

Correlation between Essential Hypertension and Serum Vitamin D3 Levels.

Dr. Vishavdeep Jain¹ Dr. Deepak Mishra² Dr. Amrit Kejriwal³

¹Senior Resident ²Third year Resident ³Professor

^{1,2,3} Authors are affiliated in the Department of General Medicine at MGM MEDICAL COLLEGE AND HOSPITAL, KAMOTHE, NAVI MUMBAI

Corresponding Author: Dr Deepak Mishra.

MBBS, Third year Resident in the Department of General Medicine at MGM MEDICAL COLLEGE AND HOSPITAL, KAMOTHE, NAVI MUMBAI

Corresponding Author: Dr. Vishavdeep Jain

Abstract: High blood pressure, i.e., hypertension is very much prevalent worldwide. In the year 1990 around 2.3 million deaths were caused by cardiovascular diseases in India only and by the year 2020 it is projected that this number will go two times i.e. double this number. Vitamin D deficiency is also another prevailing across the world. Stats have shown that vitamin D insufficiency prevails among almost 50% of the total world's population which is a huge number.

Vitamin D deficiency and hypertension has a proven relationship which is proved across the world by many studies. The present study was carried out to study the correlation between the serum Vitamin D3 levels with essential hypertension. Total 100 patients suffering from essential hypertension above 30 years of age were selected for the study. The study concluded that there is a significant association between vitamin D3 level and hypertension.

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I. Introduction

Essential hypertension constitutes maximum cases of high blood pressure. Secondary hypertension is the other kind of hypertension which means that when the high blood pressure in the body has an identifiable cause, such as disease of kidneys.¹

High blood pressure, i.e., hypertension is very much prevalent worldwide. In the year 1990 around 2.3 million deaths were caused by cardiovascular diseases in India only and by the year 2020 it is projected that this number will go two times i.e. double this number. Statistics have also shown that in India Hypertension is very much responsible for many severe ailments which have resulted into death like 24% of all coronary heart disease deaths and 57% of all stroke deaths.²

Hypertension is a major risk factor for renal, Cerebrovascular and cardiovascular disease. It has been observed that the hypertension has become one of the significant problems in the world is Hypertension.

Vitamin D deficiency is also another prevailing across the world. Stats have shown that vitamin D insufficiency prevails among almost 50% of the total world's population which is a huge number. In last 10 years many studies have supported the fact that Vitamin D has some involvement in the pathogenesis of arterial hypertension. This concept has also been supported by many experiments.

Li Y.C.et. al. (2004)³ mentioned in their study that studies have suggested a correlation between Vitamin D-deficiency and high blood pressure. Ajabshir S., Asif A. & Nayer A. (2014)⁴ mentioned in their study that those individuals who have low levels of vitamin D in their body and are being treated for hypertension, such individuals should try to maintain sufficient level of vitamin D in their body as there is a connect between vitamin D deficiency and hypertension.

Vitamin D and Hypertension

Vitamin D deficiency and hypertension has a proven relationship which is proved across the world by many studies. Lot of studies were conducted afterwards in order to examine the effect of vitamin D supplements on high blood pressure patients but many of such studies have shown inconsistent results. Jeong H.Y. et. al. (2017)⁵ did review of old data both observational and experimental and concluded that the results of Randomized Controlled Trials and meta-analysis do not support the use of vitamin D supplementation in order to control the hypertension. However, there is a role of Vitamin D in controlling hypertension which is shown in many other studies like a recent study which was randomized and double blind placebo controlled study conducted by

Nasri et al. (2014)⁶ shows that there is decrease in level of hypertension in patients with diabetes with use of Vitamin D supplementation .

Objectives

- 1) To study the levels of serum Vitamin D in patients with essential hypertension.
- 2) To correlate the serum Vitamin D levels with essential hypertension.

II. Methods

Patients visiting Medicine outpatient and patients admitted in the Medicine wards of, MGM Institute of Health Sciences, NaviMumbai during the period of 1st January 2017 to 31st August 2018 were selected for study considering the inclusion and exclusion criteria.

Information was collected through a pre-tested and structured Proforma for each patient. Qualifying patients underwent through detailed history, clinical examination and laboratory investigations.

Inclusion Criteria:

1. Patients with Essential Hypertension.
2. Patients whose age is above 30 years are included.
3. Both sexes are included.

