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Effect of Resistance Training Using Thera-Band on Muscular Strength and Quality of Life among the Elderly Residing at Selected Old Age Homes

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Abstract: ***Background**: Muscle weakness is one of the most imperative causes that the elderly faces as they age. It declines the capacity of the elderly to do the activities of daily living and primes to deterioration in quality of life. There are tremendous sources that make a person predisposed to muscle weakness. The principal treatment for muscle weakness is exercise and nutrition. **Objective**: This study was done to assess the effectiveness of resistance training using thera-band on muscular strength and quality of life of elderly. **Methods**: A quasi experimental pretest post-test control group study was conducted on 40 elderly people residing in old age homes of pathanamthitta district using non probability purposive sampling technique. Data was collected using Manual muscle strength and WHOQOL-BRIEF. Non parametric tests were used for analysis. **Results & conclusions**: The effect of exercise and quality of life compared between groups using Mann Whitney U test [U (18) =0.000; 95%CI] & [U (17.058=0.000; 95%CI]. Upper and lower limbs Pre and post comparison done using Z test and the correlation between upper and lower muscle strength with quality of life was calculated using spearman's correlation coefficient showed that there is high correlation. There is no association between muscle strengths, quality of life and selected baseline variables. The study concluded that thera-band exercises are very effective in improving muscle strength.*

Keywords: Muscle weakness, thera-band exercise, quality of life, resistance training

1. Introduction

Healthy aging is defined as "the process of developing and maintaining the functional ability that enables wellbeing in older age." (WHO).[1] Aging is a multifactorial process leading to changes in skeletal muscle quantity and quality, which cause muscle weakness and increased prevalence of disability in the aging population.

About two decades ago, sarcopenia was demarcated as the age-related loss of muscle mass but nowadays, muscle mass and strength are causally linked and that changes in mass are responsible for changes in strength. About three decades ago, it was shown that muscle strength does not solely depend on muscle mass. In elderly people, the decline in muscle strength is more rapid than the concomitant loss of muscle mass during disease is associated with loss of strength only in the range of ten percentage.[2] Age-related decline in physical functioning is a major factor in life disorders common in men and women[3].

The population of elderly is expected to reach 1.2 billion by 2025 globally. All of the countries face a major challenge in facing this demographic shift. Around 8% of the total populations of India belong to elderly age group. This is expected to increase to 12.4% of the total population by 2026. About 65% of the elderly people in India have the need to be dependent on others for their daily needs.[4] As the aging population increases drastically it is of great importance and challenge to avert the elderly from the heavy destruction of muscle weakness.

The factors contributing to poor muscle health are low socio-economic status, underlying chronic diseases, poor nutritional intake, and adverse lifestyle. Socio-economic dispossession includes low income and low education level. Chronic diseases which can increase the risk of muscle decline include diabetes and chronic obstructive pulmonary disease[5]. In addition, acute illness or injury can initiate a cascade ultimately leading to poor muscle health. In older adults, anorexia of aging is associated with muscle mass and strength. Lifestyle-related risks such as physical inactivity, smoking and drinking are also associated with poor muscle strength. The prime treatment for sarcopenia is exercise, specifically resistance training. These activities increase muscle strength and endurance using weights or resistance band.[6] They are simple, economical, effective and has safe advantages. Furthermore, these programs are feasible to perform anywhere at home or work place and which gives a positive effect on the health, independence and utmost the

overall quality of life will be ensured through proper exercises[7]. With these purposes, the present study was obvious to conduct "Effect of resistance training using thera-band on muscular strength and quality of life among the elderly."

2. Materials and Methods

A quasi-experimental pretest posttest control group design was used for this study. The study was conducted in two old age homes of pathanamthitta district. The data were collected from 40 old age people and was assigned 20 to experimental group and 20 to control group by using coin toss method, were selected using purposive sampling technique. Baseline Variables, Screening tool to participate in the study-Modified PAR-Q, Manual muscle strength Tool (MMT) 8 and Modified WHOQOL-BRIEF were used as tools for data collection. The period of the study was 3 weeks. After pre assessment the samples were divided into experimental and control group. The experimental group received the exercise package; include seated hip abduction, marching hip flexion, toe and heel raises, seated knee extension, shoulder flexion, bicep curls and shoulder external rotation with the help of thera band. In the first week all the experimental samples received red thera band exercise followed by three days of warm up exercises. At the end of each week muscle strength was assessed and the samples who got MMT grade 4 and above were allotted with the next thera bands such as green and blue.

