

Assessing the Protective Effects of Vitamin D in a High-Risk Asthma Pediatric Cohort

Lilyveth Mesa¹ and Augusto A. Litonjua, MD, MPH²

Barry University, Miami FL¹ ; University of Rochester Medical Center, Rochester NY²

Background In recent years, Vitamin D (25(OH)D) insufficiency (<30 ng/mL) has been linked to the development of childhood asthma without clear consensus on the extent of the protective effects afforded by vitamin D sufficiency. As the lung begins developing in utero and continues to mature throughout early life, understanding the impact of 25(OH)D levels throughout gestation and childhood may further preventative efforts against asthma, wheeze and atopy incidence in children.

Objective To determine whether 25(OH)D provides protective effects against development of asthma or recurrent wheeze, atopic dermatitis, and total IgE levels in children born to mothers who participated in a trial of vitamin D supplementation during pregnancy.

Methods Data from the Vitamin D Antenatal Asthma Reduction Trial (VDAART) was analyzed using R-studio. Outcomes included a composite variable of asthma diagnosis and wheeze symptoms, a diagnosis of atopic dermatitis, and IgE levels. 25OHD levels were measured from blood samples collected in mothers at study entry and in the third trimester, cord blood, and child samples collected at 3 years and 6 years. Logistic or linear regression was used for multivariable analyses of the dataset, adjusting for race, gender, maternal education, maternal asthma status and site location.

Results Average antenatal sufficiency (aOR = 0.63, 95% CI: 0.40-0.99, p = 0.045) and postnatal (aOR = 0.50, 95% CI: 0.30-0.83, p = 0.0084) sufficiency by 6 years were associated with lower odds of asthma/recurrent wheeze. Logistic regression showed a significant odds reduction of developing asthma/recurrent wheeze with increasing serum 25(OH)D in children by 6 years of age (aOR = 0.96, 95% CI: 0.93-0.99, p = 0.024). Higher serum 25(OH)D levels also provided protective effects against eczema occurrence by 6 years of age (OR = 0.97, 95% CI: 0.95-0.99, p = 0.006) but these effects were reduced after adjusting for confounders (aOR = 0.98, 95% CI: 0.94-1.01, p = 0.21). In addition, serum 25(OH)D was a significant predictor of log total IgE in children by 3 years of age ($\beta = -0.022$, p = 0.014) but its effects waned by 6 years ($\beta = -0.012$, p = 0.33).

Conclusion Collectively, these studies demonstrate the potential use of vitamin D supplementation throughout gestation and early life for the prevention of asthma/recurrent wheeze and atopy amongst insufficient, high risk children. However, further studies are needed to evaluate the effects of long-term vitamin D supplementation to confirm the impact of sustained 25(OH)D sufficiency on such outcomes.