

Family-Focused Educational Program Regarding The Buerger-Allen Exercise To Improve Lower Extremity Perfusion In Diabetes Mellitus Patients Among Household Members Residing In Selected Community Areas

Diksha Sharma, Manisha Dhairwal, Ms. Karishma Subodh, Saijal Devi, Sarabjeet, Shagun Thakur, Simran, Shreya Mankotia

Maharishi Markandeshwar College of Nursing, Kumarhatti, Solan, H.P.

ABSTRACT

INTRODUCTION: Diabetes Mellitus is a long-term metabolic condition marked by elevated blood sugar levels, resulting from the body's insufficient production of insulin or its ineffective use of the insulin it produces. According to the American Diabetes Association, Diabetes Mellitus is divided into two primary types: Type 1 Diabetes Mellitus and Type 2 Diabetes Mellitus.

AIM: To assess the effectiveness of Family-Focused Educational Program regarding the Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members.

METHODOLOGY: The research design selected for the study was One Group Pre-Test Post-Test Design under the Quantitative Research Approach. Convenient Sampling Technique was used to select the sample. Sample size were 100 Type 2 Diabetes Mellitus patients. The tools used for study were Socio-demographic variables, Clinical Profile, Family Focused Education Program and Self-Structured Knowledge questionnaire. The collected data were analysed by using descriptive and inferential statistics.

RESULTS: The finding of the study showed that Pretest mean score is 11.86 ± 3.327 and Post- test mean score is 20.07 ± 2.583 . There has been Significant difference between mean and standard deviation (8.21 ± 0.744) and The maximum 82% participants scored "Good" (16-23) followed by 12% scored "Excellent" (25-30), while only 6 % remained in the "fair" category (8-15). No subjects scored "Poor" (0-7) that showing significant improvement post-interventional knowledge. In term of association with socio-demographic variables, statistically significant association were found between post-knowledge scores that are Age ($p=0.015$), Religion ($p=0.000$), Marital status ($p=0.000$), Occupational status ($p=0.000$) and Monthly family income ($p=0.001$).

CONCLUSION: The result of the study concluded that practicing Buerger-Allen Exercise improved the lower extremity perfusion among Type 2 Diabetes Mellitus patients.

KEY WORDS: Family-Focused Educational Program, Buerger-Allen Exercises, lower extremity perfusion, Diabetes Mellitus.

INTRODUCTION

Diabetes Mellitus is a chronic metabolic disorder characterized by high blood sugar levels due to the body's inability to produce enough insulin or effectively use the insulin it does produce, whereas insulin is a hormone made by the pancreas cells that absorb glucose from the blood for energy.

When this process is disrupted, glucose remains in the bloodstream, leading to hyperglycemia, which over time can damage organs, nerves, and blood vessels. As per the etiological classification recognized by the American Diabetes Association, Diabetes Mellitus is classified into two main types- Type 1 Diabetes Mellitus and Type 2 Diabetes Mellitus.⁽¹⁾

Diabetes Mellitus is marked by resistance to insulin in body tissues and insufficient insulin production by pancreatic beta cells. Once commonly known as “adult-onset diabetes” due to its typical diagnosis later in life. It is associated with several complications including microvascular such as Retinopathy, Neuropathy and Nephropathy along with macrovascular complications like cardiovascular comorbidities.⁽²⁾

Globally, As World Health Organization states, an estimated 462 million people are affected with Diabetes Mellitus. In 2019, incidence and prevalence rate of Diabetes Mellitus was 2.2 million and 4.5 million cases respectively. In term of Diabetes Mellitus, China (116.4 million), India (70.0 million) and the United States of America (31.0 million) are recognized as the foremost countries exhibiting the highest burden of disease prevalence.⁽³⁾

According to the International Diabetes Federation (IDF) 2021, approximately 10.5% of the adult population aged 20 and 79 years were diagnosed with Diabetes Mellitus and by 2045, this is projected to rise up to 12.2%.⁽⁴⁾

India has 77 million diabetics, making it the second-largest country in the world after China. About 12.1 million of them are over 65, and by 2045, that number will have increased to 27.5 million. Nearly, 57% of adults with diabetes are undiagnosed in India, which is approximately 43.9 million.⁽⁵⁾

Under the Mukhyamantri Nirog Yojna, almost 50,000 persons in Himachal Pradesh have been identified for yearly population screening. The prevalence of Diabetes Mellitus in Himachal Pradesh is approximately 11.5%, higher than the national average of 9.8%, as research conducted by the Indian Council of Medical Research.⁽⁶⁾

