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Serum 25(Oh) Vitamin D Inadequacy in Hypertensives and Its Influence on Lipidprofile

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Abstract: Introduction*:Highprevalence of vitamin D insufficiency is a particularly important public health. Hypovitaminosis D is associated with atherosclerosis, obesity, Insulin resistance, diabetes mellitus, hypertension, myocardial infarction, and stroke.****Material & Methods****: A total of 100 patients participated in the study in the age range of 15-85 years. Out of 100 patients, 50 patients had normal vitamin D levels whereas 50 patients had reduced levels of vitamin D. In both the test group and control group, the serum total cholesterol levels and triglycerides levels were compared.****Results****: The mean ± S.D of vitamin D in test group is15.89 ± 5.72 compared to the mean ± S.D in control group is 21.39 ± 4.77. The decreased vitamin D in test group is highly significant (P <0.001). Lipid parameters such as Triglycerides, LDL and VLDL were significantly higher in test group. Correlation between vitamin D and other parameters found that systolic BP, Diastolic BP, Triglycerides and VLDL had negative correlation with vitamin D levels. Whereas total cholesterol, HDL, LDL had positive correlation with statistically significance.* ***Conclusions****: In our study serum 25(OH) VITAMIN D levels aresignificantly decreased in patients with hypertension and its stronglycorrelate with lipid parameters.*
Keywords*: vitamin D, hypertension, lipid profile, association*

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I. Introduction

Vitamin D [1, 25 (OH)2 D] is fat soluble steroid hormone influences many physiological processes besides calcium /phosphate homeostasis, including muscle and keratinocyte differentiation, insulin secretion, blood pressure regulation and the immune response[1,2]. Vitamin D may be involved in the regulation of blood pressure and the pathogenesis of hypertension through its effects on calcium homeostasis, vascular smooth muscle cells and endothelial cells and activity of renin angiotensin system[3,4]. Since both hypertension and vitamin D deficiency are highly prevalent worldwide, our study was undertaken to assess the level of 25 (OH) D in patients with hypertension, to understand the role of vitamin D in the regulation of blood pressure.

Vitamin D insufficiency affects almost 50% of the population worldwide. An estimated 1 billion people worldwide, across all ethnicities and age groups, have a vitamin D deficiency (VDD). This pandemic of hypovitaminosis D can mainly be attributed to lifestyle (for example, reduced outdoor activities) and environmental (for example, air pollution) factors that reduce exposure to sunlight, which is required for ultraviolet-B (UV-B)- induced vitamin D production in the skin.

Highprevalence of vitamin D insufficiency is a particularly important public health issue because hypovitaminosis D is an independent risk factor for total mortality in the general population. Current studies suggest that we may need more vitamin D than presently recommended to prevent chronic disease [5] . In the recent years it has been found that hypovitaminosis D is associated with atherosclerosis, obesity, Insulin resistance, diabetes mellitus, hypertension, myocardial infarction, and stroke.

Objectives of the present study were to assess the level of vitamin D in hypertensive patients and to find the association between vitamin D and lipid parameters

II. Materials And Methods

The study was conducted in the Department of Biochemistry, Guntur Medical College, GUNTUR. A total of 100 patients participated in the study in the age range of 15-85 years irrespective of their sex. Serum obtained from 5 ml of blood drawn from the ante-cubital vein under aseptic conditions from each individual with his/her consent, duly following the guidelines and norms of the hospital, was taken for the estimation of serum total cholesterol levels and triglycerides levels and the vitamin D levels.

Out of 100 patients, 50 patients had normal vitamin D levels whereas 50 patients had reduced levels of vitamin D. In both the groups the serum total cholesterol levels and triglycerides levels were compared.

Test Group
Inclusion criteria:
Hypertensives and normotensives of age groups(15 to 85 years) belonging to both sexes.
Exclusion criteria:
Patients with history ofOsteomalacia, Rickets, Diabetes mellitus, Coronary artery disease, Chronic renal disease
CONTROL GROUP: 50 normal individuals both male and female of age between 15 to 85 years, with normal waist circumference (male:<94cm,female:<80cm), without hypertension and diabetes or any other clinical abnormality.
For both control and test groups following data is recorded.
1. Physical Parameters: Waist Circumference (WC)&Body mass index (BMI)
2.Biochemical parameters
Blood samples were collected, 10-12 hours of fasting state fromboth control and test groups for the analysis of following parameters: Vitamin D&Lipid Profile (Triglycerides, Total Cholesterol and HDLCholesterol)

Statistical Analysis
SPSS V22 software was used for statistical analysis. Microsoft Excel (windows-7) was used for data entry and graphs. The data are presented as mean ± SD correlation analysis was done by using Pearson's correlation coefficient analysis. Continuous variables were compared using student ttest.variance between multiple groups was done using one way ANOVA.Pvalue <0.05 was considered statistically significant

III. Results

The present study was carried out on 100 patients with 50 hypertensive patients and 50 apparently healthy persons.

The mean ± S.D of vitamin D in test group is15.89 ± 5.72 compared to the mean ± S.D in control group is 21.39 ± 4.77. The decreased vitamin D in test group is highly significant (P <0.001).

