

A Comparison between Vitamin D Level in Multiple Sclerosis and Non-Multiple Sclerosis Patients

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ABSTRACT

Background: Multiple sclerosis (MS) is a demyelinating disease of the nervous system. Its etiology is still not well understood. Lately, attention has been increased for the relation between MS and vitamin D deficiency.

Objectives: This study aims to compare vitamin D level between MS and non-MS patients looking for any significant difference.

Methods: This is a retrospective cohort study held at a tertiary hospital. It compares vitamin D level between MS and non-MS patients in the period from 2010 to 2017. Vitamin D level <50 nmol/L was considered as low while level >50nmol/L was labelled as normal. The means of the vitamin D level were compared using the independent t-test with a p-value of 0.05 for significance level.

Results: Out of the 96 MS patients, only 72 patients had their vitamin D level measured. (51 females, mean age 34.62). In comparison with 97 non-MS patients were included in the study (65 females, mean age 37.32). Vitamin D level mean values in the MS and non-MS patients were calculated as 38.63 and 44.09 respectively. Comparing the means showed a p-value of 0.266.

Conclusion: Despite that vitamin D deficiency is known as one of the risk factors for MS, with the high prevalence of vitamin D deficiency in this region, the development of MS can be attributed to more relevant contributing factors and further studies regarding MS risk factors for our population are needed to be sought.

Keywords: Multiple sclerosis, Vitamin D deficiency, Vitamin D, Risk factors, Demyelination.

INTRODUCTION

Multiple sclerosis (MS) is a demyelinating disease of the nervous system. It is an autoimmune disease that attacks the myelin sheath of the nerves¹. MS is one of the most common debilitating disorders in the world affecting patients usually between the age of 20 and 40 years with a female to male ratio of 3:1^{1, 2}. It is considered as the leading cause of non-traumatic neurologic disability in young adults³. The prevalence of MS is increasing worldwide, the number increased from 2.1 million in 2008 to 2.3 million in 2013⁴. Regarding the Arabian Gulf region, recent studies showed moderate to high prevalence of MS. In every 100,000 individuals, 31-55 has MS⁵.

MS etiology is still unknown. It is affected by both genetic and environmental risk factors. Lately, attention has been increased for a possible relation between MS and vitamin D deficiency as one of the environmental risk factors⁵. One study found that individuals with low blood levels of vitamin D are 62% more likely to get MS compared to those with normal levels⁶.

Moreover, several studies showed that more sun exposure which in turn leads to a decreased risk of vitamin D deficiency leads to a lower MS risk^{7,8}. MS patients are also reported to consume

less vitamin D rich foods. Vitamin D deficiency may also affect the relapse rate in MS patient according to some studies which showed a lower MS relapse rate in patients with normal vitamin D levels^{9,10}. One other aspect that shows the relation between vitamin D and MS is the effect of vitamin D deficiency on the disability associated with MS as studies showed that the active hormone 1,25 (OH)2D3 can slow the progression of future disability¹¹.

Vitamin D deficiency affects almost one billion people worldwide¹². In Saudi Arabia, the prevalence of vitamin D deficiency was found to be high (83.6%) according to a study done in a tertiary hospital on 10,709 patients^{5,13}. Other studies showed that 20 to 80 % of adults in Saudi Arabia are vitamin D deficient¹⁴. Therefore, the high prevalence of vitamin D deficiency could be attributed to the fast rising incidence of MS in this region¹⁵.

The relation between vitamin D and multiple sclerosis have been suggested by many studies. One of the hypotheses included that the role of vitamin D in remyelination which is the process of new myelin sheath forming oligodendrocytes generation¹⁶. Another hypothesis included the role of vitamin D in immunomodulation which has a

role in protecting tissues in autoimmune diseases⁵. As studies showed that vitamin D inhibits T-helper 1 cytokines which play a key role in graft rejection, autoimmune diseases and stimulation of the T-helper 2 cytokines production which have immunoregulatory function¹⁷.

As vitamin D deficiency have been implicated as a potential environmental factor causing many of autoimmune disease. This study aims to compare vitamin D level between MS patients and healthy individuals at King Abdulaziz University hospital at Jeddah, KSA.

METHODS

This is a retrospective cohort study held at King Abdulaziz University Hospital in Jeddah, Saudi Arabia. It compares the vitamin D levels of MS and non-MS patients in the period from 2010 to 2017. Patients with diseases that might affect vitamin D level such as osteoporosis were excluded from the study. MS patients were included in the study based on magnetic resonant imaging (MRI) diagnosis. Their data were collected from the medical records including demographic data, duration of MS, diagnostic MRI reports, vitamin D level at diagnosis, vitamin D level at any time and vitamin D supplementation. On the other hand, the non-MS group data included demographics, diagnosis and a recent vitamin D level. The study

