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## **NORDIC WALKING – A FIELD STUDY OF BIOMECHANICAL LOADING OF THE LOWER EXTREMITIES**

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**Introduction:** Nowadays, according to the German Nordic Walking association 2 million people are doing Nordic Walking in Germany. Previous studies about the benefits of this sport for prevention and health promotion have shown positive physiological effects like higher oxygen consumption, heart rate and caloric expenditure (Porcari et al., 1997, Church et al., 2002). However, the biomechanical loading of the lower extremities is still a widespread discussed issue. For example, some sports associations or journals of physical exercise still state that walking with Nordic Walking poles provide 30-50 % load reduction to the lower extremities (see e.g. Geyer 2005). Though, this reduction seems to be clearly overestimated. Therefore, the aim of this study was to analyse the loading of the lower extremities during Nordic Walking compared to walking.

**Methods:** For that purpose 14 experienced, middle aged Nordic Walkers and 6 Nordic Walking instructors have been asked to walk a 1575m field track in randomised sequence, once with and once without poles. All subjects wore a little backpack with mobile data acquisition equipment. Biomechanical variables like the vertical ground reaction force (by insoles), vertical forces in the walking poles and position (by force transducers and inclinometers), and range of motion of the ankle and knee joint (by goniometers) have been recorded over 100 step cycles.

**Results:** The mean vertical ground reaction forces are not different between Nordic Walking and Walking. Due to dynamic forces, peak loads of approximately 140-170 % of the body weight have been measured. Nordic Walking differs from Walking mainly by the lower forces (around 4%) measured by toe off due to the use of the poles. On the other hand, at heel contact the forces are turning out a bit higher caused by forward acceleration. Similar results have been found on different walking trails.

The vertical forces measured in the poles are in average 5 kg and could exceed to 12 kg maximum. It has to be pointed out, however, that the landing of the pole has been measured in an angle of 30-50°, so that an effective release through the poles becomes less in vertical direction.

**Discussion:** The present results show that the common opinion of a load reduction of the lower extremities by 30-50 % during Nordic Walking has to be rejected. Therefore, Nordic Walking as a sport to reduce joint loading of the lower extremities should not longer be recommended. Though, physiological benefits and motivational aspects to decrease inactivity should be more emphasised.

**Conclusion:** In future, research should focus on clinical examples of patients with anterior knee pain who indicate less pain after Nordic Walking. One additional factor of pain relief might be in these cases a different neuromuscular control mechanism compared to Walking.

### **References:**

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