ELABORATION OF WHOLE BODY VIBRATION

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DOI: 10.47750/pnr.2022.13.S06.387

Abstract

In this review, we first discussed the method of action as well as the influence aspects of whole-body vibration training. We also discussed what is whole body vibration, what are its effect and uses in different conditions, how it works, benefits of using whole body vibration. This review work gives us idea about current knowledge of effect and uses of whole body vibration in physiotherapy, sports, and medical aspects, also how WBV is used in different conditions (like Knee osteoarthritis, Knee Extensor Tendon Stiffness in Hemi paretic Stroke Patients, osteoporosis, muscle spasticity of people with CNS disorders etc). This revive also states that work on a shaking programme are secured, practicable, and agreed by patients with various conditions, except its ultimate effects.

Keywords: Whole-body vibration (WBV), vibration, physiotherapy, patient, stroke, squat training.

INTRODUCTION

Whole-body shaking (WBV) programme is favored in sport, strength, and physiotherapy technique. The research clearly demonstrated that, despite their long-term consequences, vibration programme workouts are secure, practicable, and well tolerated by patients with various diseases(1). To understand the impact of WBV training on the human body and to develop the necessary rules, it is necessary to first understand biodynamic reactions to vibration, which depict how vibration is conveyed to human body and through the human body(2). The whole body vibration machine works on the principle of vibration and this vibration causes systemic changes/effect in our body. Many reports have been published on the effect vibration on human tissue and system. The biological reaction of specific types of tissues hang on various factors, which includes the shaking factors, the physical features of tissues and particular differences(3). Whole body vibration can be used in many conditions like Knee osteoarthritis, Knee Extensor Tendon Stiffness in Hemi paretic Stroke Patients, osteoporosis, muscle spasticity for people with CNS disorders etc. Different postures/positions are used to treat different extremities/part of body. Whole body vibration can be used to treat a particular body part by altering the position of patient but in such a way that patient should hold the position for particular time duration. Mostly examined biological effect of whole body vibration is increase striated muscles activity as measured by surface electromyography (2). The purpose of this revive is to draw attention to new research articles that are published after 2007 that examine the usage and benefit of whole body shaking in the physical therapy of audiovisual patients, pediatric patients, aged patients, and vitreoretinal patients(3).
Whole body vibration

Whole-body shaking (WBV) instruction has gained popularity in the sports and medical fields in recent years (2). Whole-body shaking (WBV) dated identified as effectual possible application method to resistance movement due to its capacity to increase energy, generate cubic mass in voluntary muscle, increase cartilage density, improve cardiovascular function (4). Specially detailed studied chemical effect of WBV is the growth in striated muscle pursuit as measured by electromyography on skin (3). WBV is made up of a physical impulse distinguished by a vibrating motion depicted by a particular variable such as magnitude, density, amplitude (acceleration) of vibrations. The amplitude of oscillations is usually described in g or g-force merits using body of support of equation: \( g = \frac{|D (2 \text{ Hz})^2|}{9.81} \), place \( D \) represents platform dispersion (amplitude of WBV). There are two kind of Whole body vibrators that were described. The initial kind of whole body vibrator is produced by a programme that vibrates in a predominantly perpendicular accompanied by a apex amplitude of 4 mm. The second type of WBV, on the other hand, is delivered via a platform that can rotate around an anteroposterior horizontal axis (5).  WBV also has biological effects such as bone stimulation, arrangements, vasodilatation, increased motion, and oxygen intake, increased androgenic hormone and somatotrophic hormone secretion, and cortisol reduced concentrations, an increase in intramuscular temperature, increased flexibility, as well as a decrease in circulating glucose. According to the most recent research, WBV treatment must be viewed for utilization in foremost bed recovery patients in the critical care section. It has been described the uses of opposition movements in conjunction within shaking subjection to prevent muscle atrophy caused by prolonged supine positioning (3). whole body vibration offers a way to expand the power and stretchability also increases the metabolic rate of an individual. WBL causes the muscles to contract involuntary at the same rate at which the platform is shaking. The treatment time differs according to the patients conditions. In the starting the time duration is less (in sec) but after some time when the patient gets comfortable with machine the treatment time is increased(again depending on patients holding capacity). This treatment is given in sessions. Whole-body vibration can be combined with other training programs to give a more powerful
outcome. It can be combined with squat training, strength training, stretching training, etc. Whole-body vibration can be used by alteration of body, like by doing squat and hold the position, by keeping only one leg on the machine, or by keeping only the hands-on machine and rest of the body out of vibrating machine.