According to a survey published in The Lancet Diabetes and Endocrinology, the prevalence rate of obesity in this state is 39%, compared to the national average of 2.2%. this suggests a notable rise in the number of individuals affected with both diabetes and obesity. “The state’s prevalence rates of diabetes and pre-diabetes are 13.5% and 18.7%, respectively, compared to the national average of 11.4% and 15.3%,” stated Dr. Jitender Mokta, the study’s primary investigator at Himachal Pradesh.⁽⁷⁾

Peripheral Artery Disease is a significant complication that develops when Peripheral Artery Disease and Diabetes Mellitus occur together, the risk of critical limb threatening ischemia increases which can lead to chances of limb amputation. Peripheral Artery Disease in diabetes can also contribute to functional impairment and long-term disability. According to hospital-based-studies, Peripheral Artery Disease is 2 to 7 times more prevalent in people with diabetes mellitus than in those without it, with rates between 9% and 55%.⁽⁸⁾

Several risk factors associated with Diabetes Mellitus which is broadly categorized into modifiable risk factors like body weight, physical activity levels, blood pressure and smoking habits and non-modifiable risk factor include family history, race, age, gestational Diabetes Mellitus.⁽⁹⁾ To manage diabetes and reduce modifiable risks, the Diabetic Plate Method offers a simple and effective dietary approach. It involves filling half the plate with non-starchy vegetables, one-quarter with lean protein, and one quarter with healthy carbohydrate, helping to control portions, stabilize blood sugar, support overall health.⁽¹⁰⁾

Diabetes Mellitus undergo routine wellness tests and result in a number of health issues. Excessive thirst, weight loss, increased appetite, fatigue, numbness, and recurrent infections are some warning indications that some people encounter. The Gold Standard test for Diabetes is the OGTT (Oral

Glucose Tolerance Test) found to be highly reliable for diagnosing both diabetes and prediabetes. While other test like HBA1C which is also known as glycated haemoglobin is a blood test that reflect the average blood glucose level over the past 2-3 months.⁽¹¹⁾

Proper perfusion is essential for maintain the function of lower extremities. Lower extremity perfusion refers to the blood flow that delivers oxygen and nutrients to the tissue of legs and feet. There are several factors that can affect the perfusion, such as vascular disease, diabetes, injuries, or blood clot and the signs of poor perfusion include cold or pale skin, slow healing process, weak pulse in the legs, numbness, and tingling sensation. Lower extremities perfusion can be assess using physical exams. Imaging techniques such as Ankle-Brachial Index test, Doppler ultrasound are used to evaluate blood flow more thoroughly.⁽¹²⁾

Buerger-Allen exercise was developed by Dr. Leo Buerger in 1924 and later modify by Dr. Arthur Allen in 1930 to help individuals with poor peripheral blood flow, often caused by conditions like peripheral arterial disease or diabetes.⁽¹⁴⁾ Buerger-Allen exercise is a low cost, non-surgical interventions designed to enhance peripheral circulation, particularly beneficial for individual with Diabetes Mellitus. This exercise is particularly advantageous in managing complication like Peripheral Artery Disease and Peripheral Neuropathy, which are common among individual with diabetes.⁽¹³⁾

It is also known as the “ Buerger-Allen exercises “ or “ Calf Muscles exercises” and it is found beneficial for patient with conditions that affect blood flow, especially those with Peripheral Artery Disease by improving lower extremities perfusion which is crucial to reducing risks like ulcers and amputation. This exercise comprises main position leg elevation, dependency and rest phases, targets improved blood flow and can alleviated symptoms of peripheral artery disease that is Peripheral Artery Disease, a common complication in diabetic patients. It involves a series of three phases: elevating the legs to drain venous blood, lowering the legs to lets blood flow back into the extremities, and then resting in a horizontal position to stabilize circulation. The exercise is simple but effective , making it suitable for individual who need to boost lower limb circulation safely.⁽¹⁴⁾

Ms. T. S. Lamkang, Mrs. A., S and Mrs. M. Gowri, P. 2017, conducted a study entitled “Effectiveness of Buerger-Allen exercise on level of lower extremity perfusion among patient with Diabetes Mellitus, Saveetha Medical College and Hospital, Chennai”. Finding of the study were that numerous patient diagnosed with Diabetes Mellitus experienced Peripheral Artery Disease as a result of insufficient blood flow to the lower extremities. The study concluded that nurses play a crucial role in teaching patients how to perform Buerger-Allen Exercise. Result showed that according to the Ankle-Brachial Index, patient with Diabetes Mellitus who participated in the experimental group experienced a substantial improvement in lower extremities perfusion following Buerger- Allen Exercise compared with the control group.⁽¹⁵⁾

