

## **Summary**

### **Body balance and lower limbs alignment of individuals with mild and moderate intellectual disabilities aged 13-23 years in the Podkarpackie voivodeship**

#### **Aim of the study**

This study aims to analyse the relationship between body balance, the shape of the feet, and the lower limb alignment in people with mild and moderate intellectual disabilities compared to peers without intellectual disability.

#### **Material and method**

A total of 750 participants took part in the study. As a result of the recruitment process, 50 females aged  $19.38 \pm 2.59$  and 50 males aged  $17.84 \pm 2.68$  with mild and moderate intellectual disability without co-morbidities from the Podkarpackie voivodeship entered the study correctly. The control group consisted of 50 females aged  $18.42 \pm 3.30$  and 50 males aged  $17.36 \pm 3.02$ . The control group was consistent in anthropometric parameters. Participants were assessed for static balance in two 30-second trials in a habitual position, first with eyes open and then closed. A plantographic examination of the feet was performed using a CQ podoscope. The lower limb alignment was assessed using the CqKam. Statistical analysis used tests: Shapiro-Wilk, Student's t, Mann-Whitney U, Chi2, Spearman's rank correlation, ES effect size index (Cohen's d, Glass's rg). The level of statistical significance was  $p < 0.05$ .

#### **Results**

Differences in parameters relating to the shape of the sole side of the foot between the women in the study and control group were noted, among others, for the parameters of the external angle of varus of the V toe of the left foot  $p=0.023$  and the right  $p=0.028$ . In the male control group, the left foot tended to be longer than the right foot  $p=0.027$ . Also significantly higher were the values for the parameters of the external varus angle of the V toe of the right foot  $p=0.005$  and the left foot  $p=0.009$ . The knee valgus angle of women was higher in the female study group  $p < 0.001$  and in the male group  $p=0.037$ . In the closed-eye test, the TR5 quality index was lower in the group of women with disabilities  $p=0.040$ ; the COP path length index was not significantly different. In the closed-eye trial in the men's group, there were differences for COP path length  $p=0.041$ , while the TR5 quality index was not significantly different. In the female disability group, correlations were determined for: summed knee valgus angle (SKKK) - right Wejsflog index (DL/SZp)  $RS=-0.47$ ; SKKK - left Wejsflog index DL/SZl  $RS=-0.43$ ; right foot length (DLp) - number of COP swings in AP direction with eyes open (LWAP-EO)  $RS=-0.35$ ; DLp - right limb COP path length with eyes open (SP-EO-P)  $RS=-$

0.31, DL1 - COP path length with eyes open (SP-EO)  $RS=-0.32$ ; right foot width (SZp) - mean COP velocity eyes open (MV-EO)  $RS=-0.28$ ; SZp - SP-EO-P  $RS=-0.31$ ; SZp - SP-EO  $RS=-0.33$ . In the male disability group, correlations were determined for: Clarke's angle of the right foot (CLp) - Wejsflog's longitudinal arched index of the left foot (Wal)  $RS=-0.30$ ; right knee valgus angle (KKKP) - Clarke's angle of the left foot (CLl)  $RS=-0.36$ ; femorotibial angle of the left limb (KU-PL) - Wejsflog longitudinal arched index of the right foot (WAp)  $RS=-0.32$ ; femorotibial angle of the right limb (KU-PP) - DL/SZp  $RS=-0.31$ ; KU-PP - DL/SZl  $RS=-0.31$ ; SKKK - CLl  $RS=-0.42$ ; SKKK - WAp  $RS=0.29$ . In the male control group, correlations were determined for left knee valgus angle (KKKL) - left KY index (KYl)  $RS=-0.31$ ; right knee valgus angle (KKKP) - Clp  $RS=-0.28$ ; KKKP - KYl  $RS=0.31$ .

## Conclusions

Age, body height, body weight and BMI of the subjects are differentially related to the values of plantographic parameters, lower limb alignment and static balance. The longitudinal and transverse arches of the feet in the study and control groups do not differ at the level of statistical significance. People with intellectual disabilities, especially women, have significantly more valgus lower limbs. The quality of balance of people with intellectual disabilities is lower than that of the general population, especially in the closed-eye test. Transverse flatfoot co-occurs with knee valgus in women and men with intellectual disabilities. In all men, knee valgus is accompanied by a decrease in the longitudinal arches of the left foot. Balance parameters decrease as foot length and width parameters increase. Increasing the area of the plantogram and the flattening of the feet decreases the values of the balance parameters. The quality of static balance is related to lower limb alignment, especially among women with intellectual disabilities. Lower limb alignment and static balance deteriorate with increasing levels of intellectual disability regardless of gender.