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Original article

# Acute Effects of Whole Body Vibration Training on Agility in Sedentary Men

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**Abstract.** *Study Objectives:* The aim of the study was to investigate the effects of Acute Whole Body Vibration Training on agility in sedentary men. *Methods:* Twenty healthy sedentary male volunteers who were aged between 18 and 25 participated in the study. Participants were divided into two groups as Acute Whole Body Vibration Training and Control Group. The agility performance values of the participants were determined with the Agility T-Test. Results were given in mean ± standard deviation. Independent samples t test was used to compare among independent examples. Paired sample t test was used to compare among the dependent examples. The significance level was taken as $p<0.05$. *Results:* Based on the results, it was found that there was no positive development between the pretest and posttest values of the Acute Whole Body Vibration Training Group. No statistically significant differences were detected in this respect ($p>0.05$). It was also found that there was no improvement between the pretest and posttest values of the control group. No statistically significant differences were detected in this respect ($p>0.05$). There were no statistically significant differences between the pre-test and post-test values of the groups. *Conclusion:* It can be argued that Acute Whole Body Vibration Training does not increase agility performance in sedentary men.

**Key words:** Acute effect, Whole Body Vibration, Agility, Sedentary

## Introduction

Vibration is defined as some mechanical and sinusoidal phenomena in which oscillations are produced by a periodically-moving object (1). Whole Body Vibration is applied to increase sportive performance by conveying the vibrations of mechanical character produced with vibrations through vibration platforms to the body (2,3). Whole body vibration (WBV) is a mechanical stimulus that has oscillatory motion and was hypothesized to enhance neuromuscular stimuli (4-7). WBV, which was originally a therapeutic modality, was used to treat certain diseases (8,9) and for injury rehabilitation (10). The WBV timing included before (11-13) and during muscular activity (14).

As early as the 1890s, studies were conducted on using WBV for improving some conditions of the human body (15). Since WBV can be used with several vibration parameters e.g. frequency, amplitude, duration, body position, and type of vibration vertically or in an oscillating manner, previous studies reported varying results (16,17). Muscles or tendons produce a reflex contraction called Tonic Vibration Reflex (TVR) under vibration (18-20). Muscle spindles, alpha motor neurons, and muscle fibers are activated following this reflex contraction, and contractions of the muscles increase with progressively increasing involuntary contractions (1,21,22).

WBV training is more effective and easier to implement compared to other training methods in increasing physical performance (23); and is used

not only to enhance the performance of elite athletes (24,25) but also in the field of rehabilitation. The features are employed more often in the treatment of individuals who have anterior cruciate ligament reconstruction (26), osteoporosis (27,28), and chronic low back pain (29,30). WBV is a neuromuscular method using low-to moderate-vibration stimuli to improve flexibility (31-33) muscular strength, and power (20).

Studies conducted previously show that WBV training improves muscle strength and performance. It was also reported that the flexibility of the lower extremities is improved in this respect (34-37).Some authors have suggested that WBV can be used for the improvement of balance and proprioception (38). There is some evidence indicating that whole-body vibration training can improve neuromuscular function (16). The acute effects of WBV on agility are not known well since studies in this field are very limited. Agility had great importance for many sports. The t-test is an acknowledged measurement method for valid agility assessment (39). However, it was reported that agility is correlated weakly with strength, power, and speed, which necessitate specific motor and skill training (40). Many previous studies were conducted to measure the short-term effects of WBV training on muscle strength in elite athletes and well-trained athletes (24, 41). In this context, the aim of the study was to examine the effects of acute WBV training on agility in sedentary men.

## Materials and Methods

### *Participants*

Healthy sedentary male individuals (aged 18-25) were included in the present study after being randomly divided into two groups, which included a WBV group (n=10) and a non-vibration group (n=10). WBV group (20.13 ± 1.42 years, 177.18 ± 2.38 height, 78.16 ± 3.51 weight), control group (20.49 ± 1.78 years, 178.52 ± 4.12 height, 76.62 ± 2.48 weight). All individuals had no previous experience in WBV. Individuals who have cardiovascular and neurological, musculoskeletal, or rheumatologically diseases were excluded from the study. Participants who refused to sign consent forms were also excluded (42). Individuals were told not to do training 48 hours before the pretest and WBV training, to sleep 6-8 hours, not to consume tobacco, alcohol, and caffeine 48 hours before, to eat light meals at least 3 hours before, and not to consume too much liquid before the pretest (43). All participants signed informed written consent forms before further experimentation.

### *Whole Body Vibration (WBV)*

A vibration platform was used for the training (Aspire, 588, Istanbul, Turkey). All individuals who participated in the study did a 10-minute warm-up exercise before the procedure. The Agility T-test was applied, the first measurements were made, and the pre-test values were recorded to determine the agility performance of the individuals in the Whole Body Vibration Training (WBV) group after warming up. After the pre-test, the participants were on the vibration platform at 40Hz, 2mm for 60 seconds doing dynamic squats. The Agility T-test posttest measurements of the participants were performed and the posttest values were recorded after the Acute Whole Body Vibration Training. The agility performance values were recorded by participating in the pre-test and post-test measurements in the control group.

### *Body Weight*

Measurements were carried out with feet bare and shorts using Seca brand stadiometer (44).

### *Height*

The distance between the top of the head and the ground was measured in anatomical stance, bare feet, feet together, and holding breath. Measurement results were recorded in cm using Seca digital scale. The height was measured at 1mm sensitivity, and the results were recorded (45).

