EFFECTS OF ELASTIC BAND RESISTANCE EXERCISES ON BALANCE AND MOBILITY IN ELDERLY PEOPLE

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ABSTRACT

Background: There is decline in muscular strength with advancing age. This reduction in muscular strength results in loss of balance and mobility. Loss of balance is contribution factor of fall. Elastic band resistance exercises are easiest way to improve strength of lower limb and this can improve mobility.

Objective: To find out effects of elastic band resistance exercises on balance and mobility in older adults.

Materials and Methods: This study was done in Shaheena Hashmi polyclinic Multan in time duration of 1 year. Sample size was 46. Participants were divided in 2 groups. Group A was treated by conventional physiotherapy and group B was treated by conventional physiotherapy and elastic band resistance exercises. The follow up was of 8 weeks 3 sessions per week. Participants of 60 to 75 years age group with 3 score on Manual muscle testing were included in this study. Participants suffering from Parkinson's disease, fracture history of past 5 years, hip and knee arthroplasty were excluded from this study. Berg balance scale, Functional reach test and Time up and go were used as tools. SPSS version 26 was used for data analysis**. Results:** Mean age of participants was 65.71±13.6. Treatment across the groups showed mean and standard deviation in pre and post values of Berg balance, Time up and go and Functional reach test. Within the group pre and post BBS was 12.60±5.75 and 25.36±13.4, pre and post TUG was1.956±0.206 and 1.608±0.493 and pre FRT was 1.456±0.689 and for post FRT was 2.326±1.212 which showed the experimental group showed improvement in balance and mobility as compared to control group results.

Conclusion: This study concluded that elastic band resistance exercises were effective in improving balance and mobility in elderly people.

Index Terms- Elastic band, Balance, mobility and resistance

I. INTRODUCTION

Changes in balance and mobility with advanced age are normal physiological phenomena which reflect both physiological aging of multiple body functions and the presence of pathologies(1). There is reduction in functional abilities and strength with age. This decline is because of a reduction in number of muscle fibers, with age organs and tissues in the body also degenerate and due to degeneration of visual and vestibular system balance ability is also reduced(2). When skeletal muscle size and function is declined with age there is decline in muscles power which has more declines with advancing age as compared to muscle size. The decline in muscular strength is more in focus because the muscle strength is main contributor to physical function in older adults(3). Muscles mass is important for body movement, metabolism, glycogen storage, temperature regulation, joint stabilization and endocrine functions. Therefore, having appropriate muscle mass is essential in older adults(4). Exercise interventions should focus on improving balance, reduction of number of falls and reduction of loss of muscle strength and mass. To meet these goals in elderly people, there is need of most effective type of exercise program with the best combination of volume, frequency and intensity. Besides it, as muscular power is most important predictor of

mobility, there is a need of strategies to develop skeletal muscle power in elderly people(5). Choices of lifestyle like doing physical exercise regularly both strength training and aerobics are effective measures that can prevent age related muscular loss(6). Intense resistance exercise may prevents loss in older adults. Resistance exercise training having high intensity and volume may cause a risk of injury in elderly people is other side of coin(7).

Elastic bands are not like casual resistance training , elastic bands provides adjustable resistance by adjusting the level of resistance by concentrating on rate and maximum stretch of the band for example the greater the stretch is the more the resistance the band will give smooth progression is also allowed by the elastic band(8). Resistance training using elastic bands is safe and effective to improve muscular performance and muscular strength thus improving mobility and balance .High acceptance in elderly people, versatility, light weight, low costs and minimal space requirement is the advantage of resistance training with elastic bands(9). It has been observed that systemic use of weight resistance devices is helpful in improving muscular strength and power and muscle mass. Most of the untrained elderly people with joint dysfunction are not able to lift the weight in order to improve muscular performance, due to pain(10). Resistance training with weight machines is present in gyms are commonly used by youngster; these may not be easily used by elderly people due to lack of independence. In contrast with weight machines resistance training with elastic bands is more easily available and affordable training program for elderly people(11). Because of more versatility and helping in doing more functional movements elastic resistance bands are widely used among individuals of different ages especially among elderly people (12). Training programs in outdoor situations is one of the most versatile characteristics of portability of elastic bands. There is a self-regulation of overload training stimulus by the use of the colour bands as elastic bands are of variety of forces and dimensions. With the usage of elastic bands resistance training there is marked increased in outcomes in overall muscular power (13). High loads resistance exercises can improve muscles mass. Due to loss of confidence and disturbance in balance older adults face falls(14). Fall is major leading cause of death in older adults. Elderly people have many mental changes due to which elderly people are more prone to fall risks than middle or younger adults(15). Due to inability to maintain balance older adults face disturbances in standing, during gait cycle and a decrease in the activities of daily living(16). Older adults of age 65 or more face falls at some time of their life period(17). As decrease in muscular strength of lower extremity increases risk of falls therefore, lower extremity strengthening exercises are important in prevention of falls(18). Resistance training have shown decrease in risk of falls in elderly adults(19). Decline in muscular strength is increased in older adults due to whom balance problem occurs in older adults. Because of loss of balance problem older adults experience falls. Resistance exercises using elastic band is safer and easy strength training program for increasing muscular strength which improve balance in older adults. Therefore, this research was conducted to find out effect of elastic band resistance exercises on balance and mobility in older adults.

