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Effect of Single Bout of Whole Body Vibration Therapy On Hamstring Flexibility In Subjects With Knee Osteoarthritis

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ABSTRACT

Background-Whole body vibration (WBV) exercise is a curative strength and a feasible exercise technique that has received considerable attention in recent years.to date there is no evidence of effect of whole body vibration therapy in hamstring flexibility in osteoarthritis patients. Objectiveof the study was to investigateand compare the effect of whole body vibration therapy on hamstring flexibility and comparing it with passive stretching technique to increase hamstring flexibility in patients with knee osteoarthritis.

Methodology: In this Experimental study 30 patients were selected for the study based on inclusion and exclusion criteria. Convenient sampling was used to divide patients into 2 groups. Experimental group- whole body vibration therapy, control group- passive stretching technique. Both the groups were assessed pre-intervention and after intervention for hamstring flexibility. Outcome measures were "sit and reach" test (SRT) and "active knee extension" test (AKE).

Result: Result of the study demonstrated statistically significant improvements in terms of "active knee extension" test and "sit and reach" test in both the groups.

Conclusion: the study concluded that the effect of whole body vibration therapy was better than passive stretching technique in hamstring flexibility.

Key words: hamstring flexibility, Knee osteoarthritis, Whole body vibration therapy, passive stretching technique.

1. Introduction

Osteoarthritis (OA) is a prevalent degenerative joint disorder, affecting a substantial number of individuals globally, particularly in the elderly population (1). Among the various manifestations of OA, knee osteoarthritis is a common form, characterized by pain, stiffness, and impaired joint function. Hamstring flexibility is often compromised in individuals with knee osteoarthritis, leading to further limitations in mobility and function of the affected joint (2).

Conventional approaches to manage knee osteoarthritis typically involve pharmaceutical interventions and physical therapy, which aim to alleviate pain and inflammation and

enhance joint function. However, these interventions may not adequately address the issue of hamstring flexibility, leaving a gap in the comprehensive management of the condition. As a result, there is a growing interest in exploring alternative therapies, such as Whole Body Vibration Therapy (WBVT), as adjunctive treatments to target hamstring flexibility and functional limitations in knee osteoarthritis patients (3,4).

Whole Body Vibration Therapy (WBVT) involves applying low-frequency mechanical vibrations to the entire body using a vibrating platform. These vibrations trigger muscle contractions and stretch reflexes, potentially leading to improved muscle activation and flexibility (4). The use of WBVT has gained traction in various rehabilitative settings due to its potential benefits in enhancing muscle strength, balance, and range of motion. Although several studies have explored the efficacy of WBVT in various musculoskeletal conditions, limited research exists on its impact on hamstring flexibility in individuals with knee osteoarthritis (5).

Thus, the primary aim of this study was to investigate the acute effects of a single bout of Whole Body Vibration Therapy on hamstring flexibility in individuals diagnosed with knee osteoarthritis. The study will compare the effects of WBV with those of a passive stretching technique. By assessing the impact of WBV on hamstring flexibility, the study aims to contribute to a better understanding of its potential as a rehabilitation method for individuals with knee osteoarthritis.

1.1 Aim & Objective:

To determine the immediate effect of whole body vibration therapy on hamstring flexibility in patients of knee osteoarthritis.

2. Materials and Methods:

2.1 Design

The present study was Experimental study, Patients were of the existence of two different group, but did not know whether they had been assigned to the treatment or control group.

2.2 Participants

Thirty patients with diagnosis of knee osteoarthritis as confirmed by an orthopaedist were recruited from patients who were referred to the physiotherapy clinic of Himalayan Hospital jolly grant. Knee osteoarthritis was diagnosed on the basis of clinical examination.
Patient were included if they had unilateral early Knee Osteoarthritis from 6 months which was aggravated during at least two of these activities: running, hopping, kneeling, squatting, prolonged sitting, and ascending and descending stairs.
The exclusion criteria were contraindications for Whole Body Vibration (Recent fractures, acute oedema, acute disk herniation, using a pacemaker, epilepsy), as well as history of knee surgery and any neurological disorders.

