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Effectiveness of Buerger's Allen Exercise on Improving Lower Extremity Perfusion Among Patients with Type 2 Diabetes Mellitus

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Abstract

Diabetes mellitus is increased risk of peripheral vascular diseases by causing endothelial and smooth muscle cell dysfunction in peripheral arteries. To assess the pre and post level of lower extremity perfusion among patients with type 2 diabetes mellitus in experimental and control group. To determine the effectiveness of Buerger Allen exercise on lower extremity perfusion among patients with type 2 diabetes mellitus. A true experimental research design and a quantitative research approach were used. A control group with a pretest and posttest was employed. Sixty samples with type 2 diabetes were included in the investigation. The Saveetha Institute of Medical and Technical Sciences' institutional ethical committee in Chennai granted clearance. Using the random sampling technique, thirty samples were chosen for the experimental group and thirty samples for the control group. A structured interview schedule, a modified version of the Wong Baker FACES pain assessment scale, and a modified Clarke enhanced foot assessment scale were used for the for this study. the pretest mean score was 0.62±0.22 and the post-test mean score was 0.67±0.27. The mean difference score was 0.05. The calculated paired 't' test value of t = 2.21808 which was found to be statistically significant at p<0.05 level. This clearly infers that there is significant difference between the pre-test and post-test levels of lower extremity perfusion. Analysis of variance (Anova) of the level of lower extremity perfusion in the experimental group, the pretest mean was 0.62 and the post-test mean was 0.67. The standard deviation of pretest and post-test is 0.22 and 0.27 respectively. The variance of pre-test was 0.05 and post-test was 0.07. The calculated paired 'F' value = 0.7258 which was found to be statistically significant at p<0.05 level. This clearly infers that there is a significant difference between the pretest and post-test levels of lower extremity perfusion.

Keywords: *Buerger Allen Exercise, Diabetes Mellitus, Effectiveness, Lower Extremity.*

Introduction

Diabetes mellitus is a metabolic disorder that is characterized by increased levels of glucose in the blood resulting from defects in insulin secretion, insulin action or both. This high blood sugar produced the classical symptoms of polyuria, polyphagia and polydipsia. Diabetes is a major metabolic disorder worldwide [1, 2]. The global burden and prevalence of diabetes is rapidly increasing in many countries. The documents in World Health organization (WHO) revealed the dramatic increase of diabetes in in low and middle economic status country, like India. Mostly 90% of people 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 all the glucose molecule [3, 4, 5]. The National Urban Survey conducted across the metropolitan cities of India reported similar trend 1 1.7 percent in Kolkata, 6.1 percent in Kashmir Valley Northern India, 1

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1.6 percent in New Delhi, and 9.3 percent in Mumbai compared with 13.5 percent in Chennai, 16.6 percent in Hyderabad, and 12.4 percent Bangalore. Diabetic neuropathies are neuropathic disorder that are associated with diabetes mellitus [6, 7]. These conditions are thought to result from diabetic micro vascular injury involving small blood vessels that supply nerve in addition to macro vascular conditions that can culminate in diabetic neuropathy [8, 9]. People with diabetes can over time develop nerve damage throughout the body. Some people with nerve damage have no symptoms. Others may have symptoms such as pain, tingling, or numbness, loss of feelings in the hands, feet, and legs Nerve problem can occur every organ system including the digestive tract, heart and sex organs [10, 11, 12]. About 60 to 70percent of people with diabetes can develop nerve problem at any time, but risk rises with age and longer duration of diabetes [13, 14].

Exercise is the fundamental principle for preventing peripheral vascular diseases among diabetes patients. One of the exercises is the 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 [15]. 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 doctor [16, 17, 18]. Exercise is the fundamental principle for preventing the Peripheral vascular diseases among diabetes patients. One of the exercises is the Buerger Allen exercise, which is an active postural exercise of the feet and legs for preventing peripheral vascular disease and promoting collateral circulation in lower extremities [19, 20]. Diabetes Mellitus causes, between two and four times increased risk of peripheral vascular disease by causing endothelial and smooth muscle cell dysfunction in peripheral arteries [21, 22].

