

A preliminary study to investigate the prevalence and progression of pelvic axial rotations among neonate foals

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The aim of this study was to identify the presence or absence of pelvic axial asymmetry in the neonate foal, and its progression during the first nine weeks of life, using quantitative data. The importance of symmetrical development and skeletal alignment in the adult equine athlete and its relationship with career longevity and injury is widely acknowledged. Musculoskeletal development from foal to adult requires equal consideration. It could be hypothesised that the act of parturition has the potential to have a subtle effect on the musculoskeletal system without the foal exhibiting external symptoms and thus impact ongoing musculoskeletal development. Triplicate measures of the left and right tuber coxae height were taken vertically from the dorsal aspect to level ground of ten healthy subjects (4 colts, 6 fillies) whose hind feet were no further than 5cm out of alignment. Measures were taken at three time periods: 0-1 week; 4-5 weeks and 8-9 weeks of age. A novel method of measurement was used in the form of two laser measures applied simultaneously that had been tested for and demonstrated acceptable repeatability of measurement. Between the first and second data collection foals experienced their first turnout. A questionnaire provided qualitative data in order to analyse potentially influential variables. Symmetry indices (SI) were calculated from raw data and were statistically analysed using appropriate inferential tests. Tests used on different data sets included Wilcoxon tests, Student T-tests, Mann-Whitney test with level of statistical significance at $p < 0.05$. There was a significant presence of axial rotation of the pelvis (pelvic asymmetry), compared to pelvic symmetry, within 0-1 week of age (mean SI = 0.337 ± 0.25 ; $W_{10}=55$, $p < 0.01$). These asymmetries did not change significantly between week 0-1 and week 8-9. There was no significant difference of asymmetry between week 0-1 and week 4-5 suggesting turnout did not have an effect on the prevalence of pelvic misalignments in foals (mean SI \pm SD: week 0-1 0.337 ± 0.25 ; week 4-5 0.555 ± 0.51 ; $W_{10}=17$, $p > 0.05$). Gender had no significant effect (mean SI \pm SD: colts 0.694 ± 0.38 ; fillies 0.410 ± 0.07 ; $U_{30}=77$, $p > 0.05$) on pelvic asymmetry. Foals of mares that gave birth standing up displayed significantly greater asymmetry of the pelvis during week 0-1 when compared to foals of mares that gave birth in a recumbent position (mean SI \pm SD: recumbent 0.2497 ± 0.659 ; standing 0.686 ± 0.4798 ; $U_{10}=8$; $P < 0.05$). This study shows evidence of significant pelvic axial asymmetry from birth to 8-9 weeks of age in foals. Further research is required to ascertain if pelvic axial asymmetry was caused by the birth process or from attempts to stand and subsequent locomotor efforts. Identification of such influential factors may have welfare implications in injury reduction during future ridden careers and contribute to knowledge in the field of equitation science.

Lay person message: The importance of symmetrical development during training is widely acknowledged. However, this study indicates that pelvic asymmetries may be present in new born foals, or certainly develop very early in life. Such evidence can be used to improve the future welfare of the horse when ridden, an important aspect of equitation science.

Keywords: Foal, development, asymmetry, pelvis, equitation, welfare.