Vitamin D and Other Risk Factors among Stroke Patients

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ABSTRACT

Background

Stroke is common neurological problems in Nepal. The common risk factors for stroke are age, hypertension, diabetes, dyslipidemia and atrial fibrillation. Vitamin D is an emerging risk factors for cardio-cerebrovascular disease.

Objective

This study is to find out Vitamin D and risk factors in stroke patient in Nepalese population.

Method

We reviewed the record of 281 stroke patients, admitted to Neurology ward of College of Medical Sciences, Bharatpur, Nepal from 1st January to 31st December 2013. The records were analyzed on the basis of age, sex, hypertension (HTN), body mass index (BMI), smoking habits, hemoglobin(Hb), diabetes mellitus(DM), Lipid profile, Atrial fibrillation(AF) and vascular territory with clinical and radiological evidences. The vitamin D analysis was done all stroke patients.

Result

Total patient were 281, with male 161 and age range from 18 - 87. Ischemic stroke was noted in 86.8% and hemorrhagic stroke was noted in 13.2% of patients. Middle cerebral artery (MCA) ischemia was noted in 51.5% of patients and anterior cerebral artery (ACA) ischemia was noted in 3% of patients. Multiple infarcts were noted in 12.90% of patients. About half of them were smoker, hypertension 47.40%, Diabetes mellitus 24.20% and 14.1% had atrial fibrillation. 174 (61.92%) of the stroke had less than sufficient Vitamin D.

Conclusion

The common risk factors for stroke patients like smoking, hypertension, diabetes mellitus and atrial fibrillations are present in Nepalese population. The level of vitamin D was also low in stroke patients.

KEY WORDS

Stroke, vitamin D

INTRODUCTION

Stroke is one of the leading causes of death and disability worldwide and also increasing trend in low and middle income countries like Nepal. According to WHO global health estimates, 6.7 millions of deaths were due to strokes.[1] The rates of major cardiovascular events like stroke are higher in low and middle-income countries (LMIC) than high income countries however risk factor burden is lower in LMICs.[2]

There are various modifiable and non-modifiable risk factors for stroke. Established risk factors for cardio-cerebrovascular diseases - smoking, hypertension, diabetes mellitus, dyslipidemia, obesity, physical activity, age are increasing in LMICs which correlates with morbidity and mortality. Recent studies have shown that there is a role of Vitamin D in stroke events.

Several mechanisms have been proposed on how vitamin D could be involved in blood pressure regulation and the pathophysiology of arterial hypertension, which is a major risk factor for stroke. Vitamin D effects on the renin angiotensin aldosterone system (RAAS) have been extensively investigated by experimental studies. The different stages of atherogenic process evolves, starting from inflammatory endothelial activation/dysfunction and resulting in plaque vulnerability and rupture.[3]

METHODS

We reviewed the record of 281 stroke patients, admitted in College of Medical Sciences, Bharatpur, Nepal from 1st January to 31st December 2013. They were investigated with blood tests, imaging and managed medically.

The records were analyzed for risk factors - age, sex, hypertension (HTN), body mass index (BMI), smoking, hemoglobin (Hb), diabetes mellitus (DM), lipid profile, atrial fibrillation (AF), serum vitamin D. Stroke subtype and vascular territory were analyzed on the basis of CT scan imaging evidences.

The Data were analyzed by using the SPSS version 20.

RESULTS

Among 281 stroke patients, 161 were male, age range from 18 to 87 years.

Table 1. **Baseline characteristics**

Parameters	Stroke patients (n=281)
Age range years	18 - 87
Men	161 (57%)
SBP	138 ± 27.62 mmHg
DBP	86.5 ± 18 mmHg
BMI	26.32 ± 4.54 kg/cm^2
Hb	13.02 ± 2.59 gm/dl

Table 2. **Common risk factors of stroke patients**

Risk factors	Number of Patients
Smoking	149 (52.5%)
Diabetes Mellitus	67 (24.2%)
Hypertension	132 (47.4%)
Triglycerides >150	87 (31.4%)
High Density Lipoprotein <40	126 (45.5%)
Atrial fibrillation	39 (14.1%)

Smoking was present in 52.5% while Diabetes mellitus in 24.2%, hypertension 47.2%, high density lipoprotein less than 40 in 45.5% respectively.

