



“A STUDY TO ASSESS THE EFFECTIVENESS OF BUERGER ALLEN EXERCISE IN IMPROVING THE PERIPHERAL CIRCULATION OF LOWER EXTREMITIES AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS IN SELECTED AREAS OF SOUTH GUJARAT.”

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ABSTRACT

Introduction : Type 2 diabetes is a chronic disease which is characterized by high levels of sugar in the blood. **Aim of the study**: are to assess the effectiveness of Buerger Allen exercise in improving the peripheral circulation of lower extremities among patients with type 2 diabetes mellitus in selected areas of south Gujarat and find out the association between the pre-test level of peripheral circulation of lower extremities and selected demographic variable. **Method** : Quantitative research approach with quasi- experimental design was adopted for this study. A total 60 participants (30 in experimental and 30 in control group) were selected by Non probability purposive sampling technique. Data were collected by using demographic variables, structured assessment tool and ankle brachial index scale. **Result** : The result reveal that the calculated value of $t = 23.46$ which is greater than the table value of $t = 2.05$ in experimental group while in control

group the calculated value of $t = -4.98$ which is lesser than the table value of $t = 2.05$ at the level of $p \leq 0.05$ in structured assessment tool and in ABI the calculated value of $t = 17.64$ which is greater than the table value of $t = 2.05$ in experimental group and in control group the calculated value of $t = -7.19$ which is lesser than the table value of $t = 2.05$ at the level of $p \leq 0.05$. **Conclusion:** The data shows that in both the tool in experimental group the t value is more than the calculated value while in control group its lesser than the calculated value. Thus there is a significant effect of the Buerger Allen exercise in improving the peripheral circulation of lower extremities among patients with type 2 diabetes mellitus.

Key words : Buerger Allen exercise, peripheral circulation, type 2 Diabetes Mellitus

INTRODUCTION

Diabetes Mellitus is a chronic multisystem disease which is characterized by hyperglycemia related to abnormal insulin production, impaired insulin utilization, or both. It is a serious health problem throughout the world, and its prevalence is rapidly increasing. India is fast gaining the title of diabetic capital of the world with 69.1 million people with diabetes, second only to China number of cases. The major classifications of diabetes are Type 1 diabetes, Type 2 diabetes, gestational diabetes, and Diabetes Mellitus associated with other conditions or syndromes.

Type 2 Diabetes Mellitus was earlier called as non-insulin dependent Diabetes. 90 to 95% of people with diabetes have Type 2 Diabetes Mellitus. The two main issues related to insulin in Type 2 diabetes are insulin resistance and impaired insulin secretion. Sometimes the amount of insulin is normal or even high, but because the tissues are resistant to it, hyperglycemia results. Heredity is responsible for up to 90% of cases of Type 2 diabetes.

In Type 2 Diabetes Mellitus, the high blood glucose levels cause fatty deposits to form inside blood vessels. Over time, these deposits make blood vessels narrow, hard and lessening blood flow or poor circulation. Reduced blood flow through peripheral blood vessels characterizes peripheral vascular diseases. The degree to which tissue demands exceed the supply of oxygen and nutrients available determines the physiological implications of changing blood flow. Even slightly decreased blood flow may not be sufficient to sustain tissue integrity if tissue requirements are high. If sufficient blood flow is not restored, tissues succumb to ischemia, suffer from malnutrition, and eventually perish. Patients with poor circulation may experience numbness and tingling sensation, swelling, cold skin, cyanosis, pain etc. Buerger-Allen Exercise is one of the types of exercise performed to promote Lower Extremity Perfusion whereby promoting the wound healing process among Diabetes Mellitus patients.

STATEMENT OF THE PROBLEM

“A study to assess the effectiveness of Buerger Allen exercise in improving the peripheral circulation of lower extremities among patients with Type 2 Diabetes Mellitus in selected areas of South Gujarat.”

OBJECTIVES OF THE STUDY

- To assess the level of peripheral circulation of lower extremities among patients with Type 2 Diabetes Mellitus in experimental and control group.
- To determine the effectiveness of Buerger Allen exercise on peripheral circulation of lower extremities among patients with Type 2 Diabetes Mellitus in selected areas of South Gujarat.
- To find association between the pre-test level of peripheral circulation of lower extremities with selected socio demographic variables among patients with Type 2 Diabetes Mellitus in selected areas of South Gujarat.

