WORLD CUP ALPINE SKIERS KNEE ANGLE DIFFERENCES IN LEVI WORLD CUP SLALOM

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PURPOSE: A top level alpine skier must have high aerobic and anaerobic capacities, strength, speed, agility, balance and skills to maintain the skiing position in a race. The purpose of this study was to compare differences between the knee angles of the fastest and the slowest world cup skiers and to study the effect the knee angles have on speed.

METHODS: The data was collected in Levi World Cup Slalom race 2006 of second round men skiers (N=29) and women skiers (N=27). The measurement area was two turns at the end of the race slope. Video cameras were positioned at the side of the ski slope and down below it. The measurements were made when the skier hit the gate in the steering phase and when the skier was between the gates on the fall line. The slope was icy with a steepness of 28°. The material was analyzed with the Silicon Coach Pro video analysis program.

RESULTS: In the measurement area the fastest women skiers’ (n=5) knee angles on the inside leg were 57°±9 (mean ± SD) and on the outside leg 102°±11. The respective figures in the slowest women skiers (n=5) knee angles were 74°±11 and 113°±7. Between the gates when the skiers were on the fall line the fastest women’s knee angles were 100°±11 and the slowest 101°±8. In all the women skiers who finished (N=27), the average knee angle was on the inside leg 67°±13, the outside leg 105°±10 and on the fall line 99°±7.

In the measurement area the fastest men skiers’ (n=5) knee angles on the inside leg were 50°±10 (mean ± SD) and on the outside leg 91°±7. The slowest men skiers’ (n=5) knee angles on the inside leg were 57°±7 and on the outside leg 99°±15. Between the gates when the skiers were on the fall line the knee angles in the fastest men were 87°±3 whereas the in the slowest skiers’ they were 88°±6. In all the men who finished (N=29), the average knee angle on the inside leg was 51°±9, the outside leg 95°±9 and on the fall line 89°±8.

CONCLUSION: The fastest women skiers’ knee angle on the inside leg was 17° (p<0.036*) smaller compared with the slowest skiers. The outside leg knee angle in the fastest skiers was 11° (p<0.117) smaller than in the slowest skiers. Between the gates, when the skiers were on the fall line, the fastest skiers’ knee angle was 1° (p<0.917) smaller than the slowest ones. The fastest men skiers’ knee angle on the inside leg was 7° (p<0.347) smaller than the slowest skiers’. The outside leg knee angle in the fastest skiers was 8° (p<0.289) smaller than in the slowest skiers. When the skiers were on the fall line, the ‘fastest skiers’ knee angle was 1° (p<1.000) smaller than the slowest skiers.

We can therefore come to a conclusion that in the Levi World Cup Slalom the fastest skiers had smaller knee angles and lower skiing positions than the slowest skiers.