ABSTRACT

Introduction. The theory of the six determinants of gait is still debatable. Previous studies with the use of three-dimensional gait analysis have not allowed to unequivocally determine the impact of individual determinants on vertical and lateral OSC displacements, both in healthy people and with disturbed gait stereotype.

Aim. The aim of the study was to evaluate the effect of individual determinants on limiting vertical and lateral oscillations of the OSC while walking at natural speed in people with advanced osteoarthritis of the knee joint and in healthy subjects.

Material and methods. The study involved 36 patients (28 women, 8 men) with advanced osteoarthritis of the knee, aged 40 – 60 years. Subjects with gonarthrosis of the 3rd / 4th degree in the Kellgren-Lawrence scale, a result of less than 60 points in the Lysholm scale and higher than 45 in the WOMAC scale were qualified. The control group consisted of 30 people (22 women, 8 men) aged 40 – 60 years, without any musculoskeletal dysfunction or diseases affecting the gait pattern. A one-time registration of movement was carried out with the use of the Vicon 250 system. Each participant had to walk along the designated pathway several times at a natural speed, barefoot. Based on the collected data, reports were generated on the temporal – spatial parameters, vertical and lateral oscillations, kinematics of the joints of the lower limbs and pelvis together with diagrams.

Results. The gait analysis showed that advanced gonarthrosis causes a change in the range of motion of individual joints, and significant differences were noted in the case of selected gait determinants on the affected and nonaffected limb, compared to the results of the control group. There were no significant differences between the affected and nonaffected limbs in the gonarthrosis group. After applying the diagrams of angular changes of individual determinants on the oscillation curve of the OSC, areas where the determinant has a limiting effect were marked out. On this basis, the total impact time of each determinant throughout the gait cycle, and then the index of effective limitation of vertical and lateral oscillations of the OSC were calculated.

Conclusions. Gait determinants exert a significant influence on limiting the oscillations of the center of mass (COM), both in the gonarthrosis group and in healthy subjects. The determinant of the knee joint shows the greatest reduction properties of COM oscillations, however, at the end of the Loading Response phase, and not for the entire duration of the support. The mechanisms of the foot and ankle joint as well as the summary leg rotation have a significant impact on the vertical displacement of the COM. The indicated determinants show several times greater reductive features of the oscillation of the COM upwards than downwards. Advanced

degenerative disease significantly influences the gait stereotype by changing the kinematics of the joints of the affected lower limb.
Key words: gait determinants, center of mass oscillation, reduction of oscillation