ASSUMPTIONS

- Patient with Type 2 Diabetes Mellitus may have poor peripheral circulation
- Allen Buerger exercise may improve the peripheral circulation among patients with Type 2 Diabetes Mellitus

HYPOTHESIS

- **H1:** There is a significant effect of Buerger Allen exercise on peripheral circulation of lower extremities among patients with Type 2 Diabetes Mellitus in selected areas of South Gujarat at level of significance $p \leq 0.05$.
- **H2:** There is a significant association between the pre-test level of peripheral circulation of lower extremities and selected socio demographic variables among patients with Type 2 Diabetes Mellitus in selected areas of South Gujarat at level of significance $p \leq 0.05$.

DELIMITATION:

The study is limited to,

- Patients with Type -2 Diabetes Mellitus
- Data collection period limited to 4 weeks only
- Sample size is 60 only. (30 in experimental group & 30 in control group)

OPERATIONAL DEFINITION

Assess

In this study it refers to evaluate the effectiveness of Buerger Allen exercise in improving the peripheral circulation among patients with Type 2 Diabetes Mellitus.

Effectiveness

In this study it refers to improvement in the peripheral circulation of lower extremities among patients with Type 2 Diabetes Mellitus after performing Buerger Allen exercise.

Buerger Allen exercise

In this study it refers to specific exercise to improve the peripheral circulation of lower extremities among patients with Type 2 Diabetes Mellitus.

Peripheral circulation

In this study it refer to distribution of the blood flow at peripheral area of lower extremities when assessed by Structured assessment tool and ABI (Ankle brachial index) scale among the patients with Type 2 Diabetes Mellitus.

Patient

In this study it refer to a person who is having poor peripheral circulation of lower extremities among Type - 2 Diabetes Mellitus

Type 2 Diabetes Mellitus

In this study it refer to non-insulin dependent Diabetes Mellitus.

Areas

In this study it refer to rural area with estimate of 3162 populations.

RESEARCH METHODOLOGY

REASERCH APPROACH: Quantitative research approach

RESEARCH DESIGN: Quasi Experimental Research Design

VARIABLES:

- **Research variables:**

Independent variable: Allen Buerger exercise

Dependent variable: Peripheral circulation of lower extremities

- **Demographic Variables** Age, Gender, Marital status, Dietary pattern, Type of job, Practices, Use of medication, Duration of Type 2 mellitus, History of other disease.

RESEARCH SETTING: Selected Areas of south Gujarat

POPULATION AND SAMPLE:

POPULATION: Patient with Type 2 Diabetes Mellitus

SAMPLE: 60 Type 2 Diabetic Mellitus patients (30 in Experimental group & 30 in control group)

SAMPLING TECHNIQUE: Non probability purposive sampling technique

DESCRIPTION OF TOOL:

Final tool consisted of three parts:

SECTION I: SOCIO- DEMOGRAPHIC DATA:

It consist of selected socio demographical variable such as Age, Gender, Marital status, Dietary pattern, Type of job, Practices, Use of medication, Duration of Type 2 Diabetes Mellitus , History of other disease.

SECTION II: STRUCTURED ASSESSMENT TOOL

SR. NO.	ASSESSMENT CRITERIA	INTERPRETATION	PRE- TEST		POST-TEST		REMARK
			RIGHT LEG	LEFT LEG	RIGHT LEG	LEFT LEG	
1	Pain	A) Absent					
		B) Present					
2	Numbness and tingling sensation	A) Absent					
		B) Present					
3	Capillary refill test	A) Positive (≤ 2 sec)					
		B) Negative(>2 sec)					
4	Temperature on touch	A) Warm					
		B) Cold					
5	Oedema	A) Absent					
		B) Present					
6	Cyanosis	A) Absent					
		B) Present					
7	Pale skin	A) Absent					
		B) Present					
8	Presence of sore and necrosis	A) Absent					
		B) Present					
9	Hypoxemia	A) Absent ($<90\%$)					
		B) Present ($>90\%$)					
10	Pulse(Rate and Rhythm)	A) Appropriate (normal)					
		B) Inappropriate (absent, diminished)					