Exclusion Criteria:

1. Patients below 30 years.
2. Patients above 60 years of age.
3. Pregnancy.
4. Patients with acute diarrhoeal diseases.
5. Patients with clinical signs of secondary hypertension
6. Patients already on vitamin D supplementation

Investigations

Following set of investigations were conducted for the selected patients:

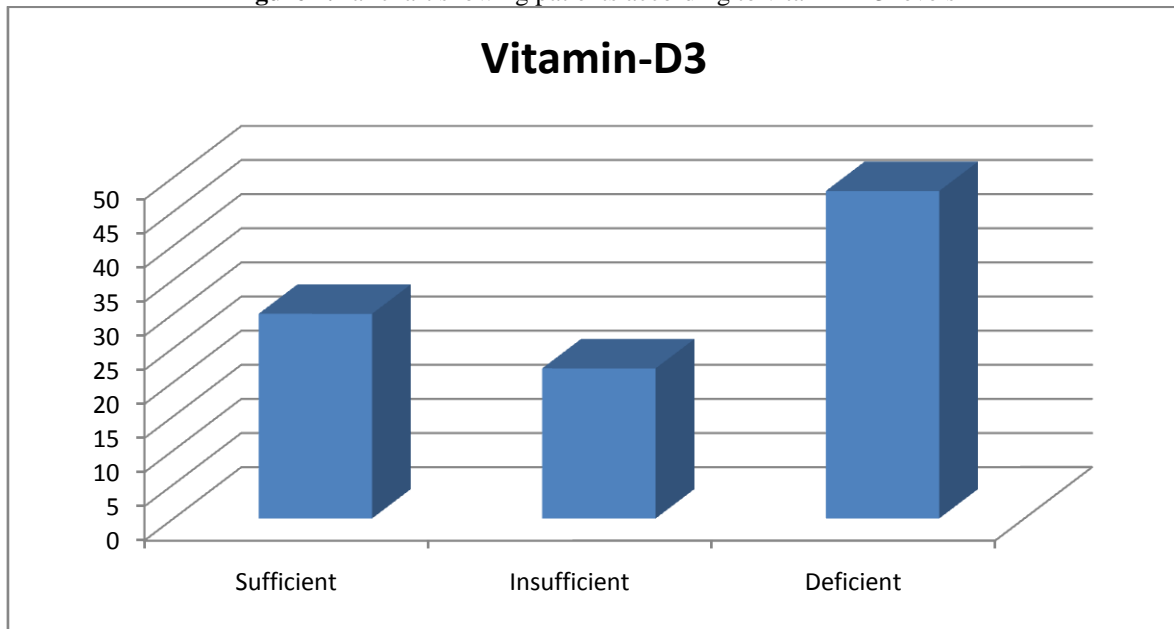
- Serum vitamin D
- Serum Urea,
- Serum Creatinine
- Total protein,
- Albumin,
- USG abdomen (if indicated).

**Statistical Analysis
Vitamin D3**

Table 1. Showing patients according to vitamin-D3 levels

	Count	Column N %
Sufficient	30	30.0%
Insufficient	22	22.0%
Deficient	48	48.0%

Figure 1. Bar chart showing patients according to vitamin-D3 levels



Duration of Hypertension:

Table 2. Showing no. of patients according to duration of disease:

	Count	Column N %
Less than 2 years	14	14.0%
2 to 7 years	49	49.0%
More than 7 years	37	37.0%

