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A Study On Vitamin D Levels And Lipid Profiles In Patients With Newly Diagnosed Essential Hypertension – A Hospital-Based Cross-Sectional Descriptive Study.

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ABSTRACT

Many people who are newly diagnosed with high blood pressure may also have low vitamin D and abnormal fat levels in their blood, without even knowing it. This study was done in a government medical college to see if there is any link between vitamin D status and lipid levels among patients who have just been confirmed as hypertensive. Fifty patients aged 18 to 65 years who were not taking any medicine before were included, and their blood samples were tested for vitamin D and lipid profile during their first OPD visit. Out of these 50 cases, only 30% had normal vitamin D levels. Most of them had low HDL and slightly high triglycerides. Those with lower vitamin D levels showed higher weight, BMI, and worse lipid values. Some small variations were seen in gender and occupation groups, but were not statistically important. People with indoor jobs had slightly more deficiencies than outdoor workers. Analysis showed a mild to moderate correlation between low vitamin D and an atherogenic pattern. Overall, the results suggest that vitamin D deficiency may be common in early hypertension and might go unnoticed if not tested. Simple screening in the first visit and correcting the deficiency may improve both pressure control and fat levels, if started early. More studies with bigger numbers are needed, but for now, it shows a possible, easy way to reduce future complications.

Keywords: Vitamin D, Essential Hypertension, Dyslipidaemia, LDL, HDL, Triglycerides

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INTRODUCTION

High blood pressure is slowly becoming more common in many Indian households, even among people who didn't have any known risk before. It is said that around one-third of adults in India are already hypertensive, and most of them are unaware until some complication occurs, like a stroke or heart attack [1]. Along with this, there is also another silent problem—abnormal fat levels in the blood. Cholesterol and triglyceride issues are being seen more and more, even in people who appear healthy. Together, both hypertension and dyslipidaemia are now being treated as twin threats to cardiovascular health [2]. At the same time, one very basic vitamin that comes from sunlight—vitamin D—is found to be low in many Indians despite living in a sunny country. Studies have started showing that low vitamin D may not only affect bones but also play some role in controlling blood pressure and fat levels [3, 4]. It is believed that vitamin D affects hormones like renin, and also has a calming effect on blood vessels and inflammatory markers [5]. When this vitamin is low, there may be changes in lipid metabolism too, like high triglycerides and low HDL levels, which are both risky for the heart [6]. Unfortunately, this connection is still not clearly understood in Indian patients who are newly diagnosed with hypertension. In many cases, they are not screened for vitamin D deficiency or lipid abnormalities unless symptoms appear. But if this link is confirmed, it can open up a very low-cost, easy-to-implement way to manage early cardiovascular risks. Correcting vitamin D, which is cheap and widely available, may help control both blood pressure and lipids without needing to wait for complications [7]. So, this study was planned in a district hospital setting to see how common vitamin D deficiency is among newly diagnosed essential hypertensives, and whether it has any relation with their lipid profile. Many of these patients come early, some don't have any major symptoms yet, and it is this window of early detection that we wanted to focus on.

MATERIALS AND METHODS

Study Design

This was a cross-sectional observational study conducted at the Department of General Medicine, Government Medical College and Hospital, Cuddalore District, Annamalai Nagar, Chidambaram, Tamil Nadu, India. The study duration was from November 2017 to August 2018.

Study Setting

The hospital is a tertiary care government centre serving a mixed urban and rural population. All assessments were conducted in the outpatient general medicine block.

Participants

Fifty adult patients aged 18–65 years, newly diagnosed with essential hypertension, were enrolled. All were drug-naïve and attending their first or second outpatient visit.

Eligibility Criteria

Inclusion Criteria: Newly diagnosed essential hypertension, aged 18–65 years, not on any antihypertensive, lipid-lowering, or vitamin D/calcium therapy.

Exclusion Criteria: Prior history of hypertension, diabetes, thyroid, renal, hepatic, TB, or malignancy. Use of corticosteroids, vitamin D, statins, or pregnancy.

Sample Grouping

Patients were divided based on serum 25(OH) vitamin D levels:

- Normal: >29 ng/mL
- Insufficient: 20–29 ng/mL
- Deficient: <20 ng/mL

Data Collection

Height, weight, waist, and hip circumference were measured. BMI and WHR were calculated. Blood pressure was recorded using a mercury sphygmomanometer after rest. Fasting blood samples were analysed for 25(OH)D and lipid profile (TC, HDL, LDL, TG).

Statistical Analysis

GraphPad Prism v5 was used. Means, SDs, and percentages were computed. ANOVA, t-tests, Pearson's correlations, and Fisher's exact tests were applied. $p < 0.05$ was taken as significant.

Ethical Approval

Approved by the Institutional Ethics Committee. Written informed consent was obtained. No extra cost was imposed on participants.