SECTION III: ANKLE BRACHIAL INDEX (ABI) SCALE

ABI VALUE	INTERPRETATION	PRE- TEST		POST-TEST	
		RIGHT LEG	LEFT LEG	RIGHT LEG	LEFT LEG
1.0-1.4	Normal				
0.9-1.0	Acceptable				
0.8-0.9	Some Arterial Disease				
0.5-0.8	Moderate Arterial Disease				
Less than 0.5	Severe Arterial Disease				

RESULTS**SECTION I: DESCRIPTION OF SOCIO DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS**

SOCIO VARIABLE	DEMOGRAPHIC	EXPERIMENTAL GROUP N=30 (%)	CONTROL GROUP N=30 (%)
AGE	41-50 years	14(46.66%)	6(20%)
	51-60 years	9(30%)	3(10%)
	61-70 years	5(16.66%)	7(23.33%)
	71-80 years	2(6.66%)	14(46.66%)
GENDER	Male	11(36.66%)	14(46.66%)
	Female	19 (63.33%)	16(53.33%)
MARITAL STATUS	Married	27(90%)	23(76.66%)
	Unmarried	0(0%)	0(0%)
	Widow/ Widower	3(10%)	7(23.33%)
	Divorcee	0(0%)	0(0%)
DIETARY PATTERN	Vegetarian	7(23.33%)	22(73.33%)
	Non vegetarian	23(76.66%)	8(26.66%)

TYPE OF JOB	Sedentary work	3(10%)	2(6.66%)
	Moderate Work	3(10%)	6(20%)
	Heavy Work	20(66.66%)	19(63.33%)
	Not working	4(13.33%)	3(10%)
PRACTICES	Habit (Smoking/ Alcohol/Tobacco)	2(6.66%)	11(36.66%)
	Eating habit (irregular/junk food)	4(13.33%)	0(0%)
	Exercise (Irregular/No exercise)	13(43.33%)	15(50%)
	All of above	5(16.66%)	1(3.33%)
	None	6(20%)	3(10%)
	USE OF MEDICATION	Yes	6(20%)
No		24(80%)	23(76.66%)
DURATION OF TYPE 2 DIABETES MELLITUS	< 5 year	23(76.66%)	16(53.33%)
	5-10 year	5(16.66%)	11(36.66%)
	>10 year	2(6.66%)	3(10%)
HISTORY OF OTHER DISEASE	Yes	8(26.66%)	12(40%)
	No	22(73.33%)	18(60%)
IF YES, SPECIFY?	Cardiovascular disease	1(3.33%)	2(6.66%)
	Renal disease	1(3.33%)	0(0%)
	Musculoskeletal disorder	2(6.66%)	9(30%)

	Neurological disorder	0(0%)	0(0%)
	None of above	4(13.33%)	1(3.33%)

SECTION II: COMPARISON OF THE OVERALL PRE-TEST AND POST-TEST LEVEL OF PERIPHERAL CIRCULATION OF LOWER EXTREMITIES ACCORDING TO STRUCTURED ASSESSMENT TOOL

PARAMETERS	PRE TEST(MEAN VALUE)				POST TEST (MEAN VALUE)			
	EXPERIMENTAL GROUP		CONTROL GROUP		EXPERIMENTAL GROUP		CONTROL GROUP	
	Right leg	Left leg	Right leg	Left leg	Right leg	Left leg	Right leg	Left leg
Pain	0.9	0.9	0.8	0.8	0.8	0.6	0.8	0.8
Numbness and tingling sensation	0.9	0.8	0.9	0.7	0.4	0.5	0.9	0.7
Capillary refill test	0.6	0.4	0.2	0.13	0.3	0.2	0.3	0.2
Temperature	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2
Oedema	0.7	0.5	0.4	0.5	0.6	0.3	0.9	0.6
Cyanosis	0.6	0.3	0.2	0.2	0.3	0.1	0.3	0.2
Pale skin	0.9	0.8	0.7	0.8	0.5	0.3	0.9	0.9
Presence of sore and necrosis	0.4	0.4	0.2	0.2	0.3	0.3	0.2	0.2
Hypoxemia	0.5	0.4	0.27	0.2	0.2	0.3	0.4	0.2

