

# Vitamin D Level in Multiple Sclerosis Patients. Could Vitamin D Level Be Routine Investigation for Multiple Sclerosis Patients?

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## Abstract

**Objectives:** To study the prevalence of vitamin D deficiency among newly diagnosed multiple sclerosis patients. **Patients and Methods:** It is a case control cross matching age related study done on totally 40 subjects (20 patients are newly diagnosed as MS; patients don't start any medication for MS (naive patients) and 20 subjects are controls with the same age and sex). Base line vitamin D level was measured (*i.e.* vitamin D, 25-OH (total)) and MRI brain with contrast was done for all patients. **Results:** Low total vitamin D level was seen among 65% of patients with MS (13/20); however, this was only 20% of normal controls (4/20). **Conclusion:** Hypovitaminosis D is common in MS patients.

## Keywords

Low Vitamin D, Multiple Sclerosis

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## 1. Introduction

Multiple sclerosis is a heterogeneous disorder with variable clinical and pathologic features reflecting different pathways to tissue injury [1]. Inflammation, demyelination, and axonal degeneration are the major pathologic mechanisms that cause the clinical manifestations [2]. However, the cause of MS remains unknown [3] [4]. The most widely accepted theory is that MS begins as an inflammatory autoimmune disorder mediated by autoreactive lymphocytes [1] [5]. Later, the disease is dominated by microglial activation and chronic neurodegeneration [2].

One proposed explanation for the possible association of MS with latitude is that exposure to sunlight may be

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protective, because of either an effect of ultraviolet radiation or vitamin D [6]. A number of studies have found an inverse relationship between sun exposure, ultraviolet radiation exposure, or serum vitamin D levels, and the risk or prevalence of MS [7]-[12], while others have shown that serum vitamin D levels are inversely related to MS disease activity [13] [14].

### 1.1. Patients and Methods

A total of 40 subjects were recruited from neurology clinic, ophthalmology clinic and internal medicine clinic starting from April 2012 till July 2014, where 20 patients were diagnosed as MS for the first time and didn't start MS treatment, and 20 patients were age matched normal controls (same age group with no evidence of multiple sclerosis or any demyelinating disorder).

All patients were diagnosed as MS according fulfill McDonald's criteria. All subjects (patients and controls) underwent MRI brain and vitamin D level. The patients, controls and their families were informed about objectives, risk factors and benefits of the study. Verbal approvals and consent were obtained and taken.

### 1.2. Inclusion Criteria

The inclusion criteria include newly diagnosed MS patients fulfilling McDonalds criteria.

### 1.3. Exclusion Criteria

Exclusion criteria include multiple sclerosis patients started already steroids or immune-modulator medicine, and MS patients with any chronic metabolic diseases (such as renal failure) affecting vitamin D metabolism.

## 2. Methods

Patients and controls that fulfilled the above criteria were subjected to the following: clinical evaluation and diagnosis as MS according to McDonalds criteria. All underwent MRI brain with or without contrast, MRI-Brain (axial T1, T2, FLAIR, T2\*, and DWI. This was done using 1.5 tesla using a head coil, the examination lasted for 20 to 30 minutes. Also visual evoked potential (VEP) with studying P wave latency in some patients to confirm the dissemination in space. Vitamin D level was measured for all patients. The reference range for vitamin D level was as follows: deficient < 10 ng/mL, insufficient 10 - 29 ng/mL, sufficient 30 - 100 ng/mL).

## 3. Results

Demographic data: as for age of multiple sclerosis patients and corresponding controls, the age ranges from 22 to 45 years old with mean age 28.3 years old.

Since vitamin D level has relationship with age, the older the age the lower vitamin D level, so only 4 cases were from 30 to 40 years old and 2 cases from 40 to 45 years old. Most of the patients ages and corresponding controls ages were from 22 years old to 30 years old (*i.e.* 34/40 cases). This age distribution with focusing on young age patients and controls was done to avoid the expected low level vitamin D in older patients.

All patients and corresponding controls were females.

Low total vitamin D level was seen among 65% of patients with MS (13/20), however this was only 20% of controls (4/20).

Further analysis of vitamin D level among MS cases showed that 61.53% (8/13) of cases had deficient vitamin D level < 10 ng/mL. And 38.46% (5/13) had insufficient vitamin D level from 10 - 29 ng/mL.

However with reference to control cases, 3 cases out of 4 (75%) were found to have insufficient vitamin D level from 10 - 29 ng/mL.

