Original Article

Vitamin D Deficiency in Patients with First Episode of Acute Coronary Syndrome

Vit. deficiency in Coronacy Syndrome

Faisal Ahmed, Imran Sandeelo, Rubina Khan, Nouman Kakepoto, Gul Naz Mureed and Mehfooz Ali

ABSTRACT

Objective: To determine the frequency of Vitamin D deficiency in acute coronary syndrome patients.

Study Design: Cross Sectional Study.

Place and Duration of Study: This study was conducted at the Department of Cardiology ward or Coronary care unit (CCU) at Liaquat National Hospital and Medical College, Karachi from October 2018 and April 2019.

Materials and Methods: This single center, non probability consecutive, cross sectional study was conducted from 6th October 2018 and 5th April 2019. A total of 159 patients presented first time with acute coronary syndrome were incorporated in this research. A thorough examination and detailed history of all the systems, especially examination of cardiovascular system and abdomen was done. 5 cc bloods was taken from the prominent peripheral vein and collected. Blood sample was shifted to the laboratory within 30 minutes from the time of withdrawn for the measurement of 25 Hydroxyvitamin D level. Pre-designed proforma was used to collect and document data.

Results: There were 109(68.55%) male and 50(31.45%) female. Frequency of deficiency of vitamin D in patients with first episode of acute coronary syndrome (ACS) was observed in 74.21% (118/159).

Conclusion: There were 109(68.55%) male and 50(31.45%) female. Frequency of deficiency of vitamin D in patients with first episode of acute coronary syndrome (ACS) was observed in 74.21% (118/159).

Key Words: Acute coronary syndrome, cardiovascular disease, Vitamin D deficiency

INTRODUCTION

Around the world, cardiovascular disease (CVD) is the most highlighted reason for mortality, causing more than 17 million deaths per year [1]. Coronary Heart Disease (CHD) is one of the most common causes of preventable death and ranks second and third in male and female over 15 years of age respectively in terms of disease burden as judged by Disability-Adjusted Life Years lost [2]. There is a remarkable rise in CHD burden in low-income and middle-income countries.[3]

Countries of south Asia i.e. Pakistan, India, Bangladesh, Nepal, Sri Lanka are counted to have one fourth of the world`s population. It also contribute in the greatest proportion of load of cardiovascular disease in the comparison of any other region around the globe[3].

Department of Cardiology,Liaquat National Hospital & Medical College, Karachi.

Correspondence: Dr. Faisal Ahmed Liaquat National Hospital, Karachi
Contact No: 0333 2608071
Email: imran_sandeelo@hotmail.com

Coronary artery disease, leading to acute coronary syndrome (ACS), accounts for about half of the total deaths total around the world associated with cardiovascular disease (CVD) [4]. Suspected acute coronary syndrome (ACS) is indicated from the data of developed countries, it is often taken as chest pain, which is counted to be the common diagnosis on being admitted into the Emergency Departments (ED) [5]. Patients` identification who were at increased risk of death or re-hospitalization within the duration of a year of being admitted to the emergency department (ED) having acute coronary syndrome (ACS) (i.e. ST elevation myocardial infarction`s diagnosis, non-ST elevation myocardial infarction, or unstable angina (UA), by which ongoing therapy could be helped to be guided [6].

Timely Identification and management of modifiable risk factors reduces the morbidity and mortality [7].

An association of vitamin D and cardiovascular disease has been supported by epidemiological research through the body of evidence [8]. It has been reported for vitamin D deficiency to be associated with considerable increases in the occurrence of factors related to cardiovascular risk i.e. hyperlipidaemia, myocardial infarction, stroke and hypertension, chronic kidney disease and diabetes of type 1 and type 2 as well [9]. Deficiency of vitamin D is health issue around the globe with the commonness of 70%-100% in population generally [10].

Aim of my study is to determine the frequency of Vitamin D deficiency in acute coronary syndrome patients. As above mentioned studies show variation in result. Results of my study will provide current magnitude of Vitamin D deficiency in patients with acute coronary syndrome. After completion of this study, exact magnitude of Vitamin D Deficiency in patients with ACS was gained and recommendations was made for screening of vitamin D in all patients presenting with ACS. So that strategies could be device to prevent morbidities and mortalities by treating vitamin D deficiency at an earlier stage in patients with ACS.

