

Frequency of Vitamin D Deficiency among Patients Presenting with Stroke

AMIR TAJ KHAN¹, KALIM ULLAH KHAN², MUHAMMAD ISHFAQ³, NAVEED AHMAD⁴, MUHAMMAD KHALID⁵, MUHAMMAD ZUBAIR KHAN⁶, IZHAR AHMAD⁷

¹MBBS, FCPS (Medicine), District Specialist, DHQ Hospital, Buner, KPK

²MBBS, FCPS (Medicine), Assistant professor Medicine Department NMC/QHAMC, Nowshera

³MBBS, FCPS (Medicine), Assistant Professor, Medical "C" ward, Hayatabad medical Complex, Peshawar.

⁴MBBS, FCPS (Medicine), Medical Officer, DHQ Hospital, Timergara, KPK

⁵MBBS, FCPS medicine, Associate Professor Medical department, NMC/QHAMC Nowshera

⁶MBBS, FCPS-II (Medicine), Trainee Medical Officer, Medical "C" Unit, Hayatabad Medical Complex, Peshawar.

⁷MBBS, FCPS (Medicine), Senior Registrar, Saidu Group of Teaching Hospital, Swat, KPK

Corresponding author: Muhammad Ishfaq, Email: dashfaq@gmail.com

ABSTRACT

Background: Stroke is the leading cause of both mortality and disability on a global scale. The documented incidence of cerebral hemorrhages at Pakistan's CT scan facilities varies from 31-40% of cases, whereas ischemic stroke is claimed to be responsible for 60-90% of cases

Objectives: The objective of the study was to assess the prevalence of vitamin D deficiency in patients presenting with stroke

Methodology: The current study was descriptive and cross-sectional carried out at the Medicine Department, Hayatabad Medical Complex Peshawar for duration of six months February 2018 to August 2018. Patients were enrolled from both the emergency and accident department and outpatient department. The blood samples were taken and transferred to the hospital diagnostic laboratory for the assessment of deficiency of vitamin D in serum. The data analysis was done by using IBM SPSS version 16.

Results: In this study, totally 341 patients were enrolled. There were 239 (70.09%) male patients while female patients were 102 (29.91%). The vitamin D deficiency in serum was observed in 50.1% patients.

Conclusion: Stroke is still a calamity, and vitamin D could have played pivotal role in the pathogenesis of stroke. Since most of our population is already deficiency in 25-hydroxyvitamin D, therefore, relationship between stroke and vitamin D deficiency cannot be studied at hospital settings. We recommend more analytical research projects not only at hospital level but also at community level to draw conclusions about the relationship between vitamin D status and occurrence of stroke.

Keywords: Stroke, Cerebrovascular accident, acute ischemic stroke, hypertension, vitamin D, 25-hydroxyvitamin D

INTRODUCTION

Stroke is the leading cause of both mortality and disability on a global scale. The documented incidence of cerebral hemorrhages at Pakistan's CT scan facilities varies from 31-40% of cases, whereas ischemic stroke is claimed to be responsible for 60-90% of cases¹. Because it is better to avoid stroke than to cure it, it is necessary to comprehend all of the risk factors associated with stroke in order to comprehend stroke. The latest risk factors to be identified were vitamin and hormone deficiencies, abnormalities of the arterial bar reflex, and pro-inflammatory cytokines. Specifically, several therapies were tried to address these risk factors, and it was found that doing so greatly reduced the frequency or severity of strokes. Stroke preventive efforts should not focus just on reducing one risk factor as the origin of a stroke is multifactorial². The prevalence of vitamin D deficiency can be attributed to lifestyle choices and other environmental variables that contribute to sunlight-induced vitamin D deficiency in the skin. There is a correlation between low levels of 25-hydroxyvitamin D [25(OH)D] and cardiovascular, musculoskeletal, infectious, autoimmune, and cancerous disorders; hence, the pandemic of vitamin D insufficiency is a cause for alarm. Epidemiological investigations have revealed, more often than not, that a lack of vitamin D increases the risk of stroke. Patients with (n=267) and without (n=2977; p-value=0.30) a history of past cerebrovascular episodes did not substantially vary in terms of serum 25(OH)D. However, the 25(OH)D levels of patients who died from stroke during follow-up (n=40) were substantially lower than those of the rest of the research population (p=0.38.3)³.

