

Back extension exercises in prone lying may increase thoracic kyphosis – a preliminary study

Question: How are the muscles of the trunk recruited during prone and sitting extension exercises?

Design: Randomised within-participant experimental study. Participants: 20 healthy adults (10 F).

Intervention: Participants performed back-extension exercises in three prone-lying positions (P1 arms above head, P2 arms hanging at side, P3 arms alongside body) and two sitting positions (S1 sitting upright, S2 sitting upright with scapular retraction).

Outcome measures: Surface EMG of the lumbar erector spinae (LES) and the external oblique (EO) muscles. Back extension force measurement using a wall mounted dynamometer. The moments generated during each exercise were calculated from anthropometric data and the forces measured. The log-ratio of moment to LES activity acted as an analogue for thoracic erector spinae (TES) activity.

Results: The prone extension tasks resulted in significantly more LES activity than the sitting tasks ($p < 0.001$). The LES amplitudes for P1 were significantly greater than for all the other tasks ($p < 0.001$). The EO amplitudes in sitting were significantly lower than in prone ($p = 0.006$) and significantly greater for P1 than for any of the other tasks ($p < 0.001$). The log-ratio of moment to LES amplitude was significantly higher for the sitting tasks than for the prone tasks ($p < 0.001$).

Conclusion: Prone extension induces a different pattern of activity from extension in sitting. When prone, more of the extension moment is the result of LES activity and the trunk flexors appear to stabilise the thoracic spine into more flexion with a paradoxical reduction in TES contribution.