

**Cardiofitness monoplanar exercise: an effective training style: a pilot study.**

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**Introduction**

Fitness centers offer a series of machines that can be used by participants independently from their training status. Cardio wave™ is a new device (Technogym®, Italy) that works simultaneously on three axes with a sliding movement of the lower limbs, activating different muscle groups according to the position maintained (i.e., 1- basic, with the chest erect and hands on the bar; 2-intermediate, with the chest leant forward and hands on the bottom of the handlebars; 3-advanced-intermediate, with the hands rest on the upper part of the handlebar and the chest more bent than the previous position; and 4-freestyle, with the upper limbs free). Thus, the purpose of the present study was to evaluate the muscle activity and exercise intensity in trained and untrained individuals during all four positions.

**Methods:**

Six subjects, 3 trained (T) and 3 sedentary (UT) (age:  $27.8 \pm 5$  yrs, height:  $175 \pm 6$  cm., weight  $77.6 \pm 2$  Kg) were recruited for the present study. After a familiarization trial with all four cardio wave positions, they were asked to perform 2 minutes on each position, with a three minute resting period in between, at the same absolute intensity (level 8 of the device). Muscular activation pattern with a surface electromyography of the vastus medialis, rectus femoralis and femoral biceps was measured. At the end of each step HR was recorded. An ANOVA for repeated measures was utilized in order to evaluate differences ( $p < 0.05$ ) in HR and muscle activation between the four difference positions.

**Results:**

The results demonstrate no difference between T and UT in muscle activation and HR. However, significant differences ( $p < 0.01$ ) between the four different positions emerged. Post-hoc analysis for muscle activation showed that position 4 had higher values than position 1 and 3. Although no significant difference emerged between muscles, in all four positions the vastus medialis was the most activated muscle, both for the right and for the left limb. Post-hoc analysis for HR showed significantly higher values for position 4 ( $185 \pm 6$  beat.min<sup>-1</sup>;  $95 \pm 3\%$ HRmax) and 3 ( $179 \pm 8$  beat.min<sup>-1</sup>;  $92 \pm 3\%$ HRmax) than position 2 ( $165 \pm 7$  beat.min<sup>-1</sup>;  $85 \pm 3\%$ HRmax) and 1 ( $149 \pm 10$  beat.min<sup>-1</sup>;  $77 \pm 4\%$ HRmax).

**Discussion:** In all four positions, the sliding movement of the lower limb seems to activate more the vastus medialis muscle. The results of the present study demonstrate that working on the Cardio wave™ with the upper limbs free (position 4) significantly increases the exercise intensity and the muscle activation, with UT showing a trend towards higher values probably due to the lower economy of this high intensity exercise. However, the lack of statistical significance between T

and UT could be attributed to the reduced number of subjects and further investigation is recommended.

**References**

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