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Effectiveness of Buerger Allen Exercise on Lower Extremity Perfusion and Peripheral Neuropathy Symptoms among Patients with Type 2 Diabetes Mellitus

Sreekala U[1], Dr. Haseena T A[2]

[1]Lecturer, Medical Surgical Nursing, Nightingale College of Nursing Nedumangad, Tvpm Ph.9778182750
Corresponding Author Email: *usreekala025[at]gmail.com*

[2]Professor, Medical Surgical nursing, Sree Gokulam Nursing College Venjaramood, Tvpm Ph.9447124144
haseenashaheed[at]gmail.com

Abstract: ***The study was conducted to evaluate the effectiveness of buerger Allen exercise on lower extremity perfusion and peripheral neuropathy symptoms among patients with type 2 diabetes mellitus. Objectives: To evaluate the effectiveness of buerger Allen exercise on lower extremity perfusion and peripheral neuropathy symptoms among patients with type 2 diabetes mellitus and to find out the association between lower extremity perfusion and peripheral neuropathy symptoms among patients with type 2 diabetes mellitus with selected socio demographic variables. Methodology: The study was conducted among 68 patients with Type 2 diabetes mellitus between the age group of 40 and 70 from both genders. Subjects were selected using a convenient sampling technique from the pay wards and general wards at SGMCH. The subjects for the experimental group were chosen first, pretest was done and intervention provided for 5 consecutive days. The intervention was repeated four times per day (morning 8 am to 1 pm two times and noon from2 pm to 5pm two times). Posttest was conducted on the 5th day using the same tools. The same process was repeated for control group without the intervention. Results: The mean rank post test score of lower extremity perfusion in experimental group was 25.79 and the mean rank post test score of lower extremity perfusion in control group was 43.21. The obtained Mann Whitney rank value is 282 and the Z value is 3.663 which is significant at p<0.001. Hence it can be interpreted that Buerger Allen exercise is effective in improving lower extremity perfusion among patients with type 2 diabetes mellitus. The mean rank post test score of peripheral neuropathy symptoms in experimental group was 24.26 and the mean rank test score of peripheral neuropathy symptoms in control group was 44.76. The obtained Mann Whitney rank value is 230 and Z value is 4.332 which is significant at p<0.001. Hence it can be interpreted that Buerger allen exercise is effective in improving peripheral neuropathy symptoms among patients with type2diabetes mellitus. Conclusion: The study suggested that specific information and Buerger Allen Exercise can be provided as a routine to the patients with type 2 diabetes mellitus in improving the level of lower extremity perfusion and to prevent peripheral neuropathy symptoms.***

Keywords: Type 2 diabetes mellitus, Lower extremity perfusion, Peripheral neuropathy symptoms, Buerger Allen exercise

1. Introduction

Diabetes must be taken seriously not only by individuals living with, or at high risk of, the condition but also by healthcare professionals and decision - makers. Diabetes remains a serious and growing challenge to public health and places a huge burden on individuals affected and their families. People living with diabetes are at risk of developing several debilitating and life threatening complications, leading to an increased need for medical care, reduced quality of life and premature death. Globally, diabetes ranks among the top 10 causes of mortality[3].

Diabetic peripheral neuropathy eventually affects nearly 50% of adults with diabetes during their lifetime, and is associated with substantial morbidity including pain, foot ulcers, and lower limb amputation. The prevalence of peripheral neuropathy is estimated to be between 6% and 51% among adults with diabetes depending on age, duration of diabetes, glucose control, and type 1 *versus* type 2 diabetes. The clinical manifestations are variable, ranging from asymptomatic to painful neuropathic symptoms. Because of the risk of foot ulcer (25%) and amputation associated with diabetic peripheral neuropathy, aggressive screening and treatment in the form of glycemic control, regular foot exams, and pain management are important. There is an emerging focus on lifestyle interventions including weight loss and physical activity as well[4].

Need for the Study

It is intended that the long - term adverse effects, in the form of the possibility of limb injury, disability, amputation, and mortality, can be minimized in patients with diabetes mellitus. If preventive measures are not carried out, then the threat of diabetic foot injuries caused by lower extremity peripheral circulation disorders, even to the point of death will increase as well. In addition, the Buerger Allen Exercise is also not yet popular in the community, so it is a very strong reason for this problem, to be used as research material.

By considering the benefits of Buerger Allen exercise on lower extremity perfusion and peripheral neuropathy symptoms, the investigator is interested to examine the effectiveness of Buerger Allen exercise on lower extremity perfusion and peripheral neuropathy symptoms among patients with type 2 diabetes mellitus.

