A Comparison of the Forces Acting on the Horse's Back under a Half-Tree and Full-Tree Race Exercise Saddle at Walk and Trot

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Abstract

Back problems are reputed to be responsible for poor performance of the racehorse (Ross and Dyson 2003, Jeffcott 1980, Gomez Alvarez *et al*. 2007), causing lameness (Landman et al. 2004), and contributing to wastage in the Thoroughbred industry (Jeffcott 1982). Poor fit or improper positioning of the saddle frequently causes back pain and poor performance (Harman 1997). In the racing industry, poor performance must be linked to exercise saddles as half-tree and full-tree saddles are used with a 'fit-anything' approach (Bromiley, 2006). Force sensing technology has been used to accurately and objectively measures pressure caused by the saddle and to evaluate saddle fit (De Cocq et al. 2006; Jeffcott *et al.* 1999; Turner *et al*. 2004). The Tekscan Conformat System is a new wireless pressure sensing mat contained within a saddle pad, which records pressure under saddle in real-time. The aim of this study was to use the Tekscan system to investigate force under the half- and full-tree exercise saddles, at the walk and trot, using the riding style that is normally used under racehorse training conditions. Nine horses were ridden by the same experienced rider in a half-tree race exercise saddle and a full-tree race exercise saddle using a standardised protocol in an indoor school. At least ten strides were recorded for each horse in both saddles in three sections: walk (W), rising trot (R. T), trot with the rider in standing/jockey position (Sd.T), pressure data was recorded in real time. Mean force for each horse in each saddle, in each section was calculated. Data from six horses was used to analyse total force and force of under quarters of the saddle. There was no significant difference between overall mean force of the half-tree and full-tree saddle (P= 0.124). Force measurement was higher in the half-tree saddle. Total mean force was significantly different between all sections. Total overall mean forces at Sd.T was 50% and 51% lower that W, and, 14% and 12% lower than R.T in Half- and Full-tree saddles respectively. Variation occurred between individuals ($P=7.46 \times 10^{-8}$). The maximum overall force value was achieved in the half-tree saddle at walk. The lowest overall force value was achieved in the full-tree saddle at standing trot. Intra-individual comparison revealed the overall mean of 3 of 5 horses differed significantly between saddles.

The saddle tree did not have a significant effect on the quarter forces but quarters were significantly different from each other ($P=9.16 \times 10^{-6}$). Force was highest in the cranial half of saddle for all thee gaits in both saddle. Quarter forces were not significantly different between the rising and standing trot. The right cranial quarter showed significantly higher force, probably due to rider imbalance. Based on using lowest over all force as a criterion for saddle fit (Meschen et al. 2007), the full-tree saddle is preferable for use. High variation between individuals indicates that the appropriateness of saddle fit should be considered on an individual basis. Reliability and repeatability testing needs to be carried out to prove the pressure sensing system used in this study is accurate and result are therefore valid. Further research is required to confirm these findings in a larger population and determine the effects of force on the horse's back.