Methods and Materials

A true experimental research design and a quantitative research approach were used. A control group with a pretest and posttest was employed. Sixty samples with type 2 diabetes were included in the investigation. The Saveetha Institute of Medical and Technical Sciences' institutional ethical committee in Chennai granted clearance. Using the random sampling technique, thirty samples were chosen for the experimental group and thirty samples for the control group. A structured interview schedule, a modified version of the Wong Baker FACES pain assessment scale, and a modified Clarke enhanced foot assessment scale were used for the pretest [15, 23]. The experimenter led the experimental group through the Buerger Allen exercise, which they were instructed to perform three times a day. The effectiveness of Buerger Allen Exercise on lower extremity perfusion among patients with type 2 diabetes mellitus between the posttest experimental and control group the mean score value 0.9 in experimental group and 0.8 in control group. The 't' value is (2.573) The findings of the study showed that the posttest level of lower extremity perfusion on Buerger's allen exercise was statistically significant at $p<0.05$ in the experimental group. The research approach was experimental in nature and quasi experimental pretest and posttest control group design was used. The study was conducted among 60 samples with type 2 diabetes mellitus. Thirty samples in experimental group and 30 samples in control group were selected by using nonprobability purposive sampling technique. Pretest was conducted using structured interview schedule, modified Wong Baker FACES pain assessment scale, and modified Clarke enhanced foot assessment scale. For the experimental group, the investigator demonstrated the Buerger Allen

exercise and were asked to do the exercise three times a day at four hours interval (8am, 12noon, and 4pm) for a period of five days under the supervision of investigator. Post assessment was done on the sixth day by using the same scale.

Result

Frequency and Percentage Distribution of Demographic Variables and Lower Extremity Perfusion Among Patient with Diabetes Mellitus in Experimental and Control Group

Table 1: Frequency and Percentage Distribution of Demographic Variables among Patients with Diabetes Mellitus in Experimental and Control Group

Demographic Variables	Experimental Group		Control Group	
	Frequency	Percentage	Frequency	Percentage
Age				
31 – 40 years	7	23.30	8	26.70
41 – 50 years	6	20.00	4	13.30
51 – 60 years	6	20.00	5	16.70
Above 60 years	11	36.70	13	43.30
Gender				
Male	18	60.00	16	53.30
Female	12	40.00	14	46.70
Education				
Illiterate	7	23.30	3	10.00
Primary education	9	30.00	9	30.00
Secondary education	9	30.00	11	36.70
Graduate	5	16.70	7	23.30
Occupation				
Unemployed	10	33.30	9	30.00
Unskilled labor	12	40.00	9	30.00
Skilled labor	8	26.70	12	40.00
Diet Pattern				
Vegetarian	7	23.30	5	16.70
Mixed	23	76.70	25	83.30
Bad Habits				
Smoking	8	26.70	6	20.00
Alcohol	7	23.30	6	20.00
Both	10	33.30	10	33.30
None	5	16.70	8	26.70
Duration of Type 2 DM				
<5 years	11	36.70	9	30.00
6 – 10 years	11	36.70	3	10.00
11 – 15 years	5	16.60	8	26.70
>15 years	3	10.00	10	33.30

Table 1 shows that the frequency and distribution of demographic variables among Type 2 diabetes mellitus patients among 30 samples in pretest experimental group, that Most of the diabetes patients 11 (36.7%) were between the age group of above 60

years,6(20%) between the age group of 51-60 years, 6(20%) between the age group of 41-50 years, 7(23.3%) between the age group of 31-40 years. The majority of the diabetes patients 18(60%) were males, 12(40%) were females. 9(30%) of patients were primary and secondary education respectively, 7(23.33%) of patients were illiterate and 5(16.7%) of patient were studied in graduate. 12(40%) patients belong to unskilled labor, 10(33.33%) were unemployed, 8(26.7%) were skilled labor. 7(23.3%) patients were vegetarian and majority of the patients 23(76.7%) belong to a mixed diet pattern. 5(16.7%) did not have any bad habits, 8(26.7%) were smoker and 7(23.3%) were alcoholic. Most of the patients were 11(36.7%) of patients where the duration of diabetes mellitus is< 5years and between 6 – 10 years respectively, 5(16.6%) were the duration of diabetes is 11-15 years, 5(16.6%) were the duration of diabetes is >15 years.