## 4. Discussion

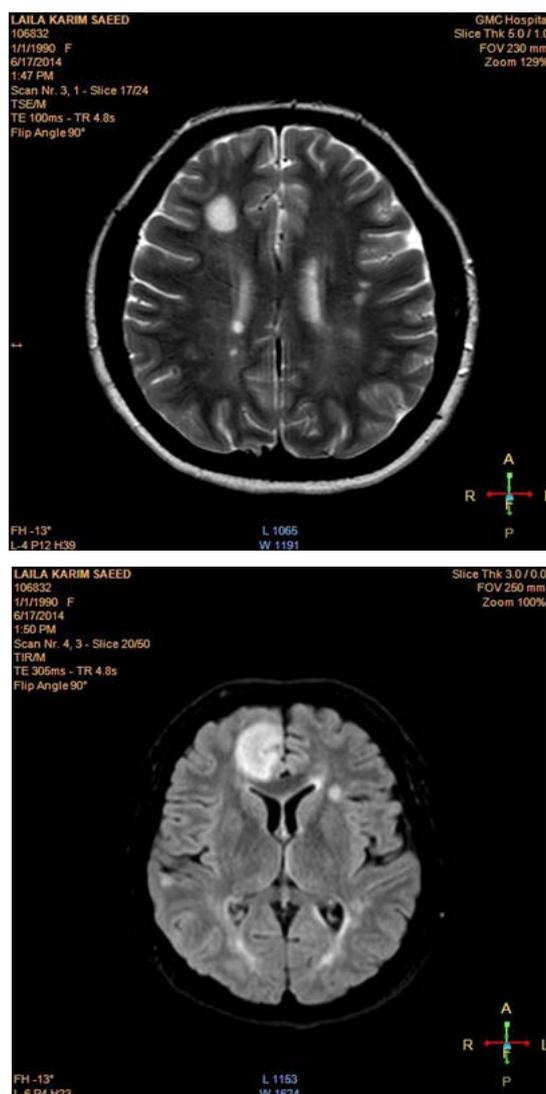
Diseases that affect central nervous system myelin can be categorized as demyelinating (acquired, usually inflammatory) and dysmyelinating (abnormal formation of myelin, usually due to a genetic disease). The most common autoimmune inflammatory demyelinating disease of the central nervous system is multiple sclerosis (MS). Relation between vitamin D and MS are under investigations.

The following observations are examples:

- An analysis of data from the Nurses' Health Study and Nurses' Health Study II observed that the risk of developing MS was significantly reduced for women taking  $\geq 400$  international units/day of vitamin D (relative risk 0.59, 95% CI 0.38 - 0.91) [12].
- A longitudinal cohort study of 469 subjects with MS found that vitamin D levels were inversely associated with the risk of new T2-weighted or gadolinium-enhancing T1-weighted lesions on brain MRI [13].
- A prospective report of over 450 patients with a clinically isolated syndrome suggestive of MS showed that serum 25-hydroxyvitamin D levels, measured in the first 12 months, were inversely associated over the subsequent four years with the risks of conversion to clinically definite MS, the presence of new active MS brain lesions on MRI, and MS progression [14].

In our study we found that 65% of patients had abnormal low vitamin D level, also many studies conducted by Smolders J. and his colleagues [15], Correale and his colleagues [16], Van Der Mei and his colleagues [17] and lastly Runia T.F. and his colleagues [18], who all found that hypovitaminosis D highly associated with MS patients.

In our study, case number one, female patient 24 years old, had vitamin D level 6 ng/mL, presented by attacks of right side numbness for 3 days, then 2 months later she developed left side weakness with instability for 4 days. MRI brain was done showed multiple demyelinating lesions mainly periventricular and frontal (**Figure 1**).



**Figure 1.** MRI brain T2 and flair showed multiple demyelinating lesions perventricular and frontal.

From this case several questions were raised. Does MS severity depend upon vitamin D level? MRI findings and demyelination load depends upon vitamin D level? How far the prognosis depends upon vitamin D level? These questions have to be further investigated and correlated to vitamin D level.

## 5. Limitations

Our study is limited by the relatively small sample size.

## 6. Recommendations

Prospective, large population studies are required in order to study relationship between low vitamin D level and load of MRI brain lesion and demyelinating patches, as well as vitamin D level and disability scale for MS patients and MS prognosis.

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