Pulse (Rate and Rhythm)	0.9	0.8	0.4	0.5	0.5	0.2	0.63	0.7
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SECTION III: COMPARISON OF THE OVERALL PRE-TEST AND POST-TEST PERCENTAGE DISTRIBUTION OF LEVEL OF PERIPHERAL CIRCULATION OF LOWER EXTREMITIES ACCORDING TO STRUCTURED ASSESSMENT TOOL

	PERIPHERAL CIRCULATION	ADEQUATE PERIPHERAL CIRCULATION	INADEQUATE PERIPHERAL CIRCULATION	POOR PERIPHERAL CIRCULATION
		<50%	50-75%	>75%
Experimental group	Pre test	27%	73%	0%
	Post test	73%	27%	0%
Control group	Pre test	57%	43%	0%
	Post test	50%	47%	3%

SECTION IV: COMPARISON OF THE OVERALL PRE-TEST AND POST-TEST LEVEL OF PERIPHERAL CIRCULATION OF LOWER EXTREMITIES ACCORDING TO ANKLE BRACHIAL INDEX

	OBSERVATION (PRACTICE)	SD	MEAN	MEAN DIFFERENCE	CALCULATED VALUE OF 'T'(PAIRED)	TABLE VALUE OF 'T'(PAIRED)	INFERENCE
Experimental group	Pre-test	0.80	2.8	1.6	17.64	2.05	Significant
	Post-test	0.48	1.2				
Control group	Pre-test	1.40	2.43	-0.7	-7.19	2.05	Non-significant
	Post test	1.30	3.13				

SECTION V: ASSOCIATION BETWEEN THE PRE-TEST LEVEL OF PERIPHERAL CIRCULATION OF LOWER EXTREMITIES AND SELECTED SOCIO DEMOGRAPHIC VARIABLE FOR STRUCTURED ASSESSMENT TOOL

SR.NO	SOCIO DEMOGRAPHIC VARIABLE	CATEGORY	TOTAL SCORE		CHI-SQUARE VALUE	TABLE VALUE	D.F	INFERENCE
			< M	≥ M				
1	AGE	41-50 years	10	10	2.03	7.82	3	Non-significant
		51-60 years	12	11				
		61-70 years	6	6				
		71-80 years	1	4				
2	GENDER	Male	12	13	0.001	3.84	1	Non-significant
		Female	17	18				
3	MARITAL STATUS	Married	24	26	0.007	7.82	3	Non-significant
		Unmarried	0	0				
		Widow/ Widower	5	5				
		Divorcee	0	0				
4	DIETARY PATTERN	Vegetarian	8	7	0.2	3.84	1	Non-significant
		Non vegetarian	21	24				
5	TYPE OF JOB	Sedentary work	3	2	2.53	7.82	3	Non-significant
		Moderate Work	6	3				
		Heavy Work	16	23				
		Not working	4	3				
6	PRACTICES	Habit (Smoking/Alcohol/Tobacco)	9	4	4.76	9.49	4	Non-significant
		Eating habit (irregular/junk food)	1	3				
		Exercise (Irregular/No exercise)	14	14				

		All of above	1	5				
		None	4	5				
7	USE OF OTHER MEDICATION	Yes	6	7	12.32	3.84	1	Significant
		No	23	24				
8	DURATION OF TYPE 2 DIABETES MELLITUS	< 5 year	17	22	22.76	5.99	2	Significant
		5-10 year	11	6				
		>10 year	1	3				
9	HISTORY OF OTHER DISEASE	Yes	12	8	1.63	3.84	1	Non-significant
		No	17	23				
	IF YES, SPECIFY?	Cardiovascular disease	1	1				
		Renal disease	1	0				
		Musculoskeletal disorder	9	3				
		Neurological disorder	0	0				
		None of above	1	4				

SECTION VI : ASSOCIATION BETWEEN THE PRE-TEST LEVEL OF PERIPHERAL CIRCULATION OF LOWER EXTREMITIES AND SELECTED SOCIO DEMOGRAPHIC VARIABLE ACCORDING TO ABI INDEX