3. Results

The findings of data have been finalized and organized in accordance with the plan for data analysis. SECTION I (A) DISTRIBUTION OF SAMPLE ACCORDING TO DEMOGRAPHIC VARIABLES

Table 1

Variables	Experimental Group		Control Group	
	f	%	f	%
Age in years				
65-75	11	55	12	60
76-85	9	45	8	40
Gender				
Male	10	50	10	50
Female	10	50	10	50
Dietary Pattern				
Vegetarian	2	10	3	15
Non vegetarian	13	65	13	65
Ovo vegetarian	5	25	4	20
Height				
150-160	13	65	12	60
160-170	7	35	8	40
Weight				
50-60	14	70	13	65
61-70	5	25	7	35
71-80	1	5	0	0
BMI				
Normal	17	85	18	90
Pre-obese	3	15	2	10
Education				
Illiterate	0	0	6	30
Primary	10	50	8	40
Secondary	9	45	6	30
Graduate	1	5	0	0

Section 2 (B): Distribution of Sample according to Clinical Variables

Table 2

Variables	Experimental Group		Control Group	
	f	%	f	%
Medications				
Nil	17	85	18	90
Opioids	3	15	2	10
Comorbidities related to muscle weakness				
Nil	13	65	13	65
CNS disorders	0	0	1	5
Hepatic disorders	3	15	1	5
Pulmonary diseases	2	10	0	0
Neuromuscular	1	5	2	10
DVT	1	5	3	15
Risk factors of muscle weakness				
Nil	15	75	14	70
Electrolyte imbalance	0	0	2	10
Infection	2	10	1	5
Anemia	1	5	1	5
Smoking	2	10	2	10

Section II: Effectiveness of Thera-Band Exercise.

Significance of muscle strength of upper right arm and left arm in the experimental group after the intervention

Table 3

Muscle strength		Mean	S. D	Median	Z value	Significance
Upper right arm	Pre-Test	3.3	0.47	3	0	1
	Post-Test 1	3.3	0.47	3		
	Pre-Test	3.3	0.47	3	4.243	0
	Post- Test 2	4.2	0.523	4		
	Pre-Test	3.3	0.47	3	4.134	0
	Post-Test 3	4.55	0.51	5		
Upper left arm	Pre-Test	3.4	0.503	3	0	1
	Post-Test 1	3.4	0.503	3		
	Pre-Test	3.4	0.503	3	4.472	0
	Post-Test 2	4.4	0.503	4		
	Pre-Test	3.4	0.503	3	4.234	0
	Post-Test 3	4.55	0.51	5		

Significance of muscle strength of lower right leg and left leg in the experimental group after the intervention.

Table 4

Muscle strength		Mean	S. D	Median	Z value	Significance
Lower right leg	Pre-Test	3.5	0.513	3.5	1	0.317
	Post-Test 1	3.55	0.51	4		
	Pre-Test	3.3	0.47	3	4.243	0
	Post-Test 2	4.2	0.523	4		
	Pre-Test	3.3	0.47	3	4.134	0
	Post-Test 3	4.55	0.51	5		
Lower left leg	Pre-Test	3.4	0.503	3	0	1
	Post-Test 1	3.4	0.503	3		
	Pre-Test	3.4	0.503	3	4.472	0
	Post-Test 2	4.4	0.503	4		
	Pre-Test	3.4	0.503	3	4.234	0
	Post-Test 3	4.55	0.51	5		

Section III: Effectiveness of Quality of Life

Significance of quality of life in experimental group after the intervention. The quality of life of the experimental group is increased after the intervention when compared to the pre values [QOLpre &post 1, (Z (2.06) =0.039, CI, 95%) QOL Pre& Post3, (Z (3.74) =0.000, CI, 99%].

Section IV: Comparison of Muscle Strength between Experimental and Control Group

Table 5: Comparison of pre and post muscle strength of upper right arm

Muscle strength of Upper right arm	Group	Mean	S. D	Median	Mann Whiteney U Test	Significance
Upper Right Arm Pre	Experimental	3.3	0.47	3	180	0.513
	Control	3.4	0.53	3		
Upper Right Arm Post 1	Experimental	3.3	0.47	3	180	0.513
	Control	3.4	0.503	3		
Upper Right Arm Post 2	Experimental	4.2	0.523	4	47.5	0.000
	Control	3.25	0.444	3		
Upper Right Arm Post 3	Experimental	4.55	0.510	5	18.0	0.000
	Control	3.20	0.410	3		

Above table shows that there is no significant difference between control and experimental groups in the pre and post 1 value and are not significant at 0.05 levels so accept the null hypothesis whereas the posttest 2 and 3 values are significant at 0.01 level. Hence reject H0. That is the values of the experimental group are greater than that of the control group.

Table 6: Comparison of pre and post muscle strength of upper left arm

Muscle strength of Upper right arm	Group	Mean	S. D	Median	Mann Whiteney U Test	Significance
Upper Left Arm Pre	Experimental	3.4	0.503	3	180	0.513
	Control	3.3	0.47	3		
Upper Left Arm Post 1	Experimental	3.4	0.503	3	180	0.513
	Control	3.3	0.47	3		
Upper Left Arm Post 2	Experimental	4.4	0.503	4	240	0.000
	Control	3.1	0.553	3		
Upper Left Arm Post 3	Experimental	4.55	0.510	5	9	0.000
	Control	2.90	0.553	3		

Above table 6 shows that there is no significant difference in the pre and post 1 values of upper left arm muscle strength and are not significant at 0.05 level. Hence we accept H0. That is there is no significant difference between the control and experimental groups whereas in the posttest 2 and 3 values are significant at 0.01 level. Hence reject H0. That is values of the experimental group are greater than that of the control group.