Result of Whole-Body shaking Training on patient with Knee Osteoarthritis for Muscle

Osteoarthritis (OA) is a leading source of disorder within elderly residents, and its prevalence has risen in recent years(6). When the vibration frequency rise from 0 to 20 Hz, Muscle activation also increased and the knee flexion angle increased from 0 to 60 degrees. WBV training at a frequency of 20 Hz was sufficient for activating the patella muscles, and couching on an average of 60-degree angle was the best for WBV training. As a result, WBV training enhance the actuate amount of patella inflection and extensor muscles in individuals with KOA, with 20 Hz trembling density and 60° knee flexion being the most effective combination(7).Knee joint discomfort decreased and rose with 10 Hz and 20 Hz WBV treatments, but increased with 40 Hz therapy. The results of the micro-CT viewed that collagen increased at initial, reaches the highest point at 20 Hz, and then point dropped. The cancellous bone, below cartilage bone thickness, and cartilage mass increased as WBV frequency rose, while serum CTX-I declined and COMP and CTX-II increased, mostly at 20 Hz.(8)

Recovery from a stroke using whole-body vibration

Mini-stroke is the 2nd major start cause of death worldwide, trailing only cardiovascular disease, and the 3rd most common reason for a disorders life year (DALY) globally. Exercise frequencies extend from 15 to 44 Hz, and transposition expands from 3 to 10 mm. The number of velocity expands from 0.3 to 15 g (in which g is the gravitational field of the Earth, or 9.81 m/s²). WBV is generally conveyed via a shaking platform which participant can be on ones feet stand still or move dynamically(5). Patients with a recent stroke who were able to participate in gait training were haphazardly assigned to one of two categories: vibration therapy or authority. For two weeks, every patient attended two 20-minute Daily training sessions, five days a week. All patients attended 20-minute training sessions twice in a day, five days in a week. Each training consisted about forty five hunches. An authorized category practiced upon a vibrating programme, while the control group practiced on the floor. Now maximum sub-maximal volitional shortening force has been measured, and pelvis and patella flexion and extension manual muscle tests were conducted (9-15).

WBV+ST group (squat training)

41 people finished the arbitration, calculation (ST group, age=65.00±4.39 years, BMI (body mass index)=23.01±2.95 kg/m2; WBV+ST group; age=64.10±4.95 years, BMI=24.79±3.12 kg/m2). In this WBV +ST group completed the coaching session three times in a week, for eight weeks, including one day gap in the middle of each session. A vibration gadget was used to conduct the training (Sport Platform, i-vib5050, BODYGREEN, China). A physical therapist oversaw all of the sessions. To keep participants from slipping backwards during training, Thera Band (resistance bands) (The Hygienic Company, Akron, OH, USA) have been employed. First end of the thera bands is tied up to the platform grip without being stretched, and the patient occupied the opposing end. On shaking platform, members performed stable ST without shoes. The members were told to fold their knees at 30° and 60° and were not allowed to bending their knees varus. The occupational therapist adjusted the angle before each training session of flexion with goniometer (17-25). When comparing the WBV+ST (squat training) group to the ST group, the peak torque (PT) of the extensors at 180°/s increases gradually (p = 0.046). Only the WBV+ST group improved extensor peak work and Flexor peak torque up to 180°/s (p0.0125). However, in these variables, there were no considerable variations (p>0.05). In patients with KOA, putting 8 weeks of WBV training with ST can enhance muscle power of patella extensors more efficiently than squat training alone(26-40).

Table-1

<table>
<thead>
<tr>
<th>Week of intervention</th>
<th>Knee flexion angle</th>
<th>Hold time</th>
<th>Rest time</th>
<th>Number of set</th>
<th>Total time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30°</td>
<td>30s</td>
<td>30s</td>
<td>6</td>
<td>12min</td>
</tr>
</tbody>
</table>
2

| 2 | 30° | 40s | 40s | 6 | 14min |
| 3 | 30° | 40s | 40s | 6 | 14min |
| 4 | 30° | 50s | 50s | 7 | 21min |
| 5 | 30° | 50s | 50s | 8 | 25min |
| 6 | 30° | 60s | 60s | 8 | 29min |
| 7 | 30° | 60s | 60s | 8 | 34min |

REFERENCES

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