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Prevalence of Vitamin D Deficiency in Hypertensive Patients in Tertiary Center at Western Regional Hospital

Kamal Kumal*, Ajay Adhikaree, Surya Bahadur Hamal Thakuri and Bidhi Dhital

Department of Medicine, Pokhara Academy of Health Sciences, Pokhara, Nepal

***Corresponding author:** Kamal Kumal, Department of Medicine, Pokhara Academy of Health Sciences, Pokhara, Nepal, Tel: 9846048919; E-mail: lotuskamalkumal@gmail.com

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Abstract

Background and aim: Vitamin D deficiency can lead to increase blood pressure in hypertension people and aim to determine the prevalent between hypertension and vitamin D deficiency in Pokhara academy of health science.

Methods: A cross sectional study was carried out in Western regional hospital, Nepal from October 2020 to March 2021. 505 patient were participants including both male and female of age >18 years old, in our out patients department. Study was designed to collect patients' information relevant about hypertension and laboratory reports of vitamin D level.

Results: Patients of hypertension are prior to vitamin D insufficiency was highly prevalent P value <0.001.

Conclusion: Vitamin D deficiency in Nepal is very common till now and Nepalese people were high prevalent with hypertension. We emphasize that most Nepalese people vitamin D is need among the hypertensive patients. Supplement of vitamin D in hypertensive patients it reduce cardiovascular morbidity.

Keywords: Vitamin D; Hypertension; Deficiency; Morbidity; Cardiovascular

Introduction

Hypertension is a common cardiovascular condition that leads to several medical problems like coronary artery disease, heart failure, cardiovascular accident, renal diseases, blindness and cardiovascular death [1]. Left ventricle hypertrophy and concentric hypertrophy these are the long term effect of hypertension [2]. One of the most common effects in calcium metabolism and bone health is vitamin D. Vitamin D synthesis occurs in skin due to endogenous ultraviolet B. High prevalence of vitamin D deficiency in patient who is associated with hypertension [3]. Attributed to lifestyle related low sunlight exposure. Identification of the Vitamin D Receptor (VDR) in almost all human being.

Our study shows prevalence of vitamin D deficiency in hypertension patients. Measurement of vitamin D level is 21 ng/ml to 29 ng/ml is insufficiency, 10 ng/ml to 20 ng/ml is deficiency and less than 10 ng/ml is severe deficiency [4].

To determination of prevalence of vitamin D level in hypertensive patients in Pokhara academy of health science.

Materials and Methods

A cross sectional studies were done in medicine Outpatients' Department (OPD) duration was six month that is October 2020 to March 2021. Five hundred five patients having hypertension above 18 years old attending out patients department of medicine in Pokhara academy of health science were selected in our study. We selected the patients who are on anti-hypertensive medicine as well as who are not in anti-hypertensive medicine and also patients who are associated with other commodities. Routine laboratory examination vitamin D was assessed all the patients. Reports were collect the next following day in OPD and record in the collect sheet. All the parameters age, gender, religion, dietary pattern, sunlight exposure, smoker, alcohol intake, non-smoker and non-alcohol intake, family history diabetes mellitus, coronary artery disease, cardiovascular accident, peripheral artery disease, benign prostatic hyperplasia, including systolic and diastolic blood pressure were determined at the time of the first visit of the patient in OPD. Follow up questionnaires and self-reports, we doctor measure the blood pressure meeting at least one of three JNC 8 criteria systolic blood pressure (SBP) ≥ 140 mmHg, Diastolic Blood Pressure (DBP) ≥ 90 mmHg, or use of anti-hypertensive drugs. Newly hypertensive patients found in OPD with vitamin D deficiency, all those patients written informed consent were taken and study was approved by IRC of Pokhara academy of health science. Fined as newly developed hypertension among those free of baseline hypertension. The definition of incident hypertension is patient self-report or doctor measurement. All participants gave their written informed consent to participate in the study that was approved by the institution ethics committee. Inclusion criteria are age group >18 years; both male and female, patients who are hypertension already or newly diagnosed. Exclusion criteria are

people with chronic renal disease; hepatic disease; cardiac disease; gastrointestinal disease; skeletal disease; pregnancy and who are in vitamin supplement.

Statistical analysis

SPSS Statistics 20.0 was used for data statistical analysis. For all the categorical data were calculated in percentage. *Chi-square* tests were applied between deficiency, moderate insufficiency, severe insufficiency variation. P value of <0.05 were statistically significant.

Results

Total patients are 505 (372 (73.6%) female and 133 (26.4%)) participation in our study. Character of 505 patients was smoker 404 (80%), alcohol intake 396 (78.4%), family history of hypertension 480 (95%), diabetes mellitus 202 (40%), coronary artery disease 126 (25%), cardiovascular accident 34 (6.7%), peripheral artery disease 14 (2.7) and benign prostatic hyperplasia 30 (5.9%) are included in the study (Table 1).

Table 1: Baseline characteristics.