2. Methodology

This chapter deals with the methodology selected by the investigator for the study. This includes research approach, research design, setting of the study, population, sample, sampling technique, criteria for sample selection, report of pilot study, techniques used for data collection procedures and plan for data analysis. Research approach: A quantitative approach is used to find out the effectiveness of buerger Allen exercise on lower extremity perfusion and peripheral neuropathy symptoms among patients with type 2 diabetes mellitus. Research design: The research design chosen by the investigator is quasi experimental with non - randomized control group.

Plan for data analysis

Data would be analyzed using SPSS. Descriptive (frequency, percentage) statistics would be used for the analysis of socio demographic variables and clinical variables. Mann Whitney rank test would be used to assess the effectiveness of Buerger Allen exercise on lower extremity perfusion and peripheral neuropathy symptoms between experimental and controlled groups. Chi square test would be used to find out the association between post test scores of lower extremity perfusion and peripheral neuropathy symptoms with selected demographic variables.

3. Results

The present study was aimed to evaluate the effectiveness of buerger Allen exercise on lower extremity perfusion and peripheral neuropathy symptoms among patients with type 2 diabetes mellitus and to find out association between lower extremity perfusion and peripheral neuropathy symptoms among patients with type 2 diabetes mellitus with socio demographic variables. The data was collected by using socio demographic variables, clinical variables, ABI scale, and Michigan neuropathy screening instrument.

More than half of the subjects in the experimental group (55.9%) and control group (67.6%) were private employed. More than half (52.9%) of the subjects in the experimental group and almost half (47.1%) of subjects in the control group were diagnosed with diabetes mellitus for 5 - 10 years. Before the intervention, 41.2% of subjects in experimental group and 44.1% of the subjects in control group had mildly impaired perfusion. In the right leg 58.8% subjects in experimental group and 55.9% subjects in control group had moderately impaired perfusion. After the intervention, 41.2% of subjects in experimental group had mildly impaired perfusion, 44.1% of subjects in control group had mildly impaired perfusion, 55.9% of the subjects in both experimental and control group had moderately impaired perfusion.2.9%ofthe subjects in experimental group had normal lower extremity perfusion after the intervention. The mean rank post test score in experimental group was 25.79 and the mean rank post test score of lower extremity perfusion in control group was 43.21. The obtained Mann Whitney rank value is 282 and the Z value is 3.663 which is significant at $p<0.001$. Hence it can be interpreted that Buerger Allen exercise is effective in improving lower extremity perfusion among patients with type 2 diabetes mellitus. There was significant association between lower extremity perfusion with socio demographic variables like gender and social habits ($p<0.05$) in control group. But there was no significant association between lower extremity perfusion with socio demographic variables such as age and educational status among patients with type 2 diabetes mellitus.

4. Discussion

This chapter discusses the major findings of the study and reviews them in terms of objectives, hypothesis and findings of other studies. The present study focused on effectiveness of buerger Allen exercise on lower extremity perfusion and peripheral neuropathy symptoms among patients with type 2 diabetes mellitus. Both in control (64.70%) and experimental group (41.20%) majority of the subjects belongs to the age group 61 - 70 years. Majority (61.8%) of the subjects in the experimental group were female and control group (52.9%) were male. All of the subjects in experimental group (100%) and majority in control group (94.1%) were married. More than half of the subjects in the experimental group (55.9 %) and control group (67.6%) were private employed. Half (50%) of the subjects in the experimental group had high school and more than (55.9%) of subjects in the control group had higher secondary education. More than half (52.9%) of the subjects in the experimental group and almost half (47.1%) of subjects in the control group were diagnosed with diabetes mellitus for 5 - 10 years. Nearly half (44.1%) of the subjects in experimental group and a quarter 29.4% of the subjects in control group were hypertensive.26.5% of subjects in experimental group and 14.7% of the subjects in control group were suffering from COPD.64.7% of subjects in experimental group and 76.5% of the subjects in control group had family history of peripheral neuropathy symptoms. The study findings are consistent with the findings of a study conducted by Bhuvaneswari et al on effectiveness of Buerger Allen exercise on lower extremity perfusion. In this study, most of the diabetes patients 12 (40%) were between the age group of above 60 years, 7 (23.33%) between the age group of 51 - 60 years and majority of the diabetes patients 19 (63.33%) were females, 11 (36.67%) were males[35]. The result of the study was contradictory to the findings of another study conducted on the effect of Buerger Allen exercise on lower extremity perfusion among patients with diabetes mellitus. Most of the patients with diabetes mellitus were in age group between 41 - 50 years, in experimental group 46.66 percent, in control group 53.33 percent. Majority (66.7 %) of the subjects in the experimental group were female and control group (66.7%) were male. Most of them were secondary, experimental group (40%), in control group graduates (33.33%). Most of them were employee (experimental group 40 %, control group 40%) [55]. The result of the study were contradictory with the findings of another study conducted on the effect of Buerger Allen exercise on lower extremity perfusion among patients with type 2 Saveetha medical college and hospital. In the experimental Group, majority 18 (60%) were in the age group of above 50 years, 20 (66.67%) were male, almost all 30 (100%) were married, 23 (76.67%) were non - vegetarian, 16 (53.33%) had type 2 diabetes mellitus for 11 – 15 years. In the control group, majority 17 (56.67%) were in the age group of 45 – 50 years, 21 (70%) were male,

