



## AN OBSERVATIONAL STUDY FOR DETERMINATION OF LEVELS OF SERUM VITAMIN D IN HYPERTENSIVE AND NORMOTENSIVE PATIENTS AT SMS MEDICAL COLLEGE & HOSPITAL, JAIPUR (RAJASTHAN)

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### ABSTRACT

Hypertension or increase in blood pressure has been considered as one of the leading factors in causing worldwide disability. Vitamin D insufficiency might have a role in numerous diseases including autoimmune disease, cancer, diabetes mellitus, hypertension and heart diseases. Thus, the aim of our study is to determine levels of serum vitamin D in hypertensive and normotensive patients. 50 known cases of hypertension and 50 normal subjects within age group of 35-65 years who gave written consent were included in this study and also which satisfy the inclusion and exclusion criteria, routine and special investigations were performed. Mean value of serum vitamin D in hypertensive group was  $21.6 \pm 7.95$  (ng/mL) and controls was  $39.54 \pm 32.91$  (ng/mL). Mean SBP in hypertensive  $156 \pm 11.4$  (mm/Hg) and in controls  $107 \pm 8.2$  and the Mean value of DBP in hypertensive  $106.4 \pm 10.7$  (mm/Hg) and in controls  $72.1 \pm 4.4$  (mm/Hg). This study showed significantly ( $p$  value  $< 0.0001$ ) lower levels of serum vitamin D in hypertensive ( $21.6 \pm 7.95$  ng/ml) in comparison to normotensive patients ( $39.54 \pm 32.91$  ng/ml).

**KEYWORDS :** Hypertension, Vitamin D, SBP, DBP

### INTRODUCTION

One of the main causes of disability globally has been identified as hypertension, or an increase in blood pressure. (1) According to a recent research on the prevalence of hypertension worldwide, there were around 1 billion adults with hypertension in 2000; by 2025, it is expected that this number would have increased to 1.56 billion. There is a severe lack of knowledge about hypertension and its consequences in India. (2) Millions of people worldwide suffer from hypertension, which is the primary cause of disability and death and one of the major preventable risk factors for renal illness, cardiovascular disease, and cognitive dysfunction.

Many diseases, such as autoimmune disorders, cancer, diabetes mellitus, hypertension, and cardiac conditions, may be influenced by vitamin D deficiency. Determining the serum vitamin D levels in individuals with hypertension and those with normotension is the purpose of our study.

### AIM & OBJECTIVE

**AIM:** - Evaluate the levels of serum vitamin D among cases of hypertension and controls.

**OBJECTIVE:-** To estimate the value of serum vitamin D in case of hypertension and controls.

### METHODOLOGY

**Permission:** The institute's department of medicine, research review board, and ethical committee granted the necessary permissions.

**Study Design:** Comparative study centered at a hospital.

**Type of Study:** An observational study.

**Study location:** Jaipur's SMS Medical College and Hospital. Six months of study, from August 2023 to January 2024. 50 is the sample size. Fifty healthy controls and confirmed cases of hypertension were enrolled in the research.

The study's inclusion criteria were 50 documented cases of hypertension and 50 healthy participants who provided

written consent and were in the 35–65 age range.

The following patients are excluded:

1. Those who have secondary hypertension
2. Stroke, kidney disease, and cardiovascular complications.
3. A history of renal illness and several blood transfusions
4. Anemia with pregnancy

### Standard Inquiries:-

CBC and routine biochemistry: lipid profile, LFT, RFT, and blood sugar

**Particular Inquiry:-** Vitamin D levels in serum.

### Sample Collection And Processing:

Blood samples were collected in EDTA vials (for CBC) and plain vials (for Routine Biochemistry) from both the hypertension patients and the healthy controls. Lipemic and severely haemolysed samples were not accepted. Following a 30-minute clotting period, the plain vial samples were separated by centrifugation at 3500 rpm for 10 minutes. The serum was then analyzed on an automated ADVIA CENTAUR XP analyzer (which used the chemiluminescence immunoassay method to estimate vitamin D) and a fully automated Beckman Coulter AU5811 analyzer (which measured biochemistry parameters).

