To Study Role of Vitamin D in Patient of Systemic Hypertension

Ashok Kumar Choudhary*, Vandana Dhangar, Ankit Premchand Vakil***, Ankit Jain******

Department of Medicine, SMIMER, Surat

Abstract: Vitamin D status differs by age, age group and gender and with different levels of systemic hypertension, low levels of Vit D being at increased risk of Hypertension. A database search yielded 12 observational studies of vitamin D status in relation to risk of hypertension. The majority of studies found a significant relationship between deficient vitamin D status and higher risk of hypertension. The evidence suggests that efforts to improve vitamin D status, for example by vitamin D supplementation, could reduce hypertension incidence, morbidity and mortality at low cost, with few or no adverse effects. [Ashok C NJIRM 2018; 9(1):117-120]

Key Words: Systemic Hypertension, Vitamin D Deficiency, Blood Pressure

Author for correspondence: Ashok Kumar Choudhary, A-802, Shyam Palace, Opposite: Shiv Kartik Enclav, Vip Road Vesu, Surat – 395007 E-Mail: acdrchoudhary@gmail.com M: 9974116982

Introduction: Vitamin D is a group of fat-soluble secosteroids responsible for intestinal absorption of calcium and phosphate. In humans, the most important related compounds of vitamin D are vitamin D2 and vitamin D3. Ergocalciferol (vitamin D2) and Cholecalciferol (vitamin D3) are unique as they constitute what we know as vitamin D and can be ingested from the diet and/or supplements. The body can also synthesize vitamin D (from cholesterol) when sun exposure is adequate (hence its nickname, the "Sunshine Vitamin").

Vitamin D deficiency has been described world-wide and its possible health consequences include several conditions in addition to bone health; these include increased risk of some types of cancer, immune disease, diabetes, cardiovascular diseases and hypertension.

Surprisingly, in addition to concerns about Vitamin D insufficiency developing in residents of higher latitudes due to reduced UVB exposure, which lowers cutaneous vitamin D synthesis, there has been increasing concern about inadequate vitamin D status in more sunny climates.

The desired range of serum 25-hydroxyvitamin D is between 20 and 50 ng/ml. This level of plasma 25-hydroxyvitamin D also appears necessary to reduce the risk of some chronic diseases. The risk of cardiovascular disease is lower when vitamin D ranged from 8 to 24 ng/ml(20 to 60 nmol/l)[13]. A "threshold effect" appears to occur once a level of 24 ng/ml (60 nmol/l) has been reached i.e., levels of vitamin D over 24 ng/ml (60 nmol/l) did not show added benefit.

Adequate amounts of vitamin D can be produced with moderate sun exposure to the face, arms and legs, averaging 5–30 minutes twice per week, or approximately 25% of the time for minimal sunburn. The darker the skin, and the weaker the sunlight, the more minutes of exposure are needed.

Causes of Vitamin D Deficiency : It can be Increasing age, Low altitude, Winter season, Clothing covering entire body, Highly pigmented dark skin, Use of sunscreen and glass shielding, Body fat content, Fat malabsorption (celiac sprue, cystic fibrosis and crohn's disease), Use of certain drugs (anticonvulsants, corticosteroids, and rifampicin), Nutritional

Aims & Objective:

1. To study the role of vitamin D level in patients of systemic hypertension.
2. To study the relation of severity of vitamin D deficiency and systemic hypertension.

Methods:

- The study was carried out in 100 consecutive patients admitted to tertiary care hospital with systemic hypertension.
- It was prospective observational study over the period of one year.
- All the patients were interviewed, examined and evaluated.
- Blood pressure measurement, CBC, serum creatinine, lipid profile, urine analysis, fasting & postprandial blood sugar and ECG were done and results were analysed.
- None of patient was having history of chronic heart disease, diabetes mellitus, nephropathy or any other major illness.
- All the patients were evaluated for vitamin D Level and divided according to the results.