MATERIALS AND METHODS

This single center, non probability consecutive, cross sectional study was conducted from 6th October 2018 and 5th April. Study population in the inclusion criteria was either gender with age of >25 years and <70 years, who were presented first time with acute coronary syndrome, admitted in the cardiology ward or coronary care unit (CCU) at Liaquat National Hospital and Medical College, Karachi. A detailed history and thorough examination of all the systems, especially examination of cardiovascular system and abdomen was done in the ward or CCU before sending the levels of vitamin D to exclude the presence of co-morbid diseases. Patients meeting the inclusion criteria was enrolled in the study. The purpose and procedure of the study was explained and an informed consent was taken from the patients included in this study before sending sample for vitamin D levels. 5 cc blood was taken from the prominent peripheral vein and collected in the red top bottle. Blood sample was shifted to the laboratory within 30 minutes from the time of withdrawn for the measurement of 25 Hydroxy vitamin D level. Report was collected within due time. Pre-designed proforma was used to collect and document data.

Statistical analysis: A statistical package for social science (SPSS-22) was used to analyze data. Frequency and percentage was computed for gender, Occupation, Unstable Angina, Non STEMI, STEMI, sun exposure time at least 30 minutes daily (Yes/No) and Vitamin D Deficiency. Mean and standard deviation was estimated for age, BMI and vitamin D level. Stratification was done to control effect modifies like age, sex, BMI, sun exposure time, occupation, Unstable Angina, Non STEMI, STEMI to observed an outcome. Post stratification chi-square test was applied. $p \leq 0.05$ was considered significant.

RESULTS

A total of 159 patients presented first time with acute coronary syndrome were included in this study. Most of the patients were above 40 years of age as shown in figure 1. The average age, weight, height, BMI and vitamin D level is presented in table 1.
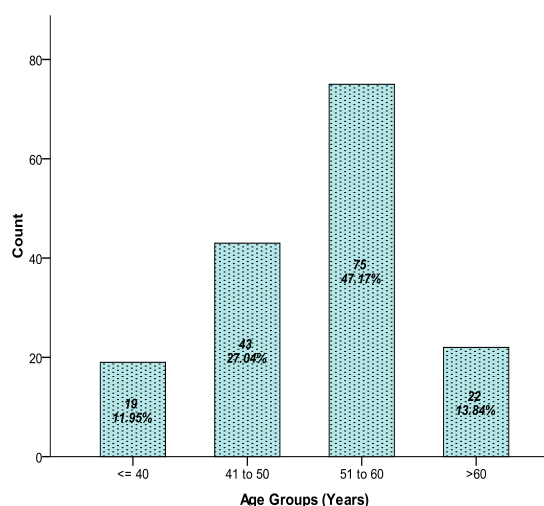

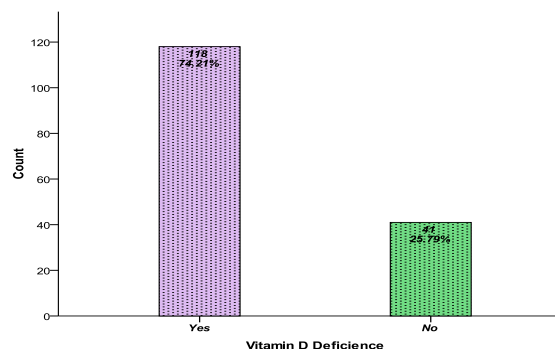**Figure No.1: Age Distribution Of The Patients N=159**

Figure No.2: Frequency Of Vitamin D Deficiency in Patients With First Episode Of Acute Coronary Syndrome N=159