almost all 30 (100%) were married, 28 (93.33%) were non - vegetarian 18 (60%) had type 2 diabetes mellitus for 5 - 10 years[12]. Before the intervention, (41.2%) of subjects in experimental group and (44.1%) of the subjects in control group had mildly impaired perfusion in the right leg. (58.8%) subjects in experimental group and (55.9%) subjects in control group had moderately impaired perfusion. After the intervention, (41.2%) of subjects in experimental group had mildly impaired perfusion, (44.1%) of subjects in control group had mildly impaired perfusion, (55.9%) of the subjects in both experimental and control group had moderately impaired perfusion. (2.9%) of the subjects in experimental group had normal lower extremity perfusion after the intervention. Before the intervention, (41.2%) of subjects in experimental group and (44.1%) of the subjects in control group had mildly impaired perfusion in the left leg. (58.8%) subjects in experimental group and (55.9%) subjects in control group had moderately impaired perfusion. After the intervention, (41.2%) of subjects in experimental group had mildly impaired perfusion, (44.1%) of subjects in control group had mildly impaired perfusion, (55.9%) of the subjects in both experimental and control group had moderately impaired perfusion. (2.9%) of the subjects in experimental group had normal lower extremity perfusion after the intervention. Before providing the intervention, (55.9%) and (58.8%) subjects in experimental group had no peripheral neuropathy symptoms on right leg in patient version and examination version respectively. Also, (47.1%) and (50%) subjects in experimental group had no peripheral neuropathy symptoms on left leg in patient version and examination version respectively. (44.1%) and (41.2%) subjects in experimental group had abnormal peripheral neuropathy symptoms on right leg in patient version and examination version respectively (52.9%) and (50%) subjects in experimental group had abnormal peripheral neuropathy symptoms on left leg in patient version and examination version respectively After the intervention, (76.5%) and (70.6%) subjects in experimental group had no peripheral neuropathy symptoms on right leg in patient version and examination version respectively. (73.5%) and (58.8%) subjects in experimental group had no peripheral neuropathy symptoms on left leg in patient version and examination version respectively. (23.5%) and (29.5%) subjects in experimental group had abnormal peripheral neuropathy symptoms on right leg in patient version and examination version respectively. (26.5%) and (41.2%) subjects in experimental group had abnormal peripheral neuropathy symptoms on left leg in patient version and examination version respectively. Before the intervention, 44.1% and 52.9% subjects in control group had no peripheral neuropathy symptoms on right leg in patient version and examination version respectively. Also, 41.2% and 52.9% subjects in control group had no peripheral neuropathy symptoms on left leg in patient version and examination version respectively.55.9% and 47.1% subjects in control group had abnormal peripheral neuropathy symptoms on right leg in patient version and examination version respectively 58.8% and 47.1% subjects in control group had abnormal peripheral neuropathy symptoms on left leg in patient version and examination version respectively After the intervention, 41.2% and 58.8% subjects in control group had no peripheral neuropathy symptoms on right leg in patient version and examination version respectively.41.2% and 55.9% subjects in control group had no peripheral neuropathy symptoms on left leg in patient version and examination version respectively.55.9% and 41.2% subjects in control group had abnormal peripheral neuropathy symptoms on right leg in patient version and examination version respectively.58.8% and 44.1% subjects in control group had abnormal peripheral neuropathy symptoms on left leg in patient version and examination version respectively. The result of the study were consistent with the findings of another study conducted on the effectiveness of buerger Allen exercise on lower extremity perfusion significant association found between other socio demographic variables such as age with lower extremity perfusion among patients with type 2 diabetes mellitus. There was significant association between lower extremity perfusion with socio demographic variables like gender and social habits ($p<0.05$) in control group. But there was no significant association between lower extremity perfusion with socio demographic variables such as age and educational status among patients with type 2 diabetes mellitus. There was a significant association found between occupational status and educational status with peripheral neuropathy symptoms in experimental group. But there was no significant association found between other socio demographic variables such as age with peripheral neuropathy symptoms among patients with type 2 diabetes mellitus. There was no significant association found between socio demographic variables such as age, occupational status and social habits with peripheral neuropathy symptoms among patients with type 2 diabetes mellitus in control group. The result of the study were consistent with the findings of another study conducted on the effectiveness of buerger allen exercise on lower extremity perfusion among patients with type 2diabetes mellitus in selected hospitals at Kanniyakumari district. The „chi" square test was calculated to find out the association between the post test levels of lower extremity perfusion and selected demographic variable such as age ($\chi 2$ value 8.82 df 1) which is Significant at $p<0.05$ level. where as other demographic variables are not Significant at $p<0.05$ level. Therefore the researcher partially reject the null hypothesis and partially accepts the research hypothesis[56].

