BOOK OF ABSTRACTS
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Saddle tilt during uphill cycling improves perceived comfort levels, with corresponding effects on saddle pressure in highly trained cyclists

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Introduction

Competitive cyclists often experience hand, foot, and saddle discomfort, creating potential for overuse injury and performance decrement (Bressel & Cronin, 2005, Journal of Biomechanics, 38, 1325–1331). The saddle is the most significant contact point, with uphill cycling (UC) performance being considered as the defining factor for success in the majority of cycling disciplines (Bertucci, Grappe, Girard, Betik, & Rouillon, 2005, Journal of Biomechanics, 38, 1003–1010). However, there is limited research related to bicycle saddle position, and in particular UC. (Caddy, Timmis & Gordon, 2016, Journal of Science in Cycling, 5, 18-25; Fonda & Sarabon, 2010, Sport Science Review, 19, 187–210).

Purpose: Recent 2016 amendments to UCI saddle position technical regulations (Article 1.3.014) enable a downward tilt of up to 9° to be achieved. The development of cycling power meters, bike fitting technology and pressure mapping allows greater opportunity to refine optimal individualised positioning for competitive cyclists. This has positive implications for performance, comfort and injury prevention. Nevertheless, current bike fitting methods are administered on a flat surface with a recommended level (0°) saddle. As a result, the aim of the present study was to investigate the effects of a downward saddle tilt on saddle pressure and perceived comfort during UC, within highly trained cyclists.

Methods

Seventeen highly trained cyclists (13 males, 4 females; mean ± SDs; age: 37.9 ± 26.1 years; height: 175.4 ± 20.8 cm; body mass: 69.2 ± 35.3 kg; Vo2 max 59.2 ± 13.8 ml.kg-1 min -1; years racing: 11.7 ± 18.3 years; maximum aerobic power 357 ± 120W) performed 9 counterbalanced bouts of 3 separate saddle positions and 3 separate gradients (0°, 5° and 10° saddle position at 0%, 15% & 30% treadmill gradient) on an electronically braked cycle ergometer, matched to their own bike, positioned on a ramped treadmill (Figure 1). A saddle pressure mapping sensor recorded kilopascal (kPa) saddle pressure (Figure 2). Subjective saddle, hand and foot comfort was measured using a VRS comfort scale.

Results

Total (saddle, hand and foot) and saddle subjective comfort data established significant differences ($p<0.005$) exist between 0°/15% and 5°/15%, 0°/15% and 10°/30%, 0°/30% and 5°/15%, 0°/30% and 10°/30%. Corresponding trend effects in saddle pressure maximum, mean and total values were also observed ($p>0.05$).

Discussion

Results indicate there were similarities between a 0° saddle at 0% gradient and either a 5° downward saddle tilt at a 15% gradient or 10° downward saddle tilt at a 30% gradient. This would suggest that a level saddle on level gradient is perceived to be as comfortable as tilting a saddle 5° downward at a 15% gradient and 10° downward at a 30% gradient. Conversely, a level saddle at a 15% or 30% gradient is considered not as comfortable as 5° downward saddle tilt at a 15% gradient or 10° downward saddle tilt at a 30% gradient.

Conclusion

A downward saddle tilt may be more appropriate during seated UC. However, future studies may consider standardisation of saddle pressure mapping systems, performance outcomes, individual characteristics and cycling discipline. These preliminary findings may assist cycling researchers, cyclists, coaches, bike fitting and medical practitioners adopting the 2016 UCI technical regulation for saddle position, relative to cycling uphill.

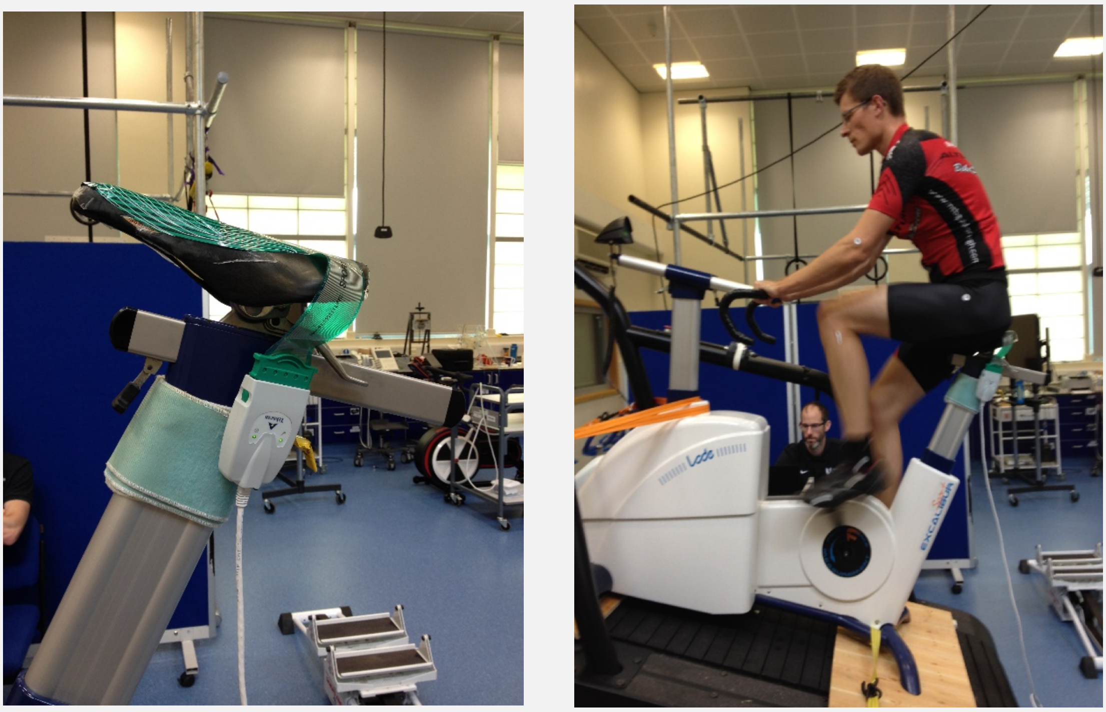

Figure 2. Saddle Pressure Mapping Sensor. Example: Level (0°) saddle at 30% gradient alters saddle tilt 16.7° upwards.

Key words: Saddle tilt; Uphill cycling; Bike fitting; Cycling comfort; Pressure mapping

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