6251 Mo–Tu, no. 3 (P60)

Effects of mild leg length discrepancy on vertical ground reaction forces in running

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Mild leg length discrepancy (LLD) appears to be quite usual among runners and researchers have suggested that they present locomotion asymmetry. Our purpose was to investigate differences in GRF during running in subjects with and without LLD. Scanograms were performed to identify structural LLD in 20 trained runners (>10 km/week). Subjects were divided into Discrepancy Group (DG) – 11 runners (LLD$\geqslant$0.5 cm) (9 men; 30.5$\pm$4.6 yrs); and Control Group (CG) – 9 runners (LLD < 0.5 cm) (7 men; 30.2$\pm$4.6 yrs). Vertical GRF were analyzed at a self-selected speed using a force plate mounted in a 10 meters indoor runway. Subjects wore their habitual running shoes. Five trials of each lower limb of each subject were acquired at 1000 Hz. We studied the first peak force (Fz_1); second peak force (Fz_2); rate of loading of the Fz_1 (RL_1); rate of loading of the Fz_2 (RL_2), and Symmetric Index (SI). T-test was used to compare groups and pared t-test to compare sides. We adopted $\alpha < 0.05$. As expected, both limbs of CG appeared even for all variables. DG showed significantly greater Fz_2 at the shorter limb (2.6$\pm$0.1 BW) compared to the greater limb (2.5$\pm$0.1 BW). DG presented also significantly greater Fz_2 than CG (2.4$\pm$0.2 BW) at the shorter limb [1,2], which implied an overload in subjects with LLD, resulting in symptoms as osteoarthritis and back pain [3]. DG and CG presented symmetrical gait since their SI values were close to zero [4]. This finding suggested that the magnitude of discrepancies analyzed (0.8$\pm$0.4 cm) were not sufficient to promote an asymmetric pattern in running. Nevertheless, discrepancies may still lead to clinical symptoms and injuries.

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5833 Mo–Tu, no. 4 (P60)

Feasibility of resistance training employing daily physical actions for improvement of muscle strength

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The present study aimed to investigate whether or not daily physical actions can be resistance exercises for improving muscular function in the young and elderly. Subjects were 6 young (26.0$\pm$4.0 yrs, 160.4$\pm$6.3 cm, 51.5$\pm$6.5 kg, means$\pm$SD) (YG) and 6 elderly (69.0$\pm$3.0 yrs, 154.5$\pm$2.9 cm, 55.6$\pm$4.5 kg) (EG) women. Electromyogram (EMG) during standing from and sitting onto a chair and sitting up from the floor were measured from the vastus lateralis (VL), rectus femoris (RF), vastus medialis (VM), and rectus abdminus (RA). The levels of muscular activity during the two prescribed actions were expressed by the percentages of the integrated EMG (averaged over time) during isometric maximum voluntary contraction. Both YG and EG performed standing from and sitting onto a chair and sitting up, every day, for 3 months. Before and after the training period, the thickness of RF and RA, isometric knee extension and hip flexion strength, as well as two performance tests (PT) (10 repetition time of standing from and sitting onto a chair, the number of sitting up for 30 seconds) were determined. The activity of quadriceps and RA in EG were significantly higher than those in YG. After 3-months training, EG showed gains in isometric strength of hip flexion per body weight (16%), muscle thickness of RA and RF (RA: 35.0%, RF: 14.4%), and PT (−32.8% and 13.7 times). YG did not show significant changes in any tests variables. In EG, the muscular activity levels of the two actions tended to be related to the magnitude of the training-induced changes in isometric strength of hip flexion and muscle thickness of RA. The results indicate that the present physical actions are effective for improvement of muscle size and strength in the elderly but not in young women. Whether or not daily physical actions become resistace exercises depends on the levels of muscular activity during the actions.

5908 Mo–Tu, no. 5 (P60)

Lateral force components on pedals measured by a cycle ergometer with three axial load cells

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This paper is focused on the measurements and analysis of the three components of the force on pedals in bicycling through a special cycle-ergometer prototype [4]. This machine allows to study the kinematics and dynamics of the bycicle-riders by quantitative measurements.
The pedals are equipped with a three-axial load cells measuring the pedalling force in three orthogonal directions, and with two encoders measuring the angular positions of foots. A third encoder is mounted on the central movement, for the measurement of the crank rotation angle.
The ergometer, developed for cycling sport performances and for clinical analysis, allows to measure the lateral components on the pedals, perpendicular to the para-sagittal plane. Notwithstanding the literature usually neglects the lateral components in non pathological subjects, they represent meaningful informations in rehabilitation treatment of pathological subjects. Moreover the biomechanical analysis of pedalling through three-axial force measurements allows to improve efficiency during cycling sports.

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6702 Mo–Tu, no. 6 (P60)

The cue of breathing in cannot decrease landing forces in the maximal vertical jump

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The training in dance programs always require a person to jump with lower impact sounds by the technique of breathing in and holding breath to reduce the rate of injury and to dance with more grace. The purpose of this study was to examine the effect of instructional cue of breathing in and holding breath to lower the peak ground reaction forces (GRF) during landing from the countermovement jump occurring naturally in athletes.
Fourteen physical education students (8 males and 6 females) who mainly major in Chinese martial arts, badminton, volleyball, or track & field were recruited as the participants for this study. Participants' mean age, body weight, and height were 19.3$\pm$0.9 years old, 64.5$\pm$9.7 kg, and 169.4$\pm$9.1 cm respectively. Every participant was asked to perform the natural maximal vertical jumps barefoot in the condition of breathing in and holding breath to land following one's inherent pattern. A Kistler force platform (type: 9287BA; sampling rate: 1000 Hz) was used to acquire vertical jumps and to assess the landing forces.
The analysis of flight height for pre-intervention (52.2$\pm$8.6 cm) and post-intervention (52.0$\pm$8.6 cm) showed no difference ($p > 0.05$). The results indicated that there were no significant differences ($p > 0.05$) in first peak GRF (PK1) (pre: 2.12$\pm$0.63BW; post: 2.00$\pm$0.71BW), second peak GRF (PK2) (pre: 5.60$\pm$1.75BW; post: 4.89$\pm$1.52BW), time to PK1 (pre: 15.9$\pm$6.4 ms; post: 15.6$\pm$4.7 ms), time to PK2 (pre: 64.6$\pm$11.1 ms; post: 67.2$\pm$12.6 ms), load rate of PK1 (pre: 156.17$\pm$80.13BW/s; post: 148.00$\pm$109.20BW/s), and load of PK2 (pre: 93.66$\pm$49.59BW/s; post: 77.17$\pm$33.35BW/s).
Researchers took into account that most participants were accustomed to land in their own patterns, and the temporary instruction of breathing in and holding breath did not seem to decrease landing force.

7348 Mo–Tu, no. 7 (P60)

Experimental considerations regarding the human ankle joint by using the technical system for training

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The technical system, conceived and realized, for training of the ankle joint, has two degrees of freedom. This system performs two independent movements, around the orthogonal axes of the horizontal plane.
The technical system allows the independent variation of the four parameters: two angular oscillatory velocities and two angular amplitudes. So, by doing certain tests on the football team members, there was pointed out the functional parameters of the technical system leading to a better accommodation of the ankle joint to the game conditions, separately by age and weight categories.
The electro-miographical measurements performed before and after training, during a training cycle, have pointed out the best results. At the same time, the sportive performances of the sportsmen using this technical system were considered better.
To emphasize the advantages and disadvantages of this system we considered three subject lots: one referential lot, to which did not apply this training technical system, one lot to which have been applied stochastic functional