Table 1: Frequency and percentage distribution of subjects based on gender, N=68

Gender	Experimental group		Control group		Chi square	df	P value
	F	%	F	%			
Male	13	38.2	18	52.9	6.839	1	0.009**
Female	21	61.8	16	47.1			
Total	34	100	34	100			

Table 1 shows that the majority (61.8%) of the subjects in the experimental group is female and control group (52.9%) were male.38.2% of the subjects in experimental group were male and 47.1%of the subjects in control group were female. Since the chi square value is 6.839 which is significant at 0.05 levels, both groups were not homogenous in terms of gender.

Section III: Effectiveness of Buerger Allen exercise on lower extremity perfusion and peripheral neuropathy symptoms among patients with Type 2 Diabetes mellitus.

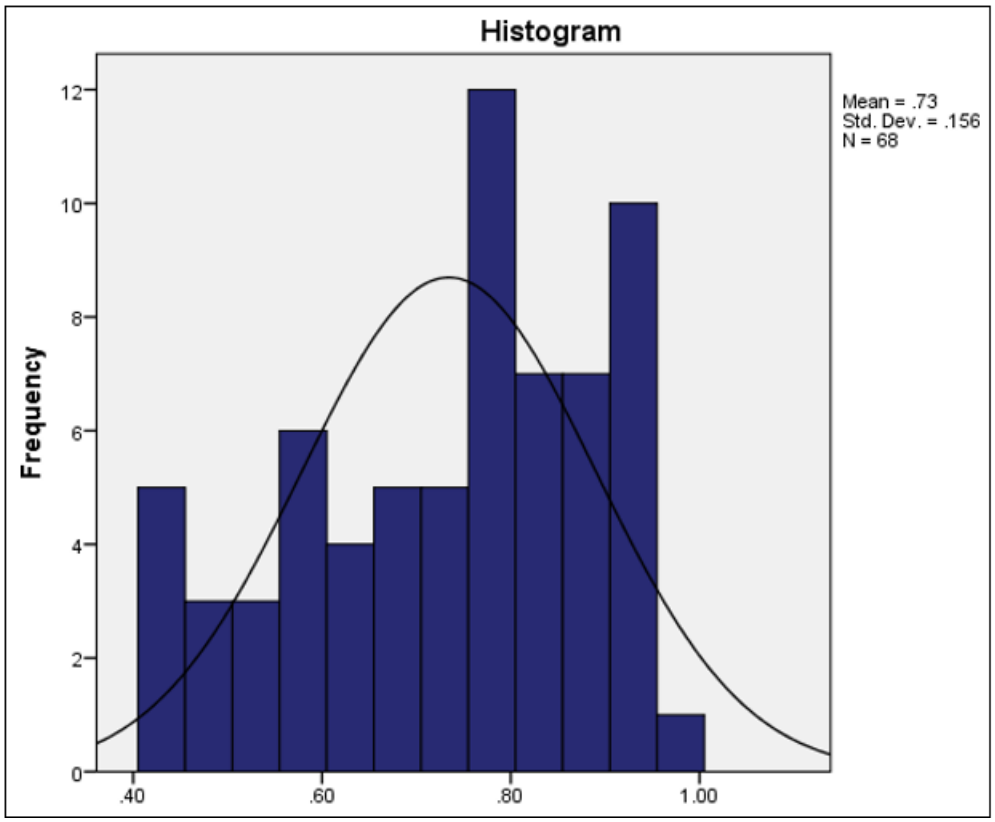

Figure 5: Distribution of subjects based on lower extremity perfusion score

The histogram did not maintain a normal distribution curve while using an independent t test. The researcher used Mann Whitney rank test to evaluate the effectiveness of Buerger Allen exercise on lower extremity perfusion among patients with type 2 diabetes mellitus.

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