in the age group of 46-50 years, 22(73.3%) respondents were in the age group of over and above 50 years. While in the control group 3 (10%) of the respondents were in the age group of up to 30-35 years, 2(6.7%) respondents were in the age group of 36-40, 1 (3.3%) respondents were in the age group of 41 – 45 years, 7 (23.3%) respondents were in the age group of 46-50 years,17 (56.7%) respondents were in the age group of over and above 50 years.

Regarding gender in the experimental group 18(60%) respondents were male, 12(40%) respondents were females. while, in the control group 19(63.3%) respondents were males, 11(36.7%) respondents were females.

Regarding marital status in the experimental group 29(96.7 %) respondents were married, 1(3.3%) respondents were unmarried, 0 was divorced and 0 was separated. while in the control group 30 (100%) respondents were married, 0(0%) respondents were unmarried, 0 was divorced and 0 was separated.

Regarding dietary pattern in the experimental group 20 (66.7%) respondents were vegetarian, 10 (33.3%) respondents were mixed. While in the control group 15 (50%) respondents were vegetarian, 15 (50%) respondents were mixed.

Regarding education status in the experimental group 13(43.3%) respondents were having no formal education, 9(30%) respondents were having primary education, 3(10%) respondents were having high school educated, 5(16.7%) respondents were graduated. While in the control group 9(30.%) respondents were having no formal education, 6(20%) respondents were having primary education, 6(20%) respondents were high school educated, 9(30%) respondents were graduated.

Regarding occupation in the experimental group 22(73.3%) respondents were self employed, 3(10%) respondents were government employee, 5 (16.7%) respondents were private employee, and 0(0%) respondents were business persons. while in the control group 11

(36.7%) respondents were self employed, 6(20%) respondents were government employee, 8 (20.7%) respondents were private employee, and 5(16.7%) respondents were business persons

Regarding type of job in the experimental group 9 (30%) respondents were having sedentary type of job, 3 (10%) respondents were having standing type of job and 18(60%) respondents were having both sedentary and standing type of job. while in the control group 7 (23.3%) respondents were having sedentary type of job, 2 (6.7%) respondents were having standing type of job and 21(70%) respondents were having both sedentary and standing type of job.

Regarding habits in the experimental group, 2 (6.7%) respondents were smokers, 2 (6.7%) respondents were those whose consume alcohol, 5 (16.7) respondents were both, 21(70%) respondents were those who are neither smokers nor alcoholic. while in the control group 10 (33.3%) respondents were smokers, 1 (3.3%) respondents were those consume alcohol, 6 (20%) respondents were both 13 (43.3%) respondents were those who are neither smokers nor alcoholic.

 Regarding Age at which type 2 diabetes mellitus was diagnosed in the experimental group 1 (3.3%) respondents were diagnosed type 2 diabetes mellitus within the age group of 20-25 years, 0 (0%) respondents were diagnosed type 2 diabetes mellitus within the age group of 26-30 years, 2(6.7%) respondents were diagnosed type 2 diabetes mellitus within the age group of 31-40 years , 6(20%) respondents were diagnosed type 2 diabetes mellitus within the age group of 41-45 years , 3(10%) were diagnosed type 2 diabetes mellitus within the age group of 46-50 years , 14(46.7%) were diagnosed type 2 diabetes mellitus within the age group of above 50 years. while in the control group 1 (3.3%) respondents were diagnosed type 2 diabetes mellitus within the age group of 20-25 years 2 (6.7%) respondents were diagnosed type 2 diabetes mellitus within the age group of 26-30 years , 2 (6.7%) respondents diagnosed type 2 diabetes mellitus were within the age group of 31-40 years , 3(10%) respondents were diagnosed type 2 diabetes mellitus within the age group of 41-45 years , 9(30%) were diagnosed type 2 diabetes mellitus within the age group of 46-50 years ,8 (26.7%) respondents were diagnosed type 2 diabetes mellitus within the age group of above 50 years.

Regarding Duration of Type 2 diabetes Mellitus in the experimental group 10(33.3%) respondents were having upto 5 years of duration of type 2 diabetes mellitus, 15(50%) respondents were having 6-10 years of duration of type 2 diabetes mellitus, 3(10%) respondents were having 11-15 years of duration of type 2 diabetes mellitus and 2(6.7%) respondents were having above 15 years of duration of type 2 diabetes mellitus. while in the control group 10(33.3%) respondents were having upto 5 years of duration of type 2 diabetes mellitus, 14(46.7%) respondents were having 6-10 years of duration of type 2 diabetes mellitus, 5(16.7%) respondents were having 11-15 years of duration of type 2 diabetes mellitus and 1(3.3%) respondents were having above 15 years of duration of type 2 diabetes mellitus.