Buerger-Allen exercise offer a number of benefits. Leg pain and inadequate lower extremity perfusion are further alleviated by increasing blood flow to the lower extremities. By promoting regular blood flow and preventing consequences including tissue damage, ulcer formation, and skin disintegration, it also helps to prevent blood clots from forming. Buerger- Allen exercise can improve overall vascular health and help individuals with venous insufficiency by reducing swelling brought on by fluid accumulation by raising the legs.⁽¹⁶⁾

METHODOLOGY

To achieve the desired objectives pre-experimental research (one group pre-test post-test design) was adopted with quantitative research approach. Study was conducted in community areas of District Solan, Himachal Pradesh. Data was collected in the month of February 2025. Data was collected from 100 Type 2 Diabetes Mellitus patients by using convenient sampling technique to see the effectiveness of Family-Focused Educational Program regarding the Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members. The following inclusion criteria was used to determine the participation in the study:

1) Subjects who were willing to participate in the study. 2) Subjects who were diagnosed with

Type 2 Diabetes Mellitus since past 3 years or more. 3) Subjects with Glucose level more than or equal to 160 mg/dl. Data was collected by sociodemographic variables, it includes: Age (in years), gender, educational status, religion, residential area, marital status, occupational status. Clinical Variables tool which includes Duration of Illness, any family history of Diabetes Mellitus, Previous Random Blood Sugar/Fasting Blood Sugar Level, Dietary Management, Perform Regular Exercise and Hypoglycaemic Medication. Self-Structured Knowledge Questionnaire tool was also used during the study to assess the level of knowledge regarding Buerger-Allen Exercise. It comprises total 30 questions about Diabetes Mellitus, Buerger-Allen Exercise, its positive effects, and the procedure to be followed. It was used to assess the level of knowledge regarding Buerger-allen Exercise to prevent lower extremity perfusion in Diabetes mellitus patients among household members residing in selected community areas of District Solan with scoring 0-7 (Poor knowledge), 8-15 (Fair knowledge), 16-23 (Good knowledge) and 24-30 (Excellent knowledge). In order to validate the applicability of tool in this study, validation was taken from 9 experts whereas reliability of tool SPSS statistics 23, the Spearman-Brown Split-Half correlational formula was used. The calculated reliability value turned out to be 0.83 for pre knowledge scores and 0.80 for post knowledge scores. Ethical permission was taken from the information ethical committee of university (IEC). Data was analyzed in accordance with study's objectives using descriptive and inferential statistics such as frequency and percentage distribution, mean, standard deviation, chi square.

DATA COLLECTION

A Self-Structured Knowledge Questionnaire was pilot tested. The population of research consisted of Type 2 Diabetes Mellitus patients among household members of selected community area of District Solan, Himachal Pradesh. When power analysis was performed the sample size was calculated with 5% error level, 95% confidence interval and percentage proportion of picking up is 93%. It was found that approximately 100 Type 2 Diabetes Mellitus patients were needed. It took around 15-20 minutes for data collection.

INTERVENTION

The study's inclusion and exclusion criteria were used to select the sample. The data was collected using interview technique (pen and paper). The final set of data was gathered in the month of February 2025. The participants were given an introduction to study's purpose and themselves in order to built rapport. The goal of the study was described and participants were asked to rate honest response. The participants gave their written consent. They were asked to fill the sociodemographic details then their clinical variables were assessed and documented. Self- Structured Knowledge Questionnaire were used to assess the level of knowledge regarding the Buerger-Allen Exercise. After assessment Family-Focused Educational Program regarding Buerger-Allen Exercise was given by explaining the purpose and benefits of doing the exercise and demonstration of the Buerger-Allen Exercise was done as well.

STEPS OF PROCEDURE:- 1) First, the patient lies flat on the plinth with legs elevated to 45 degrees angle until the skin become pale, it will take approximately 3 minutes to occur, and this time varies from one individual to another. 2) Next, the patient sits at the edge of the plinth with feet hanging and doing the following exercises: dorsiflexion, plantar flexion, inversion, eversion, and flexion the extension of toes, this phase may also be maintained for 5 minutes. 3) Finally, the patient lies flat again with their legs positioned horizontally and covered with a warm blanket for approximately 2 minutes. 4) The exercise routine is recommended to be performed three time daily, with each complete cycle repeated three times. The duration of each phase can be adjusted according to the patient's tolerance level and the speed of color change in the extremities.