- Data entry and analysis was done in Microsoft excel through Descriptive statistic, 't' test and chi-square tests.

Vitamin D Level	Interpretation
<=20ng/ml	Deficient
21-29 ng/ml	Insufficient
>=30 ng/ml	Sufficient

Inclusion Criteria:

1. Diagnosed case of systemic hypertension.
2. Age between 30-70 years.

Exclusion Criteria:

1. Chronic heart disease
2. Diabetes mellitus (FBS>110 mg/dl, PP2BS >140 mg/dl)
3. Nephropathy (albuminuria, hematuria, s.creatinine >1.5 mg/dl)
4. Any other major illness
5. Age 70 years.

Results & Discussion: Age Wise Distribution of Patients of Hypertension: In this study, I have included patients in the age from 31-70 years. Out of which, 20(20%) patients were in the age group of 31-40 years, 33(33%) patients were in age group of 41-50 years, 23(23%) patients were in the age group of 51-60 years and 24(24%) patients were in the age group of 61-70 years.

Sex Wise Distribution of Patients of Hypertension: In present study, I have included 100 patients of systemic hypertension. Out of which,52 (52%) patients were male and 48 (48%) patients were female.

The Distribution of Age And Sex: Out of 52 males 8(15.4%) patients were in the age group of 31-40 years of age, 23(44.2%) patients were in the age group of 41-50 years of age, 8(15.4%) patients were in the age group of 51-60 years of age and 13(25%) patients were in the age group of 61-40 years of age in this study. Out of 48 females 12(25%) patients were in the age group of 31-40 years of age, 10(20.8%) patients were in the age group of 41-50 years of age, 15(31.2%) patients were in the age group of 51-60 years of age and 11(22.9%) patients were in the age group of 61-70 years of age.

Level of Vitamin D in Patients of Hypertension: In my study, I have included 100 patients of systemic hypertension. Out of which, 62(62%) patients had deficient vitamin D level, 27(27%) patients had insufficient and 11(11%) patients had sufficient vitamin D level. So, majority of patients of hypertension had deficient vitamin D level.

Vitamin D Deficiency in Relation Toage: In age group of 31–40 years: Out of 20 patients, 19 (95%) patients had vitamin D deficiency and 1 (5%) patient had sufficient vitamin D level. In age group of 51-60 years: Out of 23 patients, 21 (91.30%) patients had vitamin D deficiency and 2 (8.70%) patient had sufficient vitamin D level. In age group of 61-70 years: Out of 24 patients, 21 (87.50%) patients had vitamin D deficiency and 3 (12.55%) patients had sufficient vitamin D level. In my study, vitamin D deficiency is almost same in the every groups of age. So, vitamin D deficiency is not related to age.

Severity of Vitamin D Deficiency In Relation To Age: In age group of 31–40 years: Out of 19 patients with vitamin D deficiency, 17 (89.47%) patients had deficient level of vitamin D and 2 (10.53%) patients had insufficient level of vitamin D. In age group of 41-50 years: Out of 28 patients with vitamin D deficiency, 18 (64.29%) patients had deficient level of vitamin D and 10 (35.71%) patients had insufficient level of vitamin D. In age group of 51-60 years: Out of 21 patients with vitamin D deficiency, 16 (76.19%) patients had deficient level of vitamin D and 5 (23.81%) patients had insufficient level of vitamin D. In age group of 61-70 years: Out of 21 patients with vitamin D deficiency, 11 (52.38%) patients had deficient level of vitamin D and 10 (47.62%) patients had insufficient level of vitamin D. So, vitamin D deficiency is more severe in the age group of 31-40 years than any other groups of age.

Vitamin D Deficiency In Relation To Sex: In present study, out of 48 female patients 40(83.33%) had vitamin D deficiency and 8(16.67%) had sufficient level of vitamin D. In my study, out of 52 male patients 49(94.23%) had vitamin D deficiency and 3(5.77%) had sufficient level of vitamin D. So, vitamin D deficiency is slightly higher in males than females.

