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Serum vitamin D and its association with lung function and inflammation in subjects with respiratory symptoms

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The prevalence and severity of asthma has been linked to hypovitaminosis D⁽¹⁾. Hypovitaminosis D is common in countries at high latitudes, such as Ireland (53°N). The aim of this study was to measure serum vitamin D levels in consecutive patients (both asthmatic and non-asthmatic) with respiratory symptoms.

Body mass index (BMI) was calculated following standard protocols. Blood samples were obtained and serum was tested for total immunoglobulin E (IgE), high sensitive C-reactive protein (hsCRP), 25-hydroxyvitamin D (25(OH)D) levels and eosinophil cationic protein (ECP). Serum total IgE and hsCRP were measured on the Abbott Architect ci8200 analyser. Total 25(OH)D was analyzed using the DiaSorin LIAISON. ECP was tested by ImmunoCAP Technology using fluorescent enzyme immunoassays on the IDM Phadia 250. Additionally, to evaluate the severity of airway disease; spirometry was performed to ascertain the Forced Expiratory Volume (FEV₁) – a measure of lung function. All statistical analyses were performed using SigmaStat 3.0(SPSS) software.

We examined 42 Caucasian adults (mean age 50.9±17.2; mean BMI 27.4 kg/m² ±5.9) with respiratory symptoms of more than 4 weeks (FEV₁, 89±24% predicted. The average serum vitamin D level was 38.3±21.3 nmol/L. Vitamin D levels were positively associated with FEV₁ ($r = 0.33, p = 0.018$). Moreover, all patients with airway obstruction (FEV₁ less than 80% predicted) had vitamin D insufficiency (<80 nmol/L) and 50% were vitamin D deficient (<25 nmol/L)⁽²⁾. Markers of inflammation (ECP, hsCRP) and allergic immunity (IgE) were elevated in the vitamin D deficient state compared to sufficiency, but these differences were non-significant. All patients with IgE>500 IU/mL had deficient levels of 25(OH).

We conclude that vitamin D deficiency is common in Irish patients with airway disease. Using the recently revised *Institute of Medicine's* criterion for vitamin D deficiency of total 25(OH)D (<50 nmol/L)⁽³⁾, approximately 80% of the patients in the study had evidence of vitamin D deficiency. Vitamin D has emerged as an important immunomodulator with diverse benefits in respiratory disorders, for example antimicrobial peptide production⁽⁴⁾. In addition, corticosteroid therapy is commonly prescribed for respiratory disorders, including asthma and chronic bronchitis, thus careful consideration should be made regarding bone health in patients with symptomatic airway obstruction. Our findings add to the growing evidence suggesting vitamin D may play an important role in airway disease.

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