II. MATERIAL AND METHODS

Randomized controlled trial was conducted in Shaheena Hashmi Polyclinic Khan Village road Multan and data was collected over 1 year with sample size of 48. The participants included were the age 60 to 75 years, participant having cognitive ability (score more than 26 on MMSE) to listen and follow explanation of exercises and participants having 3 score in MMT (20). The participant excluded were suffering from Parkinson's disease, history of fractures for past 5 years, hip and knee arthroplasty, people who take more than 5 medications (13). Sampling technique were simple random technique. Tools for balance used was Berg balance scale, Berg balance scale has 14 components. Total score of Berg balance scale is 56 and Functional reach test in which there is measure of distance between the length of an outstretched arm in a maximal Forward reach, while maintaining a fixed base of support. For mobility, Time up and go test was used. It uses the time that a person takes to rise from a chair, walk three meters, turn around, walk back to the chair, and sit down.

Participants were divided in two groups.

Group A was control group. Follow up was of 8 weeks. Participants got 3 sessions per week. Each session was of 30 minutes in which 10 minutes was of warm up exercises. Participants had conventional physiotherapy which was stretching

exercises for ankle dorsiflexors, knee extensors, knee flexors, hip extensors, hip extensors, hip abductors, hip adductors and piriformis muscles for 20 minutes having resting intervals with ten repetitions of each stretching exercises.

Group B was experimental group which were given elastic band resistance exercises for 20 minutes and warm up exercises for ten minutes before exercises. The elastic band was of green color having moderate resistance. The resistance exercises were for dorsiflexors, knee extensors, knee flexors, hip extensors, hip extensors, hip abductors, hip adductors and piriformis muscles. The exercises were of 10 repetitions for each exercise with resting intervals according to participant's need. Both groups were given cool down exercises for last 10 minutes. Pre values were taken before the starting of program and post values were taken after 8 weeks of sessions.(21)

III. RESULTS

After analysis of the socio demographic data the mean age of participants in control group was 66.09±3.692 and participants in experimental group was 65.61±3.10 years. In control group 34.78% participants were males and 65.22% were females. In experimental group 39.13% were males and 60.87% were females. In control group 30.43% participants were from upper class, 65.22% were from middle class and 4.35% were in lower class according to socioeconomically status. In control group 34.78% were in upper class, 43.48% were in middle class and 21.74% were in lower class.

The Shapiro-Wilk test tested the normality of data, demonstrating that data are normally distributed ($p>0.05$). Parametric test was applied to compare the two population at pre and post treatment levels. Independent t-test were applied to compare between group analysis on outcome measure variables. In control group the mean value of BBS component pre standing unsupported for 120 seconds was 0.96± 0.638 and1.22±0.518 was for experimental group. In control group the mean of BBS component pre sitting unsupported for 120 seconds was 1.39±0.656 and 1.39±0.968 for experimental group. The mean of pre standing unsupported with closed eyes for control group was 0.52±0.73 and0.61±0.783 for experimental group. The mean of pre standing unsupported with feet together for control group was 1.00±o.739 and 1.04±0.475 was for experimental group. The mean of FRT for control group was 1.39±0.722 and 1.52±0.665 for experimental group.

Independent sample t-test of TUG, it revealed that there was statistically significant difference between two groups with p value lesser than 0.05. The mean of TUG for experimental group was 1.5217±0.665 and for control group was 1.391±0.722. The mean of FRT for experimental group was 3.304±0.7029 and for control group was 1.347±0.714 which means the mean value of FRT in experimental group was greater than control group and p value was lesser than 0.05 so there was a statistically significant difference.

Paired sample t-test, it revealed that there was statistically significant difference with in the group with p value lesser than 0.05. The mean of total pre BBS was 12.608±5.752 and post BBS was 25.36±13.47 which means there was significant difference in pre and post results. The mean of total pre TUG was 1.956±0.206 and total post TUG was 1.608±0.493 with p value was lesser than 0.05. The mean of pre FRT was 1.456±0.689 and for post FRT was 2.326±1.212 with p value lesser than 0.5 which means there was significant difference within the group.

The results of BBS, TUG and FRT showed that there was statistically significant difference between two groups according to p value which is lesser than 0.05.