Figure 2. Showing no. of patients according to duration of disease

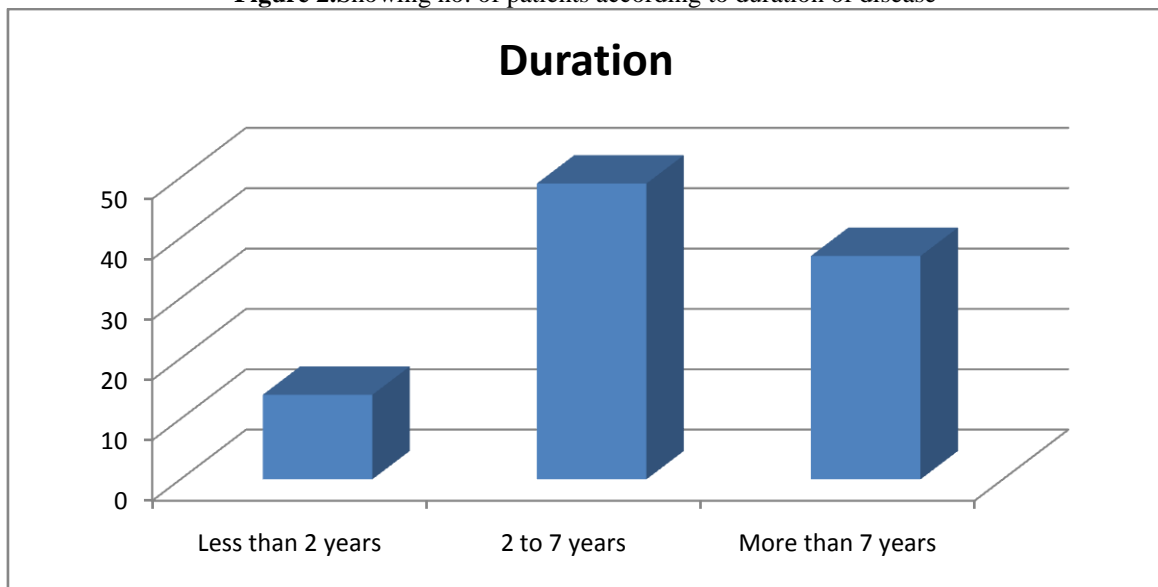


Table 3. Comparison of vitamin-D3 against Duration of Hypertension:

	Vitamin D3								
	Sufficient			Insufficient			Deficient		
	Count	% (Vit-D3)	% (Duration)	Count	% (Vit-D3)	% (Duration)	Count	% (Vit-D3)	% (Duration)
Less than 2 years	7	23%	50%	1	4.5%	7.10%	6	12.5%	42.9%
2 to 7 years	13	43.3%	26.5%	12	54.5%	24.5%	24	50.0%	49%
More than 7 years	10	33.3%	27.0%	9	40.9%	24.3%	18	37.5%	48.6%

Figure 3. Duration of hypertension in different Vitamin D3 levels

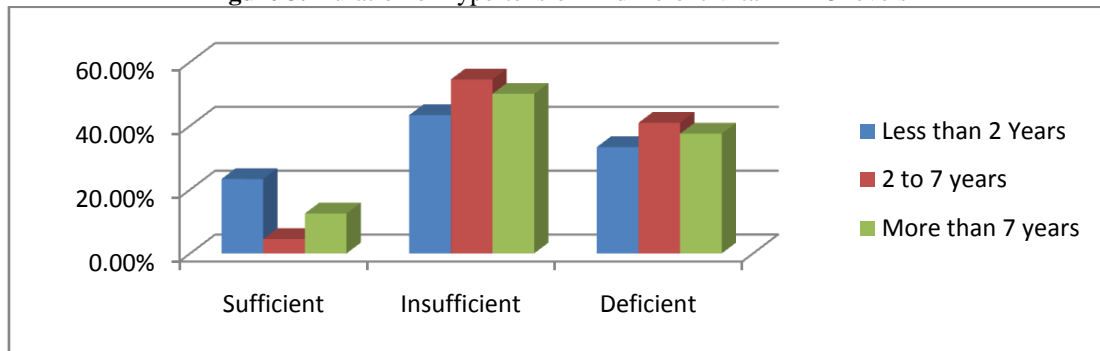


Figure 4 Vitamin-D3 Levels as per Duration of Hypertension

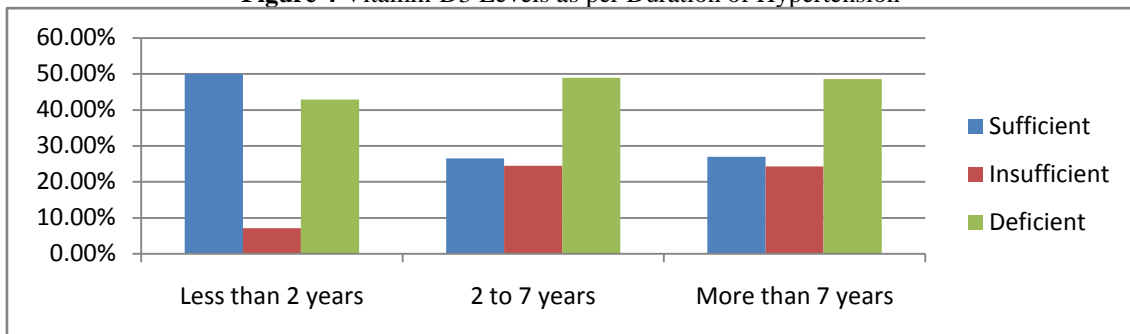


Table 4. Chi-Square test result:

	Value
Chi-square	3.896
Df	4
p-value	.420

Interpretation: Since p-value for the chi-square test is greater than that of 0.05 indicates no significance of association between duration and Vitamin-D3 Level.