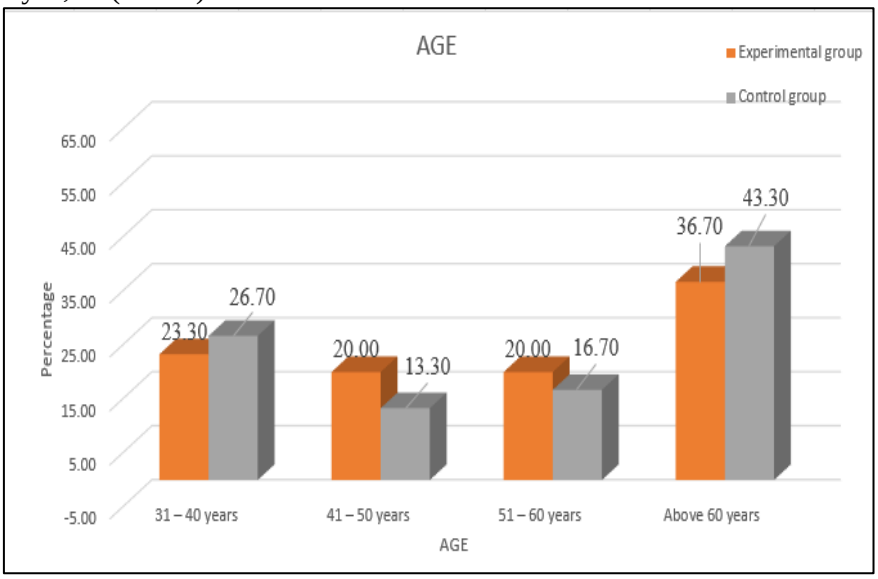

Figure 1: Percentage Distribution of Age of Patients in the Experimental and Control Group

Figure 1 Depict That Most of the diabetes patients 11 (36.7%) were between the age group of above 60 years, 6(20%) between the age group of 51-60 years, 6(20%) between the age group of 41-50 years, 7(23.3%) between the age group of 31-40 years.

Figure 2 depicts that 7(23.3%) patients were vegetarian and majority of the patients 23(76.7%) belongs to a mixed diet pattern.

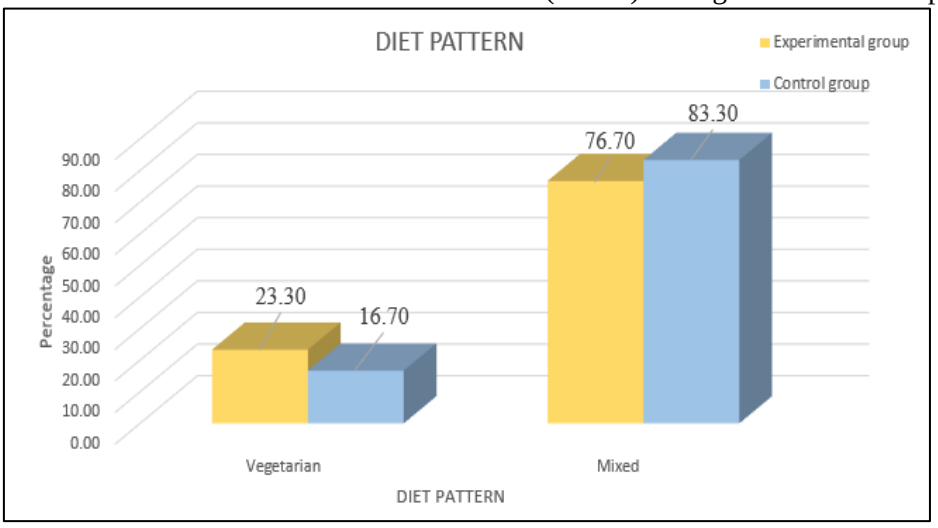

Figure 2: Percentage Distribution of Diet Pattern of Patients in the Experimental and Control Group

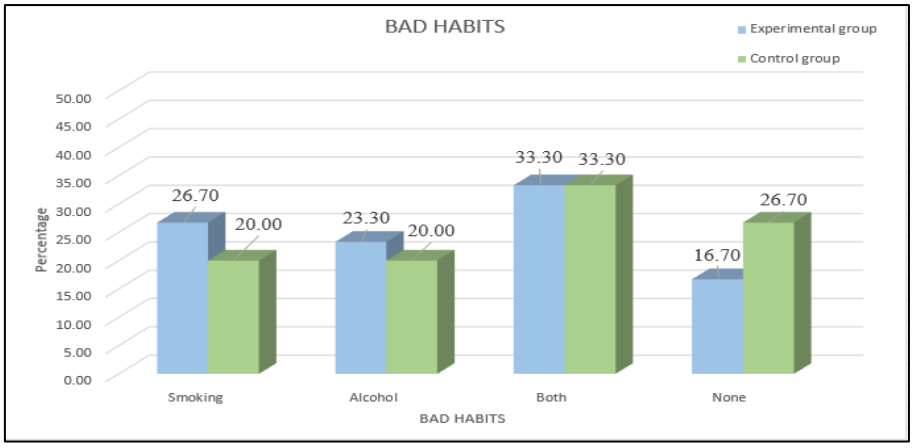

Figure 3: Percentage Distribution of Bad Habits of Patients in the Experimental and Control Group

Figure 3 depict that Diabetes Mellitus patients 5(16.7%) did not have any bad habits, 8(26.7%) were smoker and 7(23.3%) belong to alcoholic habit.