Regarding Family History of Peripheral Arterial Disease in the experimental group 4(13.3%) respondents were having family history of Peripheral Arterial Disease and 26(86.7%) respondents were not having any Family History of Peripheral Arterial Disease and in the control group 14(46.7%) respondents were having family history of Peripheral Arterial Disease, 16(53.3%) respondents were not having any Family History of Peripheral Arterial Disease.
Regarding Type of Medication in the experimental group 27(90%) respondents were on Oral Hypoglycaemic Agents and 3 (10%) respondents were on insulin and in the control group 29 (96.7%) respondents were on Oral Hypoglycaemic Agents and 1 (3.3%) respondents were on insulin

FIGURES
Diagram Showing the distribution of pre-test and post-test level of lower extremity perfusion scores of respondents with type 2 diabetes mellitus both in Experimental and Control Group(Figure 1)

Diagram showing the mean and SD score level of lower extremity perfusion in experimental and control Group among patients with type 2 diabetes mellitus (Figure 2)
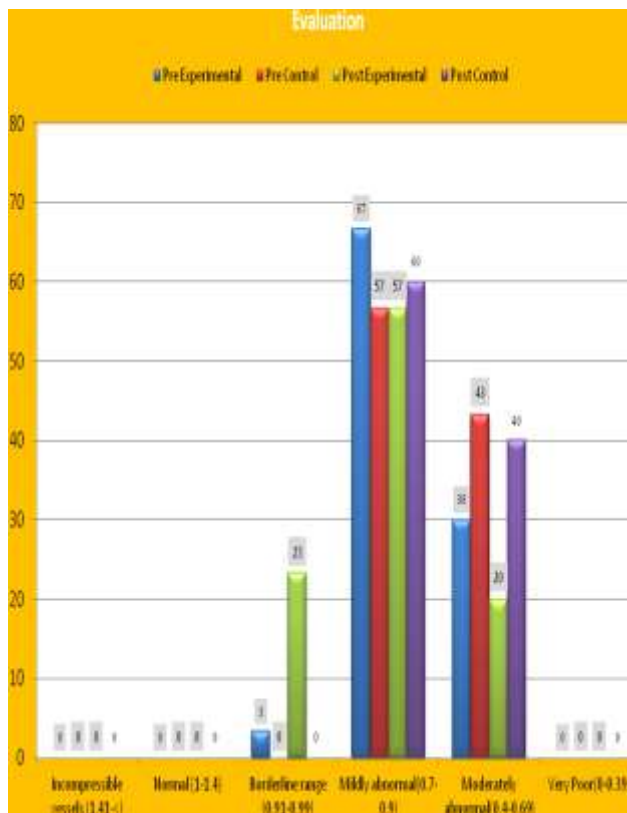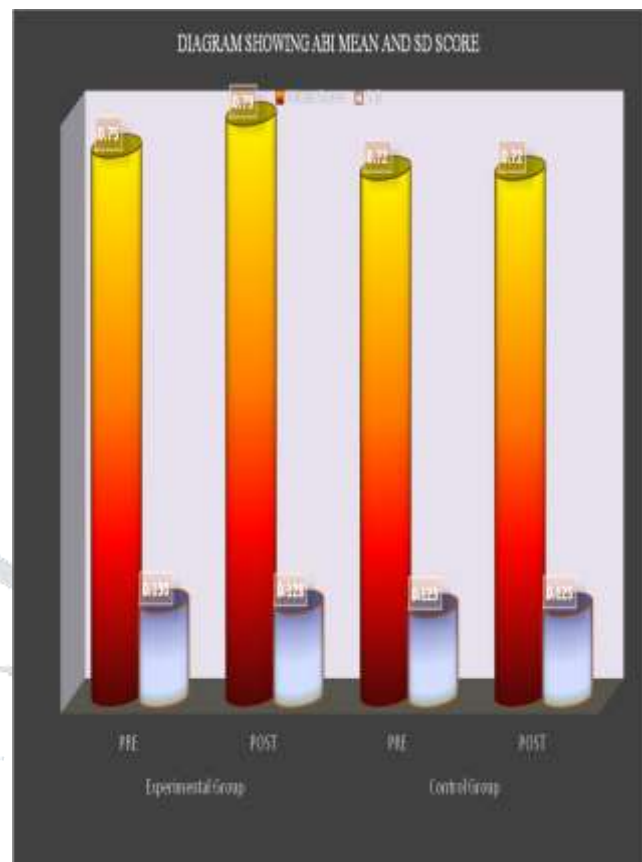
Figure 1

Figure 2

CONCLUSION

This study concluded that the administration of buerger Allen exercise showed significant improvement on level of lower extremity perfusion among patients with type 2 diabetes mellitus

DISCUSSION:

The focus of this study was to assess the effectiveness of buerger allen exercises on level of lower extremity perfusion among patients with type 2 diabetes mellitus in tertiary care hospital, bathinda punjab . In this study quasi experimental research design (two group pre-test, post-test) was used. 60 samples were drawn using non probability convenience sampling technique. The data was collected using Ankle brachial pressure index (ABPI) to assess the lower extremity perfusion using hand held Doppler among patients with type 2 diabetes and administering buerger Allen exercise to only experimental group after obtaining consent from participants . The collected data were analyzed by using both descriptive and inferential statistical methods. The finding of the present study revealed that the pre interventional level of lower extremity perfusion was 0.75 with SD +/-0.130 for experimental group and 0.72 with S.D +/- 0.123 for control group and the mean score for Post interventional level of lower extremity perfusion among patients with type 2 diabetes mellitus was 0.79 with SD+/-0.128 for experimental group and 0.72 with SD+/- 0.125 for control group.