Supplementing with vitamin D has been shown to improve muscular strength while decreasing osteopenia, falls, and fractures in stroke patients.⁴

90 patients were observed in one study, and the results are as follows. Vitamin D deficiency is seen in 58.8% of patients (n=53), meaning that the amount of vitamin D is lower than 20 ng/ml. The TSH levels found in 73 instances of euthyroidism ranged from 0.25 to 5 U/U/ml. Ten cases of subclinical hypothyroidism were found, but seven cases of overhypothyroidism were found. Accordingly, mean vitamin D levels of 16.23±10.47 and 13.11±10.48 ng/ml were found for

overt and subclinical hypothyroidism, respectively. A substantial disparity in vitamin D levels was seen in each instance.⁵

Unfortunately, there is a lack of data and local trials on the prevalence of vitamin D insufficiency in patients presenting with stroke at present. And thus, we set out to find out how common vitamin D deficiency was amongst patients presenting with stroke in our area.

MATERIALS AND METHODS

The current study was descriptive and cross-sectional carried out at the Medicine Department, Hayatabad Medical Complex Peshawar. The study duration was six months February 2018 to August 2018. The sample size in the current study was 341 by keeping 66.6% proportion of vitamin D deficiency amongst patients with stroke, significance level as 5%, margin error of 5% and Confidence level of 95%⁶. Consecutive sampling method was used in our study. The criteria for inclusion in the current study were all the patients of both the gender having age 60-85 years and being confirmed for stroke on CT scan. The criteria for exclusion were all the patients diagnosed with osteoporotic disease on DEXA scan, patients on treatment with steroid, patients on supplementation of vitamin D or calcium, patients with chronic kidney problem and patients with chronic liver diseases. Ethical and research committee of the hospital approved our study. Patients were enrolled from both the emergency and accident department and outpatient department. An informed consent was signed from all the patients. The blood samples were taken and transferred to the hospital diagnostic laboratory for the assessment of deficiency of serum vitamin D. The data analysis was done by using IBM SPSS version 16. Means and standard deviations were determined for variables like age whereas frequencies and percentages were determined for variables like gender and vitamin D deficiency. The stratification of deficiency of vitamin D was done with age, gender and type of stroke by using chi-square test with p value of less than 0.05 as significant statistically.

RESULTS

In this study, totally 341 patients were enrolled. There were 239 (70.09%) male patients while female patients were 102 (29.91%).

The patients were categorized into three age groups. The average (SD) age was 68.4 (+7.4) years. (Table 1) Based on CT scan, ischemic stroke patients were 58.4% while hemorrhagic stroke patients were 41.6%. The average (SD) vitamin D level in serum was 17.9 (+7.3) ng/ml. The deficiency of vitamin D in serum was observed in 50.1% patients. (Table 2). The stratification of deficiency of vitamin D done with age, gender and type of stroke are given in Table 3-5.

Age was associated significantly with vitamin D deficiency (p=0.001) while gender (p=0.105) and type of stroke (p=0.625) was not associated significantly with the vitamin D deficiency.

Table 1: Distribution of patients based on age

Age Groups (years)	Frequency (%)
60 - 70	241 (70.7%)
> 70 - 80	64 (18.8%)
> 80 - 85	36 (10.6%)

Table 2: Frequency of Vitamin D Deficiency in stroke patients

Vitamin D Deficiency	Frequency (%)
Yes	171 (50.1%)
No	170 (49.9%)

Table 3: Stratification Of Vitamin D Deficiency with age

Age Groups	Vitamin D Deficiency		P VALUE
	Yes	No	
60 to 70 years	99	142	< 0.001
	41.1%	58.9%	
> 70 to 80 years	50	14	
	78.1%	21.9%	
> 80 to 85 years	22	14	
	61.1%	38.9%	
Total	171	170	
	50.1%	49.9%	