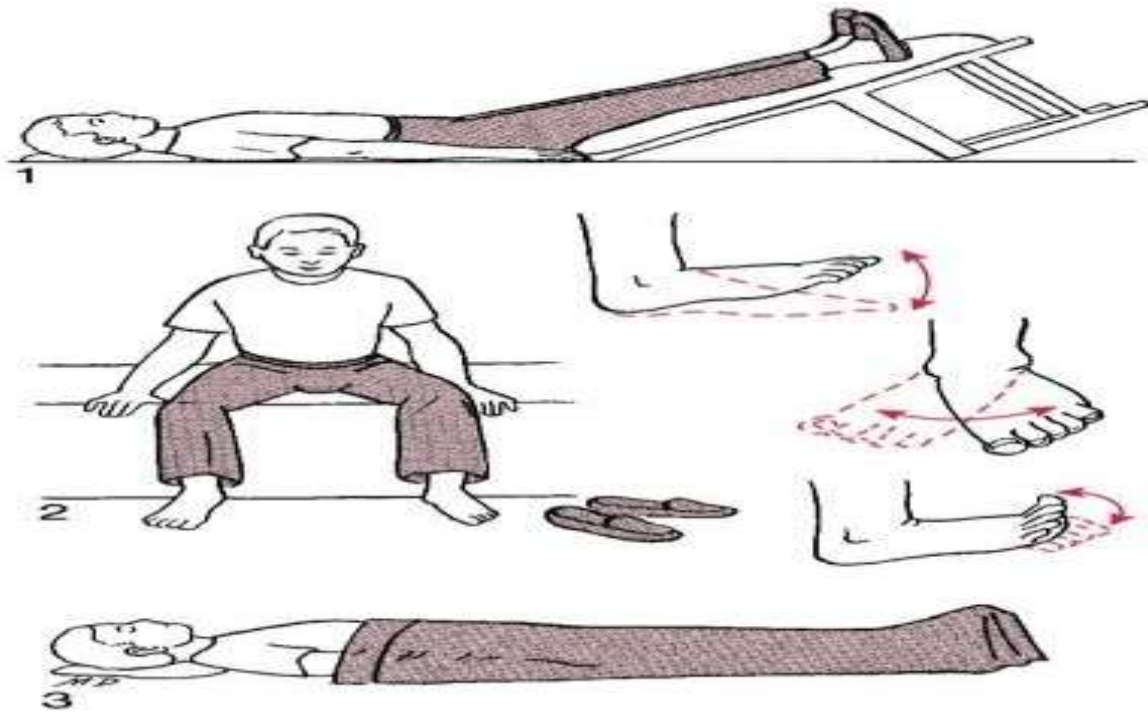


Fig.3.1 Diagram of Buerger-Allen Exercise

BENEFITS:- 1) Buerger exercise are recognized as important preventive measures and are clinically proven to enhance circulation and manage various complications related to diabetic foot in diabetic patients. 2) It also helps to reduce the symptoms of nerve damage (peripheral neuropathy) in people with diabetes. 3) It promotes healing process. 4) It improves lower extremity perfusion.

IN INTERVENTIONAL GROUP:-

The data was used for scientific purpose and the individual data was kept confidential. The investigator took informed consent from participants after it researcher explained the purpose of study to participants and assured for maintaining of confidentiality. The prepared sociodemographic variables and clinical variables were assessed. Initial assessment was done using Self-Structured Knowledge Questionnaire. Initially, pre-test was conducted. On the next day of pre-test, intervention was provided to the group. Post-test was conducted on 7th day and 14th day.

Interventional group:-

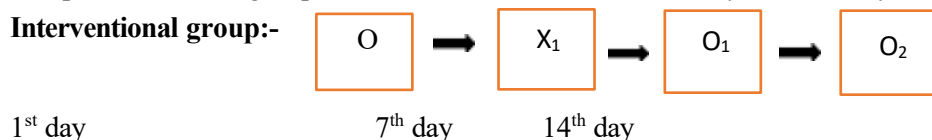


Fig.3.3 Schematic representation of research design:

Keys:-

O – Pre-test on first day

X₁ – Family-Focused Educational Program

O₁ – Post-test on 7th day

O₂ – Post-test on 14th day

Data was analyzed on the basis of objective of the study. Descriptive and inferential statistics such as Frequency and Percentage distribution, mean, standard deviation, chi square. Calculations were carried manually with the calculator and with the help of SPSS statistics version 23.

OBJECTIVES OF THE STUDY

1. To assess the pre knowledge scores regarding Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members.
2. To implement Family-Focused Educational Program regarding Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members.
3. To assess the post knowledge scores regarding Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members.
4. To compare the pre and post knowledge scores regarding Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members.
5. To find out the association between the post knowledge scores regarding Buerger- Allen exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members with selected socio-demographic variables.

RESULTS

Findings related to Socio-demographic and Clinical profile by using frequency and percentage in Interventional group .

TABLE 4.1. FINDINGS RELATED TO SOCIO-DEMOGRAPHIC VARIABLES USING FREQUENCY AND PERCENTAGE IN INTERVENTIONAL GROUP.