SR.NO	SOCIO DEMOGRAPHIC VARIABLE	CATEGORY	TOTAL SCORE		CHI-SQUARE VALUE	TABLE VALUE	DF	INFERENCE
			< M	≥ M				
1	AGE	41-50 years	4	16	36.99	7.82	3	Significant
		51-60 years	3	20				
		61-70 years	0	12				
		71-80 years	0	5				
2	GENDER	Male	5	20	2.88	3.84	1	Non-significant
		Female	2	33				
3	MARITAL STATUS	Married	7	43	1.43	7.82	3	Non-significant
		Unmarried	0	0				

		Widow/ Widower	0	10				
		Divorcee	0	0				
4	DIETARY PATTERN	Vegetarian	4	11	4.36	3.84	1	Significant
		Non vegetarian	3	42				
5	TYPE OF JOB	Sedentary work	0	5	2.41	7.82	3	Non- significant
		Moderate Work	0	9				
		Heavy Work	6	33				
		Not working	1	6				
6	PRACTICES	Habit (Smoking/ Alcohol/Tobacco)	2	11	0.34	9.49	4	Non- significant
		Eating habit (irregular/junk food)	0	4				
		Exercise (Irregular/No exercise)	3	25				
		All of above	1	5				
		None	1	8				
7	USE OF OTHER MEDICATION	Yes	1	12	21.21	3.84	1	Significant
		No	6	41				
8	DURATION OF TYPE 2 DIABETES MELLITUS	< 5 year	7	32	23.3	5.99	2	Significant
		5-10 year	0	17				
		>10 year	0	4				
9	HISTORY OF OTHER DISEASE	Yes	1	19	1.29	3.84	1	Non- significant
		No	6	34				
	IF YES, SPECIFY?	Cardiovascular disease	0	2				
		Renal disease	0	1				
		Musculoskeletal disorder	1	11				

	Neurological disorder	0	0			
	None of above	0	5			

DISCUSSION

A total 60 Type 2 diabetic individual who met the sampling criteria were selected by purposive sampling technique. The data were gather by structured assessment tool and ABI (ankle brachial index) scale used to assess the peripheral circulation.

Structured assessment tool shows that there were (27%) of Type 2 Diabetes Mellitus patient having adequate peripheral circulation in experimental group and (57%) in control group. Whereas (73%) of Type 2 Diabetes Mellitus patient having inadequate peripheral circulation in experimental group and (43%) in control group. Also, (0%) Type 2 Diabetes Mellitus patient having poor peripheral circulation in both group experimental and control. In post test (73%) of Type 2 Diabetes Mellitus patient having adequate peripheral circulation in experimental group and (50%) in control group. Further more (27%) of Type 2 Diabetes Mellitus patient having inadequate peripheral circulation in experimental group and (47%) in control group. Also, (0%) Type 2 Diabetes Mellitus patient having poor peripheral circulation in experimental group and (3%) in control group.

Also study shows that the calculated value of $t = 23.46$ which is greater than the table value of $t = 2.05$ in experimental group while in control group the calculated value of $t = -4.98$ which is laser than the table value of $t = 2.05$ at the level of $p \leq 0.05$ in structured assessment tool and in ABI the calculated value of $t = 17.64$ which is greater than the table value of $t = 2.05$ in experimental group and in control group the calculated value of $t = -7.19$ which is laser than the table value of $t = 2.05$ at the level of $p \leq 0.05$.

Research study show the association of peripheral circulation of lower extremities with use of medication, duration of Type 2 Diabetes Mellitus and history of other disease and no association with age, gender, marital status, dietary pattern, Type of job, practices through structured assessment tool and In ABI index the association of peripheral circulation of lower extremities Gujarat with age, dietary pattern, use of medication, duration of Type 2 Diabetes Mellitus and no association gender, marital status, Type of job, practices, and history of other disease.

CONCLUSION

A two group non-equivalent control group pre test post test research design, quasi experimental study was conducted on a samples of 60 diabetic individual (Type 2) through purposive sampling technique using structured assessment tool and ABI (ankle brachial index) scale to assess the peripheral circulation. The data collection of period is 4 week from 25/04/2022 to 21/05/2022 at selected areas of south Gujarat to assess the effectiveness of Buerger Allen exercise in improving the peripheral circulation of lower extremities among patients with Type 2 Diabetes Mellitus in selected areas of south Gujarat. The study reveal that the Buerger Allen exercise is improving the peripheral circulation of lower extremities among patients with Type 2 Diabetes Mellitus in selected areas of south Gujarat

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