Table 3. **Level of Vitamin D**

Vitamin D	No of patients
0-10 (deficient)	12 (4.27%)
11-29 (insufficient)	162 (57.65%)
> 30 (sufficient)	107 (38.42%)

174 (61.92%) of the stroke had less than sufficient Vitamin D.

Table 4. **Stroke subtypes and vascular territory**

Areas of Brain	Frequency
Ischemic Middle Cerebral Artery	145 (51.5%)
Ischemic Anterior Cerebral Artery	8 (3%)
Brain stem ischemia	34 (12.12%)
Cerebellum ischemia	12 (3.07%)
Thalamic infract	12 (4%)
Multiple infract	36 (12.9%)
Basal ganglia Bleed	23 (8.11%)
Brainstem Bleed	14 (5.1%)

Middle cerebral artery (MCA) ischemia was noted in 51.5% of patients and anterior cerebral artery (ACA) ischemia was noted in 3% of patients. Multiple infarcts were noted in 12.90% of patients.

DISCUSSION

Stroke is common neurological problems in Nepal. Cardio embolic stroke is the most common cause of stroke. Other causes are premature atherosclerosis, hematological, immunological disorders and migraine.

This study shows that smoking (n =149) is commonest risk factor among stroke patients. Hypertension, low HDL, high triglyceride, diabetes mellitus are also common. Atrial fibrillation was found among 39 patients.

In this study, we found association between 25-hydroxyvitamin D deficiency and stroke. Similar results have been found from the western part of the world.[4,5]

We noted deficiency of 25-hyroxyvitamin D in nearly 61.8% of stroke patients, which further divided into three categories insufficiency and deficient. A similar association of hypovitaminosis D with stroke was also found in north India.[6]

1,25-OH D is the biologically active, hormonal form of vitamin D; however, serum 25-OH D is regarded as the best indicator of vitamin D status in individuals without kidney disease, because it is the substrate for the renal and non renal production of 1,25-OH D, has a longer biological half-life than 1,25-OH D, and circulates in much higher concentrations. Serum 25-OH D reflects the total production of vitamin D from both endogenous and exogenous sources, including exposure to ultraviolet-B radiation and intake of various dietary forms.

In this analysis, 61.8 % of cases had less than sufficient amount of Vitamin D. The mean Vitamin D level in the cases were 0-10 (deficient) in 4.27 % and insufficient in 57.65 % of the stroke patients. This may have lead to the vascular events in the patients.

The mechanism of deficiency of vitamin D and atherosclerosis is not fully understood. Li et al. observed that vitamin D regulated blood pressure by suppressing the renin angiotensin system.[7] Aihara et al. demonstrated vascular effects of vitamin D with inhibition of thrombosis and reduction in arterial hypertension by vitamin D deficiency.[8,9]

There was a study showed low 25-hydroxyvitamin D was significantly associated with increasing intimal media thickness and carotid plaques in individuals.[10] Multiple level effect of Vitamin namely rennin angiotensin system, change in thrombotic state, arterial hypertension and intimal media changes may have increased risk of stroke.

An association between vitamin D deficiency and atherogenic dyslipidemia has also been suggested. In a cross-sectional study that included 107811 patients, vitamin D was associated with a significant increase in total cholesterol and high-density lipoprotein cholesterol.[11]

Besides being a risk factor, stroke patients that 25(OH) D levels at hospital admission are associated with stroke severity, as well as with poor early functional outcome.[12]

We don't know the cause of deficiency of vitamin D in Nepalese patient. The actual level of vitamin D in general population of Nepal is yet to be identified.

CONCLUSION

Stroke is common neurological problems. Smoking, hypertension, diabetes mellitus, dyslipidemia, atrial fibrillation are major factors for associated with stroke. This small study also showed the relation of level of vitamin D with stroke. However systemic larger scale study needs to proof this association.

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