Table 4: Stratification of Vitamin D Deficiency with gender

Gender of Patient	Vitamin D Deficiency		P value
	Yes	No	
Male	113	126	0.105
	47.3%	52.7%	
Female	58	44	
	56.9%	43.1%	
Total	171	170	
	50.1%	49.9%	

Table 5: Vitamin D Deficiency stratification with respect to with type of stroke

Type of Stroke	Vitamin D Deficiency		P VALUE
	Yes	No	
Ischemic	102	97	0.625
	51.3%	48.7%	
Hemorrhagic	69	73	
	48.6%	51.4%	
Total	171	170	
	50.1%	49.9%	

DISCUSSION

The most frequent cause for admissions to a neurology unit in our region is a stroke. Stroke can be categorized as "Transient" if full recovery takes place in 24 hours or "Evolving" if a neurological imbalance worsens after 6 hours. Immediately following the onset and once a stable, non-evolving deficit has been developed. Nearly two-thirds of strokes are ischemic in nature, and the remaining third either are thrombotic or embolic in nature.⁷

Ischemic stroke has been linked to a number of fixed and modifiable risk factors. The primary constant risk factors are age, sex, and ethnicity, while the main modifying variables are diabetes mellitus in 36.3% cases, hypertension in 65% cases, obesity in 18% cases, smoking in 32% cases and dyslipidemia in 32.7% cases.⁸ Stroke is the third largest cause of mortality in the United States. One of the leading causes of morbidity and lost years of productive life in the young is stroke.⁹

Recent research has shown that patients with vitamin D deficiencies are more likely to have cardiovascular issues or are at a higher risk of acquiring cardiovascular disorders. The precise method through which vitamin D may protect people from cardiovascular disease is not yet fully understood.⁹

End-stage renal disease (ESRD) and cardiovascular disease (CVD) have been linked to vitamin D status and the risk of developing cardiovascular disease. In a 7 year follow up research, 300 participants who had coronary angiography had severe vitamin D insufficiency (25(OH)D 10 ng/mL), which increased their risk of death from sudden cardiac arrest or heart failure by 3-5 times relative to adequate levels of vitamin D.¹⁰ Furthermore, vitamin D deficiency in these same participants was linked to a 50% increase in fatal strokes.¹¹ Similar findings in hemodialytic patients have been reported.¹² Another smaller research in India reported no effect for patients with CVD and an optimum level of 25(OH)D.¹³ This research is in contrast since it reveals a relationship between very high levels of 25(OH)D (>89 ng/mL) and an increased risk of ischemic heart disease.

There is a correlation between low levels of 25(OH)D and ischemic stroke, according to a prior research that was conducted in populations around the globe.¹⁴ Numerous investigations conducted on both humans and animals have shown that vitamin D causes a reduction in the activity of the renin-angiotensin-aldosterone pathway. Additionally, it aids in the control of the genes responsible for renin production.¹⁵ Additionally, it has been demonstrated in one experimental model that vitamin D has the capacity to drastically lower the lipid profile and adhesion molecule of the sera.¹⁵

Vitamin D deficiency disorders are widespread both domestically and internationally. Several investigations have been conducted recently with an epidemiological focus. These studies reveal that there is relation between cardiovascular issues and vitamin D insufficiency. According to many studies, those who are vitamin D deficient are more likely to have heart failure, hypertension, sudden cardiac arrest, and ischemic heart issues. The research demonstrates some biological support for vitamin D possible significance in the prevention or treatment of cardiovascular issues.

CONCLUSION

Stroke is still a calamity, and vitamin D could have played pivotal role in the pathogenesis of stroke. Since most of our population is already deficiency in 25-hydroxyvitamin D, therefore, relationship between stroke and vitamin D deficiency cannot be studied at hospital settings. We recommend more analytical research projects not only at hospital level but also at community level to draw conclusions about the relationship between vitamin D status and occurrence of stroke.

Conflict of interest: The authors declare that they have no conflict of interest.

Author contributions: Amir taj khan data analysis, Kalim Ullah Khan and M Ishfaq manuscript writing/editing, Naveed Ahmad data collection, Muhammad Zubair Khan manuscript writing/editing, Izhar Ahmad manuscript writing/editing

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