

# INSIGHTS INTO CHIROPRACTIC

*Discerning the true nature of an alternative health care method*

## Is There Such A Thing As "Normal" Spinal Alignment? Part I: The Lumbar Spine

### INTRODUCTION

Chiropractors have long held as one of their cherished beliefs the notion that a "normal" spinal alignment exists for humans, and that alterations in spinal alignment represent an abnormality of human structure resulting in abnormal function. These misalignments of vertebral position have been termed "vertebral subluxations" and represent the spinal lesion the chiropractic profession attempts to treat.

Although this is a cherished "belief" of the chiropractic profession, the question that begs an answer is whether or not this chiropractic "belief" has any validity. Is there such a thing as "normal" spinal alignment and is there any reliable data which demonstrates that departure from such an alignment has a bearing on a patient's health? These are the questions that this issue of Insights Into Chiropractic shall address as they relate to the lumbar spine.

### THE NORMAL LUMBAR LORDOSIS

In 1997 a multidisciplinary group of authors including chiropractors, mathematicians from the University of Alabama in Huntsville, and a medical physician from the University of Southern California School of Medicine attempted to provide an answer to the often asked question as to what constitutes normal sagittal alignment of the lumbar spine. In their study published in the Journal of Spinal Disorders, Troyanovich et al.(1) presented

data from fifty subjects who had been retrospectively selected from the files of a central Illinois spine center.

The standing lateral lumbar spine radiographs of 50 consecutive subjects who underwent a preemployment screening process including a thorough medical history and neuromusculoskeletal examination were selected. Inclusion criteria consisted of: a) no prior history of back trauma or disabling back pain; b) no history of treatment for any type of back or back-related condition; c) normal neuromusculoskeletal examination results; and d) no radiographic evidence of congenital anomaly, degenerative joint disease, or other osseous disease.

Measures taken from the radiographs demonstrated that the geometric configuration of the lumbar lordosis resembled the shape of an ellipse. That is to say there existed virtually no lordotic curvature in the upper portion of the lumbar spine with 65% of lumbar lordosis occurring between the fourth and fifth lumbar segments and the first sacral segment.

Troyanovich et al.(1) then compared their findings against six other similar studies that included measures of the magnitude of lumbar lordosis in an additional 502 asymptomatic subjects with an average age range of 12.8 yr to 57.0 yrs(2-7). They found virtually identical measures of lumbar lordosis in each of these studies leading them to conclude: "We believe there is significance in

that 552 normal subjects, studied in seven different investigations with widely differing age groups, had very similar RRAs(intersegmental angles), ARAs(overall lordosis angle), and Cobb angles in the sagittal lumbar view. Additionally, two of the prior studies discussed compared the results obtained from their asymptomatic volunteers with back pain patients and found differences between the geometric configuration of the upright asymptomatic lumbar spine and the geometric configuration of the painful upright lumbar spine. From a strictly mechanical standpoint, this is suggestive to us that there may exist an ideal sagittal lumbar curvature that may tend to protect holders of this geometric configuration against nociceptive tendencies(1)."

#### LUMBAR LORDOSIS IN ACUTE & CHRONIC BACK PAIN SUFFERERS

In a follow-up study published in late 1998, this same research team tested their hypothesis regarding normal spinal alignment in another study published in the Journal of Spinal Disorders(8). In this follow-up study, three more groups of subjects' sagittal lumbar spine configuration was compared against the sagittal lumbar spine configuration of the earlier normal asymptomatic group. These other groups of subjects consisted of two groups of low back pain sufferers who did not have radiographically demonstrable lumbar spine pathologies and who were matched for age, sex, and size: a) an acute low back pain group of fifty subjects; b) a group of 50 chronic low back pain sufferers. Finally, the third group of low back pain sufferers consisted of 24 subjects with radiographic abnormalities such as disc degeneration, compression fractures, spondylolisthesis, etc.

Radiographic measures were taken from each subject and an elliptical computer model of lumbar lordosis was applied to each subject as well. Analysis of the data demonstrated discrete differences between each of the groups that reached statistical significance. In general, all three of the matched groups (normal,

acute low back pain, chronic low back pain) sagittal lumbar spine configuration resembled the geometric configuration of an ellipse as determined by the computer modeling analysis. However, on average, the acute low back pain group tended to be hyperlordotic while the chronic low back pain group tended to be hypolordotic, in comparison to the normal group. Perhaps most interestingly, in many instances the third group of subjects with radiographic anomalies could not be modeled at all by the elliptical computer analysis.

#### CONCLUSION

The chiropractic belief that alterations in spinal alignment, commonly termed vertebral subluxations, is beginning to be evaluated in a systematic scientific manner. Studies performed by a wide variety of authors indicates that a normal sagittal lumbar configuration exists in healthy pain-free subjects, and that this configuration is an elliptical shape with approximately 65% of the lumbar lordosis contributed by the segments L4-L5-S1. Several studies now exist that demonstrate that, indeed alteration in spinal alignment, vertebral subluxation, may be a significant factor in spinal dysfunction syndromes.

In the next issue of this series, alignment of the sagittal cervical spine will be reviewed.

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