Assessment Tables of Level of Lower Extremity Perfusion

Table 2: Frequency and Percentage Distribution of Pre-test and Post-test Level of Lower Extremity Perfusion in the Experimental Group

Level of Lower Extremity Perfusion	**Pre test**		**Post test**	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Normal	-	-	8	26.67
Mild	16	53.33	15	50.00
Moderate	10	33.33	7	23.33
Severe	4	13.33	-	-

Table 2 shows that in the experimental group, 16(53.33%) had mild level, 10(33.33%) had moderate level, 4(13.33%) had severe level of lower extremity perfusion in the pretest whereas in the post test, 8(26.67%) had normal level, 15(50%) had mild level, 7(23.33%) had moderate level of lower extremity perfusion.

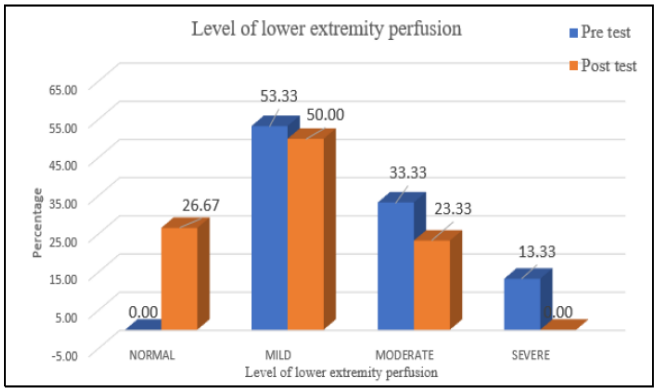

Figure 4: Percentage Distribution of Pre-test and Post-test Level of Lower Extremity Perfusion in the Experimental Group

Figure 4 depicts that in the experimental group, 16(53.33%) had mild level of lower extremity perfusion and 10(33.33%) had moderate level of lower extremity perfusion 4(13.33%) had severe level of lower extremity perfusion in the pretest whereas in the post test, 8(26.67%) had normal level, 15(50%) had mild level, 7(23.33%) had moderate level of lower extremity perfusion.

Table 3: Frequency and Percentage Distribution of Pre-test and Post-test Level of Lower Extremity Perfusion in the Control Group

Level of Lower Extremity Perfusion	Pre test		Post test	
	Frequency	Percentage	Frequency	Percentage
Normal			4	13.33
Mild	10	33.33	10	33.33
Moderate	15	50.00	12	40.00
Severe	5	16.67	4	13.33

Table 3 shows that in the control group, 10(33.33%) had mild level, 15(50%) had moderate level, 5(16.67%) had severe level of lower extremity perfusion in the pretest whereas in the post test, 4(13.33%) had normal level, 10(33.33%) had mild level, 12(40%) had moderate level and 4(13.33%) had severe level of lower extremity perfusion.

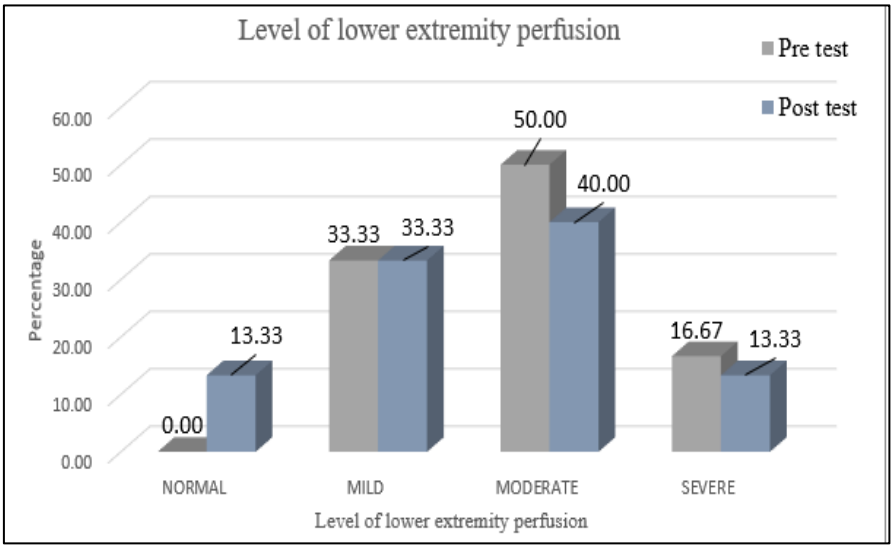

Figure 5: Percentage Distribution of Pre-test and Post-test Level of Lower Extremity Perfusion in the Control Group

Figure 5 shows that in the control group, 10(33.33%) belongs to mild level of lower extremity perfusion, 15(50%) belongs to moderate level, 5(16.67%) belongs to severe level of lower extremity perfusion in the pretest whereas in the post test, 4(13.33%) had normal level, 10(33.33%) had mild level, 12(40%) had moderate level and 4(13.33%) had severe level of lower extremity perfusion.

