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Serum Vitamin D Levels in Acute Stroke Patients At RIMS, Ranchi, Jharkhand, India.

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Abstract
Introduction: *Vitamin D has been associated with mineral homeostasis and musculoskeletal health. However many studies have described the extra- skeletal effects of the vitamin D, like low levels of vitamin D have been associated with diabetes, peripheral vascular disease , hypertension, multiple sclerosis and cardiovascular diseases. In our study we have tried to find out any of its association with cerebrovascular accident.*
Objective: *To evaluate serum Vitamin D levels in stroke patients.*
Method: *Data for the study was collected from thirty acute stroke patients , admitted in the medicine ICU of RIMS, Ranchi, Jharkhand. The healthy control group comprise thirty healthy persons, age and sex matched to cases.*
Results: *serum vitamin D levels was lower in cases(20.06 +/ - 5.99 ng/ml) than control (22.00+/- 4.47 ng/ml). However most of the individuals of control groups also having lower level of vitamin D, but were higher than that of cases.*
Conclusions: *There are significant (p value = 0.000) differences in vitamin D levels between stroke patients and healthy control group.*
Keywords: *Vitamin D, stroke, PTH, Jharkhand patients.*

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I. Introduction

Vitamin D has been associated with mineral homeostasis and musculoskeletal health [1, 2]. Vitamin D deficiency is a widespread health problem, affecting up to 1 billion people worldwide [3]. Recent literatures describes the association between low level of vitamin D and cardiovascular disease [4,5,6]. Several epidemiological studies have shown associations of Vitamin D deficiency with a variety of chronic extra-skeletal diseases, including cardiovascular and renal diseases, cancer, autoimmune, neurological, and infectious diseases [7-15]. Vitamin D is mainly derived from endogenous ultraviolet- B induced vitamin D synthesis in the skin, therefore, largely be attributed to lifestyle related low sunlight exposure. The identification of the vitamin D receptor in almost all human cells suggest a role for vitamin D also in extra – skeletal diseases. Studies demonstrated several antihypertensive and vascular protective effects of vitamin D, such as suppression of the rennin angiotensin aldosterone system, beneficial modulation of classic cardiovascular risk factors, and anti- atherosclerotic properties including improvements of endothelial function. Additional neuroprotective actions of vitamin D have also been reported. In line with this, studies have largely shown that vitamin D deficiency is an independent risk factor for arterial hypertension and strokes.

The relationship of vitamin D deficiency to large vessels stroke and other atherosclerotic cardiovascular diseases may be mediated by atherogenic proinflammatory cytokines that foster atherosclerotic vascular changes and plaque instability [16,17]. Among stroke patients, vitamin D deficiency has been shown to predict severity and adverse outcomes including death [18,19]. Currently, there are few data on the magnitude of vitamin D deficiency in patients with cardiovascular diseases. We therefore sought to determine the prevalence and characteristics of vitamin D deficiency in hospitalized patients with acute stroke at RIMS, Ranchi, Jharkhand, India.

II. Materials And Method

Work is carried out in the critical wards of Rims, ranchi, Jharkhand in collaboration with department of biochemistry Rims between January 2017 to august 2017. A total of 60 persons (30 cases of stroke and 30 control) are included in the study.

Exclusion criteria:

1. Patients with known valvular heart disease, atrial fibrillation, hypercoagulable state, vasculitis, blood dyscrasia.
2. Known patients of cerebral arterio- venous malformation, diabetic nephropathy, chronic kidney disease, chronic liver disease
3. Patients with any co-morbid diseases
4. Patients were on vitamin D supplementation.

Inclusion criteria:

All the patients admitted under the department of general medicine with rapidly developing signs of disturbances of cerebral functions with no apparent cause other than vascular origin were clinically proven as stroke by clinicians of rims. Only non-contrast CT scan confirmed CVA patients were included in the study.

Blood collection: sample collection were done in CVA patients and evaluate for serum vitamin D and parathormone by chemiluminescent microparticle immunoassay method on ABOTT ARCHITCT 1000SR IMMUNOASSAY machine. Serum calcium assessment by direct ion selective electrode method and phosphate by AU480 autoanalyser. To assess the risk factors of CVA, along with detailed history and clinical examination, complete hemogram, fasting, post prandial blood sugar and others test like ecg, markers, MRI, were done by concerning department to exclude other cause of CVA other than the vascular orgin. Control population was selected from out patients department of medicine. They were age and sex matched as cases.

