

The effect of ligament stiffness on the stability of the human spine

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The problem to be investigated in this study will be the role and influence of the spinal ligaments on spinal stability. The importance of the spinal ligaments and the effect on the total spinal stability have not been emphasized sufficiently in the literature and is currently a big field of interest world wide.

The spinal column has both intrinsic and extrinsic stability:

Intrinsic stability results from the opposing forces of (a) ligaments restraining vertebral motion, and (b) pressure within the *nucleus pulposus* tending to push the vertebrae apart (Nixon and Brown, 1986:100).

Extrinsic stability results largely from trunk musculature and intra-abdominal pressure, which is in turn maintained by abdominal wall musculature (Nixon and Brown, 1986:100).

A study was done on the muscles acting on the L4/L5 joint of the lumbar spine (Potvin and Brown, 2005:973-980). Bergmark (1989) was the first to fully define and examine the mechanical stability of a muscular system which can be considered stable when the potential energy, V (a function of several variables), of the entire system is at a relative minimum. A stable system must always be able to return to its original state of equilibrium in response to perturbations around this original state.