Blood Pressure:

Table 5. Showing distribution of controlled and uncontrolled BP

	Count	Column N %
Controlled	92	92.0%
Uncontrolled	8	8.0%

Figure 5. Showing distribution of controlled and uncontrolled BP

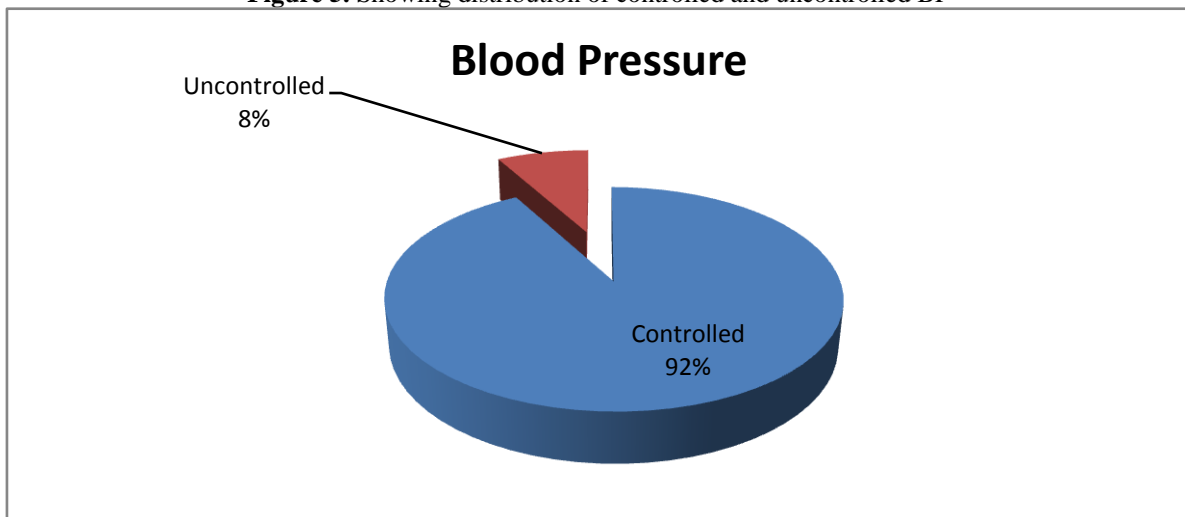
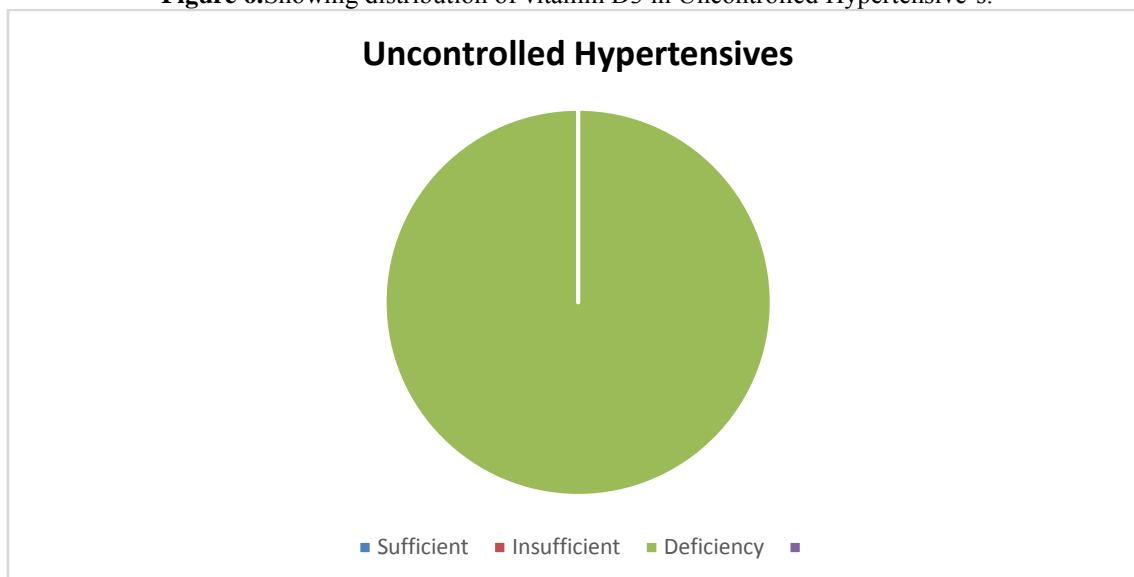