Comparison Tables Within the Group of Level of Lower Extremity Perfusion

Table 4: Level of the Lower Extremity Perfusion in the Experimental Group

Level of lower extremity perfusion	**Mean**	**S.D**	**Mean Difference Score**	**Paired 't' test & p-value**	
Pre test	0.62	0.22	0.05	t= 2.21808	
Post test	0.67	0.27		p=0.03453	Significant

P<0.05, significant

The table 4 shows that the pre-test mean score was 0.62±0.22 and the post-test mean score was 0.67±0.27. The mean difference score was 0.05. The calculated paired t test value of t = 2.21808 which was found to be statistically significant at p<0.05 level. This clearly infers that there is significant difference between the pre-test and post-test levels of lower extremity perfusion.

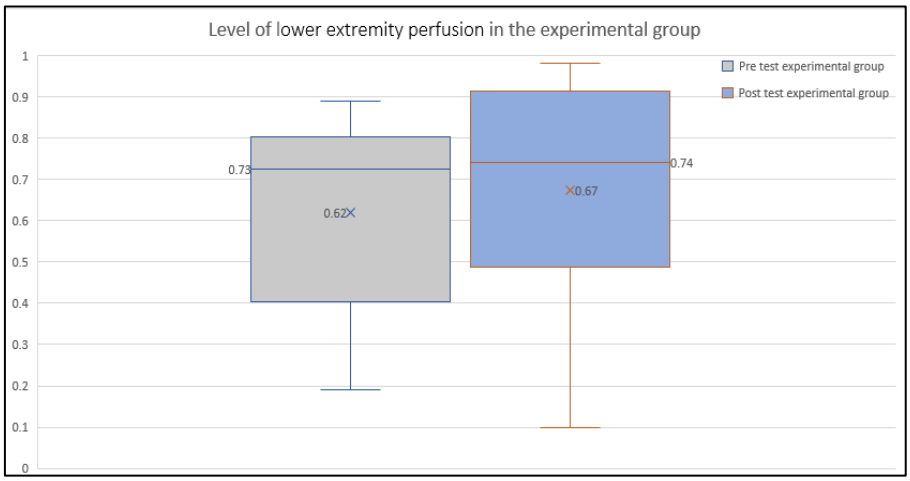

Figure 6: Boxplot Showing the Level of the Lower Extremity Perfusion in the Experimental Group

Figure 6 depict that the pre- of lower extremity perfusion **(Median: Pre-test – 0.73, Post Test – 0.74)** test mean score was 0.62±0.22 and the post-test mean score was 0.67±0.27. The mean difference score was 0.05. The calculated paired 't' test value of t = 2.21808 which was found to be statistically significant at p<0.05 level. This clearly infers that there is significant difference between the pre-test and post-test levels.

Table 5: Level of the Lower Extremity Perfusion in the Control Group

Level of Lower Extremity Perfusion	**Mean**	**S.D**	**Mean Difference Score**	**Paired 't' test & p-value**	
Pre test	0.54	0.23	0.02	t= 0.8453	Not
Post test	0.52	0.27		p= 0.40484	Significant

The table 5 shows that the pre-test mean score was 0.54±0.23 and the post-test mean score was 0.52±0.27. The mean difference score was 0.02. The calculated paired 't' test value of t = 0.8453 which was found to be statistically not significant at p<0.05 level. This clearly infers that there is no significant difference between the pre-test and post-test levels of lower extremity perfusion.

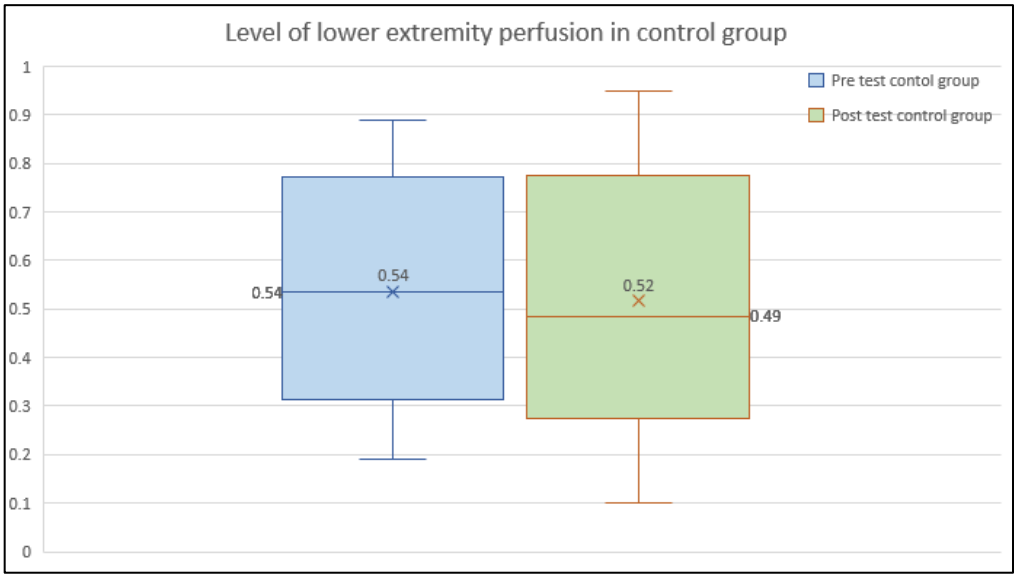

Figure 7: Boxplot showing the Level of the Lower Extremity Perfusion in the Control Group