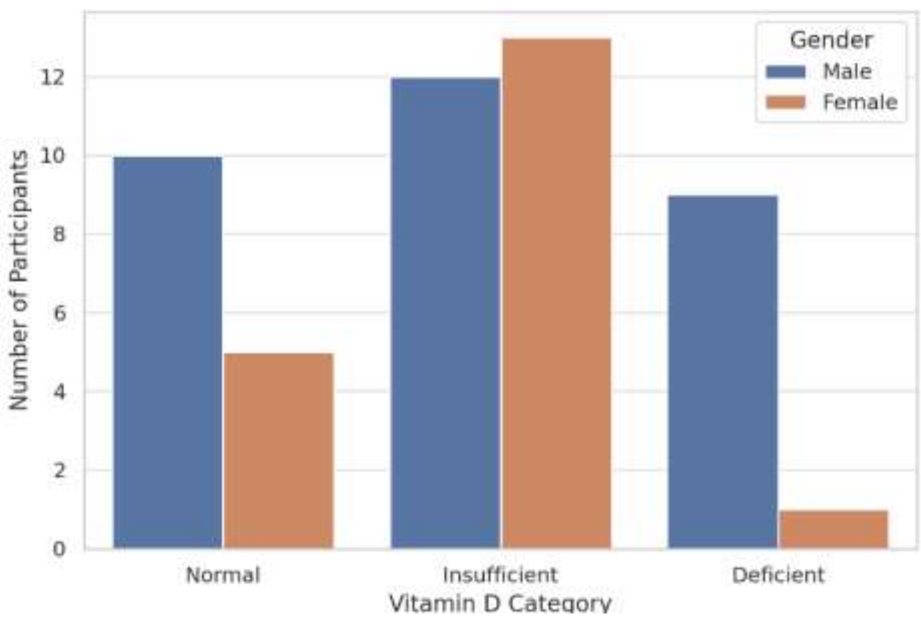
OBSERVATIONS AND RESULTS

Table 1: Participant Demographics, BMI, and Occupation

Category	Value
Male	31 (62%)
Female	19 (38%)
Mean Age (years)	50.2 ± 8.2
Mean BMI (kg/m^2)	24.7 ± 4.4
Waist-Hip Ratio	0.965 ± 0.05
Outdoor Occupation	30 (60%)
Indoor Occupation	20 (40%)

This table summarises demographic and anthropometric features of the study population, including occupation type and gender split.

Figure 1: Gender-wise Distribution of Vitamin D Status



Males had a higher proportion of deficiency and insufficiency compared to females, who showed relatively better vitamin D status.

Vitamin D and Lipid Profile Trends

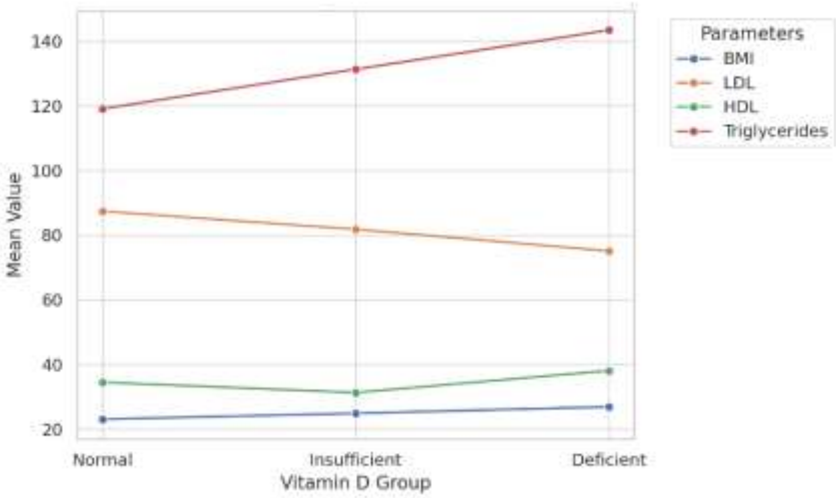
Serum vitamin D status showed marked differences in metabolic profile across the three groups. Patients with deficient vitamin D levels had the highest BMI and triglyceride values.

Table 2: BMI and Lipid Profile Across Vitamin D Categories

Vitamin D Group	BMI	LDL	HDL	Triglycerides
Normal	23.07	87.4	34.5	119.1
Insufficient	24.9	81.8	31.3	131.3
Deficient	26.9	75.1	38.1	143.4

BMI and triglycerides progressively increased with decreasing vitamin D levels, while LDL and HDL showed less consistent patterns.

Figure 2: Trends of BMI and Lipid Profile Across Vitamin D Groups



Line graph showing increasing BMI and triglycerides in patients with declining vitamin D; HDL and LDL trends appear less linear.

