

Can Whole-Body Vibration Therapy Augment the Results of Conventional Physiotherapy among Chronic Non-Specific Low Back Pain Patients

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Abstract: *Objective -The primary objective of the study is to find out the effects of adding whole-body vibration therapy to conventional physiotherapy among chronic non-specific low back pain patients. Methodology:20 subjects with chronic non-specific low back pain patients were selected as samples. This study design is an experimental study and the study type is comparative. The duration of this study is 12 weeks within which whole body vibration therapy and conventional physiotherapy are given to the patients of group A and group B. subjects with chronic non-specific low back pain [LBP], age group around 30 to 50, both males and females are included in this study. GROUP -A -Ten weeks of vibration therapy was provided to selected samples. All the subjects underwent baseline analysis and post-test analysis after ten weeks of intervention using the 3 selected outcome measures, namely the Roland Morris scale for pain, Oswestry disability index, and Visual analog scale. GROUP-B- was treated with conventional physiotherapy. Result: On comparing the between group analysis of the Roland-Morris scale, Oswestry disability index, and Visual analog scale. It has been found that there is no significant difference between group A and group. On comparing the within-group analysis, it has been found that there was a significant difference in the Roland-Morris scale of group A and group B of pre-test and post-test with the p-value 0.005. In Oswestry Disability index of group-A and group B for pre-test and post-test with ap-value of 0.005. In VAS of group A for pre-test and post-test with the p-value of 0.005 and group B with the p-value of 0.004. Conclusion: The study concluded that whole-body vibration therapy is more effective than conventional physiotherapy in treating with chronic non-specific low back pain.*

Keywords: Chronic non-specific low back pain [LBP] patients, whole body vibration [WBV] therapy, conventional physiotherapy, lumbar and core muscle strengthening exercise

I. INTRODUCTION

Chronic non-specific low back pain is defined as the persistent pain that occurs in the low back region without any specific pathology and that lasts for more than 6 weeks. Approximately 80% of the world population will improve low back pain (LBP) while the adulthood (1). In 80% of cases of LBP, it is tough to find the cause (2). Non-specific low back pain (NLBP) is one of the most common presentations in elementary care. Among 7% and 9% of all subjects from the common population with a complaint of the lumbar spine will consult their primary care physician (3). Most conditions of low back pain (LBP) cure gradually and are not incapacitating (4). Although, non-specific chronic low back pain (NCLBP) is a highly incapacitating disorder (5), that is accompanied by substantial usage of healthcare resources as an outcome of medical consultation, examination, and prescription. The complaint also has a negative effect on social and also in employment resources, particularly as a consequence of missed working days (6). Long-term incapacity drastically develops the risk factor, that the condition will become chronic and decreases the likelihood of soon coming back to work (7). Although the research indicated that exercise can reduce pain and enhance function in patients with Non-specific Chronic Low Back Pain (NCLBP) (8), there is no consensus about the most correct form of exercise (9). Whole body vibration (WBV) has improved over the last decade and research on WBV in healthy individuals has come to an end that this method of guiding is useful in increasing the strength of lower extremities (10), balance (11), neuromuscular performance (12) and health-related quality of life (13). A current review stated that WBV

is useful in a range of medical disorders. WBV has also been displayed as a feasible therapy for utilization in frail individuals who are previously physically untrained (15).

WBV includes the use of oscillatory muscle stimulation. The foot is placed on a platform that vibrates at a programmed frequency and amplitude. The vibrations are then transferred throughout the whole body, bringing out muscle stimulation via vibrating tonic reflex when the short and fast modification in muscle length was revealed by different proprioceptive organs, which improves the frequency of motor-evoked potentials (14). Undergoing vibrations have traditionally been considered harmful (16). Though the results of various studies demonstrate that WBV relieves chronic back pain (17) via a genuine analgesic impact, and that vibration per se suppresses pain (18). Furthermore, studies in the general population have displayed that WBV increases muscle strength (12) and that may contribute to preserving those aspects of physical fitness that are affected by NCLBP.

