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Effect of elastic band treadmill walking on gait and balance in osteoarthritis knee patients- randomized control trial

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ABSTRACT

Background

Osteoarthritis is a non-inflammatory degenerative disorder of the joints characterized by progressive deterioration of the articular cartilage of the bone and new bone formation. Weight bearing joints like the Hip and Knee are the most involved joints. In the osteoarthritic pain and walking difficulty is the main presenting symptom and in occurs usually during or after weight bearing activity. Approximately 10 to 30% of people diagnosed with osteoarthritis have pain sever enough to limit function and cause disability.

Objective

Effects of elastic band treadmill walking and ground walking in osteoarthritis knee patients.

Materials and Methodology

Total number of 30 osteoarthritis knee patients between age group of 50 to 70 years of both male and female with stage 1 and 2 were selected by simple random sampling. Dynamic gait index and berg balance scale was used to assess gait and balance pre and post intervention. Intervention is based on static, strengthening exercises and treadmill walking 5 times a week for 6 weeks for 30 minutes.

Results

After comparing pre and post intervention data using patient paired t test results showed that there was significant improvement in gait and balance ($p<0.0001$).

Conclusion

There is significant improvement in elastic band treadmill walking in osteoarthritis knee patients.

Keywords: Osteoarthritis, Elastic band, Gait, Treadmill

INTRODUCTION

Osteoarthritis is a non-inflammatory degenerative disorder of the joints characterized by progressive deterioration of the articular cartilage and formation of the new bone. It is more common in weight-bearing joints such as the hip and knee .In osteoarthritis pain is the main presenting symptom and it occurs usually during or after weight-bearing activity. The joint becomes swollen due to synovitis

Causes of primary and secondary OA knee: Primary causes such as multiple metabolic disorders, multiple endocrinal disorders and Secondary causes are obesity, varus or valgus deformity at the knee, intra-articular injury, fracture, DM, etc [1].

Osteoarthritis is more common in women than men, prevalence is increased dramatically with age. Nearly 45% of women over the age of 65 years have symptoms while radiological evidence found in 70% of those over 65 years [2]. in the arthritic joints may arise from tension / spasm of soft tissues around the joint or from destruction of subchondral bone [5].

Aerobic exercise has been found to have significant effects on pain, joint tenderness, functional status and respiratory capacity for patients with OA knee. Cardio-respiratory capacity is recognized as an important component of health-related fitness. Physical fitness and aerobic exercise capacity are low in obese individuals and also cycling helps to reduce pain and improve quality of life [3].

The elastic bands exercises are hassle free because they can be used easily anywhere, unlike other resistance equipment but give the same benefits and are easy to use [5]. Chronic kinematic alteration can cause degenerative changes in the cartilage, particularly in older adults whose cartilage may no longer have to ability to adapt to load bearing. Treadmill walking may reduce the pain and disability in patients with OA knee However, walking may be a pathogenetic factor for biomechanical joint loading, and it may worsen the OA. [8]

MATERIALS AND METHODOLOGY

A pre-post experimental study was conducted where in 30 osteoarthritis knee patients in Group A (control group) and Group B (experimental group) were selected according to inclusion and exclusion criteria using simple random sampling. Patients with stage 1 and 2 osteoarthritis knee were included. Participants with any cardiovascular disease, post CABG, VAS more than 6 were excluded.

PROCEDURE

Synopsis was submitted to Institutional Ethical Clearance to Tilak Maharashtra Vidyapeeth, Department Of Physiotherapy, Pune. General population of osteoarthritis knee patients were approached and 30 samples were randomly selected. Informed consent was taken and subjects were explained the aim and objectives of the study.. Demographic data is obtained by using data collection sheet. Participants were assessed for gait using Dynamic gait index and were assessed for balance using berg balance scale and readings were noted. Assessment was done on pre and post intervention on day 1 and after 6 weeks. Interventions were given 5times a week for 6 weeks. The treatment was given according to the respective groups. The results found were compared statistically.

The treatment protocol started with simple warm up and cools down exercises as it is crucial for optimizing climbing performances. Then we proceeded with knee exercises which were given 5 times a week with 10 repetitions.

Protocol: Elastic band treadmill walking: 6 weeks – 5 times a week (conventional exercises and elastic band treadmill exercises was given.

Elastic band treadmill walking for 20 minutes according to their speed up to perceived exertion of 11-13 which is based on Borg scale.

Duration: 30 minutes

Type: statics for knee muscles to prior to the treatment

Strengthening exercises

STATISTICAL ANALYSIS

Microsoft office excel 2010 was used and statistical analysis was done by Instat.