Correlation with Metabolic Parameters

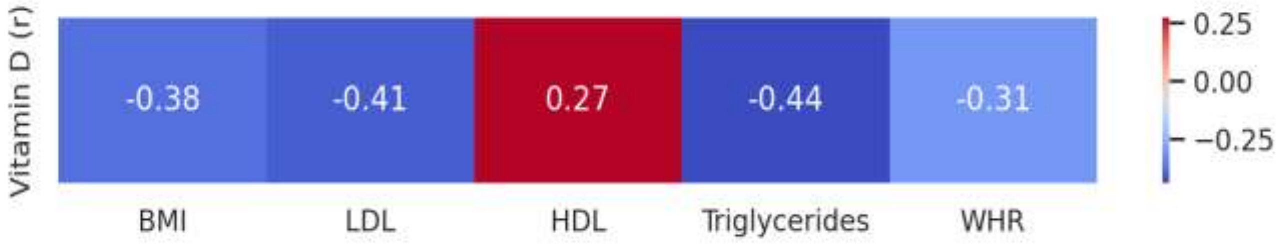
Pearson's correlation analysis revealed that serum vitamin D was inversely associated with BMI, LDL, triglycerides, and waist-hip ratio, and mildly positively associated with HDL.

Table 3: Correlation Between Vitamin D and Metabolic Parameters

Parameter	Correlation with Vitamin D ®	p-value
BMI	-0.38	0.007
LDL	-0.41	0.003
HDL	+0.27	0.059
Triglycerides	-0.44	0.001
Waist-Hip Ratio	-0.31	0.021

Negative correlations were statistically significant for all parameters except HDL, which showed only a weak positive association.

Figure 3: Correlation of Vitamin D with Metabolic Parameters



Heatmap visualising inverse correlation of vitamin D with metabolic markers such as BMI, LDL, WHR, and triglycerides.

DISCUSSION

The findings from this study suggest a significant link between suboptimal vitamin D levels and altered lipid metabolism among newly diagnosed hypertensive patients. Most participants had either insufficient or deficient vitamin D, which aligned with national trends reported in India, where 70–90% of the population shows varying degrees of hypovitaminosis D [8].In our study, individuals with deficient vitamin D had the highest BMI and triglyceride levels (Table 2, Figure 2), reinforcing the hypothesis that vitamin D may play a role in adiposity and lipid balance. Prior investigations have suggested that low vitamin D might be associated with increased parathyroid hormone levels and lipogenesis, which could partly explain this observation [9]. The inverse correlation found between vitamin D and LDL, BMI, and triglycerides (Table 3, Figure 3) was consistent with studies conducted by Vacek et al. and Sadiya et al., which demonstrated similar trends in both hypertensive and diabetic cohorts [10,11]. Although HDL showed a weak positive association with vitamin D, this did not reach statistical significance, aligning with other Indian studies that noted HDL is often affected by multiple confounders, including diet, physical activity, and hormonal factors [12]. Gender-wise comparison (Figure 1) showed that males were more likely to be deficient or insufficient in vitamin D. This trend has been reported previously in South Asian studies, attributed partly to occupational differences and lower healthcare-seeking behaviour among men [13]. In contrast, females in our study, despite having lower sun exposure due to indoor lifestyles, showed slightly better vitamin D status, possibly due to increased antenatal supplementation awareness or health checkups. A noteworthy strength of the study was the use of a drug-naïve hypertensive population. This removed confounding influence from medications like statins or antihypertensives, which are known to independently impact lipid and vitamin D metabolism [14]. The strict exclusion of diabetics and those with chronic diseases further narrowed the cohort and allowed clearer associations. However, the study has limitations. The cross-sectional design prevents us from inferring causality. Seasonal variation in vitamin D levels, dietary habits, and unmeasured lifestyle factors could also affect the findings. Despite this, the correlations remain clinically relevant and support the need for early vitamin D screening in hypertensives. Emerging literature has already proposed vitamin D supplementation as an adjunct to standard hypertension and dyslipidaemia therapy [15]. Though interventional studies have shown mixed outcomes, populations with severe deficiency may benefit the most. A meta-analysis by Barbarawi et al. showed modest BP reductions with vitamin D repletion only among deficient individuals [16].

In summary, the present study adds to growing Indian evidence that vitamin D deficiency may not just be a skeletal concern but has broader cardiovascular implications. Routine screening, lifestyle modification, and cost-effective supplementation may provide a simple way to mitigate early metabolic derangements in hypertension.

CONCLUSION

Most newly diagnosed hypertensive patients in this study had low vitamin D levels, along with abnormal body fat and lipid values. These findings suggest that vitamin D deficiency may start early and silently impact cardiovascular health. Testing vitamin D at the first visit could offer a low-cost chance to reduce future risks, especially in public healthcare settings.

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