# Evolution and spine shape may predispose you to back problems

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The reason many humans experience pain in their lower back can be found in our evolutionary past, according to new research from a team of bioarchaeologists at the University of Sydney, Simon Fraser University and the University of Liverpool.

The study published in *Evolution, Medicine, and Public Health*, examined what makes the vertebrae in our spine more susceptible to a particular stress fracture known as spondylolysis—a condition that often affects athletes.

Because spondylolysis only occurs in humans and does not affect our great ape cousins, it has long been assumed to be the result of increased stress placed on our spine by our unique ability to walk upright on two legs. However, there have been few attempts to test this hypothesis.

In the new study, the team of researchers used advanced 3-D shape analysis techniques to compare the final lumbar vertebrae of humans with and without spondylolysis to the same bones in our closest living relatives, the great apes.

The team found that the differences between human vertebrae with spondylolysis and great ape vertebrae were greater than the differences between healthy human vertebrae and great ape vertebrae. The nature of the differences was such that the researchers concluded that spondylolysis is connected with vertebral traits that are exaggerated adaptations for bipedalism.

This is the second spinal pathology that the team of researchers have linked to vertebral shape and the evolutionary history of our lineage. In previous work, they demonstrated that humans with intervertebral disc hernias have vertebrae that are more similar in shape to those of modern chimpanzees and our fossil ancestors than they are to the vertebrae of humans with healthy spines.

"For decades, scholars have assumed that the reason humans are so commonly afflicted with back problems is because we walk on two legs. Our studies are the first to confirm a clear link between the shape of your vertebrae, bipedalism, and the health of your spine," said Dr.

Kimberly Plomp, a postdoctoral researcher from Simon Fraser University.

The project's Principal Investigator, Mark Collard, the Canada Research Chair in Human Evolutionary Studies at Simon Fraser University, said: "We can picture the distribution of vertebral shape variation in humans as a bell-curve with one end having vertebrae with an ancestral shape and the other end having vertebrae with exaggerated bipedal adaptations, and where an individual's vertebrae lie within this distribution has a bearing on their spinal health."

"This is an area requiring further study, but our data show that studying the past can have a direct bearing on current societal issues—in this case the prevention and management of back pain," said Keith Dobney, Professor of Human Palaeoecology and Head of the School of Philosophical and Historical Inquiry at the University of Sydney, and also of the University of Liverpool.

Dr. Plomp added: "by 'mining' the archaeological and fossil record, we could develop a predictive model for understanding—and perhaps even mitigating or preventing—common back problems affecting so many people today."

**More information:** Kimberly A Plomp et al. Spondylolysis and spinal adaptations for bipedalism, *Evolution, Medicine, and Public Health* (2020). DOI: 10.1093/emph/eoaa003

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