On the other hand, conventional physiotherapy is given to the patients such as interferential therapy (IFT) and shortwave diathermy (SWD). These have advantages like reducing pain and inflammation, increasing muscle stimulation, increasing blood circulation, curing edema, increasing metabolic rate, and making connective tissues more flexible. The aim of the present study is to compare the effectiveness of whole-body vibration therapy (WBV) and conventional physiotherapy for a duration of 12 weeks in which 25 patients are treated with whole-body vibration therapy and the remaining 25 patients are treated with conventional physiotherapy. The results of the study will be observed through the Rolland Morris scale for pain and Oswestry Disability index. Chronic non-specific low back pain is still a serious clinical, social, and economic problem. It is an important cause of labor loss and also it is a common functional insufficiency under 45 years of age. The Low back pain prevalence is 84% lifetime chronic non-specific LBP prevalence is 23% low back pain causing disability prevalence is also 11%. Hence, this study is used to evaluate the difference between the effectiveness of whole-body vibration therapy and conventional physiotherapy on non-specific low back pain. The primary objective of the study is to find out the effects of whole-body vibration therapy versus conventional physiotherapy among chronic non-specific low back pain patients.

II. METHODOLOGY

In this study Chronic non-specific low back pain patients of both males and females of age between 30 to 45 years. Subjects with Inter vertebral disc prolapse, any surgery to the spine, patients who are under pain medication, deformities like kyphosis, scoliosis, limb length discrepancy, and pregnancy were excluded from the study. The outcome measures were the Roland Morris scale for the pain to assess the pain characteristics, the Oswestry disability index to evaluate the disability rate, Visual analog scale to assess the pain intensity. This study was performed with a sample size of 20 subjects, in which 10 subjects with allocated to GROUP A that is whole-body vibration (WBV) therapy group, and the remaining 10 subjects were allocated to GROUP B that is conventional physiotherapy group with the help of simple random sampling method. GROUP A:10 subjects who are allocated in group A are treated with whole-body vibration therapy. Initially, explaining ree whole-body vibration therapy to the patients and how it works on patients, and what modification it makes in the human body. Then, advising the patient if there is any discomfort while performing whole-body vibration therapy ask them to inform immediately. The whole-body vibration therapy [WBV] was performed in the standing position in this study. So, the participants were asked to remove their shoes in order to eradicate any damping of the vibrations. The subject stood on the platform of the vibration device placing their feet side by side. The angle of the knee joint was kept at 120 degrees in order to avoid any reduction in the transmission of the vibrations to the upper body region (especially the spine and head) and to increase the effort of the leg muscles. The platform generated side-alternating oscillations of the whole body. This therapy was given to the patients for the duration of 10 weeks, and four sessions of treatment were undergone by the patient each week. Hence, the frequency of the therapy was set as 20 Hz, the duration of treatment time is six minutes and the rest time was 30 s. following this treatment the required conventional physiotherapy was also provided.

Mainly, the repetitions of the therapy decrease with an increase in the week. The training protocol is shown in table 1. Outcome measures such as Roland Morris Questionnaire, Oswestry Disability Index, and Visual Analog Scale for pain were used asa pre-test and post-test measures in whole- body vibration therapy group to find the effect of the therapy.

Table 1: Characteristics of whole-body vibration therapy.

Time	Weeks	Session	series	Repetition	Interval WBV total		Time
					Frequency	rest	
1-2	1-4	60	6	20	30	360	
3-4	5-8	120	3	20	30	360	
5-6	9-12	180	2	20	30	360	
7-8	13-16	240	2	20	30	480	
9-10	17-20	360	1	20	-	360	

GROUP B:

10 subjects who are allocated to group B are conventional physiotherapy groups. They are treated with short-wave diathermy (SWD) and interferential therapy (IFT). Initially asking the patient to lie in the prone position. Interferential therapy (IFT) was provided to the patient in the quadripolar method with a pre-set program of the base, spectrum, and sweep. IFT was applied to the patient for a duration of 12 minutes. Subsequently, patients were treated with short wave diathermy (SWD) also as a form of deep heating agent. Co-planar method was used with wider spacing of electrodes. Electrodes were placed on the lumbosacral region. This treatment was provided for 12 minutes of duration and with an intensity of 250mA was used. Strengthening exercises were provided for the multifidus and transverse abdominus which are the core stabilizers of the spine. The total treatment time duration of this group (GROUP B) was 10 days. Finally, the same outcome measure which was used in group A was also used in group B as pre-test and post-test measures to find out the effectiveness of the treatment. The treatment duration per session was limited to 40 Minutes in both groups with group A receiving 30 minutes of conventional physiotherapy and 6 minutes of WBV whereas group B received 40 minutes of conventional physiotherapy.

