[NM-271] Evaluation of the Prevalence of Vitamin D Inadequacy in Pediatric Patients Undergoing Posterior Spinal Fusion

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Background:
Scoliosis is an abnormal lateral curvature of the spine. It is estimated to have a prevalence of 2.5% in the adolescent population. These patients sometimes electively have posterior spinal fusion surgery to correct the curvature of their spine. These surgeries are usually involved with major intraoperative blood loss and length of stay in the postoperative period. With the manipulation of the spine and the amount of hardware implanted during surgery, bone healing is essential for recovery from posterior spinal fusion. Recent adult data suggest the majority of adults presenting for orthopedic procedures have Vitamin D inadequacy which may lead to increase postoperative complications such as poor bone healing. The purpose of this study was to look at the prevalence of Vitamin D inadequacy in pediatric patients undergoing posterior spinal fusion.

Methods:
After IRB, we performed a prospective study in children between the ages of 2 and 18 undergoing elective posterior spinal fusion of more than 2 levels. All patients that went through our preoperative anesthesia clinic at our institution in Nashville, TN were presented with the study. Formal consent and when possible assent were obtained before 25 hydroxyvitamin D labs were drawn. Labs samples were quantified using direct competitive chemiluminescent immunoassay in the hospital laboratory. A 25-hydroxy vitamin D level of <20 ng/mL was defined as deficient while <32 ng/mL was considered inadequate. Utilizing this data and patient demographics, a logistic regression was performed using SAS software (version 9.3, SAS Institute, Inc., Cary, NC) with Vitamin D deficiency as the response variable.

Results
There were 64 patients enrolled for the study. Only 62 patients completed the study. Demographics of this patient population are presented in Table 1. Vitamin D deficiency was found to be present in 39% of the patients while 84% of the patients were vitamin D inadequate. Factors that were associated with deficiency include being non-white (P value = 0.047), heavier weight (P value = 0.036) and sampling during the colder seasons (P value = 0.022) as depicted in Table 2. Factors not associated with deficiency included passive smoke exposure, scoliosis type, and ASA status.

Conclusions:
Vitamin D inadequacy has a high prevalence in pediatric patients undergoing posterior spine fusion. Factors that increase the likelihood of being vitamin D inadequate are race, weight, and seasonal variation. More research needs to be performed to determine if inadequacy may lead to postoperative complications.

Table 1.   Demographic Characteristics*

Age (years)	13.5 ± 2.5
Weight (kg)	49.4 ± 18.1
Male/Female Proportion	18/44 (29.0%/71.0)
ASA class (3/2/1)	21/38/2 (34.4%/62.3/3.3)
Idiopathic/ Neuromuscular	42/20 (67.7%/32.3)
Race (White/African American/Hispanic)	52/9/1 (83.9%/14.5/1.6)

* Population statistics for non-proportion data expressed as mean ± standard deviation.

Table 2   Predictors of Vitamin D Deficiency*

Characteristic	OR	95% CI	P-value
Weight (per kg)	1.05	1.00 to 1.10	0.036
Sample During Cold Months			
no	1.00	(referent)	
yes	8.21	1.35 to 50.02	0.022
Race			
Non-white	1.00	(referent)	
White	0.10	0.01 to 0.97	0.047

OR = odds ratio, CI = confidence interval.

*This logistic regression model was generated using stepwise selection based on AIC and SC. Hosmer-Lemeshow test with 8 degrees of freedom yielded P-value of 0.32, signifying good model fit. Weight was modeled as a continuous variable while cold months and race were modeled as nominal variables. P-value < 0.05 was considered statistically significant.