The influence of asymmetry of strength and muscular power of the lower limbs on the multidirectional speed of female soccer players

Strength and conditioning in women's soccer is a very important part of the training process. Improvement sport performance and development of movement potential, reduces the risk of injury. Relationships between motor abilities such as strength, speed and agility have an impact on the game performance. In turn, the strength and power of the lower limbs have an impact on the achieved running speed and change of direction speed. It seems that playing football for many years can cause disproportionate strength of the lower limbs due to the dominance of one limb. The inter limb asymmetries of strength or power is associated with worst individual technical activities and increases the risk of injury. The impact of the difference in strength or power between the lower limbs on physical fitness remains poorly researched. Despite the fact that the issue is interesting, there is no scientific consensus on this topic, and published reports seem to contradict each other. The aim of this study was to examine the impact of the difference in strength and power between the lower limbs (inter-limb asymmetry) on the linear running speed and change of direction speed in professional female soccer players. The study involved 30 women participating in the Women's Ekstraliga in Poland (age 24 ± 3 years; height 165 ± 5.7 cm; body weight 57.8 ± 5.9 kg; body fat level 15.8 ± 3%). The athletes performed strength and power tests on pneumatic devices Keiser Leg Press (WJ), Keiser Squat (PJ) with a load of 50% RM and jumping tests vertical single-leg jump (WJWG) and lateral single-leg jump (SWJB) on the dynamic platform. 10 and 30 m sprinting tests and the change of direction tests Zigzag and 505 were measured with the use of photocells. The percentage index asymmetries were calculated from, WJWG, SJWB,WJ and PJ. There was no statistically confirmed correlation between strength and power asymmetry and multidirectional speed abilities. However, when the athletes are divided into two groups: "G1" and "G2" with respectively lesser and greater asymmetry from each strength and power condition, different speeds were observed between the groups. One-way ANOVA between groups G1 and G2 shows the increase in linear running speed in group G1 in normal to group G2 when athletes were divided according to the asymmetry obtained in the SJWB, WJ and PJ tests. The G2 group achieved a higher average speed during the change of direction than group G1 from calculations differences in force and power in the WJWG ,WJ, PJ tests. Based on these results, it was found that the players with less asymmetry were faster in a linear running speed. This may be due to the even distribution of forces between the lower limbs, which maintains a stable running track.

Players with greater asymmetry performed better in tests with change of direction. One limb works faster and more efficiently, which achieves higher cornering speeds when changing direction. Tests using Keiser pneumatic devices with the load of 50% 1RM allowed to detect the highest levels of asymmetry and differentiated the G1 and G2 groups. The smallest differences were detected by the WJWG test, perhaps due to the fact that the movement used during the game was used in the test. In addition to the development of speed and strength abilities, which are the primary goal of strength and conditioning training for female soccer players, it would be worthwhile to include information on the size of asymmetry in the training plan and to reduce it to less than 15%. This could not only reduce the risk of injury, increase effectiveness of performing technical elements but also in addition, according to the presented research, it could improve the linear running speed and change of directional speed in female soccer.

Keywords: asymmetry, female soccer, multidirectional speed, linear running speed, change of direction speed, strength, power