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HAIR TISSUE MINERAL PATTERNS IN CHILDREN WITH IDIOPATHIC SCOLIOSIS

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Scoliosis, an abnormal curvature of the spine, is estimated to affect up to 15 percent of children who have been screened. The condition is more prevalent in girls than boys and tends to worsen during puberty. The cause of this potentially debilitating condition is unknown, however its development is speculated to be caused by genetic, growth, chemical, biomechanical and neuromuscular factors. Factors that are known to affect the musculo-skeletal system include, hormonal, neurological, and nutritional status. This paper will explore the nutritional aspects associated with scoliosis as viewed through hair tissue mineral analysis (HTMA), of affected children.

HTMA Patterns in Idiopathic Scoliosis Patients

Pratt, and Phippen, were the first to report observations on the trace element content of hair in patients with idiopathic scoliosis in 1980. Their study included 74 patients with idiopathic adolescent scoliosis and 25 controls. Ages of the children ranged from 9 years to 18 years. A significant elevation of copper was found in the hair of the scoliotic group compared to the controls. The mean HTMA copper level in the study group was reported at 6.5 mg%, compared to the control group of 3.6 mg%.

An ongoing study of HTMA patterns in patients with scoliosis is being conducted by Trace Elements, Inc. of Dallas, and Dr. Arthur L. Copes, of Baton Rouge, Louisiana. Dr. Copes specializes in the treatment and training of doctors in treating children with scoliosis. In this present study, we have confirmed that elevated HTMA copper is common in a scoliotic population from the Copes Clinic. The preliminary data shows a close correlation with Pratts' results. A mean HTMA copper level was found in a group of 24 patients less than 15 years of age, of 6.52 mg% (TEI ideal - 2.5 mg%).

The study by Pratt and Phippen, showed a mean Zn/Cu ratio of 3.12 in scoliotic patients. This correlates with our preliminary studies of scoliosis patients who had a mean Zn/Cu ratio of 3.07 (TEI Ideal 8:1).

Significance of Elevated HTMA Copper and Idiopathic Scoliosis

The mineral copper is antagonistic to zinc, iron, and manganese. When excess copper accumulates in the tissues, it results in a relative deficiency of these elements. Zinc deficiency results in a lack of protein synthesis and turnover, and collagen synthesis is reduced. Therefore, a low HTMA Zn/Cu (less than 8:1) ratio would indicate a potential disturbance in normal

collagen formation. Iron and manganese activated enzymes required for collagen synthesis would also be affected. Researchers have found reduced levels of glycosaminoglycan in the nucleus pulposus of patients with adolescent scoliosis, as well as reduced levels of keratin sulfate. Manganese deficiency is known to be related to skeletal abnormalities, chondrodystrophy, and ligamentous disorders. Manganese deficiency may be related to Osgood Schlatters, and Perthes disease. (23)

Copper antagonizes not only minerals involved in the formation of collagen, but vitamins as well. Excessive accumulation of copper increases the oxidation of vitamin C and can contribute to a relative deficiency of the vitamin. A sub-clinical scurvy may exist in high HTMA copper groups. Elevated HTMA copper levels (above 2.5 mg%) or low Zn/Cu ratio (less than 8:1) can be indicative of an increased need for vitamin C. Vitamins B3, B5, and B6 are also antagonized by copper and therefore, requirement for these nutrients may be higher in the scoliotic population.

Pratt and colleague reported other factors related to their study group that differed from the control group. The group with scoliosis missed more school days due to menstrual cramps and had more cavities, and poorer diets than the control group. They concluded that the affected group may generally be less healthy than normal children. This is not surprising since elevated tissue copper has long been associated with menstrual irregularities, PMS, depression, fatigue, hypo- thyroid and adrenia, and increased incidence of viral infections.

Heredity and Scoliosis

The tendency to develop idiopathic scoliosis seems to be related in part to heredity. A recent report by Lonstein in Lancet (Nov. 19, 1994), stated that, "If both parents have idiopathic scoliosis, the chance of their children requiring treatment is fifty times that of the normal population." He further states that, "If one child in a family has idiopathic scoliosis, then the other offspring should be evaluated." Children can certainly possess inherited chemistries or mineral patterns that may contribute to their development of scoliosis. Our HTMA studies of entire families and twins confirm that the mineral pattern of the parent can be passed on to their offspring.

Conclusion

On the basis of these previous reports and our present findings, it is apparent that a relationship exists between trace element status and the scoliotic population. It is also evident that HTMA can be a significant tool in assessing the nutritional-biochemical balance in affected individuals.