

# A STUDY EVALUATING THE EFFECTS OF BOMBAY HOSPITAL PHYSIOTHERAPY PROGRAM AND CONVENTIONAL PHYSIOTHERAPY EXERCISE PROGRAM ON GERIATRIC PATIENTS PRESENTING WITH CALF PAIN

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## ABSTRACT

**Objective:** To investigate the effects of (BHP-Program) on geriatric patients with calf pain.

**Method:** This research was designed by evaluating the progress report of Geriatric Physiotherapy patients at Multi-specialty Department of Physiotherapy- Bombay Hospital-Indore. The subjects were the patients receiving Physiotherapy at Multi specialty Physiotherapy Department - Bombay Hospital, Indore. VAS scale was used for the pain evaluation. Pain Scale parameters of 30 Patients of age group 60-65 years presenting with calf pain and treated at our Department were included in Data Collection and Data Analysis.

**Results:** Statistical analysis showed highly significant ( $p < 0.001$ ,  $t = 6.81$ ) reduction in pain among Treated group compared to control group with  $5.13 \pm 0.91$  and  $1.93 \pm 1.57$  mean pain score of control and treated group respectively.

**Conclusion:** It has been concluded from the results that BHP Program is more effective and beneficial in reducing calf pain among geriatric population. BHP Program, which includes specialized exercises in form of Dr. Subhedar's Dynamic Combined Quadriceps and calf Drills with ankle toe exercises, isometric and isotonic quadriceps & straight leg raise, proved to be an important protocol for geriatric patients presenting with calf pain.

**KEY WORDS:** BHP Program, Calf pain, Dr. Subhedar's Dynamic Quadriceps and Calf Drills, Geriatrics.

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## INTRODUCTION

Calf pain is any feeling of discomfort in the fleshy tissue on the back side of the lower leg, from below the knee to above the ankle [1]. People suffering from calf pain complaints of inability to walk or cannot bear weight on affected side, swelling and in severe cases sometimes deformity may develop. It can be experienced at any age but the frequency of foot

and leg pain increases markedly with advancing age [2-5], as with ageing there is an increased adipose tissue accumulation around muscle concomitant with a reduced muscle cross-sectional area (CSA) [6-8]. A greater percentage of non contractile tissue (fat and connective tissue) results in a decreased force production capability [9]. Also, vascular function is altered with aging and may influence muscle blood flow

and exercise performance [10]. Decreased capillary density [11] and a thickening of vascular walls [12] are present with aging. These structural and functional alterations in the vascular system may explain age associated reductions in muscle blood flow [10] and impedes blood flow increases the pain sensations. Physical activity status influences vascular function and may explain alterations in muscle blood flow [10]. Arterial diameters [13-14] capillary density [15-16] vascular reactivity [17-18] and endothelial function [19-20] are improved with training and reduced with inactivity. Thus, increases the blood flow and reduces the pain. Apart from this, the benefits of regular exercise in older adults are extensive: reducing the risk of cardiovascular disease, thrombo-embolic stroke, hypertension, type 2 diabetes, osteoporosis, obesity, colon cancer, breast cancer, anxiety and depression [21]. Exercise may be of particular benefit to patients with venous leg ulcers as the presence of venous insufficiency and the subsequent venous hypertension may lead to calf muscle changes such as muscle fiber atrophy [22], abnormal gait [23] and reduced strength and functioning of the calf muscle [24, 25].

Thus the purpose of this study was to find out the best exercise program for geriatric population of our region presenting with generalized calf pain, in form of calf pumps in different positions with other lower extremity Conventional mobility exercises. Also our main aim was to design the exercise program according to the capabilities and limitations of geriatric people, which will benefit them in best possible way for Independent Pain free Living.

## MATERIALS AND METHODS

This research was designed by evaluating the progress report of Geriatric Physiotherapy patients at Multi-specialty Department of Physiotherapy- Bombay Hospital-Indore. The subjects were the patients receiving Physiotherapy at Multi specialty Physiotherapy Department - Bombay Hospital, Indore. VAS scale was used for the pain evaluation. Pain Scale parameters of 30 Patients of age group 60-65 years presenting with calf pain and treated at our Department were included in Data

Collection and Data Analysis. Pain Scale Parameters Included in Control Group A (n=15), were of those subjects who received Conventional Physiotherapy for a period of approximately one month Duration, whereas Pain Scale Parameters Included in the Experimental Group B (n=15) were of those subjects who received specialized Exercise program in form of BHPP in corresponding months with diet counselling in the form of (4F) diet technique. Inclusion Criteria: Parameters of subjects with Age group 60-65 years; pain parameters of patients of Bombay Hospital-Indore were included. Independent variable was BHPP and dependent variable was Calf pain among geriatrics.

**Conventional Physiotherapy Program:** Previously the treatment protocol used for geriatric patients coming in our Physiotherapy Department included traditional electro-therapeutic modalities and simple calf pumps in lying position.

**BHP PROGRAM:** Specialized lower extremity exercise program with Breathing was designed for the geriatric patients along with traditional Physiotherapy protocol for improving our results of patient recovery. Exercises included in this program were:

### 1. Dr. Subhedar's Dynamic combined Quadriceps and Calf Drills:

**Consist of two techniques**

#### a. Complex Quadriceps and calf combo therapy:

- Pillow below the knees, knee press with ankle Dorsiflexion, hold for 10 sec in this position and then relax.
- Pillow below the knees, knee press with ankle Inversion & Dorsiflexion, hold for 10 sec in this position and then relax
- Pillow below the knees, knee press with ankle Eversion & Dorsiflexion, hold for 10 sec and then relax

#### b. Antigravity calf pumps:

- Prone lying, knees in 90 degree of flexion, in this position ankle Dorsiflexion with inhalation and ankle Planter flexion with exhalation.

