



Low serum levels of Vitamin D in MS patients in Puerto Rico

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Introduction

Multiple Sclerosis (MS) is a complex disease where genetic and environmental factors are implicated. In Puerto Rico the prevalence of MS is 52/100,000 habitants, according to the MS Epidemiological Study, with ratio female to male of 4:1. Insufficient dietary intake, enzymatic defects, reduced exposure to UV radiation, polymorphisms of the vitamin D receptor genes, and differences in the pigmentation for the skin might contribute to the vitamin D deficiency, observed in autoimmune diseases. Epidemiological data relates low vitamin D levels in rheumatoid arthritis, multiple sclerosis, inflammatory bowel disease hypertension, type 1 diabetes, and lymphomas, prostate, colon, and breast cancers. It is proposed that effect of latitude on MS could be mediated by the extent of exposure to UV radiation and Puerto Rican MS patients, with a geographical location of 18°.15"N and 66°.30"W, should not show a hypovitaminosis D. Studies in mice have demonstrated a vitamin D regulation of the T cell development and function. Vitamin D hormone regulates T helper cell, regulatory T cells, and dendritic cell function (associated with autoimmunity); stimulates the TGFβ-1 and IL-4 production, suppressing inflammatory T cell activity. Administration of the active metabolite 1,25-(OH)₂D in mice and rats with EAE prevented and reduced the disease activity. 1,25-(OH)₂D alters dendritic cell and T cell function and , regulates macrophages activity in the EAE. 1,25-(OH)₂D is thought to operate on central nervous system constituent cells as well. It has been shown that vitamin 1,25(OH)₂D₃ levels are reduced in patients with RRMS, and it is more pronounced during exacerbations. In Caucasian MS patients the risk of MS decreased with increasing vitamin D serum levels, which could be useful as a predictor. There is no published information regarding vitamin D insufficiency/deficiency in MS patients in Puerto Rico.

Objective

To determine Vitamin D3 serum levels in Puerto Rican MS patients and correlate them to MS clinical manifestations.

Results

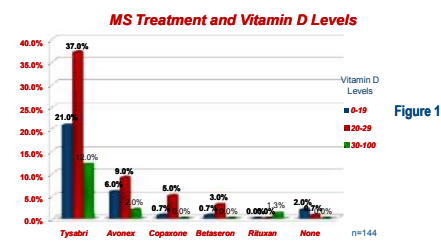


Figure 1

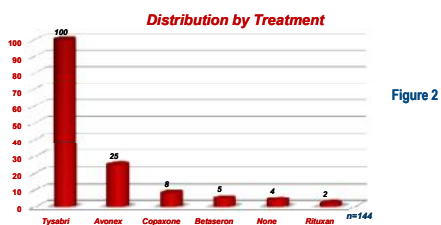


Figure 2

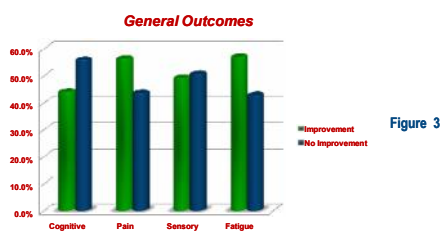


Figure 3

Methods

144 MS patients were evaluated: demographic data was obtained, MS type, treatment, perception of sensory, pain, fatigue, cognition, and EDSS scores. Vitamin D3 serum levels were measured and categorized in 3 groups: deficient (less than 20 ng/ml), insufficient (20 to 29 ng/ml) and normal (30 ng/ml or more). These values were correlated to EDSS score. Questionnaire of perception of symptoms: sensory (paresthesias), pain (musculoskeletal and neurogenic), fatigue, and cognition were administered after vitamin D3 replacement. Statistical analysis was performed to correlate findings to 25 OH vitamin D serum levels.

Results

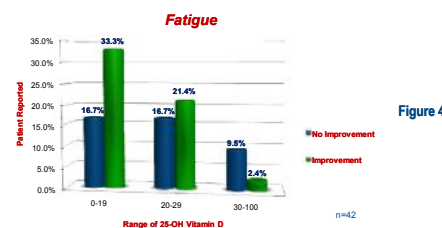


Figure 4

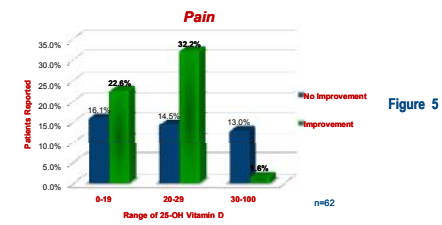


Figure 5

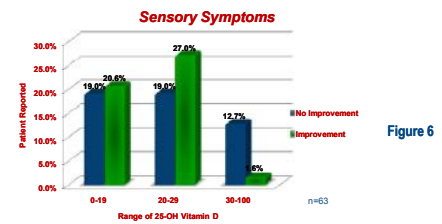


Figure 6

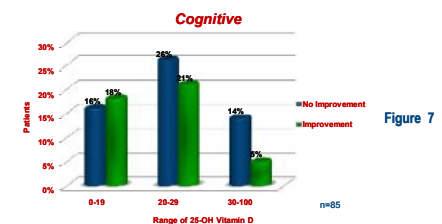


Figure 7

Results

- Mean age of MS patients was 41.5 years. Female to male ratio was 4.8:1 (79% females and 21% males).
- 82% of patients had RRMS.
- 53% of patients had a EDSS score of 2.5 or less.
- 85% of MS patients showed Vitamin D3 deficiency or insufficiency; only 15% showed more than 30 ng/ml.
- Vitamin D3 supplementation ranged from 2,000 to 10,000 IU daily or weekly doses of 50,000 IU, based on vitamin D serum levels.
- MRI load was categorized as mild, moderate and severe.
- 69% of patients that showed moderate to severe MRI lesion load were vitamin D deficient/insufficient s: 29% of patients (0-19ng/ml) and 39.7% of patients (20-29ng/ml).
- Only 5.2% of patients with vitamin D range more than 30ng/ml showed moderate to severe MRI lesion load.
- Patient reported an improvement of symptoms after replacement of vitamin D (figure 3).
- The major improvement was reported in fatigue and pain (figures 4 & %), although EDSS remained stable.
- 70% of the patients were treated with Tysabri and 58% have vitamin D deficiency or insufficiency (figures 1 and 2).

Conclusion and Future Studies

We observed that the study group had a mean age of 42 years, had RRMS, more than 50% had EDSS scores of 2.5 or less. We were able to demonstrate that the majority of them were vitamin D deficient or insufficient (85%). These patients reported an improvement of MS symptoms after vitamin D3 supplementation. We continue analyzing vitamin D3 levels after treatment and increasing the study population to include other MS types and evaluate changes in the EDSS and cognition as a function of vitamin D normal levels. We are also exploring the genetic profile of patients looking for HLA alleles expression and polymorphisms associated to the vitamin D receptor genes, regulatory cytokines patterns and peripheral blood mononuclear cells protein profile using the Proteomics technology.