Severity of Vitamin D Deficiency In Relation To Sex: In our study, out of 40 female patients with vitamin D deficiency 29(72.50%) had deficient level of vitamin D and 11(27.50%) had insufficient level of vitamin D. In my study, out of 49 male patients with vitamin D

deficiency 33(67.35%) had deficient level of vitamin D and 16(32.65%) had insufficient level of vitamin D. In my study, severity of vitamin d deficiency is almost same in females and males. So, severity of vitamin D deficiency is not related to sex.

Blood Pressure Wise Distribution of Patients of Hypertension: We have included 100 patients of systemic hypertension. Out of which, 14 (14%) patients had BP of 140/90 mm/hg in this study. So, majority of patients in this study had BP of =>140/90 mm/hg.

Level of Vitamin D in Patients with BP >=140/90 Mm/Hg: There were 86 patients had BP =>140/90 mm/hg. Out of which 60(69.77%) had deficient vitamin D level, 24(27.91%) patients had insufficient vitamin D level and 02(2.32%) patients had sufficient vitamin D level in this study. So, majority of patients of systemic hypertension with BP of =>140/90 mm/hg had deficient level of vitamin D.

Level of Vitamin D in Patients with BP: In our study, 14patients had BP<140/90 mm/hg. Out of which 2(14.29%) had deficient vitamin D level, 3(21.43%) patients had insufficient vitamin D level and 9(64.28%) patients had sufficient vitamin D level. So, majority of patients of systemic hypertension with BP of <140/90 mm/hg had sufficient level of vitamin D.

Vitamin D Deficiency In Relation To BP: In present study, out of 86 patients with BP of =>140/90mm/hg 84(97.67%) patients had vitamin D deficiency and 2(2.33%) patients had sufficient level of vitamin D. In my study, out of 14 patients with BP of 140/90mm/hg than patients with BP of <140/90mm/hg 5(35.71%) patients had vitamin D deficiency and 9(64.29%) patients had sufficient level of vitamin D. So, vitamin D deficiency is more in patients with BP of =>140/90mm/hg than patients with BP of => 140/90mm/hg than patients with BP of the patients.

Severity of Vitamin D Deficiency In Relation To BP: In our study, out of 84 patients with BP of >=140/90 mm/hg with vitamin D deficiency 60(71.43%) had deficient level of vitamin D and 24(28.57%) had insufficient level of vitamin D. In my study, out of 5patients with BP of =140/90 mm/hg. In my study, vitamin d deficiency is more severe in patients with BP of >=140/90 mm/hg. So, severity of vitamin D deficiency is related to BP of the patient.

Conclusion: The role of vitamin D deficiency in different disorders has not been well studied in India although hypovitaminosis D was detected to be a risk factor for development of hypertension in western population but there are no studies in such regard conducted in the Indian population.

Vitamin D levels are significantly low in patients with systemic hypertension. There is association between poor BP control and severity of vitamin D deficiency in patient of hypertension.

Patients with vitamin D deficiency are more prone to have poor BP control and high blood pressure. The majority of observational data suggest that lower levels of vitamin D may be associated with a higher blood pressure and a higher risk of developing hypertension.

Some observational and experimental data in humans, suggest that vitamin D and its metabolites are integrally related to blood pressure and the RAS. Thus, proper dietary intake of vitamin D has a low risk for developing hypertension.

Physical activity and sunlight exposure adequately are protective measure against systemic hypertension. So, patients with poor control of blood pressure should search for vitamin D deficiency.