**2. Ankle Toe movement:** Individual Toe flexion/extension and Ankle Dorsiflexion/Plantar flexion with inhalation and exhalation respectively.

**3. Simple Isometric Quadriceps:** Pillow below the knees, knee press holds for 10 sec then relax.

**4. Straight Leg Raising:** Supine lying, SLR 0 to 30° with inhalation holds for 5 sec with ankle dorsiflexion then again down the leg with exhalation and Plantar flexion.

**5. Isotonic Quadriceps:** High sitting, Knee extension with Inspiration, hold this position with ankle Dorsiflexion for 10 sec and then knee flexion/bend the knee with exhalation.

**6. (4F) Diet Councelling and Awareness for Geriatric Patients in the form of:**

- F = Fat Free Diet
- F = Fiber Diet
- F = Fruit Diet
- F = Fluid Diet

**DATA ANALYSIS**

Students ‘t’ test was used as a statistical tool for data analysis. Statistical significance was considered at the probability level, p<0.001 levels

The formula used for  $t_{value}$  is mentioned below:

$$T\text{-Value} = \frac{\bar{X} - \bar{Y}}{\sqrt{\frac{\sum(X-X)^2 + \sum(Y-Y)^2}{(NX - 1) + (NY - 1)} \times \frac{1}{NX} + \frac{1}{NY}}}$$

**Degree Of Freedom (DF) = (N<sub>x</sub> - 1) + (N<sub>y</sub> - 1)**

**RESULTS**

Exercises with Deep Breathing	Frequency	Repetitions	
		First 15 days	Next 15 days
Dr. Subhedar’s technique (a)	3Times per Day	15 reps each	25 reps each
Dr. Subhedar’s technique (b)	3Times per Day	15 reps each	25 reps each
Ankle Toe Movement	3Times per day	15 reps each	25 reps each
Isometric Quadriceps	3Times per day	15 reps	25 reps
Isotonic Quadriceps	3Times per day	15 reps	25 reps
SLR	3 Times per day	10 reps	15 reps

**Table 1:** BHPP Regime practiced by the patients:

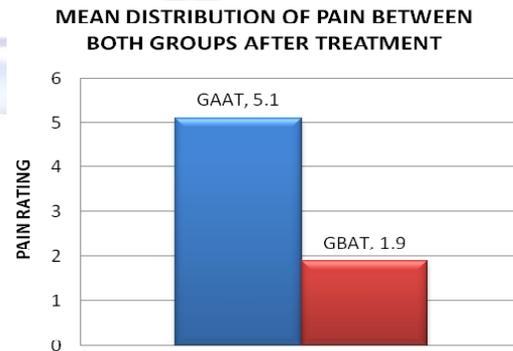
The subjects in this study were geriatric patients both male and female of 60-65 years age group. The purpose of this study was to investigate the effects of BHP Program (which includes Dr Subhedar’s dynamic quadriceps and calf drills, ankle toe movement, simple isometric quadriceps, isotonic quadriceps and SLR) on geriatric patients of calf pain. The mean distribution of pain After Treatment (AT) for Group A and Group B were 5.13 ± 0.91 and 1.93 ± 1.57.

**Table 2:** Comparison of pain between Group A and Group B after treatment.

GA-AT WITH GB-BT	Mean Difference	D.F.	t value	p-value
Pain	3.2	28	6.81	P<0.001

The above table is based on comparisons between treatment and control group for calf pain. When the mean values of pain after treatment were compared it is observed that the t-value of unpaired t-test when equal variances assumed was 6.81 for 28 degrees of freedom. The obtained probability values indicated highly significant levels (p<0.001; one-tailed).

**Fig. 1:** Bar diagram depicting Pain distribution of subjects after treatment.



## DISCUSSION

This study evaluated the extent of prognosis and scale of recovery among those geriatric patients who received Physiotherapy for pain and tenderness in lower limbs as a whole, specifically aiming towards calf tenderness and pain. Bombay Hospital Physiotherapy program was specially designed by Dr. Rohit Subhedar, which included Dynamic combined quadriceps and calf drills with ankle toe movement, SLR and a combination of isometric-isotonic quadriceps drills and 4F Diet Technique.

The results of this study revealed that group B that received the BHPP demonstrated highly significant improvement in reducing pain (measured by VAS) ( $t = 6.81, p < 0.001$ ) as compared to group A that had received only traditional physiotherapy. Many researches have been conducted on effects of calf pumps in reducing calf pain with vascular inefficiency and benefits of exercises in elderly to reduce the effects of ageing to remain pain free [26,27]. Thus, we can conclude that our BHP Program has proved to be an efficient method for reducing calf pain in geriatric patients, as it is a comprehensive calf exercise program compared to conventional calf exercises. This Program also proved beneficial for reducing hazards of inactivity among geriatric population by inducing and encouraging simple bed mobility. Further research has been suggested for finding out the effects of this BHPP on generalized leg pain and in accelerating healthy ageing among geriatric population with large sample size for more accurate and highly significant results.

## CONCLUSION

Thus it has been concluded that BHP Program has beneficial effects in reducing calf pain among Geriatric population and thereby improving and inducing quality of geriatric pain free lifestyle. This program increases the mobility of peripheral tissues, blood circulation, strength of calf muscle and helps in reducing skeletal muscle ageing process. Thus, along with the electrotherapeutic modalities this BHP Program proves to be an important technique in maintaining mobility and reducing pain in calf muscles due to inactivity and ageing among

geriatric population. The future scope of present study is to conduct a randomized controlled study for finding the beneficial effects of specialized exercises used in this Program with long term follow up on wider age group and large sample size.

**Conflicts of interest:** None

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