Table 1: Between group analysis of experimental and control group

COMPONENTS	Control GROUP Mean±S.D	Control Group Mean±S.D	Exp. Group Mean±S.D	Exp. group Mean±S.D	P VALUE	P VALUE
	PRE	POST	PRE	POST	PRE	POST
BBS1	1.217±0.85	1.304±0.764	1.0870±0.900	2.741±0.619	0.616	0.000
BBS2	0.956±6380	1.000±0.603	1.217±0.518	2.956±0.706	0.135	0.000
BBS3	1.3913±0.656	1.479±0.790	1.3913±0.988	3.260±0.6889	1.000	0.000
BBS4	0.913±0.668	1.0000±0.603	1.304±0.6349	3.1304±0.7570	0.048	0.000
BBS5	1.0435±0.5623	1.174±0.576	0.7826±0.5997	2.6522±0.573	0.135	0.000
BBS6	0.5217±0.7304	0.9130±0.949	0.6087±0.783	2.347±0.8316	0.699	0.000
BBS7	1.0000±0.7385	1.2609±0.7518	1.0435±0.47465	2.826±0.8340	0.813	0.000
BBS8	0.782±0.5997	0.9565±0.5623	1.173±0.7168	3.1304±0.6944	0.051	0.000
BBS9	0.5217±0.5107	0.478±0.5108	0.5217±0.5931	2.304±0.82212	1.000	0.000
BBS10	0.869±0.6255	1.0870±0.5964	1.1739±0.5762	2.869±0.8688	0.093	0.000
BBS11	0.6522±0.486	0.6957±0.4704	0.782±0.5997	2.521±0.8979	0.422	0.000
BBS12	0.478±0.51075	0.6087±0.4990	0.3913±0.583	2.173±0.5762	0.593	0.000
BBSTOTAL	11.826±5.365	0.6087±4.859	13.39±6.132	37.13±7.665	0.362	0.000
TUG	1.913±0.288	1.391±0.722	2.000±0.000	1.5217±0.665	0.155	0.000
FRT	1.3913±0.722	1.5217±0.665	1.5217±0.665	3.304±0.7029	0.527	0.000

This table shows the value of independent sample t test of control and experimental group in which p value of experimental group shows significant difference.

IV. DISCUSSION

Results of current study were strongly supported by research conducted in 2020 on the effect of elastic band resistance exercises

on physical fitness, activities of daily living, fall efficacy and quality of life among older women receiving home nursing. After analysis the group which was receiving elastic band resistance exercises has significant improvement in enhancing physical fitness, activities of daily living and quality of life. These results can be supported by a further study in which elastic band resistance training improves body composition, muscle strength, and physical function in older women. Researcher performed elastic band resistance training on 28 participants of experimental group. It concluded that elastic band resistance exercises improve flexibility, agility, balance and mobility (40).

Literature further supports the effectiveness of resistance training program on the sarcopenia and functionality of the elderly living in a nursing home. 19 older adults were included in this study who received 12 weeks' program. The primary outcome was improvement in muscular strength and physical performance. The p value of result was less than 0.05 which showed that there is significant improvement in muscular strength and physical fitness in older adults who received elastic band resistance exercises (22). However, based on this study results, a previous study also showed that the effect of elastic band resistance exercises using PNF on strength and dynamic balance of adults with ankle instability. Experimental group received PNF with elastic band resistance training and control group received stretching with PNF. The results showed that ankle muscular strength and dynamic balance was improved in the experimental group as p value was less than 0.05(23). A study further supports this study in such a way that elastic band resistance training improves balance and functional performance in older women. The experimental group received elastic band resistance training for 12 weeks. The analysis showed that the p value was less than 0.05 which means that there was significance difference between the control and experimental group as the participants in experimental group showed marked increment in muscular muscles and improvement in functional performance (24). Researcher in past study finds out the effectiveness of elastic band resistance training in their clinical practice. A study was done to find out the effect of stretching on balance and mobility. This study was in contrast to current study as in this study it was proved that balance and mobility in older adults were improved by stretching. The berg balance scale was used to find out the result which showed improvement in balance and mobility with p value less than 0.05.

V. CONCULSION

This study concluded that elastic band resistance exercises were effective in improving balance and mobility in elderly people.

LIMITATIONS of the Study involved only elderly population due to COVID-19 older adults were reluctant to participate in study, Rehabilitation center was so far from the houses of the patients, Berg balance scale was time taking for performance the participants got exhausted for performing it. RECOMMENDATIONS are Future studies can be done in proper well settle centers and old age homes, in future study's comparison of improvement in male and female patients can be studied to check the gender response to the physical therapy interventions, supervised home based exercises should be performed and Education of elder participants is very important

VI. CONCLUSION

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

Conflict of Interest

There was no conflict of interest.

Financial Statement

No funding's were given by any authorities; it was a project thesis of Masters in Physical therapy.

Data availability

Data will be provided on the demand by corresponding author.

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