### Statistical Analysis:

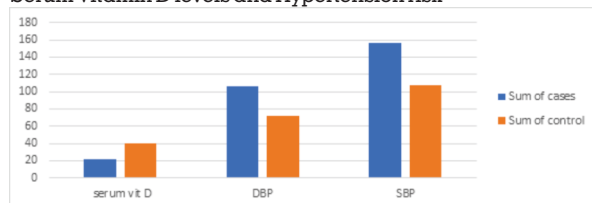
Tables and graphs were used to analyse the data. The information is displayed as Mean  $\pm$  SD. P values less than 0.05 are regarded as significant. The chi square test was used to assess the vitamin D levels between hypertension individuals and controls. Using Pearson's coefficient, the relationship between patients' SBP and DBP and vitamin D was examined.

### RESULTS

Serum vitamin D mean levels among cases and controls

	CASE	CONTOL	P VALUE
Serum vitamin D (ng/ml)	$21.6 \pm 7.95$	$39.54 \pm 32.91$	$< 0.0001$
SBP(mmHg)	$156 \pm 11.4$	$107 \pm 8.2$	$< 0.0001$
DBP(mmHg)	$106.4 \pm 10.7$	$72.1 \pm 4.4$	$< 0.0001$

## Serum Vitamin D levels and Hypertension risk



Serum vitamin D mean value in hypertension patients was  $21.6 \pm 7.95$  (ng/mL), while in controls it was  $39.54 \pm 32.91$  (ng/mL). The hypertensive's mean SBP was  $156 \pm 11.4$  (mm/Hg), while the controls' mean was  $107 \pm 8.2$ . The hypertensive's mean DBP was  $106.4 \pm 10.7$  (mm/Hg), while the controls' mean was  $72.1 \pm 4.4$  (mm/Hg).  $25(\text{OH})\text{D} < 20$  ng/mL is the threshold for vitamin D deficiency,  $20\text{--}30$  ng/mL for insufficiency, and  $\geq 30$  ng/mL for sufficiency.

## DISCUSSION

In India, vitamin D deficiency is about to become a serious public health issue. The Indian population has a high frequency of vitamin D insufficiency, ranging from 50 to 90%. When compared to healthy controls, the serum vitamin D level in hypertension patients was considerably lower.

Our study's findings are in line with those of Padalkar RK et al.'s [4] investigation into the relationship between serum vitamin D levels and hypertension. In their investigation into the relationship between blood vitamin D levels and hypertension, Kar A and Datta S8 found that the mean ages of hypertensive patients and controls were, respectively, 53.24 and 46.75 years.

Patients in the hypertension group and the control group have mean serum Vitamin D levels of 20.97 ng/mL and 38.70 ng/mL, respectively. The hypertension group's mean serum vitamin D level is noticeably lower than that of the control group. Our study's findings are consistent with research by Padalkar RK et al., [4], Kar A and Datta, Vatakencherry RJ and Saraswathy L,[5], which found that the hypertension group had lower vitamin D levels. Vitamin D is important for factors that control high blood pressure, such as endothelial cell function, vascular smooth muscle cell proliferation, function, control the renin-angiotensin-aldosterone pathway, and regulate blood pressure by reducing renin activity through elevated intracellular calcium.[5] Studies have indicated that vitamin D insufficiency is widely prevalent in India.[6,7] Skin pigmentation, modern lifestyles with little sun exposure, vegetarian diets, and cultural customs could all be contributing factors to this high incidence in our society. When the skin is exposed to UV radiation from the sun, vitamin D is created. It was thought up until recently that Indians possessed adequate levels of vitamin D. The majority of Indians are now vitamin D deficient since we are forced to work more indoor jobs and receive less sun exposure. Lack of sunshine inhibits the body's ability to produce vitamin D, which raises blood pressure.

## CONCLUSION

The results of this study indicated that individuals with hypertension had considerably ( $p$  value  $< 0.0001$ ) lower serum vitamin D levels ( $21.6 \pm 7.95$  ng/ml) than patients with normotension ( $39.54 \pm 32.91$  ng/ml). Therefore, it may be concluded that there may be a connection between serum vitamin D deficiency and hypertension. As a result, measuring vitamin D levels and taking supplements may be helpful in improving hypertension treatment.

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