

CYBEX Arc Trainer



CYBEX: Arc Trainer Study

2005

A Comparative Kinematic and Biomechanical Analysis of Two Gait Simulators: An Independent Research Study and Review of Key Findings

ARC PREVAILS, ELLIPTICALS STRESS

COMMENTS:
ow impact is my main criteria for choosing this machine.
there is NO STRESS on my ankle, knee or hips." - AB, Trainer, Ontario, CAN
The Cybex Arc Trainer IS THE ONLY PIECE of equipment that delivers a non-impact
porkout and is fully adjustable for all users."
- Norman Morrison, Product Manager, Gym Source
this year's MUST-HAVE ITEM: the Cybex Arc trainer." - Major Boston Newspaper
breater than any of its competitors, a fantastic, truly safe and effective workout."
- Ben Wilde, Fitness Training Solutions, UK
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Review of Key Findings

- 1. Introduction and Purpose
- Large numbers of fitness consumers are gravitating towards elliptical cross training devices, largely under the premise that these machines are not stressful to the body.
- This perception stems from the belief that because the elliptical cross trainers reduce or eliminate reactive forces ("pounding" in the layman's lexicon), there is no associated joint stress.
- The consumers' perception is false, however, as there are, in fact, forces that act on the skeletal system during use of an elliptical cross trainer which may induce relatively high levels of stress, even in the absence of "pounding." These levels of stress are brought on by the introduction of torques to the musculo-skeletal system.
- The purpose of this study was to evaluate the relative stress loading of two different gait simulators in order to understand their effects on the musculo-skeletal system.
- 2. Methods
- A new portable force platform, designed by Cybex, was used in this study to evaluate the application of forces during repeated stride cycles on two gait simulators.
- One gait simulator, the Precor EFX[®] model 546, is an elliptical device based on a crank and slider design.
- The other gait simulator, the Cybex ARC Trainer,[™] produces an arcuate path around a moving parallelogram.
- One subject performed repeated stride cycles on each gait simulator at relatively equal inclines and levels of intensity.

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Review of Key Findings

4. Results

EFX Elliptical

- Hip and knee motion were out of phase, meaning the knee began extension prior to the hip. This is not consistent with climbing.
- This motion also caused the forces to be applied mostly forward, rather than down and forward. The knee was subjected to a significant flexor torque, which resisted its extensor movement, but the hip experienced little to no resistance to motion. This caused an increase in shear stress at the knee, potentially contributing to knee pain.
- The foot plate also did not move in a manner consistent with normal gait. As force was applied by the user, the foot plate rotated downward with virtually no accompanying backward motion.
- The downward tilt forced the user to lean forward, potentially causing stress in the low back region.

ARC Trainer

- Force applied to the foot plate resulted in direct downward and backward movement of the support, mimicking natural stair climbing.
- Hip and knee motion were synchronous, and in phase, so the two joints worked cooperatively.
- The forces applied to the foot plate were both forward and downward, not primarily forward, so the reactive force created a flexor torque at the hip. The hip, therefore, had to work against resistance, eliminating translation of forces to the knee, and reducing shear stress.

• A more vertical posture reduced loading on the back, and increased user comfort.

For complete research study, click here.

EFX is a registered trademark of Precor Incorporated.