Table 1: Levels of Vitamin D in test group and control group

	Test group	**Control group**	**p value**
Vitamin D	15.89 ± 5.72	21.39 ± 4.77	<0.001

The mean + S.D of systolic BP in test group was 142.2 + 12.00 compared to the mean + S.D. in control group is 118.4 + 5.09.The mean + S.D. of diastolic BP in test group was 80.2 + 11.33 compared to the mean + S.D. of control group is 74.6 +7.61.

Table 2: Lipid parameters in both the groups

Lipid parameter	**Test group**	**Control group**	**p value**
Total cholesterol	144.7±16.82	146.2± 29.91	>0.05
Triglycerides	226.18 ± 37.13	150.92 ± 52.06	p < 0.001
HDL	28.38 +6.18	35.38 ± 8.99	p < 0.001
LDL	70.2± 14.82	80.2 ± 26.38	p<0.05
VLDL	45.16 ± 7.42	29.83 ± 10.41	p<0.001

The mean ± S.D of Total Cholesterol in test group was144.7±16.82 compared to the mean ± S.D of control groupis146.2± 29.91.
The mean ± S.D of triglycerides in test group was 226.18 ± 37.13 compared to the mean ± S.D of control group is 150.92 ± 52.06. The increase in triglycerides in test group is highly significant (p < 0.001).
The mean ± S.D of HDL cholesterol in test group was 28.38 +6.18 compared to the results of HDL in control group is 35.38 ± 8.99. The decrease in HDL Cholesterol in test group is highly significant (p<0.001).
The mean ± S.D of LDL cholesterol (LDL-C) in test group was70.2± 14.82 compared to the mean ± S.D of control group LDL is 80.2 ± 26.38.The decrease in LDL cholesterol (LDL-C) in test group is statistically significant (p<0.05).
The mean ± S.D of VLDL cholesterol in test group was 45.16 ± 7.42 compared to the mean ± S.D of control group VLDL is 29.83 ± 10.41.The increase in VLDL cholesterol in test group is statistically highly significant (p<0.001).
Correlation of Vitamin D with other parameters by Pearson's correlation coefficient(r- value).

Table3: Correlation of Vitamin D with other parameters

Parameter	p-value	r value
Vitamin D with Systolic BP	<0.001	-0.41
Vitamin D with Diastolic BP	<0.001	-0.10
Vitamin D with TC	<0.001	0.07
Vitamin D with TG	<0.001	-0.27
Vitamin D with HDL	<0.001	0.21
Vitamin D with LDL	<0.001	0.17
Vitamin D with VLDL	<0.001	-0.27

Correlation between vitamin D and other parameters found that systolic BP, Diastolic BP, Triglycerides and VLDL had negative correlation with vitamin D levels. Whereas total cholesterol, HDL, LDL had positive correlation with statistically significance.

IV. Discussion

In our study serum 25(OH) VITAMIN D levels aresignificantly decreased in patients with hypertension and its stronglycorrelate with lipid parameters.

The mean ± S.D of Total Cholesterol in test group was144.7±16.82 compared to the mean ± S.D of control group is 146.2 ±29.91.The decrease in Total Cholesterol in test group is ($p>0.05$). It wasobserved that the mean levels of serum total cholesterol andtriglycerides were higher in patients who have lower levels of vitamin Das compared to subjects with normal vitamin D levels. Similar resultswere reported by various authors in their studies [6,7,8]. Wang et al alsoshowed that raised levels of vitamin D were related with favorable lipidprofile, whereas lower levels of vitamin D were related with atherogeniclipid profile. Gaddipati et al[9] also suggested that serum vitamin D levelswere negatively correlated with total cholesterol, triglycerides and LDL-Cand positively correlated with HDL-C in Americans [10]. This rise incholesterol and triglycerides level in vitamin D deficient patientssuggests its influence on lipid profile.

The serum levels of LDL-C would be reduced by thedecreased absorption of fat [11] . The higher concentrations of 25(OH) Dsuppress serum PTH levels which in turn results in lowering oftriglyceride levels [12]. There is strong evidence that low levels of vitaminD may be associated with impaired functioning of β-cells of pancreasand insulin resistance which could affect metabolism of lipoproteinthereby leading to raised triglyceride level and reduced HDL-C level [13].

In addition, vitamin D may directly affect lipid regulation as it is related tothe metabolism of lipids e.g. synthesis of bile acid in the liver [14].

The mean ± S.D of HDL cholesterol in test group was28.38 +6.18 compared to the results of HDL in control group is 35.38 ±8.99. The decrease in HDL Cholesterol in test group is significant($p<0.001$). Serum HDL-C levels showed a significant decreased inhypertensives compared to controls.A decrease in HDL cholesterol canresult in endothelial damage and trigger on increasing in BP.HDL alsoexhibit potent anti-inflammatory and anti-oxidant effects that inhibitatherogenic process[15].

According to Pavithran et al alteration in lipidmetabolism including a decreased in HDL can result in endothelialdamage and trigger on increase in BP which may partially account for itsstrong predictive power for CHD(coronary heart disease).it has longbeen known that a low level of HDL cholesterol is a powerful predictorof increased cardiovascular risk[16].

V. Conclusion

In our study serum 25(OH) VITAMIN D levels aresignificantly decreased in patients with hypertension and its stronglycorrelate with lipid parameters. Since, vitamin D inhibits RAAS, itsdeficiency might have an important role in the development ofhypertension, which could be proved by further population basedprospective study once the causal role of vitamin D is established itcould create a mile stone in the management of hypertension, which ispublic health challenge, all over the world.

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