Figure 1. Comparison of within-group and between-group analysis of Roland Morris scale

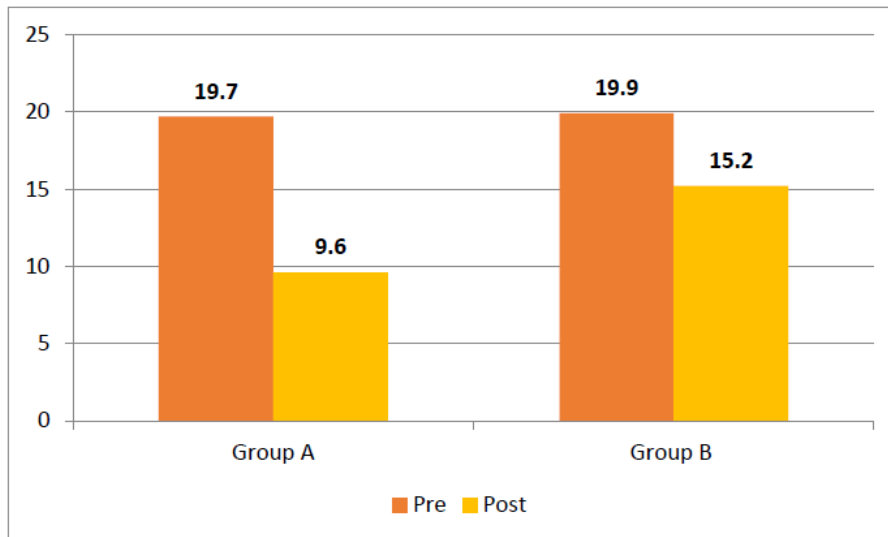


Figure 2: Comparison of within-group and between-group analysis of Oswestry disability index scale

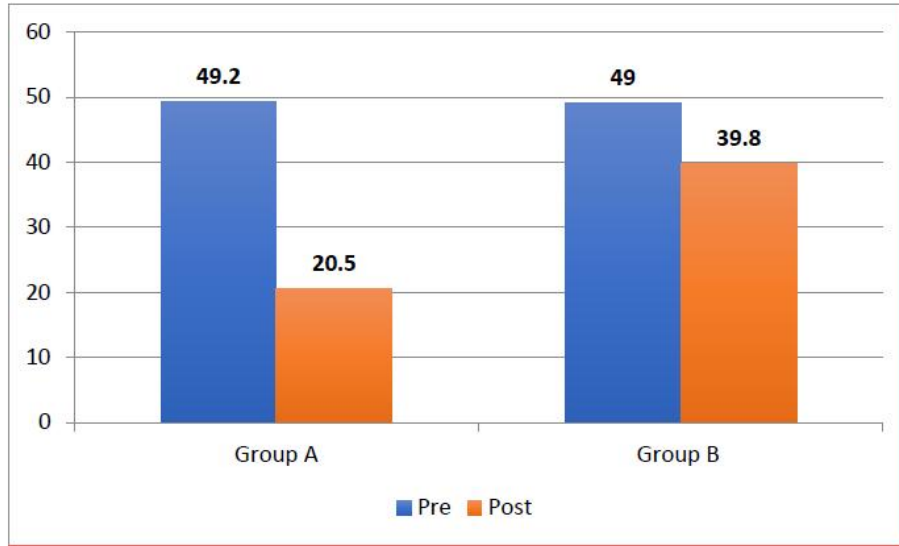
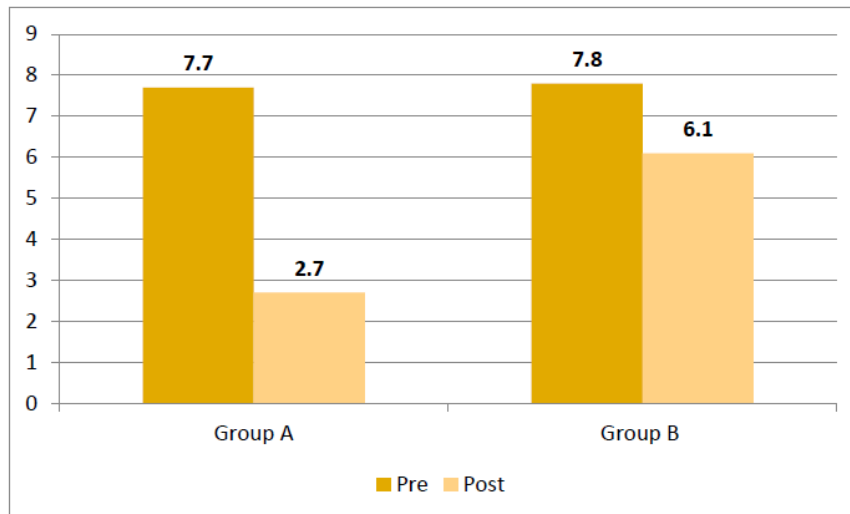


