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ORIGINAL RESEARCH

The Study of the Correlation of Vitamin D Levels and Angiographic Severity of Coronary Artery Disease in Patients with Acute Coronary Syndrome

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ABSTRACT

Background: There has been increasing evidence from animal and human studies to suggest that Vitamin D deficiency may be an important risk factor in the pathogenesis of CAD. Given the gravity of the problem posed by CAD, it is imperative to conduct an extensive research to determine the novel risk factors which can be potential therapeutic targets for the treatment and prevention of the disease. **Aims of the Study:** To the study of Correlation Of Vitamin D Levels And Angiographic Severity of Coronary Artery Disease in patients presenting with acute coronary syndrome to ICCU,KIMS, Hubballi.

Methods: 114 patients presenting with acute coronary syndrome admitted in Karnataka Institute Of Medical Sciences, Hubballi Hospital were included. Patients having renal, hepatic, parathyroid disease, osteomalacia and patients taking drugs interfering with Vitamin D (Vit-D) metabolism were excluded. After detailed history and thorough clinical examination, routine investigations and 25- (OH) D level was estimated. Subsequently patients underwent CAG. . Data was analysed using software version SPSS 22. p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Results: In the present study among subjects with Vitamin D deficiency, 5% had normal Coronaries, 0% had SVD, 15% had DVD and 80% had TVD. Among subjects with Vitamin D insufficiency, 8.3% had normal Coronaries, 8.3% had SVD, 77.8% had DVD and 5.6% had TVD. Among subjects with normal Vitamin D levels, 25.9% had normal Coronaries, 58.6% had SVD, 15.5% had DVD and 0% had TVD. There was significant association between Vitamin D levels and CAD.

Conclusion: We conclude from this study presence of significant association of VDD with severe CAD. DVD and TVD by CAG were common with low Vit-D levels.

Keywords: Acute Coronary Syndrome, Angiographic severity, Vitamin D

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CAD: Coronary Artery Disease, **ACS:** Acute Coronary Syndrome, **CAG:** Coronary Angiography, **DVD:** Double Vessel Disease, **SVD:** Single Vessel Disease, **TVD:** Triple Vessel Disease, **VDD:** Vitamin D Deficiency

INTRODUCTION

Coronary artery disease (CAD) has emerged as a major cause of death worldwide and is one of the major life-threatening diseases. Compared to high-income countries, CAD affects people at younger ages in low- and middle- income countries such as India, thereby having a greater economic effect on low- and middle- income countries. CAD presents clinically in a consistent manner in the form of stable angina marked by a mismatch in the demand and supply of myocardium oxygen; however, much of the mortality caused by the condition is responsible for the drastic and unexpected presentation in the form of acute coronary syndrome. In addition, common risk factors such as tobacco, diet, physical inactivity, dyslipidemia, obesity, hypertension, and diabetes mellitus are also known for CAD.[1] Evidence from animal and human studies has been rising to indicate that vitamin D deficiency can be a significant risk factor in CAD pathogenesis. Given the nature of the problem posed by CAD, it is important to undertake comprehensive research to identify new risk factors that may be potential therapeutic targets.

Aims and Objectives

1. To evaluate the clinical course of ACS patient's admitted to ICCU KIMS Hubbali Karnataka.
2. To Correlate Vitamin D levels and Coronary Angiography findings.

MATERIALS AND METHODS

Study Design

Centre and period of study: The study carried out between January 2019 to June 2020 in the ICCU, Department of Cardiology, Karnataka Institute of Medical Sciences; Hubballi. Karnataka.

Type of Study

This is a Prospective Observational study

Sample Size

The study included 114 patients admitted to ICCU KIMS Hubli who diagnosed as Acute Coronary Syndrome and met inclusion and exclusion criteria.

Inclusion Criteria

Patients with clinical manifestations, ECG and enzymatic changes suggestive of STEMI, Unstable angina and NSTEMI.

Exclusion Criteria

- The presence of neoplastic disease,
- Heart failure,
- Recent major surgical procedure,
- Evidence of hypercalcemia and
- Systemic inflammatory conditions, such as infection, liver, or kidney disease.
- The patients on Vitamin D And Calcium supplements.

RESULT

In this study of 114 patients with 84 male and 30 female in a M:F ratio of 2.8:1 the mean age of patients was 56.6. Among 114 subjects 75 were smokers, 53 had diabetes 39 had hypertension and 19 had family history of CAD.

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Upon Vitamin D level estimation among 114 subjects 20(17.5%) had Vitamin D deficiency (<20 ng/ml), 36(31.6%) had Vitamin D insufficiency (21 to 30 ng/ml) and 56(50.9%) had normal Vitamin D (>30 ng/ml).(Table1)

Table 1: Vitamin D levels classifications among subjects

		Count	%
Vitamin D	<20 ng/ml	20	17.5%
	21 to 30 ng/ml	36	31.6%
	>30 ng/ml	58	50.9%
	Total	114	100.0%

In the study among subjects with Vitamin D deficiency, majority were in the age group 61 to 70 years (65%), among subjects with Vitamin D insufficiency, majority were in the age group 61 to 70 years (38.9%) and among subjects with normal Vitamin D levels, majority were in the age group 41 to 50 years (37.9%). There was significant association between age and Vitamin D deficiency. (Table2)