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MATERIAL AND METHODS:
VARIABLES UNDER STUDY:

Independent variable: Buerger Allen exercise

Dependent variable: Lower extremity perfusion

SETTING: The present study was conducted at Tertiary Care Hospital Bathinda Punjab,

SAMPLING: Non probability Convenience sampling technique

SAMPLE SIZE: 60 patients with Type 2 Diabetes Mellitus

DESCRIPTION OF TOOLS: Data collection tool was divided into two parts

SECTION I– Comprised of 12 items seeking information on Demographic data such as Age ,Gender ,Marital status ,Dietary pattern, Education status, Occupation ,Habits ,Age at which type 2 diabetes mellitus was diagnosed, Duration of type 2 diabetes mellitus, Family history of peripheral arterial disease, Type of medication.

SECTION II- Ankle brachial preesure index (ABPI) used to assess the effectiveness of buerger Allen exercise on level of lower extremity perfusion among patients with type 2 diabetes mellitus.
Consists of 6 items. Response option: 1.0-1.4= normal, 0.91-0.99 = Borderline range, 0.70-0.90 = mildly abnormal, 0.40-0.69= moderately abnormal <0.40 = severely abnormal, >1.4 = Incompressible vessels

ANKLE-BRACHIAL INDEX (ABI)	INTERPRETATION
1.0-1.4	Normal
0.91-0.99	Borderline range
0.70-0.90	Mildly abnormal
0.40-0.69	Moderately abnormal
< 0.40	Severely abnormal
> 1.4	Incompressible vessels

IMPLICATIONS

NURSING EDUCATION
The nurse educators should involve in teaching the students about various Exercises that helps patient in clinical setting.
Nurses should have knowledge about the factors, which enhance and increase the lower extremity perfusion.
Nurses can be educated about the various techniques, which have multiple effects on lower extremity perfusion.
Nurse educator can prepare the student nurses to practice the Buerger Allen Exercise in nursing care of patients with type 2 Diabetes Mellitus.
Nurse educator may encourage student nurses to conduct project on Buerger Allen Exercise in different areas.
Nurse educator may divide the students in teams and encourage them to conduct variety of education programmes on various aspects of Buerger Allen Exercise.
The study serves as a base for the nurse educator to teach on the recent trends of Buerger Allen Exercise techniques on evidence based practice.
Regular educational and practical sessions for nurses can be encouraged to improve knowledge and skill in administering Buerger Allen Exercise

NURSING PRACTICE
Health education is an important function of the health personnel.
The nurse plays an important role in the prevention of complications, as well as promotion of health.
Nurses as resource persons working in hospital and community settings should provide information and skill (Buerger Allen Exercise) and timely helps the patients with type 2 diabetes mellitus to understand about the effect of Buerger Allen Exercise and manage the risk of Peripheral vascular disease.
Evidence based practice should be encouraged about use of Buerger Allen Exercise in nursing practice

NURSING ADMINISTRATION

Nursing administrator plays a pivotal role in the supervision and management of nursing profession.

The Nurse administrator should formulate policies, protocols, guidelines and system of care for patients with type 2 diabetes mellitus in collaboration with multidisciplinary team.

Developing a protocol to Buerger Allen Exercises for all patients admitted with type 2 diabetes mellitus.

Standard protocol prepared and administer for all patients at the risk of decreased lower extremity perfusion.

Arrange and conduct workshops, conferences, seminars to the people for providing awareness about the level of lower extremity perfusion among patients with type 2 diabetes mellitus.

NURSING RESEARCH

Nurse researcher can encourage clinical nurse to apply the research findings in their daily nursing care activities.

Dissemination of findings through conference, professional journals will make the application of research findings too effective on evidence based practice.

Evidence based practice should be encouraged about use of Buerger Allen Exercise in nursing research

A piece of literature generated by present study will be referred by future researcher.

Investigator got firsthand experience in conducting a research and will be able to carry out more complex studies in future.

Findings of this study will act as catalyst to carry out more extensive research on the largest samples in different settings

RECOMDATION

Similar study can be undertaken with a large sample to generalize the findings.

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.

A descriptive study can be conducted to assess the knowledge and attitude of nurses towards various type of exercise for peripheral vascular disease.

A longitudinal study can be done on the patients with type 2 diabetes mellitus 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.

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