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Vibratory Hypersensitivity in Idiopathic Scoliosis

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Summary: This study determined whether a significant difference in response to vibratory stimuli was consistently present in a large group of children with idiopathic scoliosis as compared with age-matched controls. Fifty-eight unselected adolescent females with documented progressive idiopathic scoliosis were studied along with age-matched controls. Threshold to detection of a vibratory stimulus was measured in both the right and left upper and lower extremities. Results indicated that highly significant differences existed between scoliotic children and controls at all sites tested ($p < 0.01$), with scoliotic children being more sensitive than controls. The results support the presence of a central aberration in posterior column function that may be a primary etiology of idiopathic scoliosis. **Key Words:** Idiopathic scoliosis—Vibratory stimuli.

Much evidence accumulated in recent years supports a neurologic etiology for idiopathic scoliosis. The axial skeleton is recognized to be potentially vulnerable to deformity by dysfunction of the nervous system at virtually any level from peripheral nerve to cerebral cortex, particularly during periods of rapid growth (22). Numerous studies have shown differences in postural equilibrium in patients with adolescent idiopathic scoliosis (AIS) as compared with controls (1,3,26,27,33,36). Proprioceptive input is a prominent contributor to postural equilibrium and it has been hypothesized to play a significant role in the etiology of AIS (20). Clinical studies have supported this viewpoint (4,37). Proprioceptive sensation is conducted through the posterior columns, and the finding of significant differences in response between patients with idiopathic scoliosis and normal controls implies dysfunction at some level of this pathway. Scoliosis has consistently been produced in animal studies by damaging the posterior column pathway at various levels (21,24,25). In addition, clinical studies have suggested that proprioception is different in patients with AIS (4,37). Vibratory response, however, is generally recognized as a more sensitive indicator of posterior column function (16). It was the purpose of this study to quantitate vibratory threshold in a large group of patients with documented AIS and to compare them with age-matched controls.

In studies examining the etiology of scoliosis, it is often difficult to determine whether observed differences in clinical sensory testing are a primary etiologic factor or are the secondary result of the spinal deformity. Afferent input from the upper extremities enters the central nervous system at the cervical spinal cord level and should not be affected by a thoracic curvature. Measurements in this study were made on both upper and lower extremities to minimize the possibility that any observed differences might be secondary to a thoracic deformity.

SUBJECTS AND METHODS

Scoliotic Group

The test group consisted of 58 unselected adolescent females being followed for AIS at Children's Hospital, New Orleans. All patients had either a curve of >31° or a curve of >20° with >5° of radiographically documented progression. The mean age of this scoliotic group was 15.4 years (range 11.8–18.7 years), and the mean Cobb angle was 35° (range 20–52°). All children had standing anteroposterior radiographs of the thoracolumbar spine within 2 months of the time of examination. All radiographs were measured by the same examiner. For all patients standardized flow sheets recorded

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