N=100

SOCIO-DEMOGRAPHIC VARIABLES	CATEGORY	f (%)
Age	35-45	12
	46-56	26
	57-67	28
	≥ 68	34
Gender	Male	50
	Female	50
	Other	00
Educational Status	Illiterate	20
	Primary	24
	Secondary	35
	Graduate	21
	Postgraduate	00
Religion	Hinduism	99
	Muslim	00
	Sikh	00
	Christian	01
Residential Area	Urban	42
	Rural	58
Marital Status	Never Married	00
	Married	89

Occupational Status	Separated	00
	Widow	11
	Government Job	08
	Private Job	16
	Farmer	50
Monthly Family Income (in Rupees)	Self-employed	26
	≤ 10,000	31
	10,001-40,000	50
	40,001-70,000	19
	≥ 70,001	00

***Significant (p<0.05)**

NS

Non Significant (p>0.05)

TABLE 4.1 represent the demographic characteristics of subjects in the interventional group. In terms of age distribution, maximum (34%) patients belong to age group of ≥68 years followed by (28%) were of 57-67 years age group followed by (26%) were of 46-56 years age group and minimum (12%) lied between the age group of 35-45 years.

Gender distribution was equal, with (50%) male and (50%) female patients.

Regarding the educational status, the majority (5%) had completed secondary education followed by (24%) had primary education followed by (21%) were graduates and minimum (20%) were illiterate.

In terms of religion, maximum (99%) were Hindu and minimum (1%) were Christian.

When looking at the residential area, (58%) of participants lived in rural regions, while (42%) were from urban areas.

Marital status showed that a significant majority (89%) were married followed by (11%) being windows.

Occupational data revealed that majority (50%) of the patients were farmers followed by (26%) were self-employed followed by (16%) were private employees and minimum (8%) were employed in government jobs.

Regarding monthly family income, maximum (50%) of the patients had an income ranging from 10,001-40,000 rupees followed by (31%) earned ≤10,000 rupees and the remaining (19%) had an income between 40,001-70,000 rupees.

TABLE 4.1.1: FINDINGS RELATED TO CLINICAL PROFILE BY USING FREQUENCY AND PERCENTAGE IN INTERVENTIONAL GROUP.

N=100

CLINICAL VARIABLES	CATEGORY	f (%)
Family History of Diabetes Mellitus	Yes	47
	No	53
Duration of Illness	<05 years	26

	5-10years	45
	>10 years	29
Previous RBS/FBS	Less than 160 mg/dl	13
	160 mg/dl	33
	More than 160 mg/dl	54
Exercise Regularly	Yes	23
	No	77
Dietary Habits	Vegetarian	75
	Non-Vegetarian	25
Hypoglycemic Medication	Yes	83
	No	17
Previous Knowledge related to Diabetes Mellitus	Yes	58
	No	42
Body Mass Index	<18.5	3
	18.5-24.9	38
	25-29.9	45
	>30	14

TABLE 4.1.1 depicts the information about the several characteristics of the study participants. It shows that the majority of patients (53%) had no family history of Diabetes Mellitus, while (47%) had the family history of Diabetes Mellitus.

Regarding duration of illness, majority (45%) had been Diabetic for 5-10 years followed by (29%) who had the condition for >10 years and minority (26%) who were diagnosed <5 years.

In terms of previous blood sugar levels (RBS/FBS), maximum (54%) of patients had values exceeding 160 mg/dl followed by (33%) had exactly 160 mg/dl and minimum (13%) recorded levels below 160 mg/dl.

When examining lifestyle habits, majority (77%) patients didn't exercise routinely while minority (23%) patients exercised regularly.

Dietary patterns revealed that the majority (75%) patients followed a vegetarian diet whereas minimum (25%) were non-vegetarian.

The use of Hypoglycaemic medication was also notable, maximum (83%) patients were using hypoglycemic medication and minimum (17%) of patients didn't use hypoglycemic medication.

In term of awareness, majority (58%) had previous knowledge related to Diabetes Mellitus whereas minority (42%) patients were unaware.

Lastly, the BMI distribution showed that maximum (45%) patients BMI ranged between 25-29.9 followed by (38%) lied between 18.5-24.5 followed by (14%) patients BMI was >30 and minimum (3%) patients BMI was <18.5.

Assessment of the pre knowledge scores regarding Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members.

TABLE 4.2. Findings related to pre knowledge scores regarding Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members.