Paired Student t test was used for normalised the data with $p<0.001$

Mean age 22.63

Total number of 13 Males and 17 females participated in study.

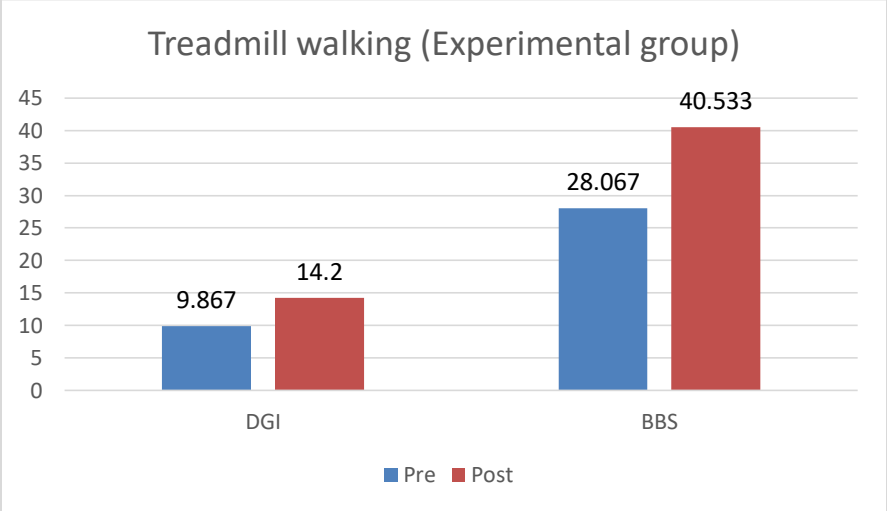
RESULTS

Table no. 1:

Group	Gender	Age(yrs) (Mean±SD)
Treadmill Walking	M= 6 F=9	57.600±5.316
Ground Walking	M=8 F=7	58.733±5.861

Table no. 2:

Outcome Measures	Group A (control group) (Mean±SD)		P value	Group B (experimental group) (Mean±SD)		P value	P values of group A and B	
	Pre	Post		Pre	Post		(Pre) p value	(Post) p value
Dynamic Gait	9.133±3.642	9.733±3.535	0.0140	9.867±3.623	14.2±3.745	<0.0001	0.5847	0.0023
Berg Balance Scale	30.6±7.935	31.267±8.207	0.0192	28.067±6.029	40.533±5.97	<0.0001	0.3333	0.0014



Graph 1

Interpretation

This graph shows the pre and post intervention values of Dynamic Gait Index and Berg Balance Scale for Group B(Treadmill Walking) and shows significant improvement with p value <0.0001.

DISCUSSION

The purpose of this study was to compare effect of elastic-band treadmill walking and ground walking of gait and balance in OA knee patients. In this study 50 participants were approached out of which 10 participants were excluded according to inclusion and exclusion criteria,5 drop out and 5 not completed treatment protocol.

The results of present study shows that the elastic-band treadmill walking is a effective way to improved gait and balance of OA knee patients. This is in accordance with the study done by Kevin R Vincent et al in which it is stated that in persons with OA knee, mobility tasks become easier and

are performed more efficaciously after treatment training due to strengthening exercises [4].

Another study done by Froughi et al supports the present study by stating that muscle strength was increasing in knee flexors and extensors as well as hip flexors and abductors, isokinetic knee torque can increase more after greater treatment intensity (higher resistance loads, fewer repetitions) than after lower treatment intensity [9].

Another study done by Farhin Mulla et al supports the present study by stating that there is effect on improving strength of hip extensors leading to reduced hip flexion moment and leading to improved gait [2].

Christopher et al shows with treadmill walking improvement in muscle activation pattern, reduction in adductor moment arm at knee during stance phase of gait and augmented stretch at hamstring muscle group during stride. It also helps to improve strength of hip extensors leading to reduced hip flexion moment during stance phase thus preventing abnormal loading at knee joint [10].

CONCLUSION

In our study we concluded that Elastic- band Treadmill walking has a greater effect on Gait and Balance in Osteoarthritis Knee Patients.

LIMITATIONS

This study evaluated the effects of Elastic-band Treadmill walking and ground walking on Gait and Balance in osteoarthritis Knee Patients. But in this study Patello-femoral, tibio-femoral and tricompartmental arthritis differentiation was not done and patients with stage 3 and 4 Osteoarthritis were not considered.

FUTURE SCOPE

Further study can be done by comparing elastic band Treadmill walking and cycling on gait and balance in osteoarthritis knee patients. Also effect of elastic band treadmill walking on pain, activity of daily living and quality of life in osteoarthritis knee patients can be studied.

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