Table 7: Comparison of pre and post muscle strength of lower right leg

Muscle strength of Lower right leg	Group	Mean	S.D	Median	Mann Whitney U statistic	Significance
Lower Right Leg Pretest	Experimental	3.5	0.513	3.5	180	0.513
	Control	3.4	0.503	3.4		
Lower Right Leg Post-1	Experimental	3.55	0.510	4	170	0.348
	Control	3.4	0.503	3		
Lower Right Leg Post-2	Experimental	4.4	0.503	4	36	0.000
	Control	3.3	0.470	3		
Lower Right Leg Post-3	Experimental	4.6	0.503	5	12	0.000
	Control	3.15	0.366	3		

Above table 7 shows that pre and posttest 1 values are not significant at 0.05 level. Hence accept H0. That is there is no significant difference between the control and experimental groups whereas in the posttest 2 and 3 values are significant at 0.01 level. Hence reject H0. That is the median values of the experimental group are greater than that of the control group.

Table 8: Comparison of pre and post muscle strength of lower left leg

Muscle strength of Lower left leg	Group	Mean	S. D	Median	Mann Whitney U test	Significance
Lower Left Leg Pre-test	Experimental	3.55	0.510	4	130	0.024
	Control	3.2	0.410	3		
Lower Left Leg Post1	Experimental	3.6	0.503	4	120	0.011
	Control	3.2	0.410	3		
Lower Left Leg Post2	Experimental	4.4	0.754	4.5	33.5	0.000
	Control	3.15	0.366	3		
Lower Left Leg Post3	Experimental	4.6	0.503	5	8	0.000
	Control	3.1	0.308	3		

Above table 8 shows that in lower left leg the pre and posttest values1 are significant 0.05 level and posttest 2 and 3 values are significant at 0.01 level. Hence reject H0. That is values of the experimental group are greater than that of the control

group.

Section V: Comparison of quality of life between experimental and control group.

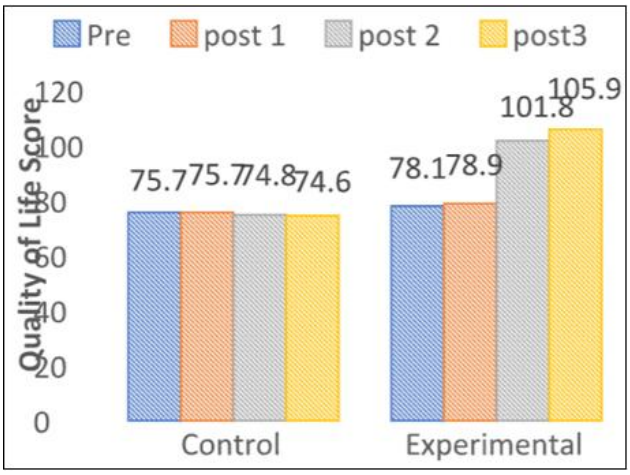

Figure 1

Section VI: Correlation between muscle strength and quality of life in the pre intervention.

The correlation between muscle strength and quality of life in the pre intervention was done and it showed that the muscle strength of lower left leg, lower right leg and quality of life are significant at 0.05 level, where as muscle strength of upper right arm, left arm and quality of life are not significant at 0.05 level.

Section VII: Correlation between muscle strength and quality of life in the post intervention**.**

The correlation between muscle strength and quality of life in the post intervention reveals that there is correlation between the upper right arm, left arm, right leg and left leg with that of quality of life after the intervention. Hence it can be stated that the P value is significant at 0.05 level and reject null hypothesis H0.

Section VIII: Association between muscle strength, and selected demographic variables.

The study reveals that there was no association between muscle strength and selected demographic variables. Hence it is not significant at 0.05 level and accept the H0.

Section IX: Association between quality of life and selected baseline variable.

The study reveals that there was no association between quality of life and selected demographic variables. Hence it is not significant at 0.05 level and accept the H0.

That is there is no significant association between baseline variables and quality of life.

4. Discussion

In the present study the investigator evaluates the effectiveness of muscle strength using thera-band exercise. On analysis it was found to be significant at 0.05 level.

A study conducted in Iran to assess the effect of resistance training using thera band and quality of life among the elderly also showed same results.

5. Conclusion

Findings of the present study strongly suggest that, thera-band exercises are an effective exercise in improving the muscle strength of the elderly and thereby increase the quality of life.

6. Recommendation

On the basis of the findings and limitations of the study, the recommendations for further studies are as follows.

- Study can be replicated in different settings
- A study can be conducted on large sample
- Studies can be conducted in comparison with supplementing Vitamin D3 and exercises
- Studies can be conducted in comparison with ROM exercises and thera-band exercises.
- A similar study can be conducted using random sampling method
- Study can be applied in the health centres and nursing homes.
- Study can be conducted to evaluate the size and thickness of thera-band which could be more reliable to know the muscle strength.

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