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CORRELATION BETWEEN 25-HYDROXYVITAMIN D AND SEVERITY OF PARKINSON'S DISEASE

General Medicine

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ABSTRACT

The present study is aimed to determine the associations of circulating 25-hydroxyvitamin D (25OHD) levels with the severity of PD. In 109 patients, the severity of PD was evaluated by using Hoehn & Yahr (HR) stages and Unified Parkinson's Disease Rating Stage (UPDRS) Part III compared with 25OHD level in a double-blind and cross-sectional study. Mean ± SD levels of 25OHD were 28.5 ± 1.4 and 27.1 ± 1.5, for males and females, respectively. Also, 38.4% of the patients showed deficiency levels of 25OHD (<20 ng/mL), and 72.8% had insufficient levels (<30 ng/mL). High prevalence of 25OHD insufficiency in subjects with early disease was not associated with HR stage and UPDRS scores even after multivariate adjustment for possible confounders including disease duration. These findings are consistent with the possibility that vitamin D status does not seem to deteriorate during the early disease stages of PD.

KEYWORDS

25-Hydroxyvitamin D,PD.

INTRODUCTION

Optimal balance, muscle strength, and innate immunity require sufficient vitamin D levels, and its deficiency is correlated with increasing risk for various types of cancer, as well as autoimmune and cardiovascular disorders. Recently, chronic inadequacy of vitamin D intake has been suggested to play a remarkable role in the pathogenesis or progression of Parkinson's disease (PD). It seems that the distribution of vitamin D receptors in the substantia nigra is widely known to be affected in PD, and the involvement of this vitamin has been revealed in the regulation of tyrosine hydroxylase gene expression and consequently dopamine biosynthesis.Therefore, we designed this study to evaluate vitamin D levels in different stages of PD, to see if there are significant lower levels of vitamin D with disease progression, to elucidate the possible role of vitamin D deficiency and insufficiency in pathogenesis of PD, or as sedentary effect of PD.Serum 25OHD levels can differ substantially in the same individual depending on the season, latitude, where the person lives, skin color, diet, and other lifestyle factors. In this cross-sectional study, we sought to thoroughly determine associations of circulating 25OHD levels and severity of PD.

MATERIAL AND METHOD

This cross-sectional study was carried out at RIMS RAIPUR , as a double-blind study of 25OHD in patients with PD.125 Patients with PD, diagnosed by experienced neurologists, were eligible criteria and asked to participate during September to November 2017. This study was conducted in the outpatient clinics and clinical wards. Patients were excluded if they were already taking vitamin D supplements or 1, 25 vitamin D or were considered to have familial or early onset of PD (<40 years old). Finally, 109 patients had pertinent eligibility for our study.The diagnosis of PD was based on diagnostic criteria for Parkinson's disease including the presence of resting tremor, bradykinesia, and/or muscle rigidity. Disease duration (months) was defined as the period of time between diagnosis of PD and the clinical assessment for entry into this study. At baseline, we evaluated Hoehn & Yahr (HY) in four stages of 1–1.5, 2–2.5, 3, and 4-5 and also motor part of the Unified Parkinson's Disease Rating Scale III (UPDRS III), by people who were blinded to data regarding 25OHD and serum calcium levels. All patients received standard protocol treatment for PD and provided written informed consent. Serum levels of 25OHD (we defined vitamin D insufficiency as a 25OHD concentration of less than 30.0 ng/mL and vitamin D deficiency as a 25OHD concentration of less than 20.0 ng/mL) and parathyroid hormone (PTH) (normal range: 10–65 IU/L) were analyzed by enzyme immunoassay (Biomerica, CA, and IDS, UK).

RESULTS

A total of 109 patients agreed to participate in this study. Mean ± SD values of age and disease duration were 61.4 ± 1.19 years and 57.2 ± 4.94 months, respectively. Severity values of PD measured by UPRDSIII and HY stages with mean ± SD were 22.9 ± 1.81 and 1.8 ± 1.1, respectively.Most participants were ales 70.6% and 29.4% were females. The mean ± SD values of 25OHD for males and females were 28.5 ± 1.4 and 27.1 ± 1.5, respectively. One-third of the patients (38.4%) showed deficiency levels (<20 ng/mL) and a majority of subjects (72.8%) had insufficient levels (<30 ng/mL) of 25OHD.Initial analysis showed that patients with higher HY stage had longer duration of disease (P=0.05) and were older (P=0.02). Other characteristics such as gender, Ca, ALP, PTH, and phosphorus did not differ significantly between HY stages. There was no association between serum levels of 25OHD with HY stages(P=0.9). When the severity of PD was evaluated by UPDRS III, there were significant associations between age, duration of disease, and UPDRS (III) (P=0.002 and P=0.003 , resp.). Serum 25OHD levels were not associated with UPDRS III when measured by multiple linear regression methods; however, phosphorus and ALP concentrations were positively related to UPDRS III (P=0.03and P=0.008 , resp.).

DISCUSSION

We observed high prevalence of 25OHD insufficiency (72.8%) and deficiency (38.4%). Positive correlations between UPDRS III and HY scores with age and duration of disease were observed.Sato et al. reported a negative correlation between 25OHD and not 1, 25 OHD with severity of PD when divided by HY stages 1 to 2 and HY stages 3 to 5 in PD. Similar results were reported by Suzuki et al., where the severity of PD was evaluated by HY stages 1 to 5. There was a significant trend showing that when HY stage deteriorated, 25OHD levels became lower. It seemed that long-term effects of PD might cause the progression of insufficient vitamin D levels. But these results were not confirmed in our study. The reason for this discrepancy may be contributed to the smaller number of patients with advanced PD in our study—the mean HY stage was 1.8 in our study but 3.3 in Sato et al. study and 2.4 in Suzuki et al. study. According to these results, in our study, we observed that the more advanced stage of PD was with lower level of 25OHD (HY stages 1 to 1.5, 25OHD: 28.3 ± 1.4 versus HY stages 4 to 5, 25OHD: 20.3 ± 1.1); but this difference was not significant. Evatt et al. measured 25OHD levels at baseline and at final visits in a longitudinal cohort study and showed that throughout the progression of PD, the level of 25OHD levels did not decline, suggesting that lower circulating 25OHD levels are an accelerator instead of being an outcome of PD. In our study, the observation of mildly significant higher levels of phosphorus and ALP related to higher scores of UPDRS III could be concluded to be the result of mild increased level of hypovitaminosis D in higher stages of PD.

CONCLUSION

In our study,we find that vitamin D status does not seem to deteriorate

during the early disease stage of PD. Future studies are needed to be conducted on at-risk subjects or presymptomatic to elucidate the potential role of vitamin D insufficiency or deficiency in the pathogenesis or progression of PD.

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