INTERVENTIONAL GROUP

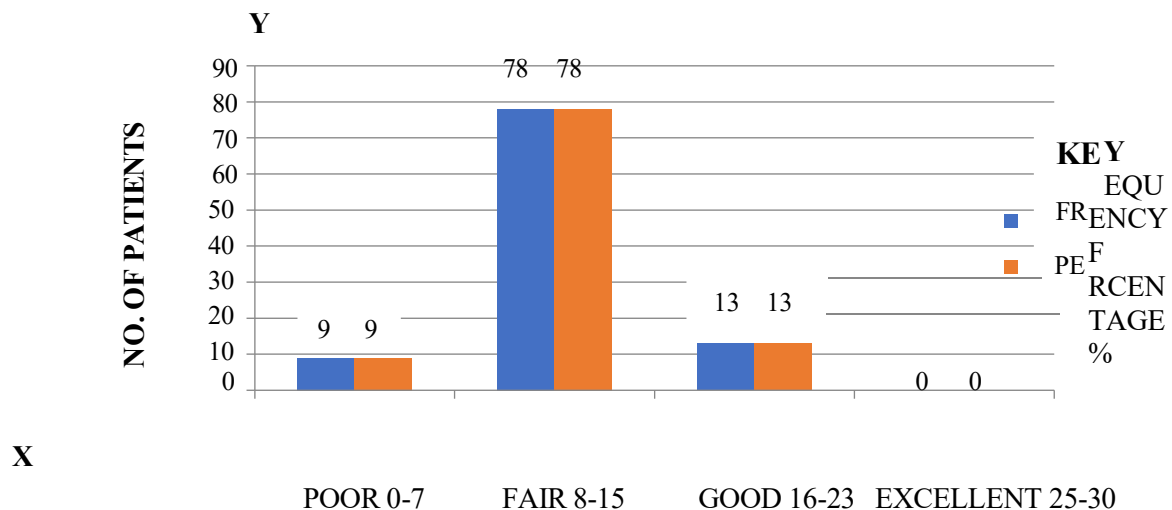
N=100

Level of Knowledge	Pre-Test		
	Frequency (f)	Percentage (%)	Mean±SD
POOR (0-7)	09	09	11.86 ±3.327
FAIR (8-15)	78	78	
GOOD (16-23)	13	13	
EXCELLENT (25-30)	00	00	

Maximum score = 30

Minimum score = 00

TABLE 4.2 displays the information about the pre-test knowledge scores regarding Buerger- Allen Exercise; maximum (78%) of subjects were having fair knowledge (8-15) followed by 13% subject were having good (16-23) and minimum (9%) of subjects were having knowledge was Poor (0-7). Pretest mean score and standard deviation is **11.86 ±3.327**.



LEVEL OF KNOWLEGE

Fig. 4.1 Frequency and Percentage distribution of Pre-test knowledge scores

Assessment of the post knowledge scores regarding Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members.

TABLE 4.3: Findings related to assess the post knowledge scores regarding Buerger- Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members.

INTERVENTIONAL GROUP

N=100

Level of Knowledge	Post-Test		
	Frequency (f)	Percentage (%)	Mean±SD
POOR (0-7)	00	00	20.07±2.583
FAIR (8-15)	06	06	
GOOD (16-23)	82	82	
EXCELLENT (25-30)	12	12	

Maximum score = 30

Minimum score = 00

TABLE 4.3 depicts the information about the post-test knowledge scores regarding Buerger- Allen Exercise; maximum (82%) of patients were having good knowledge (16- 23) followed by 12% subjects were having Excellent knowledge (25- 30) as 6% of subjects were having minimum scores. Post-test mean score is **20.07 ±2.583**.