Figure 7 shows that the pre-test mean score was 0.54±0.23 and the post-test mean score was 0.52±0.27. The mean difference score was 0.02. The calculated paired 't' test value of t = 0.8453 which was found to be statistically not significant at p<0.05 level. This clearly infers that there is no significant difference between the pre-test and post-test levels of lower extremity perfusion**.** (Median: Pre-test – 0.54, Post Test – 0.49)

Comparison Tables Between the Groups of Level of Lower Extremity Perfusion

Table 6: Level of the Lower Extremity Perfusion between the Experimental and Control Group

Level of Lower Extremity Perfusion	**Experimental Group**		**Control Group**		**Mean Difference Score**	**Paired 't' test & p-value**
	Mean	**S.D**	**Mean**	**S.D**		
Pre test	0.62	0.22	0.54	0.23	0.08	t= 0.8453 p= 0.40484 **Not Significant**
Post test	0.67	0.27	0.52	0.27	0.16	t= 2.21808 p= 0.03453 **Significant**

The table 6 shows that the pre-test mean score was 0.62±0.22 and the post-test mean score was 0.67±0.27. The mean difference score was 0.08. The calculated paired 't' test value of t = 2.21808 which was found to be statistically significant at p<0.05 level. This clearly infers that there is significant difference between the pre-test and post-test levels of lower extremity perfusion. The pre-test mean score was 0.54±0.23 and the post-test mean score was 0.52±0.27. The mean difference score was 0.16. The calculated

paired 't' test value of t = 0.8453 which was found to be statistically not significant at p<0.05 level. This clearly infers that there is no significant difference between the pre-test and post-test levels of lower extremity perfusion.

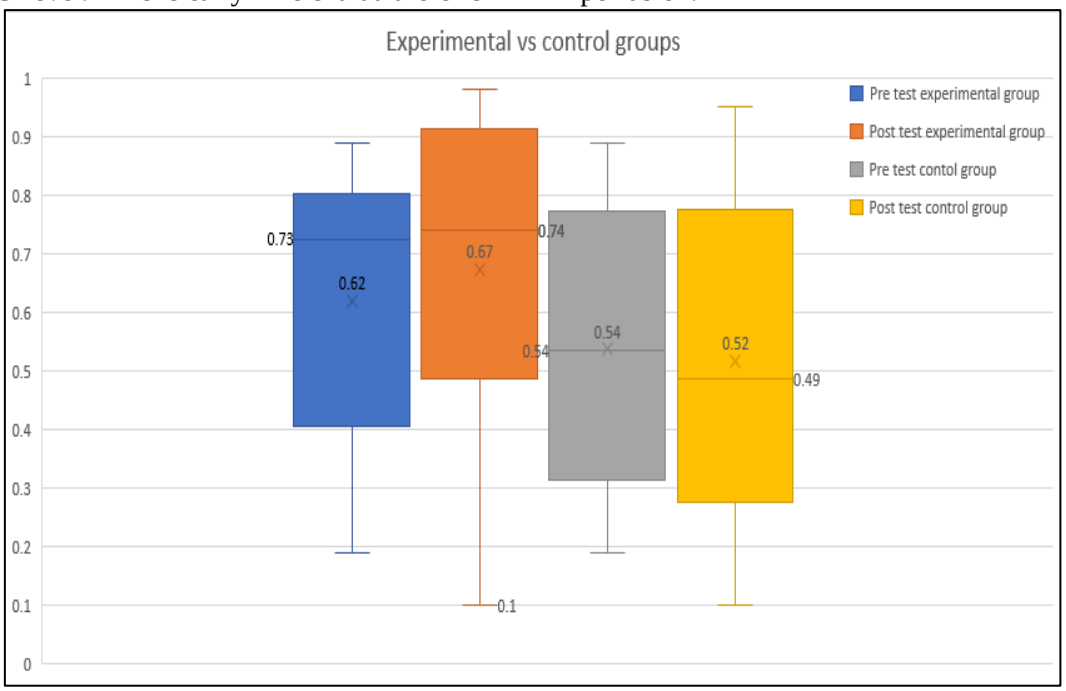

Figure 8: Boxplot Showing the Level of the Lower Extremity Perfusion between the Experimental and Control Group

Figure 8 depict that the pre-test mean score was 0.54±0.23 and the post-test mean score was 0.52±0.27. The mean difference score was 0.16. The calculated paired 't' test value of t = 0.8453 which was found to be statistically not significant at p<0.05 level. This clearly infers that there is no significant difference between the pre-test and post-test levels of lower extremity perfusion.