References:

1. Holick MF (March 2006). "High prevalence of vitamin D inadequacy and implications for health". Mayo Clin. Proc. 81 (3): 353–73. doi:10.4065/81.3.353. PMID 16529140.
2. Calvo MS, Whiting SJ, Barton CN; Whiting; Barton (February 2005). "Vitamin D intake: a global perspective of current status". J. Nutr. 135 (2): 310–6. PMID 15671233.
3. Norman AW (August 2008). "From vitamin D to hormone D: fundamentals of the vitamin D endocrine system essential for good health". Am. J. Clin. Nutr. 88 (2): 491S–499S. PMID 18689389.
4. Wolf G (June 2004). "The discovery of vitamin D: the contribution of Adolf Windaus". J Nutr. 134 (6): 1299–302. PMID 15173387.
5. Pittas AG, Chung M, Trikalinos T, Mitri J, Brendel M, Patel K, Lichtenstein AH, Lau J, Balk EM; Chung; Trikalinos; Mitri; Brendel; Patel; Lichtenstein; Lau; Balk (Mar 2010). "Vitamin D and Cardio metabolic Outcomes: A Systematic Review". Annals of

Internal Medicine. 152 (5):307–14. doi:10.7326/0003-4819-152-520100302000009. PMC 3211092.PMID 20194237.
6. Chung M, Balk EM, Brendel M, Ip S, Lau J, Lee J, Lichtenstein A, Patel K, Raman G, Tatsioni A, Terasawa T, Trikalinos TA; Balk; Brendel; Ip; Lau; Lee; Lichtenstein; Patel; Raman; Tatsioni; Terasawa; Trikalinos (August 2009). "Vitamin D and calcium: a systematic review of health outcomes". Evidence report/technology assessment (183): 1–420. PMC 4781105. PMID 20629479.
7. Bolland MJ, Grey A, Gamble GD, Reid IR (January 2014). "The effect of vitamin D supplementation on skeletal, vascular, or cancer outcomes: a trial sequential meta- analysis". Lancet Diabetes Endocrinol (Meta-analysis). 2 (4): 307–20. doi:10.1016/S2213- 8587(13)70212-2. PMID 24703049.
8. Bischoff-Ferrari HA (2014). "Optimal serum 25-hydroxyvitamin D levels for multiple health outcomes". Advances in Experimental Medicine and Biology (Review).810: 500– 25. PMID 25207384
9. Harinarayan Vitamin D Status in India – Its Implications and Remedial Measures (2009) [cite http://www.japi.org/january_2009/R-1.html]a review of over 50 studies of 25(OH)D
10. Wang L, Song Y, Manson JE, Pilz S, März W, Michaëlsson K, Lundqvist A, Jassal SK, Barrett-Connor E, Zhang C, Eaton CB, May HT, Anderson JL, Sesso HD; Song; Manson; Pilz; März; Michaëlsson; Lundqvist; Jassal; Barrett-Connor; Zhang; Eaton; May; Anderson; Sesso (November 2012). "Circulating 25-hydroxy-vitamin D and risk of cardiovascular disease: a meta-analysis of prospective studies". Circ Cardiovasc Qual Outcomes. 5 (6): 819– 29. doi:10.1161/CIRCOUTCOMES.112.967604. PMC 3510675.PMID 23149428.
11. Holick MF (March 2004). "Vitamin D: importance in the prevention of cancers, type 1 diabetes, heart disease, and osteoporosis". The American Journal of Clinical Nutrition. 79 (3): 362–71. PMID 14985208.
12. Holick MF (2011). The Vitamin D Solution: A 3-Step Strategy to Cure Our Most Common Health Problems. New York: Plume. p. 27.ISBN 0-452-29688-9. C. Claiborne Ray (May 17, 2005). "Sunshine Vitamin D".The New York Times.Archived from the original on February 21, 2013. Retrieved March 8, 2013
13. 13.Ross AC, Taylor CL, Yaktine AL, Del Valle HB (2011). Dietary Reference Intakes for Calcium and Vitamin D. Washington, D.C: National Academies Press. ISBN 0-309-16394-3.

Conflict of interest: None

Funding: None

Cite this Article as: A Choudhary, V Dhangar, A Vakil, A Jain. To Study Role of Vitamin D in Patient of Systemic Hypertension. Natl J Integr Res Med 2018; 9(1):117-120