Characteristics	Number	Percentage
Smoker	404	(80%)
Alcohol intake	396	(78.4%)
Family history HTN	480	(95%)
Diabetes mellitus	202	(40%)
Coronary artery disease	126	(25%)
Cardiovascular accident	34	(6.7%)
Peripheral artery disease	14	(2.7%)
Benign prostatic hyperplasia	30	(5.9%)

Our study age group, 18 to 30 year: 66 patients (31 male 47% and 35 female 53%), 30 to 60 years group: 245 patients (58 male 23.6% and female 187 76.4%), 60 to 75 years group: 191 patients (43 male 22.5% and female 148 77.5%) and above 75 years group: 3 patients (1 male 33.33% and 2 female 66.67%). Below 50 years were 299 (59.2%) and above 50 years old patients were 206 (40.8%) hypertensive patients with prevalence of vitamin D deficiency (Table 2). Prevalence of severe vitamin D deficiency were 53 patients (7%) *i.e.* male 5 and female 30, mild-moderate vitamin D deficiency were 184 patients (36.4%) *i.e.* male 30 and female 154, insufficiency vitamin D were 286 patients (56.6%) *i.e.* 98 male and 188 female (Table 3). Insufficiency vitamin D is more than moderate and severe deficiency and female are more than male.

Table 2: Total number and distribution according to gender and age.

Age group	Male %	Female %
18 to 30 years old	31 (47%)	35 (53%)
30 to 60 years old	58 (23.6%)	187 (76.4%)
60 to 75 years old	43 (22.5%)	148 (77.5%)
≧ 75 years old	1 (33.33%)	2 (66.67%)
Total	133	372

Table 3: Total number and distribution according to female and male.

Deficiency	Frequency	Female	Male	P value
Insufficiency	285	232	53	0.00001

Moderate deficiency	185	122	63	0.00001
Severe deficiency	35	18	17	0.00001
Total	505	372	133	

Discussion

One of the most important significant risk factor is arterial hypertension. Incidences of hypertension are increase day by day in larger quantity and also increase morbidity and mortality in Nepal [5]. Recent studies shows that high blood pressure responsible is one of the important factors were vitamin D deficiency. In regulation of blood pressure *via* increased intracellular calcium leading to decreased renin activity due to proliferation of vascular smooth muscle cells, endothelial cell function and regulation of renin angiotensin pathway [6]. In our study, prevalence of severe vitamin D deficiency in hypertensive was 7%. Prevalence of vitamin D moderate sufficiency in hypertensive was 36.4%. Prevalence of vitamin D deficiency insufficiency 56.6% which shows directly associated to increase blood pressure. Vitamin D and hypertension in people coming for health check up to a tertiary care centre in South India journal of family medicine and primary care, shows that prevalence severe and moderate vitamin D deficiencies were 77% and 8.7% respectively. Insufficiency and sufficiency with hypertension were 6% and 8.3% respectively [7].

One study shows that higher latitude people had incidence of high blood pressure. In winter month higher values of blood pressure by 2.5 mmHg. North and South equator the prevalence of hypertension increase by 2.5% [8]. A study by Tomaschitz A, et al., showed that both 25 (OH) D and 1, 25 (OH) D and plasma renin and angiotensin II concentrations were inversely associated to increase blood pressure [9]. Retrospective studies have shown vitamin D and SBP are significant inverse association between them. Prospective study in 1,448 women was 2.21 fold increases in hypertension of vitamin D deficiency versus control group [10]. Comprising study of health professionals 613 men from follow-up study and 1,198 nurses' health study showed that lower serum 25 (OH) vitamin D levels of 15 ng/mL (<37 nmol/L), hypertension is relatively increased by 6.13 in males and 2.67 in nurses [11,12]. Randomized controlled trial demonstrates that a modest amounts of vitamin D 400 IU with supplement of calcium given over 2 months period significantly reduced systolic blood pressure by 9% [13]. Similarly our study shows that lack of vitamin D because significantly increase the prevalence patient increase blood pressure. Vitamin D with an increased risk of cardiovascular disease risk factor, especially hypertension [14]. In a cross-sectional study conducted by 4,125 subject's deficiency and hypertension [15]. Suzanne E. Judd et al. in 2016 shows that increased risk of incident of stroke in people of deficiency of vitamin D. our study shows that 34 people of cardiovascular patients had 6.7% deficiency of vitamin D. Cardiovascular disease are also risk factors, skin diseases, respiratory disease, musculoskeletal disease are also co interrelation of vitamin D deficiency [16-17]. Early identification of vitamin D deficiency in Nepal and do supplement and significantly reduce the high blood pressure population thus decrease the prevalence of cardiovascular events.

Limitations of this study are few. Hypertensive patients is also association with vitamin D deficiency and this is a small sample of study so further more study is need in our country. Study period is also short; we need more and long duration study to have dynamic vitamin D deficiency in hypertension patients.

Conclusion

Our study shows that deficiency of vitamin D directly proportional to increase blood pressure which are insufficiency group were more than moderate and severe deficiency.

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