Table 2: Association between Age and Vitamin D levels among subjects

		Vitamin D							
		<20 ng/ml		21 to 30 ng/ml		>30 ng/ml		Total	
		Count	%	Count	%	Count	%	Count	%
Age	<40 years	0	0.0%	3	8.3%	1	1.7%	4	3.5%
	41 to 50 years	6	30.0%	5	13.9%	22	37.9%	33	28.9%
	51 to 60 years	1	5.0%	10	27.8%	18	31.0%	29	25.4%
	61 to 70 years	13	65.0%	14	38.9%	12	20.7%	39	34.2%
	>70 years	0	0.0%	4	11.1%	5	8.6%	9	7.9%
	Total	20	100.0%	36	100.0%	58	100.0%	114	100.0%

In the study on ECG among subjects with Vitamin D deficiency, 10% had NSTEMI, 85% had STEMI and 5% had UA. Among subjects with Vitamin D insufficiency, 25% had NSTEMI, 66.7% had STEMI and 8.3% had UA. Among subjects with Normal Vitamin D, 6.9% had NSTEMI, 89.7% had STEMI and 3.4% had UA. There was no significant association between ECG findings and Vitamin D levels.(Table 3).

Table 3: Association between ECG findings and Vitamin D levels among subjects

		Vitamin D							
		<20 ng/ml		21 to 30 ng/ml		>30 ng/ml		Total	
		Count	%	Count	%	Count	%	Count	%
ECG	NSTEMI	2	10.0%	9	25.0%	4	6.9%	15	13.2%
	STEMI	17	85.0%	24	66.7%	52	89.7%	93	81.6%
	UA	1	5.0%	3	8.3%	2	3.4%	6	5.3%
	Total	20	100.0%	36	100.0%	58	100.0%	114	100.0%

In the study among subjects with Vitamin D deficiency, 5% had normal Coronaries, 0% had SVD, 15% had DVD and 80% had TVD. Among subjects with Vitamin D insufficiency, 8.3%

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had normal Coronaries, 8.3% had SVD, 77.8% had DVD and 5.6% had TVD. Among subjects with normal Vitamin D levels, 25.9% had normal Coronaries, 58.6% had SVD, 15.5% had DVD and 0% had TVD. There was significant association between Vitamin D levels and CAD.(Table 4).

Table 4: Association between CAD findings and Vitamin D levels among subjects

		Vitamin D							
		<20 ng/ml		21 to 30 ng/ml		>30 ng/ml		Total	
		Count	%	Count	%	Count	%	Count	%
CAD	Normal Coronaries	1	5.0%	3	8.3%	15	25.9%	19	16.7%
	SVD	0	0.0%	3	8.3%	34	58.6%	37	32.5%
	DVD	3	15.0%	28	77.8%	9	15.5%	40	35.1%
	TVD	16	80.0%	2	5.6%	0	0.0%	18	15.8%

DISCUSSION

In our study, a single center, prospective observational study, the primary objective was to study the levels of plasma 25-hydroxy-vitamin D in patients of coronary artery disease in various subsets including myocardial infarction (ST-Segment Myocardial Infarction (STEMI), Non-ST Segment Myocardial Infarction (NSTEMI)), Unstable Angina (UA)) with angiographic severity in coronary artery disease patients using Vessel Score. Mean age of the study subjects was 56.6. Mean age among Vitamin D deficiency subjects was 58.35 ± 8.51 years, among Vitamin D insufficient subjects was 57.33 ± 11.81 years and among Normal Vitamin D subjects was 55.59 ± 9.37 years. These findings were comparible with study of Syal SK et al[2] and S. K., Tripathy et al[3]

In our study of 114 patients with 84 male and 30 female in a M:F ratio of 2.8:1 the mean age of patients was 56.62. In the study 20 had Vitamin D deficiency, 36 had Vitamin D insufficiency, with normal levels in 56 patients. The gender distribution in our study was similar to studies conducted by Ashraf et al3[80] and Salla SP et al4[81]

Diabetes and smoking was the major risk factors in our study. This observation was similar to the observations in the study of S. K., Tripathy et al[3]. However Ashraf et al[4], Salla SP et al[5] observed Hypertension to be the major risk factor in their study.

Table 5: Comparison of Risk Factors in Similar Studies

Study	Ashraf et al [80]	Salla SP et al[81]	S. K., Tripathy et al[82]	Present study
Sample size	112	100	100	114
Hypertension	61	84	39	54
Diabetes	61	58	53	64
Family History	45	34	19	2
Smoking	66	38	38	75

In the present study among subjects with Vitamin D deficiency, 5% had normal Coronaries, 0% had SVD, 15% had DVD and 80% had TVD. Among subjects with Vitamin D insufficiency, 8.3% had normal Coronaries, 8.3% had SVD, 77.8% had DVD and 5.6% had TVD. Among subjects with normal Vitamin D levels, 25.9% had normal Coronaries, 58.6% had SVD, 15.5%

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had DVD and 0% had TVD. There was significant association between Vitamin D levels and CAD. These observation are similar to S. K., Tripathy et al[3]

Syal SK et al[2] in their study found out that there was vitamin D deficiency, 53% of CAD of double-vessel disease, 38% in CAD of triple vessel.

Akin F et al[6] in their study revealed the 83% of the study population had the vitamin D levels less than 30 ng/mL, which remained as a significant predictor for the severity of the CAD similar to our study where 48.1% had lower than 30ng/ml.

CONCLUSION

In patients with CAD, the evaluation of vitamin D levels has not been recognized as an integral part of the clinical work-up of patients or persons at risk of CAD. The inverse association of vitamin D levels with CAD and different cardiovascular risk factors has been demonstrated in a large number of recent studies. In our research, we also found that VDD was associated with extreme CAD, as evidenced by greater multi-vessel disease presence. To establish role of VDD in CAD more number of studies involving a large number of patients are required.

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