Analysis of Variance (ANOVA) of the Level of Lower Extremity Perfusion

Table 7: Level of the Lower Extremity Perfusion between the Experimental and Control Group

	Experimental Group			**Control Group**		
	Mean	**± S. D**	**Variance**	**Mean**	**± S. D**	**Variance**
Pre test	0.62	0.22	0.05	0.54	0.23	0.05
Post test	0.67	0.27	0.07	0.52	0.27	0.07
F- value	0.7258			0.09468		
p-value	0.39774			0.7594		

The table 7 shows that, in the experimental group, the pre-test mean was 0.62 and the post-test mean was 0.67. The standard deviation of pre-test and post-test is 0.22 and 0.27 respectively. The variance of pre-test was 0.05 and post-test was 0.07. The calculated paired 'F' value = 0.7258 which was found to be statistically significant at p<0.05 level. This clearly infers that there is a significant difference between the pre-test and post-test

levels of lower extremity perfusion. In control group, the pre-test mean was 0.54 and the post-test mean was 0.52. The standard deviation of pre-test and post-test is 0.23 and 0.27 respectively. The variance of pre-test was 0.05 and post-test was 0.07. The calculated paired 'F' value = 0.09468 which was found to be statistically not significant at $p<0.05$ level. This clearly infers that there is no significant difference between the pre-test and post-test levels of lower extremity perfusion.

Bonferroni Correction of the Level of Lower Extremity Perfusion

Table 8: Bonferroni Correction of the Lower Extremity Perfusion Between the Experimental and Control Group

Pairwise Comparisons		**Bonferroni Correction**	
Experimental Group	**Control Group**	**p-value**	**Significance**
Pre test	**Pre test**	0.1603	Not significant
Pre test	**Post test**	0.1120	Not significant
Post test	**Pre test**	0.0375	Not significant
Post test	**Post test**	0.0273	Not significant

Table 8, shows that, the Bonferroni correction by pairwise comparisons between the experimental group and the control group with the significance level of 0.0125 [0.05/4]. The pairwise comparison between the pretest of the experimental group and the pretest of the control group gives 0.1603 which is not significant. The pairwise comparison between the pretest of the experimental group and the post test of the control group gives 0.1120 which is not significant. The pairwise comparison between the post test of the experimental group and the pretest of the control group gives 0.0375 which is not significant. The pairwise comparison between the post test of the experimental group and the post test of the control group gives 0.0273 which is not significant.

Table 9: Association of the Level of the Lower Extremity Perfusion with Selected Demographic Variables in the Experimental and Control Group

Demographic Variables	**Experimental Group**		**Control Group**	
	Frequency	**Chi square and p value**	**Frequency**	**Chi square and p value**
Age				
31 – 40 years	7	X^2=14.9061 d.f=6 p=0.021 Significant	8	X^2=14.0575 d.f=6 p=0.029 Significant
41 – 50 years	6		4	
51 – 60 years	6		5	
Above 60 years	11		13	
Gender		X^2 =6.7048 d.f=2		X^2 =6.3884 d.f= 2
Male	18		16	

Female	12	p=0.035 Significant	14	p= 0.041 Significant
Education				
Illiterate	7	X^2 =12.2803 d.f= 6 p=0.056 Not Significant	3	X^2 =11.9541 d.f=6 p=0.063 Not Significant
Primary education	9		9	
Secondary education	9		11	
Graduate	5		7	
Occupation		X^2=10.6340 d.f= 4 p= 0.031 Significant		X^2 =10.2778 d.f= 4 p= 0.036 Significant
Unemployed	10		9	
Unskilled labor	12		9	
Skilled labor	8		12	
Diet Pattern		X^2 =8.2703 d.f= 2 p= 0.016 Significant		X^2 =7.2238 d.f= 2 p= 0.027 Significant
Vegetarian	7		5	
Mixed	23		25	
Bad Habits				
Smoking	8	X^2 =16.3487 d.f= 6 p= 0.012 Significant	6	X^2 =15.9546 d.f= 6 p= 0.014 Significant
Alcohol	7		6	
both	10		10	
none	5		8	
Duration of Type 2 DM				
<5 years	11	X^2 =17.3748 d.f= 6 p= 0.008 Significant	9	X^2 =16.1443 d.f= 6 p= 0.013 Significant
6 – 10 years	11		3	
11 – 15 years	5		8	
>15 years	3		10	

The table 9 shows that in the experimental group, the demographic variable education (χ^2 = 12.2803, p= 0.056) had shown statistically not significant with the level of the lower extremity perfusion in the experimental group. All the other variables show statistical significance with the level of lower extremity perfusion in the experimental group. The experimental group, the demographic variable education (χ^2 = 11.9541, p= 0.063) had shown statistically not significant with the level of the lower extremity perfusion in the experimental group. All the other variables show statistical significance with the level of lower extremity perfusion in the control group.

