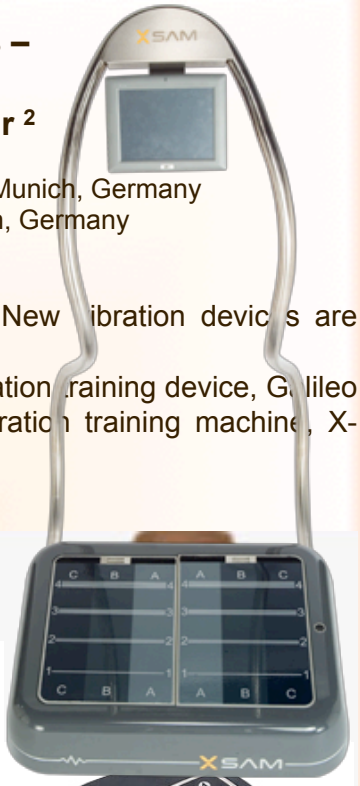
New generation of vibration training devices reduces undesirable accelerations

– comparison of two vibration systems –

M. Hartard [1], F. Tusker [2], J. Hermsdörfer [2]

1) Center of Diagnostics und Health – Outpatient Department – Munich, Germany
2) Chair of Movement Science, Technical University Munich, Germany



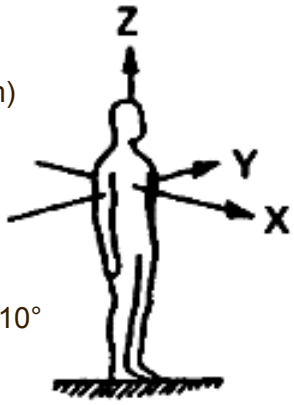
Introduction

Vibration has become of increasing interest to health professionals. New vibration devices are coming up and show differences in applying vibrations to the body. The present test tried to compare a common vibration training device, Galileo Advanced ®, with the mechanical impacts dispensed with a new vibration training machine, X-SAM®.

The two machines transfer vibrations to the body in two ways. Both devices operate in a side-alternating way. Galileo® is functioning with one vibrating plate and a fixed rotary component. In contrast, X-SAM® operates with two vibrating plates, as well as in a side-alternating way.

Methods

To answer the purpose 20 men and women (32.3±6.2 years, 78.4±7.8 kg, 175.0±12.1 cm) participated in a controlled and randomized test series of the two machines.



The series varied in three different body positions:

1) Legs apart (35 cm) and elongated;
2) Legs apart (35 cm) and knee flection of 110° (goniometer) and
3) Like alternative 2 but with raised heels.

The test series lasted one minute for each position and were done with an upstroke up to somewhat of 5 mm and a frequency of 20 Hertz to investigate the accelerations at foot, knee, hip and head. The accelerations were recorded with a 3-d-accelerometer (measuring the accelerations of the x-, y- and z- vectors and calculating a sum-vector). To test whether the accelerations differ depending of the vibration paired t-tests were performed. Test values have been the mean absolute values of the acceleration in a time range of 40 seconds within one-minute test intervals.

Results

Generating about the same acceleration-force (g) at the platforms (3-6g) the accelerations through the bodies were significantly different in between the two devices, here presented as mean±SD. Especially the accelerations of the lower limbs were much higher ($p<0,05$) in Galileo (Pos.1: ankle joint sum-vector 4.12±1.09g, head sum-vector 1.01±0.01g and ankle joint z-vector 1.93±0.67g and y-vector 2.12±0.91g and knee joint. z-vector 0.63±0.34g and y-vector 0.69±0.38g) than on the X-SAM® (Pos. 1 ankle joint sum-vector 3,00±0,76g, head sum-vector 1,0±0,001; ankle joint z-vector 1.04±0.64g and y-vector 1.70±0.50; knee joint z-vector 0.44±0.21g and y-vector 0.61±0.28g).

Discussion / Conclusion

The results give the impression that in comparison to the Galileo® system, the vibration technology of X-SAM® device could reduce accelerations in the regions of lower limbs, hip and head, but further evidence is needed.

Correspondence: Manfred Hartard, CDG-Munich, Nadistr.16, D-80809 Munich, Germany.
e-mail: m.hartard@cdg-muenchen.de