Abstract

Title: Nordic walking – analysis of senior walking

Aims: This thesis aims to make a kinematic and kinetic analysis of gait and NW in elderly using Qualisys and Kistler. Afterwards, it also aims to compare the selected parameters with each other and, based on the results, to objectify the effect of NW on the gait of the elderly.

Methods: The theoretical part of this thesis was processed using books and electronic sources obtained from online databases (PubMed, Medline, and Google Scholar). The research part was done in the form of an experiment. Fifteen women aged between 65 and 83 years (mean age 74) who regularly practiced Nordic walking under professional guidance participated in the research. These women were measured while walking and NW. A 3D kinematic analysis of walking and NW was performed using the Qualisys Motion Capture camera system. Ground reaction forces were measured using Kistler force plates placed in the captured kinematic analysis path. Data from these instruments was processed in Qualisys Track Manager and Microsoft Office Excel. Selected gait parameters that were analyzed included stride length, double-step length, gait speed, stride cadence, standing phase duration, lateral pelvic deviation, hip flexion and extension, knee joint flexion, dorsal and plantar flexion of the ankle joint, and all components of the pad reaction force. A paired Student's t-test with a significance level of 0.05 was used for statistical analysis of the data.

Results: The results of the study show a statistically significant difference between the kinematic parameters of gait and NW in the elderly in stride length, double-step, speed, and stride cadence, with an increase in the value of these parameters during NW. The results also showed a statistically significant difference between gait and NW in the elderly in lateral pelvic deviation, where NW resulted in a decrease in this pelvic movement to the side of the standing limb, and a statistically significant difference in the maximum ranges of motion to both hip flexion and extension, where NW led to an increase in the range of motion of these parameters. There was no statistically significant difference between the duration of the standing phase or between the maximum range of motion in the sagittal plane at the knee and hock joints during walking and NW. The kinetic part of the study demonstrated a statistically significant difference between walking and NW in the elderly in the maximum vertical component and acceleration force of the anteroposterior component, where there was an increase during NW. Moreover, at the peak of the lateral force of the mediolateral component, NW caused its decrease. In contrast, there was no statistically important difference between the minimum of the vertical component and the maximum of the braking force of the anteroposterior component of the reaction force

during walking and NW in the elderly. Due to the relatively small amount of probands, the results cannot be generalized to the broader population, but only to the present study population. **Conclusion**: I suggest that the change in most of these parameters during NW is related to gait acceleration during NW rather than to the use of Nordic poles themselves. The more significant change caused by NW can be considered to be the reduction in mediolateral component strength and the reduction in the magnitude of lateral pelvic deviation during NW, which allow seniors to walk more stably with greater movement confidence and affect its other parameters.

Key words: kinematic gait analysis; kinetic gait analysis; nordic walking; gait; the elderly