

## Abstract

**Title:** Strength asymmetries of female soccer players according to playing position

**Objectives:** The aim of this diploma thesis was to characterize the unilateral and bilateral asymmetries of knee flexors and extensors in elite football players based on player positions and to define the characteristic isokinetic strength profile for each playing positions.

**Methods:** The research group consisted of 66 female football players who play in the highest czech league. The players completed laboratory testing under the supervision of qualified experts, which took place according to the standard conditions described in the methodological part of this study. In the case of players, we examined the strength asymmetries in the flexors and extensors of the knee and compared them between the 4 basic positions in football.

**Results:** After summing the data from all angular velocities ( $60^{\circ} \cdot s^{-1}$ ,  $180^{\circ} \cdot s^{-1}$ ,  $300^{\circ} \cdot s^{-1}$ ) we found that 33% of our attackers had quadriceps asymmetries above 10%, which was the most of all posts. This is followed by goalkeepers with 28% and midfielders with 25%. The lowest percentage of quadriceps asymmetries was recorded in defenders 22%. Even in the case of hamstrings, we recorded the most asymmetries ( $> 10\%$ ) in attackers, up to 46%. For midfielders and defenders, it was the same result for both 43%. Goalkeepers recorded overall the least asymmetries of hamstrings, 33%. Regarding unilateral asymmetries, mean values of the H:Q ratio above 60% were demonstrated only by defenders in the dominant lower limb ( $59.46 \pm 12.02\%$ ;  $62.50 \pm 9.88\%$ ;  $61.50 \pm 7.78\%$ ). The midfielders were closest to the 60% limit ( $57.12 \pm 7.96\%$ ;  $59.28 \pm 6.45\%$ ;  $59.00 \pm 8.59\%$ ). Goalkeepers had slightly worse results compared to midfielders ( $56.86 \pm 12.11\%$ ;  $56.00 \pm 7.54\%$ ;  $58.71 \pm 5.20\%$ ). The lowest averages in the dominant lower limb were reached by the attackers ( $49.20 \pm 17.65\%$ ;  $49.80 \pm 18.24\%$ ;  $47.10 \pm 18.41\%$ ). The highest H:Q ratios in the non-dominant lower limb were recorded in defenders and midfielders (54.44 - 57.60%). The ratios of the goalkeepers were found to be around 50%. On average the lowest H:Q ratios in the non-dominant lower limb are recorded in attackers whose results were around 47%.

**Conclusion:** Based on the findings of our study, we conclude that there are differences in strength profiles and asymmetries based on the player's post. We found a higher proportion of

bilateral asymmetries of quadriceps in goalkeepers compared to hamstrings, while other positions showed a higher percentage of hamstring asymmetries. We also found that the attackers recorded the lowest H: Q ratios of all positions. The highest H:Q ratios were proved by the defenders, then the midfielders.

**Keywords:** soccer, isokinetic strength, assymetry, knee muscles, playing position