Table 6. Vitamin D3 Levels in Patients with Uncontrolled Hypertension:

	Count	Column N %
Sufficient	00	0%
Insufficient	00	0 %
Deficient	08	100 %

Figure 6. Showing distribution of vitamin D3 in Uncontrolled Hypertensive's:



III. Results and Discussion

The result of the analysis showed that out of total 100 patients selected for the study, 30 had sufficient Vitamin D3 level, 22 had insufficient Vitamin D3 level and 48 had Vitamin D3 deficiency. Analysis further revealed that according to the duration of disease 14 patients had hypertension less than 2 years, 49 were between 2 to 7 years group and 37 were in more than 7 years age group. Comparison of Vitamin D3 against duration of the disease showed that in sufficient Vitamin d3 group 23.3% patients had sufficient vitamin D3 level and the duration of the disease is less than 2 years. 43.3% patients had sufficient vitamin D3 level and the duration of the disease is 2 to 7 years. 33.3% patients had sufficient vitamin D3 level and the duration of the disease is more than 7 years. Similarly in insufficient group 4.5% patients had insufficient vitamin D3 level and the duration of the disease is less than 2 years. 54.5% patients had insufficient vitamin D3 level and the duration of the disease is 2 to 7 years and 40.9% patients had insufficient vitamin D3 level and the duration of the disease is more than 7 years. Also, in Vitamin D3 deficient population 12.5% patients had vitamin D3 deficiency and the duration of the disease is less than 2 years. 50% patients had vitamin D3 deficiency and the duration of the disease is 2 to 7 years and 37.5% patients had vitamin D3 deficiency and the duration of the disease is more than 7 years. Analysis revealed that there is no association between duration of disease and Vitamin D3 level. Analysis of the data showed that 92% of the patients had controlled blood pressure while 8% patients had uncontrolled blood pressure. Analysis revealed that all the patients with uncontrolled hypertension had vitamin D3 deficiency.

Various studies done in past points towards that vitamin D deficiency of longer duration has increased chances of hypertension and should be corrected promptly. Also, study conducted by **Jeong HY et. al. (2017)**⁷ concluded that till date the results of any trials do not support the use of vitamin D as an individual treatment for hypertension, but many other studies contradict this statement with their results and prompts us for more clinical trials.

IV. Conclusion

The present study also concluded that there is a significant association between vitamin D3 level and hypertension. Many studies in past both epidemiological and clinical studies have supported the correlation of vitamin D deficiency and insufficiency with hypertension. Hypertension as discussed is a host to number of disease and almost affects all body systems including cardiovascular, nervous and renal system.

References

- [1]. <https://www.healthline.com/health/essential-hypertension>
- [2]. <https://www.ncbi.nlm.nih.gov/pubmed/14730320>
- [3]. Li, Y. C. (2003). Vitamin D regulation of the renin–angiotensin system. *Journal of cellular biochemistry*, 88(2), 327-331.
- [4]. Ajabshir S, Asif A, Nayer A. The effects of vitamin D on the renin-angiotensin system. *Journal of nephropathology*. 2014;3(2):41.
- [5]. Jeong HY, Park KM, Lee MJ, Yang DH, Kim SH, Lee SY. Vitamin D and hypertension. *Electrolytes & Blood Pressure*. 2017 Sep 1;15(1):1-1.
- [6]. Nasri H, Rafieian-Kopaei M. Effect of vitamin D on insulin resistance and nephropathy in type 2 diabetes. *Journal of Research in Medical Sciences*. 2014 Jun 1;19(6).
- [7]. Jeong HY, Park KM, Lee MJ, Yang DH, Kim SH, Lee SY. Vitamin D and hypertension. *Electrolytes & Blood Pressure*. 2017 Sep 1;15(1):1-1.

Dr. Vishavdeep Jain. “Correlation between Essential Hypertension and Serum Vitamin D3 Levels.” *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 18, no. 12, 2019, pp 01-06.