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2.3 Procedure

- 30 individuals were selected according to the inclusion and exclusion criteria.
- Baseline flexibility assessment was performed using an "active knee extension" test (AKE) and "sit and reach" test.
- The active knee extension test (AKE) was used for the assessment of the strength of hamstring muscles. The subjects were asked to lie in supine position with hip and knee flexed at 90 degrees. Both left and right extremities were tested and the pelvis was stabilized for control on accessory movements.
- Landmarks used to measure hip and knee range of motion were greater trochanter, lateral condyle of femur and the lateral malleolus which were marked on skin by permanent marker. The fulcrum of the goniometer was centred over the lateral condyle of femur with the proximal arm secured along the femur using greater trochanter as a reference. The distal arm was aligned with the lower leg. The hip and knee of the extremity being tested was placed into 90 degrees of flexion. The subject was then asked to extend the testing lower extremity as far as possible until the stretch was felt. The goniometer was used to measure the angle of knee flexion. Three readings were performed and an average of three was taken as final reading.
- Sit and reach test was also used for the assessment of hamstring flexibility in which a standard sit and reach box was placed on the floor, by placing tape at a right angle to the 38 cm mark. The participant sat on the floor with shoes on, and fully extended the affected leg so that the sole of the foot was flat against the end of the box, then the participant extended his arms forward, placing one hand on top of the other. With palms down, participant was asked to reach forward sling hands along the measuring scale as far as possible without bending the knee of the extended leg. Heels remained at the 45 cm mark. Three trials were performed and the average of the three trials was used for subsequent analyses.
- Using convenience sampling randomization was done into 2 groups, group A: whole body vibration therapy and group B: passive stretching group.

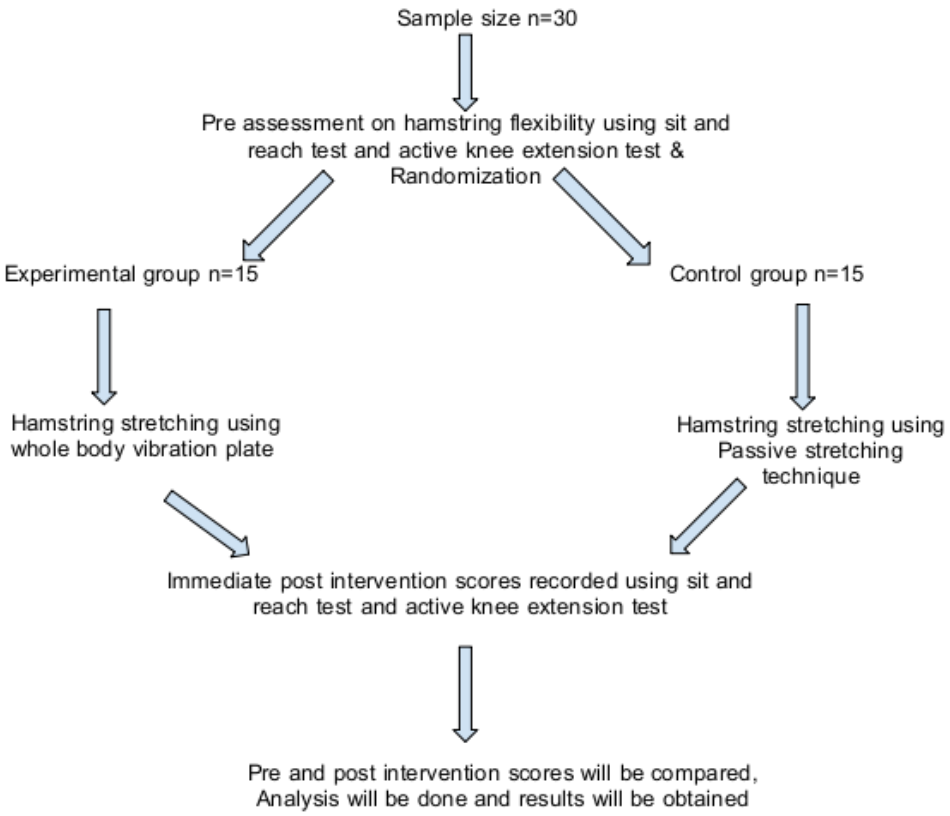

Figure 1: Flow chart of Study

3. Results

Table 1: Descriptive Statistics of AKE (degree) & SRT (inches) Pre & Post score among Passive Stretching Technique and Whole Body Vibration Therapy

Descriptive Statistics	AKE (degree)		SRT (inches)		Difference b/w Pre & Post Score	
	Pre	Post	Pre	Post	AKE (degree)	SRT (inches)
Passive Stretching Technique						
Mean±SD	35.67±11.47	19.67±8.55	3.60±1.74	4.40±2.02	16.00±10.21	0.80±0.80
Maximum	55	35	8	9.5	35	2
Minimum	15	10	1	1	5	-1
Median	35	15	3.5	4.5	10	1
Whole Body Vibration Therapy						
Mean±SD	40±11.02	16.33±6.94	5.17±1.91	7.70±2.12	23.67±8.55	2.53±0.55

Maximum	55	25	11	14.5	40	3.5
Minimum	20	5	3	5.5	10	1.5
Median	45	20	5	7.5	25	2.5

Table 1 shows the Pre and post score of AKE and SRT of Passive Stretching Technique and Whole Body Vibration Therapy. Among the Passive Stretching Technique, mean of AKE Post Score was decreased (19.67±8.55) as compared with Pre score test (35.67±11.47) and the difference between Pre and Post test Score was16.00±10.21. The mean of SRT Post test score was increased (4.40±2.02) as compared with Pre-test score (3.60±1.74), and the differences between Pre and Post test score was 0.80±0.80 respectively.