III. Results

The cases were diagnosed by the physicians of RIMS. A total 30 stroke patients and 30 controls were included in study. Mean age of the stroke patients were (55.00 +/- 4.47 yrs) comparable to that of controls (59.00 +/- 4.47 yrs, p value = 0.000). Both groups were somehow matched with respect to age, sex and other confounding factor like hypertension, diabetes, socioeconomic status, rural- urban differences, religion, races and duration of exposure to sunlight.

Table no 1 -4 depicted various statistical correlation between cases and control groups which are as follows-

Table no 1. Age (years) distribution in cases and controls:

	controls	cases	P value
No of subject	30	30	0.000
Age (years) Mean +/- SD	59.00 +/- 4.47	55.00 +/ - 4.47	

Table no 2. Vitamin D (ng/ml) distribution in cases and controls:

Group	Mean	SD	P value
controls	22.00	4.47	0.000
cases	20.06	5.99	

Table no 3. Comparison of serum calcium (mg/dl) between cases and controls:

Group	Mean	SD	P value
controls	8.80	0.45	0.017
cases	8.58	0.34	

Table no 4. Comparison of serum phosphate (mg/dl) between cases and controls:

Group	Mean	SD	P value
controls	3.20	0.44	0.000
cases	3.13	0.51	

Table no 5. Parathormone (pg/ml) levels in cases.

Group	Mean	SD
cases	44.33	15.52

Levels of serum vitamin D, calcium, phosphate are described in above table no. 2,3 and 4 respectively. Vitamin D levels in cases and controls are statistically significant. Parathormone levels was within the normal limit in cases. Lower ranges value of phosphate in cases group was below than the lower range value of controls group.

There was correlation in the level of vitamin D, phosphate between cases and controls and data was statistically significant. Correlational between calcium of cases and controls was statistically insignificant, but srum calcium levels in cases was lower than the controls group.

IV. Discussion

In our study, we found a significant association between vitamin D deficiency and stroke and established an independent association. Similar result have been found from the western part of the world [20,21,22,23,24,25]. Vitamin D acting through vitamin D receptor (VDR) leads to calcium and phosphate absorption from intestine, reabsorption of the same from kidney, suppression of parathyroid hormone secreation thus maintaining bone mineral health. At the cellular level presumably through VDR, vitamin D promotes cell differentiation and inhibits cell proliferation [26]. Similarly it influences proliferation of vascular smooth muscles along with their migration and gene expression. It also influences elastogenesis and immunomodulation. All these are process involved in the pathogenesis of atherosclerosis. In addition vitamin D can modulate rennin secretion thus influence blood pressure as well [27]. Several mechanism have been proposed on how vitamin D could be involved in blood pressure regulation and pathophysiology of arterial hypertension, which is a major risk factor for stroke. Smooth muscle cells and lymphocyte express receptors for vitamin D and convert circulating 25- hydroxyl vitamin D to 1,25- dihydroxyvitamin D. 1, 25 – hydroxyl vitamin D in turn reduce the proliferation of lymphocytes and the production of cytokines [28, 29]. This anti – inflammatory effect may have a protective role as there is increasing evidence that systematic inflammation leads to atherosclerosis.

The strength of this study is that both cases and controls were collected from a single centre with same confounding risk factor for stroke and vitamin D analysis was done in one lab. Age may impact vitamin D levels. Gillor et al found that with increasing age 25 – hydroxyvitamin D decreases [30], as capability of skin to produce pre – vitamin D after ultraviolet (UV) B irradiation declines with age. In our study this effect is nullified as both groups were age and sex matched.

V. Conclusions

Vitamin D levels is low in stroke patients irrespective of their sex, residence, and other risk factor of stroke. This study established that vitamin D deficiency had an independent association with stroke. This consideration can serve as a rationale for the evaluation, prevention and treatment of vitamin D deficiency in individuals with arterial hypertension and stroke.

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