Figure 3: Comparisons of within-group and between-group analysis of visual analog scale



III. RESULT

SPSS 26 version was used to analyze the results of the study. A 95% confidence interval was used for the study and the significance level was set at 0.05. Non-Parametric analysis was performed for all three outcome measures, as all the scales were ranking scales. For within-group analysis, the Wilcoxon test was used and for between groups analysis was performed using the Mann Whitney U test. On comparing the group analysis of the Roland-Morris scale, Oswestry disability index, and Visual analog scale. It has been found that there is no significant difference between group A and group B. On comparing the within-group analysis, it has been found that there was a significant difference in the Roland-Morris scale of group A and group B of pre-test and post-test with the p-value 0.005. In Oswestry Disability index of group-A and group B for pre-test and post-test with a p-value of 0.005. In the VAS of group A for pre-test and post-test with a p-value of 0.005 and for group B with the p-value of 0.004.

IV. DISCUSSION

The aim of this study is to find out the effects of whole-body vibration therapy versus conventional physiotherapy among chronic non-specific low-back pain patients. Nowadays, low back pain is a major issue in the general population. This study is based on how far effectively whole-body vibration therapy and conventional physiotherapy works on low back pain (LBP). There are many previous studies on low back pain management. Xue-Qiang Wang did research on the Effects of whole-body vibration exercise for non-specific chronic low back pain. He concluded that whole-body vibration exercise could provide more benefits than general exercise for relieving pain and improving functional disability in patients with non-specific chronic low back pain. Nashmin Sajadi concluded that in Low-frequency WBV might induce more improvement in the accuracy of lumbopelvic repositioning compared with high-frequency WBV with the method of WBV used in this study. Lope H Barrero concluded that Higher WBV exposures were associated with back pain-related absences in this population, which appears after a few years of follow-up. Introducing controls to lower exposure levels may help reduce back pain-related work absences. Mateus Zanatta concluded that the study demonstrated that whole-body vibration exercise could provide more benefits than general exercise for relieving pain and improving functional disability in patients with non-specific chronic low back pain. Iwamoto concluded that whole-body vibration exercise using a Galileo machine appears to be useful in reducing chronic back pain, probably by relaxing the back muscles in post-menopausal osteoporotic women treated with alendronate. Chan CW concluded that the addition of aerobic training to conventional physiotherapy treatment did not enhance either short- or long-term improvement of pain and disability in patients with chronic LBP. Inani SB concluded that Core stabilization exercises were found to be more effective in reducing pain and improving functional status by decreasing the disability of patients with non-specific low back pain in comparison with conventional exercises. França FR concluded that segmental stabilization is superior to superficial strengthening for all variables. Superficial strengthening does not improve transverseabdominal muscle activation capacity. You JH Concluded that their study provides the clinical evidence that adding ankle dorsiflexion to drawing in the abdominal wall gave increased benefit in terms of physical disability, pain, and core stability in patients with chronic low back pain. Masharawi Y concluded from their study that a functional program of non-weight bearing group exercising improves functional, painful status, lumbar flexion, and extension ranges of motion in women suffering from NSCLBP. The above discussion provides evidence that whole-body vibration therapy is more effective than conventional physiotherapy. This study was done with outcome measures like Roland-Morris, Oswestry disability index, and visual analog scale. The result of this study reveals that there was no significant difference in the group analysis of group A and group B but there is a significant difference identified in the within-group analysis of the data of group A and group B. Result from within-group analysis of data from group A (whole- body vibration therapy) and group B (conventional physiotherapy) shows that whole-body vibration therapy is more effective than conventional physiotherapy.

V. CONCLUSION

The study concluded that whole-body vibration therapy is more effective than conventional physiotherapy in treating with chronic non-specific low back pain. There are a few limitations of this study like the duration of the study was short, the small sample size, and subjects with only a limited age group (30-50) included in this study. Future studies can be done with a longer duration of follow-up, and a study with a larger sample size and more objective outcome measure on subjects with another age group (that is above 50 years) can be performed.

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