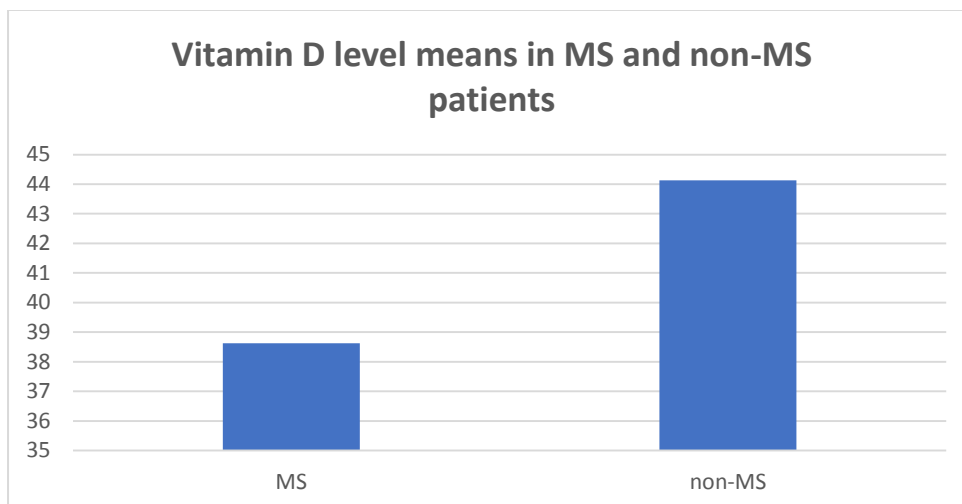
was done after approval of ethical committee of King Abdulaziz university.

Vitamin D levels classification are as following: vitamin D deficiency which is defined as levels <25 nmoI/L 25(OH)D, insufficiency as 25-50 nmoI/L, and sufficiency >50 nmoI/L⁽¹²⁾. In this study, patients with vitamin D level <50 nmoI/L were categorized as low vitamin D patients while patient with vitamin D level >50nmoI/L were classified as normal vitamin D patients.

The mean values of vitamin D level between the two groups were compared using the independent t-test package with a p-value of 0.05 for significance level. Data were analyzed by the IBM SPSS statistics, version 21.

RESULTS

This study included 96 MS patients. Out of these 96 patients, only 72 patients had their vitamin D level measured. They were 51 females and 21 males with a mean age of 34.62 years. 52 were Saudis and 20 were non-Saudis. In comparison, 97 non-MS patients were included in the study (65 females and 32 males) and their mean age was 37.32 years. They were 67 Saudis and 30 non-Saudis. The mean values of vitamin D in the MS and non-MS patients were calculated as 38.63 and 44.09 respectively. Comparing the means showed a p-value of 0.266. (Graph1)



Graph (1): The mean values of vitamin D level

DISCUSSION

In this study, we compared the vitamin D levels between MS and non-MS patients. Its deficiency was found to increase the risk of multiple autoimmune diseases including insulin-dependent diabetes mellitus (IDDM), inflammatory bowel disease (IBD), systemic lupus erythematosus (SLE), and rheumatoid arthritis (RA) and MS¹⁸.

Recent studies found that vitamin D plays a role in the immune system particularly, T lymphocytes which are the main cells involved in the pathogenesis of MS^{19,20}. Moreover, several studies included vitamin D deficiency as one of the risk factors to develop MS. As one study mentioned vitamin D deficiency being an environmental risk factors for MS along with smoking, EBV infection and high latitude²¹.

A meta-analysis stated that vitamin D level mean values were lower in patients diagnosed with MS²². In contrast with these results, this study found that the difference between the mean values of vitamin D level of MS and non-MS groups was not significant. This maybe contributed to the fact that vitamin D deficiency prevalence is generally high in the region of Saudi Arabia and it is calculated as up to 80%¹⁴. This is related to the decreased sun exposure in our population which is the major source of vitamin D in the body.

Usually 50-90% of vitamin D is produced by ultraviolet radiation exposure from the sun and the remainder comes from our diet. However, despite the sunshine abundance in the middle east region, it was found that this area has some of the lowest vitamin D levels worldwide¹⁴. This was addressed in one study mainly by the difficulty of going outside in the sun due to weather issues or work that was reported by 65.5% of Jeddah population²³.

Despite that vitamin D deficiency is known as one of the major risk factors for MS, with the high prevalence of vitamin D deficiency in this region, the development of MS can be attributed to more relevant contributing factors and further studies regarding MS risk factors for our population are needed. However, this study results should raise awareness that most of our population who are vitamin D deficient need to be more exposed to sunlight. As it was found that one should spend 15-20 minutes under the sun light daily with their skin surface 40% exposed¹⁴. Moreover, every deficient individual should be supplemented with vitamin D which could protect them against MS and it can also decrease the relapse rate in patient already diagnosed with MS. As a large prospective

cohort study showed a decrease in the incidence of MS by 41% in those who took supplement of ≥ 400 IU of vitamin D daily in comparison to those who didn't²⁴.

Also a randomized controlled trial in which vitamin D supplements were given to MS patients for 52 weeks resulted in a decrease in number of relapses. Moreover, recent studies found that for each increase in vitamin D level by 4 ng/ml, 12% of the relapse risk will be reduced¹⁵. So, further research to address this relationship in our population is necessary.

LIMITATIONS

This study has some limitations which have to be pointed out. The small sample size and that not all MS patients had their vitamin D level measured which lead to further reduction to our sample size. For this reason, these finding cannot be generalized to the broader community based on this study alone and further studies should be done with a larger sample for more accurate results. Also, the fact that vitamin D levels are not measured regularly in our patients lead to some differences in the comparison between vitamin D levels.

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