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Comparison of high- and low-calibre ice skaters stride time and stride length on a synthetic ice surface

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1. ABSTRACT

Temporal and spatial parameters are the first and foremost metrics to characterize any repetitive activity like forward ice skating. While most of the public ice rinks have been restricted due to COVID-19, synthetic ice is an alternative, allowing skater to practice and stay ready for competitions. Biomechanical assessment of skating on synthetic ice helps coaches monitor the players remotely but has not yet been comprehensively performed. This study aimed to compare the stride time (ST) and stride length (SL) of high-calibre and low-calibre ice skaters on synthetic ice. Twelve able-bodied individuals, six high-calibre skaters (age 24 ±4 years, height 164 ± 3 cm, body mass 66 ± 7 kg, ice skating experience 18±4 years) and six low-calibre skaters (age 24 ±4 years, height 174 ± 8 cm, body mass 72 ± 11 kg, ice skating experience 6±6 years), were recruited to skate forward on a synthetic ice surface (14×2 m^2) built in a motion capture lab. Pressure insoles (Novel, DE) were placed in the participants' skates to measure the ground reaction force during skating and thus detect ice contacts using a 5 N threshold. ST was defined as the time between two consecutive ice contacts. Twelve motion-capture cameras (Vicon, UK) tracked the trajectory of retroreflective markers placed on the sacrum of the participants to measure the SL; SL was defined as the distance traveled by the sacrum markers in one stride. All the systems' sampling frequencies were 100Hz. On the contrary of ice experiments, the SL of high-calibre and low-calibre skaters were significantly different (rank-sum test, p=0.00). There was no significant difference between the ST of these two groups (rank-sum test, p=0.31), unlike on-ice studies. In other words, skating on synthetic ice surfaces has altered the skating rhythm and movements of the ice skaters compared to on-ice skating. These findings concur with the literature that reported these effects of skating on synthetic ice on the skating timing and kinematics due to the shorter skating area and higher friction of synthetic ice compared to standard ice rinks. Players' skating on synthetic ice must be further analyzed to help coaches monitor player performance remotely, particularly when in-person coaching has faced limitations.