Among the Whole Body Vibration Therapy, mean of AKE Post Score was decreased (16.33±6.94) as compared with Pre score test (40±11.02) and the difference between Pre and Post test Score was 23.67±8.55. The mean of SRT Post test score was increased (7.70±2.12) as compared with Pre-test score (5.17±1.91), and the differences between Pre and Post test score was 2.53±0.55 respectively.

Figure 2 depicts the average pre &post score of AKE (degree) for passive Hamstring Stretching and Whole body vibration Therapy.

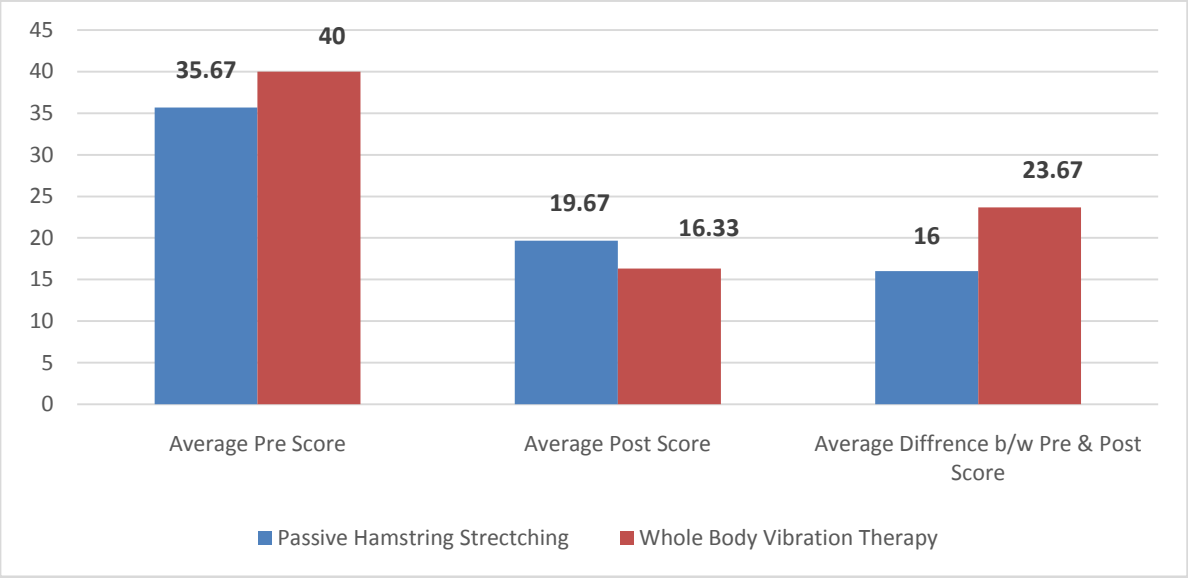

Figure 2: Average Pre & Post Scores of AKE (degrees) for Passive Hamstring Stretching and Whole Body Vibration Therapy

Average pre score of AKE (degree) was high among Whole body vibration therapy and the difference b/w pre and post score was also high.

Figure 3 depicts the average pre &post score of SRT (inches) for passive Hamstring Stretching and Whole body vibration Therapy.