Discussion

Study results revealed that ABI mean scores before performing Buerger exercises in the right and left legs were 885 and 937 respectively, while the mean scores after were 1.097 and 1.086, in the right and left legs respectively. According to WHO index for blood pressure, the study findings regarding blood pressure showed that participants were in the pre-hypertension category which means that they are at increased risk for developing

hypertension and subsequently impaired peripheral circulation especially that they are diabetics. This is congruent with Makin10 and Priya11, who reported that the diabetic patients, with elevated blood pressure, long disease duration and obesity; are at a greater risk to develop impaired circulation of lower extremities. Regarding the results related to the 2nd post interventionwhichwasassessedafter15days, a significant difference and acceptable level of improvement of ABI mean scores was presented as there was an observable shift from each category to another. In a simple way, the participants improved from mild-moderate ABI to borderline and from borderline to normal. This means that performing Buerger exercises for 15 days is more effective in improving peripheral circulation. So, the 2nd hypothesis was supported and verified. These results were supported and concurrent with 12-14 who reported a significant difference after using exercises for15days as recommended [24].

Based on research findings, the Buerger Allen exercise has been shown to effectively boost peripheral blood circulation. Diabetic patients who underwent the Buerger Allen exercise intervention reported experiencing reduced tingling and cramping in the leg area, decreased pain (intermittent claudication), and an improvement in peripheral circulation as indicated by changes in the ankle brachial index [10]. Consistent with previous studies, determined that the Buerger Allen exercise is crucial in the therapeutic process of diabetic foot wounds. By altering the technique of gravity in the lower extremities and incorporating muscle contraction through dorsiflexion and plantar flexion movements at the ankles, the Buerder Allen exercise can enhance peripheral blood vessel circulation [21].

The study shows that the Buerger Allen exercise is effective in enhancing peripheral blood circulation. Diabetic patients experienced reduced tingling and cramping in the legs, alleviated pain (intermittent claudication), and improved peripheral circulation as measured by changes in the ankle brachial following the Buerger Allen exercise intervention [10]. Consistent with previous studies, determined that the Buerger Allen exercise is crucial in the healing process of diabetic foot wounds. The Buerger Allen exercise can enhance circulation in peripheral blood vessels by altering the gravitational technique in the lower limbs (lower extremities) and engaging muscle contractions through variations in dorsiflexion and plantar flexion movements at the ankles [21].

Study revealed that there was a significant improvement in lower extremity perfusion and reduction in pain. Therefore, it was concluded that Buerger Allen exercise was found to be effective on improving the lower extremity perfusion and reducing pain among patients with type 2 diabetes mellitus the mean score of level of lower extremity pain was reduced from 4.33 to 1.30. The reduction of pain was statistically significant difference at 1% level of significance [14].

Study was conducted to evaluate the effectiveness of Buerger Allen exercise on improving lower extremity perfusion among patients with type II diabetes mellitus in selected hospitals at Erode, the findings revealed that there no significant association between the mean post-test level of lower extremity perfusion with demographic variables at $p<0.05$ level of significance in experimental group. The results of the study concluded that practicing Buerger Allen exercises improved the lower extremity perfusion among patients with type II Diabetes mellitus [25].

Conclusion

The findings of the study showed that the posttest level of lower extremity perfusion on Buerger's allen exercise was statistically significant at $p<0.05$ in the experimental

group. Hence it could be concluded that there will be an association between diabetes mellitus and Buerger's allen exercise. The study shows that the effectiveness of Buerger Allen Exercise on lower extremity perfusion among patients with type 2 diabetes mellitus between the posttest experimental and control group the mean score value 0.9 in experimental group and 0.8 in control group. The variance of pre-test was 0.05 and post-test was 0.07. The calculated paired 'F' value = 0.7258 which was found to be statistically significant at $p<0.05$ level. This clearly infers that there is a significant difference between the pretest and post-test levels of lower extremity perfusion.

Ethical Approval

Got approval from Saveetha medical college and Hospital.

Authors Contribution

All the authors actively participated in the work of the study. All authors read and approve the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

Source of Funding

No.

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