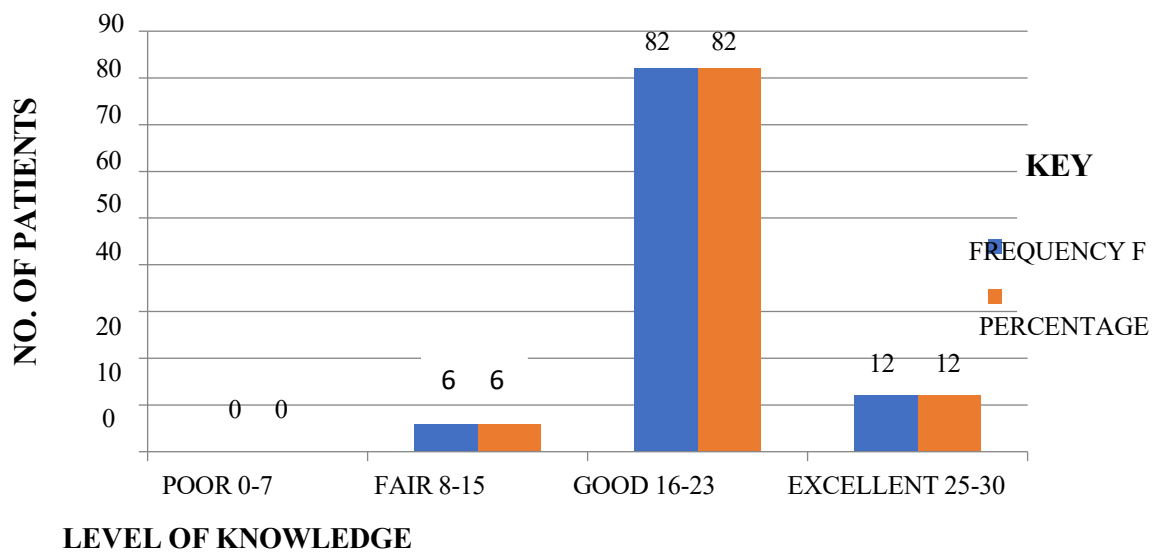


Fig. 4.2 Frequency and Percentage distribution of Post-test knowledge scores

Comparison of the pre and post knowledge scores regarding Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members.

TABLE 4.4: Findings related to comparison of the pre and post knowledge scores regarding Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members.

INTERVENTIONAL GROUP

N=100

	Mean±SD	Mean Difference	Paired T Test	p value
Pre-Test	11.86±3.327	8.21±0.744	-23.420	0.00*
Post-Test	20.07±2.583			

*Significant (p<0.05)
(p>0.05)

NS Not Significant

Maximum score = 30

Minimum Score = 00

TABLE 4.4 shows the information about the pretest mean score was **11.86±3.327** and 20.07±2.583 was post-test mean score. Here computed t = -23.420 which indicate that it is highly significant at 0.05 level. Significant difference has been found between mean and standard deviation that was 8.21±0.744 in pre-test and post-test scores.

Hence, alternative hypothesis (H1) is accepted. That is there will be a significant difference between the pre and post knowledge scores regarding Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members residing in selected community areas of District Solan, significant level at p<0.05.

Find out the association between the post knowledge scores regarding Buerger-Allen exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members with selected socio-demographic variables.

TABLE 4.5 Findings related to find out association of the post knowledge scores regarding Buerger-Allen Exercise to improve lower extremity perfusion in Diabetes Mellitus patients among household members with selected socio-demographic variables.

Chi-Square analysis showing the association between socio-demographic variables with Post-test knowledge scores in Interventional group.

INTERVENTIONAL GROUP

N=100

Socio- Demographic Variables	Categories	Level of Knowledge f %	χ^2	df	p value

		Poor	Fair	Good	Excellent			
Age	35-45	00	00	09	03	10.400	3	0.015*
	46-56	00	03	19	04			
	57-67	00	01	23	04			
	≥ 68	00	01	32	01			
Gender	Male	00	04	40	06	0.000	1	1.000 ^{NS}
	Female	00	02	42	06			
	Others	00	00	00	00			
Educational Status	Illiterate	00	01	17	02	5.680	3	0.128 ^{NS}
	Primary	00	01	21	02			
	Secondary	00	02	28	05			
	Graduate	00	02	16	03			
	Postgraduate	00	00	00	00			
Religion	Hinduism	00	06	81	12	96.040	1	0.000*
	Muslim	00	00	00	00			
	Sikh	00	00	00	00			
	Christian	00	00	01	00			
Residential Area	Urban	00	04	32	06	2.560	1	0.110 ^{NS}
	Rural	00	02	50	06			
Marital Status	Never Married	00	00	00	00	60.840	1	0.000*
	Married	00	05	71	12			
	Separated	00	01	10	00			
	Widow	00	00	00	00			
Occupational Status	Government Job	00	01	07	00	39.840	3	0.000*
	Private Job	00	01	14	01			
	Farmer	00	04	42	04			
	Self-employed	00	00	19	07			
Monthly Family Income	≤ 10,000	00	02	24	05	14.660	2	0.001*
	10,001-40,000	00	00	45	05			
	40,001-70,000	00	04	14	01			
	≥ 70,001	00	00	00	00			

*Significant (p<0.05)
Significant(p>0.05)

NSNot

TABLE 4.5 depicts the association between post-test knowledge scores regarding the Buerger-Allen Exercise with selected sociodemographic variables among Type 2 Diabetes Mellitus Patients. The maximum 82% scored “Good” (16-23) followed by 12% scored “Excellent” (25- 30), while only 6 % remained in the “fair” category (8-15). No subjects scored “Poor” (0-7) that showing significant improvement post-interventional knowledge.

In term of association with socio-demographic variables, statistically significant association were found between post-knowledge scores that are Age ($p=0.015$), Religion ($p=0.000$), Marital status ($p=0.000$), Occupational status ($p=0.000$) and Monthly family income ($p=0.001$).

