Effects of a Structured Core Strength Training Program on Reducing Lower Back Pain and/or Enhancing Performance

Background The purpose of this investigation was to examine whether trunk endurance affords protection against decrements in performance and breakdown of posture. 41 college-age male and female rowers (21.4 ± 1.1 years), half of whom had taken part in trunk endurance training and half who did not, participated in this study. Over 3 sessions subjects were tested for maximal trunk endurance hold times, maximum isometric trunk strength, rowing ergometer step-test to determine power profile, followed by a simulated rowing training task of 3 sets of 15 minutes at anaerobic threshold at the third test session. Trunk endurance was related to markers of power output, muscle activity, and posture by comparing the 2 groups across a variety of measures including isokinetic dynamometer assessed trunk and leg strength, spinal posture kinematics (anterior-posterior lumbar rotation, anterior-posterior thoracic rotation, and hip angle), performance (the point in the rowing stroke where peak power was reached, peak force at the handle, and peak force at the feet) and surface electromyography (sEMG) muscle activity of the thoracic and lumbar erector spinae muscles, vastus medialis, and rectus femoris.

Result ANOVA analyses showed that trunk extensor and flexor endurance test scores were significantly higher in the high trunk endurance group compared to the low trunk endurance group (p-value < 0.05). Anterior lumbopelvic rotation decreased, and hip angle increased, over the 3 sets significantly at the catch and finish of the drive phase, respectively (p-value < 0.05), but did not differ between the groups (p-value > 0.05). There was no significant difference in percentage of stroke to reach peak power, nor were there differences in time to peak force at the hands or feet (p-value > 0.05), but interesting there was a trend for back erector spinae sEMG activity in the high trunk endurance group to decrease over the 3 sets (p-value < 0.05), even though intensity was maintained.

Conclusion To conclude, anterior lumbopelvic rotation did decrease, although not significantly, in both groups over the course of the rowing test, which might suggest that the rowers were more at risk of low back injuries later in the training session. It is also clear from this study that trunk endurance is not related to prevention of postural breakdown in interval durations of 15 minutes at anaerobic intensity, nor does trunk endurance have a significant effect on how power is applied in the rowing stroke in club level rowers. Of interest, was the degree, although non-significant, to which spinal erector muscles in those with better trunk endurance tended to show relatively less muscle activity over the rowing bout, despite no significant changes in sEMG activity of the leg muscles (p-value > 0.05). The ability to generate power rapidly at either the feet or hands must depend on different musculature, most likely the legs.

Practical Application Although we did not find trunk endurance to influence performance or reduce decrements in posture breakdown during rowing, from a practical point of view it would not be prudent to discard training of the trunk muscles. In fact, from a biomechanical standpoint the trunk is absolutely imperative as a kinetic link between the arms and legs. The question remains how much trunk endurance or trunk strength is sufficient for a rower to perform at a high level, and is the trunk, and the much hyped core stability, so important in athletic performance? Like any other part of the body the trunk muscles should be well conditioned, but coaches should consider the role of the trunk and whether it needs to be trained in isolation. Trunk endurance alone does not automatically allow a rower to sit with better posture in the boat, just as improved trunk endurance will not make one sit up properly in a chair. What coaches should consider is reinforcing good posture and mechanics at all times and eventually rowing with good posture will become automatic. Furthermore, rowers with tight hamstrings will not be able to get into, or maintain proper spinal positioning for long in a seated position, because the length of the hamstrings will affect the ability to anteriorly rotate the pelvis. Sports practitioners and coaches should consider that regardless of how well an individual can hold a posture when standing or sitting, as soon as movement begins, the joints need freedom to flex, extend and rotate around the trunk, and if mobility around a joint due to tight muscles is limited, the trunk may be the first place to sacrifice position to allow greater range of movement. Trunk rotation mobility, and flexibility about the joints of the connecting limbs, should not be overlooked when expecting athletes to maintain proper postures in sport activities. Future studies need to consider this.

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