Risk Factors of Vitamin D Deficiencies on Slipped Capital Femoral Epiphysis Development

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INTRODUCTION: Slipped capital femoral epiphysis (SCFE) is one of the most common hip disorders in adolescents. Multiple metabolic disorders have been associated with secondary SCFE, and the association of obesity with primary SCFE has been well studied. While the incidence of vitamin D deficiency in childhood has been increasing, few studies have examined a potential link with SCFE. This study investigates the impact of Vitamin D on SCFE development and related complications.

METHODS:

A large comprehensive national database was queried for patients under age 9 years who have records of calcidiol lab drawn between 9-18 years of age. These patients are followed up until SCFE occurrences or until the patient turns 18 years. Patients were divided into vitamin D adequate (calcidiol >= 30 ng/mL) and vitamin D deficient (calcidiol < 30 ng/mL) groups. Propensity score matching was performed adjusting for demographics and risk factors including BMI, medications, medical comorbidities, and laboratory values. Temporal analysis was performed comparing risks of SCFE development between the two cohorts. Statistical significance is held at 0.05.

RESULTS: On preliminary analysis, 98,045 patients met the inclusion criteria. After matching, 34,552 in the Vitamin D deficient and 34,552 in the Vitamin D adequate groups were included. The average patient ages were 11.4 years and 50% were female. 136 (0.39%) and 48 (0.14%) patients developed SCFE in Vitamin D deficient and adequate groups, respectively (p<0.0001). In total, 64.7% of SCFE development is attributed to Vitamin D deficiency (RR 2.833, 95% CI [2.040-3.936]; HR 1.558, 95% CI [1.119-2.168], p <0.0001).

DISCUSSION AND CONCLUSION: This is one of the largest studies to-date demonstrating the association between vitamin D deficiency and SCFE development. Vitamin D deficient children are more susceptible to developing SCFE than those with adequate supplementation. These findings suggest managing adequate vitamin D supplementation in at-risk adolescents, especially among the obese, nutrient-deficient, and populations living further from the equator to lower the risk of future SCFE development.