These results imply that subjects from older age groups, Hindu religion, married individuals, farmer, and those with lower to mid-level income were more likely to show higher knowledge levels after the educational program.

Conversely, variables such as gender, educational level and residential area did not show a statistically significant association with knowledge levels, implies Family-Focused Educational Program was broadly effective, regardless of gender, education, or location.

DISCUSSION:

While assessing the pre-test knowledge scores regarding Buerger-Allen Exercise; maximum (78%) of subjects were having fair knowledge (8-15) followed by 13% subject were having good (16- 23) and minimum (9%) of subjects were having knowledge was Poor (0-7). Pretest mean score is 11.86 ± 3.327 .

While assessing the post-test knowledge scores regarding Buerger-Allen Exercise; maximum (82%) of patients were having good knowledge (16-23) followed by 12% subjects were having Excellent knowledge (25- 30) as 6% of subjects were having minimum scores. Post-test mean score is 20.07 ± 2.583 .

These findings were consistent with the study conducted by Jasmi Manu and Pooja (2022) a study to evaluate the staff nurses' understanding of Allen Buerger's exercise in a chosen hospital in Kanpur, Uttar Pradesh. Data was collected by using Convenient sampling technique. The finding of the study revealed that knowledge levels among staff nurses: 29% had strong knowledge, 56% had average knowledge and 15% had low knowledge. Statistical data: Mean knowledge score: 24.68 and Standard deviation: 4.08.⁽³⁴⁾

Present study shows the information about the pretest mean score was 11.86 ± 3.327 and 20.07 ± 2.583 was post-test mean score. Here computed $t = -23.420$ which indicate that it is highly significant at 0.05 level. There is a Significant difference between mean and standard deviation (8.21 ± 0.744) in pre-test and post-test knowledge scores.

These findings were consistent with the study conducted by K.K Vinisha and Rani S. Rajina (2022) evaluated the effectiveness of an organized instruction program on the Buerger Allen Exercise in preventing varicose veins in traffic police station employees in Erode, Tamil Nadu. Data was collected by using Convienient sampling technique. The finding of the study revealed that Buerger Allen Exercise taught to petrol station worker through a structured teaching program, was successful. In pre-test, Mean score- 12.12 with Standard deviation- 4.70. In post- test, Mean score- 28.12 and Standard deviation- 2.76, (MD = 16.00).⁽³⁵⁾

Present study shows the association between post-test knowledge scores regarding the Buerger-Allen Exercise with selected sociodemographic variables among Type 2 Diabetes Mellitus Patients. The maximum 82% scored “Good” (16-23) followed by 12% scored “Excellent” (25- 30), while only 6 % remained in the “fair” category (8-15). No subjects scored “Poor” (0-7) that showing significant improvement post-interventional knowledge.

In term of association with socio-demographic variables, statistically significant association were found between post-knowledge scores that are Age ($p=0.015$), Religion ($p=0.000$), Marital status ($p=0.000$), Occupational status ($p=0.000$) and Monthly family income ($p=0.001$).

These results imply that subjects from older age groups, Hindu religion, married individuals, farmer, and those with lower to mid-level income were more likely to show higher knowledge levels after the educational program.

Conversely, variables such as gender, educational level and residential area did not show a

statistically significant association with knowledge levels, implies Family-Focused Educational Program was broadly effective, regardless of gender, education, or location.

The finding of our study was consistent with the study conducted by Ms. Shiva Chauhan and Prof. Kiran Sharma (2022) on the effect of educational program on the Buerger Allen Exercise in improving lower extremity perfusion among Diabetes Mellitus patients in setting Yashoda Hospital ,Ghaziabad. The tool used for the data collection included demographic variables and Tissue Perfusion Scale. The Major findings of the study revealed that the majority 43.3% (13) belong to the age group of 30-40 years. The results also indicated an association between the level of knowledge and selected Sociodemographic variables (Age) among Diabetes Mellitus at level of significance <0.05 , in experimental group.⁽³⁶⁾

RECOMMENDATION OF THE STUDY

Based on the findings of the study, the following recommendation are made: 1) It is recommended to replicate the study with large sample size to validate and generalize the findings. 2) A quasi-experimental study can be conducted to assess the effectiveness of Buerger- Allen Exercise in preventing lower extremity perfusion issues in Diabetes Mellitus patients. 3) A comparative study may be performed to compare the effect of Buerger-Allen Exercise with Lower Extremity Strengthening Exercise in Type 2 Diabetes Mellitus patients. 4) Further research can explore the impact of Buerger-Allen Exercise on improving perfusion of the lower legs. 5) A study can be done in a various setting, including Hospitals, Community health centers and Diabetes clinics or centers. 6) A similar study with a large sample size can be conducted to confirm and generalize the results.

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