### *Agility Test*

The T-Test was used to measure the agility performance. Four cones were arranged in a T shape, with a (B) cone placed 9.14 m from the starting (A) cone and

two further cones placed (C and D) 4.57 m on either side of the second cone. Participants ran when the 'go' order as quickly as possible to the central cone and touched the tip of the cone (B) with their right hand. Then they performed a lateral shuffle to the left 4.57 m. and touched the tip of the cone (C) with the left hand. Subjects then shuffled 9.14 m. to the right and touched the tip of the cone (D) with their right hand. They then shuffled 4.57 m. to the left and touched cone (B) with their left hand. Finally, subjects back-peddled 9.14 m., passing through the finish at cone (A). The time to complete each test is measured in seconds. Each individual repeated the test twice, and the best time was recorded in seconds as the degree of the individual (46). Pauole and Madole found the Agility t-test to be highly reliable with intra-class reliability was 0.98 (47).

*Statistical Analysis*

Results were given in mean ± standard deviation. The Shapiro-Wilk test was applied to determine whether the data showed a normal distribution, and it was determined that the data showed normal distribution. Independent samples t test was used to compare among independent examples. Paired sample t test was used to compare among the dependent examples. The significance level was taken as $p<0.05$

## Results

According to the results given in Table 1, the result of the WBV group of the participants in the agility T-test pre-test results was 12.11±0.24 sec., and that of the Control Group was 12.40±0.45 sec., No significant differences were detected between the groups according to the pre-test results ($p>0.05$). According to the posttest results, the result of the WBV group was 11.87±0.13 sec., and that of the control group was 12.39±0.47 sec., No significant differences were detected between the groups according to the post-test results ($p>0.05$). According to the pre-test and post-test results, there were no changes in terms of the agility values between the groups.

According to the results given in Table 2, the result of the WBV group of the participants in the agility T-test pre-test results was 12.11±0.24 sec., and the posttest result was 11.87±0.13 sec. It was found that there were no statistically significant differences between the groups according to the pretest and posttest results ($p>0.05$). The pretest result of the control group was found to be 12.40±0.45 sec.; and the posttest result was 12.39±0.47 sec. There were no statistically significant differences between the groups according to the Agility T-Test pretest and posttest results ($p>0.05$).

**Table 1.** Comparison of the pre-test and post-test scores of the Whole Body Vibration Training and Control Group

| **Variables** | **Pre-test** | | **Post-test** | |
|---|---|---|---|---|
| | WBV (Mean± SD) | Control (Mean± SD) | WBV (Mean± SD) | Control (Mean± SD) |
| T Test (sec) | 12.11±0.24 | 12.40±0.45 | 11.87±0.13 | 12.39±0.47 |
| Significance Level | t= .638 p=.574 | | t=.893 p=.287 | |

**Table 2.** Comparison of the Whole Body Vibration Training and Control Group Scores in the Intergroup score

| **Variables** | **WBV** | | **Control** | |
|---|---|---|---|---|
| | Post-test (Mean± SD) | Post-test (Mean± SD) | Post-test (Mean± SD) | Post-test (Mean± SD) |
| T Test (sec) | 12.11±0.24 | 11.87±0.13 | 12.40±0.45 | 12.39±0.47 |
| Significance Level | t=.784 p=.359 | | t=.695 p=.559 | |

## Discussion and Conclusion

The aim of the study was to examine the effects of Acute Whole Body Vibration Training on the agility of sedentary men. Based on the results of the present study, the agility performance of the Acute Whole Body Vibration Training group was found to be 12.11±0.24 sec. in the pretest, and 11.87±0.13 sec. in the posttest. It was determined that there were no statistically significant differences between the agility values of the WBV group in the pre-test and post-test scores ($p>0.05$). The agility performance pretest was 12.40±0.45 sec. in the Control Group, and the post-test was determined as 12.39±0.47 sec. It was found that there were no statistically significant differences between the pretest and posttest agility performance scores of the control group ($p>0.05$). No statistically significant differences were detected between the agility performance pre-test results between the groups ($p>0.05$). There were no statistically significant differences between the agility performance post-test results between the groups ($p>0.05$). The agility t-test test measurements were made for evaluating the agility performances. According to the results of the present study, it was found that Acute Whole Body Vibration Training had no effects on agility in sedentary men.

Torvinen et al. applied a shuttle run test to participants for agility performances after 2 and 60 minutes following WBV training, with 4-minute different vibration frequencies and gradual increase (15 Hz to 30 Hz). They reported that WBV training had no significant impacts (20).

In another study, non-Elite athletes were trained with WBV for 9 days. Agility performances were measured, and it was reported that no differences were found between the WBV training group and the control group (48). Agility performance was measured in another study following acute WBV training in female volleyball players. No significant results were reported in pretest and posttest results (49). In a study that was conducted with basketball players who were aged between 14-15, it was found that there were no changes in the agility values as a result of Whole Body Vibration Training performed 3 times a week for a total of 6 weeks (50). It was determined in another study that there were no significant differences in pre-test and post-test agility scores after 8 weeks of whole-body vibration (51). It was seen that many studies conducted previously support the results of the present study, and it is seen that similar results were reported. On the other hand, there are also studies reporting that significant improvements were found in the agility values as a result of the 3-week whole-body vibration training of professional football players (52). Chin et al. reported that vibration training improved agility, speed, and power performance of male volleyball players at significant levels (53). No studies were found in the literature on the effects of acute WBV training on agility in sedentary men. The effects of long-term whole-body training on agility were examined in many of the previous studies.

Due to the differences in WBV training and participant characteristics, it is difficult to compare the results of this study. More studies are required on the effects of Acute Whole Body Vibration Training on agility in sedentary individuals. Future studies to be conducted on the effects of Acute Whole Body Vibration Training on different groups will contribute to the literature. The acute effect of whole body vibration training on agility will be elucidated with different results to be found in these studies.

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