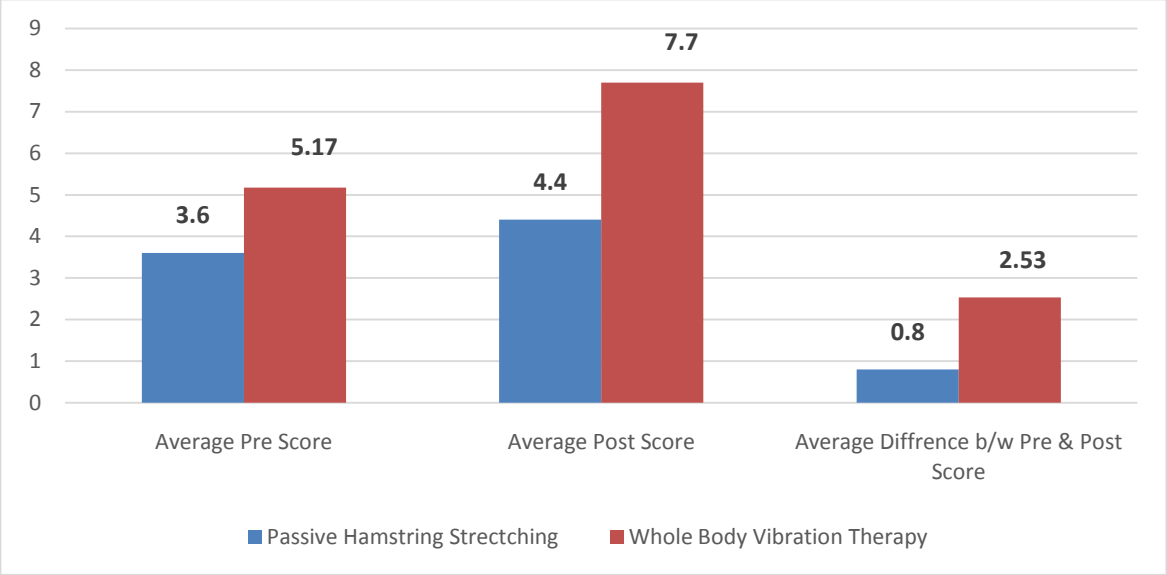

Figure 3: Average Pre & Post Scores of SRT (inches) for Passive Hamstring Stretching and Whole Body Vibration Therapy

Average pre score of SRT (inches) was high among Whole body vibration therapy and the difference b/w pre and post score was also high.

4. Discussion

The findings of the study indicate that intragroup analysis for both the groups showed statistically significant improvement in terms of active knee extension test and sit and reach test. In experimental group, the p value was .0016 and .0002 and it was found to be .000 and .0001 in control group. But the mean difference of AKE and SRT showed higher values in experimental group that was 23.67 and 2.53 as compared to control group which was 16 and 0.80.

Results of this study are associated with significant effects in favour of whole body vibration therapy. The result of our study is supported by the study done by Cochrane et al., on 70 athletes for increasing hamstring flexibility, and showed a significant improvement on adding whole body vibration stimulus to flexibility.(6)

Several studies examine the acute effect of WBV interventions over hamstring flexibility; however few studies evaluate residual effect. Jacobs et al. reported a significant improvement in SR test immediately post intervention.(7) Conversely, in regard to residual effect, most studies involved individual athletes. Cronin et al. and Despina et al. found significant differences after 10 and 15 min of WBV intervention in competitive athletes (2.0% and 3.6%, respectively). This study shows an improvement of 16.5%, however hamstring flexibility was measured through active range of motion and the intervention lasted for 4 weeks (2 sessions/week). Therefore, a single bout of WBV could improve the residual effect of hamstring flexibility, as well as longer-lasting intervention.(8,9)

4.1 Limitation

- Limitation of the study is small sample size.

- Only immediate effects have been recorded.

5. Conclusion

In conclusion, using a single bout of whole body vibration therapy in knee osteoarthritis subjects has a potential effect on hamstring flexibility than passive hamstring stretching group and therefore can be used prior to exercise program as stretching to show better results.

References:

1. Bart Staal et al., 2008, "WBAO-Trial: Whole Body Vibration versus usual Physiotherapy for Rehabilitation of Elderly with Knee Osteoarthritis," ClinicalTrials.gov Identifier: NCT00528502.
2. Fagnani F et al., 2018, "The Efficacy of Whole Body Vibration in Patients with Knee Osteoarthritis: A Systematic Review," PLoS One, 13(10), e0201456.
3. Cheung WH et al., 2013, "Whole Body Vibration Exercise for Knee Osteoarthritis: A Randomized Controlled Trial," Archives of Physical Medicine and Rehabilitation, 94(2), 302-311.
4. Russo TL et al., 2015, "Acute Effects of Whole Body Vibration on the Hamstring Flexibility in Healthy Individuals," Journal of Exercise Physiology Online, 18(2), 42-49.
5. Perraton LG et al., 2010, "Randomized Controlled Trial of Whole Body Vibration Exposure on Markers of Bone Turnover in Postmenopausal Women," Journal of Osteoporosis, 2010, 720857.
6. Cochrane, D. J., & Stannard, S. R. (2005). Acute whole body vibration training increases vertical jump and flexibility performance in elite female field hockey players. British Journal of Sports Medicine, 39(11), 860-865.
7. Jacobs, P. L., & Burns, P. (2009). Acute enhancement of lower-extremity dynamic strength and flexibility with whole-body vibration. Journal of Strength and Conditioning Research, 23(1), 51-57.
8. Cronin, J. B., et al. (2008). The acute effects of whole-body vibration on countermovement jump performance in college-aged men. Journal of Strength and Conditioning Research, 22(2), 735-740.
9. Despina, T. S., et al. (2014). Acute effects of whole-body vibration on sprint and jump performance in elite skeleton athletes. Journal of Strength and Conditioning Research, 28(4), 1022-1027.