Table No. 1: Descriptive statistics of the patients n=159

Statistics		Age (Years)	Weight (kg)	Height (cm)	BMI (kg/m²)	Vitamin D3 Level
Mean		51.19	154.21	67.62	28.36	21.63
Std. Deviation		9.16	5.54	12.50	4.68	9.953
95% Confidence Interval for Mean	Lower Bound	49.76	153.34	65.67	27.63	20.07
	Upper Bound	52.63	155.08	69.58	29.10	23.19
Median		53.00	152.4	68	28.30	17.
Inter quartile Range		10	9	15	6.21	8

There were 109(68.55%) male and 50(31.45%) female (Table-2). There are different type of occupation like doctor, bankers, teacher, data analyst, computer engineer, engineers, retired govt. job and other so we convert variable into categories employees and not employee. It was observed that 71.07% of the patients were employed as shown in Table-2. Smoking habit was observed in 52(32.7%) cases (Table-2).

Table No. 2: Frequency Distribution 0f Gender, Occupation, Smoking, Hypertension, Diabetes Mellitus, Sun Exposure Time, Unstable Angina, St Elevation Myocardial Infarction, Non St Elevation Myocardial Infarction)   (n=159)

Gender	Frequency (n=159)	Percentage (%)	
Male	109	68.55%	
Female	50	31.45%	
Total	159	100%	
Occupation			
Employee	113	71.07%	
Non-employee	46	28.93%	
Total	159	100%	
Other factors	Yes	No	Total
Smoking	52(32.70%)	107(87.30%)	159(100%)
Hypertension	49(30.82%)	110(69.18%)	159(100%)
Diabetes mellitus	80(50.31%)	79(49.69%)	159(100%)
Sun exposure time at least 30 minutes daily	23(14.47%)	136(85.53%)	159(100%)
Unstable angina	87(54.72%)	72(45.28%)	159(100%)
ST elevation myocardial infarction	34(21.38%)	125(78.62%)	159(100%)
Non ST elevation myocardial infarction	38(23.90%)	121(76.10%)	159(100%)

Table No. 3: Frequency Of Vitamin D Deficiency In Patients With First Episode Of Acute Coronary Syndrome Stratified By Age, Gender, Bmi, Occupation and Sun Exposure Time

Variables	Vitamin D Deficiency		Total	P-Value
	Yes	No		
Age Groups (Years)				0.15
≤ 40 Years	11(57.9%)	8(42.1%)	19	
41 to 50 Years	34(79.1%)	9(20.9%)	43	
51 to 60 Years	59(78.7%)	16(21.3%)	75	
>60 Years	14(63.6%)	8(36.4%)	22	
Gender				0.12
Male	77(70.6%)	32(29.4%)	109	
Female	41(82%)	9(18%)	50	
Body mass Index				0.45
≤25 kg/m^2	39(72.2%)	15(27.8%)	54	
25 to 30 kg/m^2	41(70.7%)	17(29.3%)	58	
>30 kg/m^2	38(80.9%)	9(19.1%)	47	
Occupation				0.09
Employee	88(77.9%)	25(22.1%)	113	
Not Employee	30(65.2%)	16(34.8%)	46	
Sun Exposure time at least 30 min daily				0.0005
Yes	1(4.3%)	22(95.7%)	23	
No	117(86%)	19(14%)	136	

Chi-square test applied for each variables

Hypertension and diabetic mellitus was observed in 69.18% and 49.69% cases as shown in Table-2. Regarding acute coronary syndrome unstable angina was observed in 54.72% patients, non-ST elevated myocardial infarction 23.9% and ST elevated myocardial infarction 21.38% cases as shown in table-2. There were 23(14.47%) patients who had sun exposure time at least 30 minutes daily as shown in Table-2. Frequency of vitamin D deficiency in patients with first episode of acute coronary syndrome was observed in 74.21% (118/159) patients as shown in figure-2. Rate of vitamin D deficiency was not significant with respect to age groups, gender, BMI, occupation while it was significantly high in those patients who had no exposure to sum at least 30 minutes daily (p=0.0005) as shown in Table 3.

Table No. 4: Frequency Of Vitamin D Deficiency In Patients With First Episode Of Acute Coronary Syndrome Stratified By Other Factors

Variables	Vitamin D Deficiency		Total	P-Value
	Yes	No		
Smoker	37(71.2%)	15(28.8%)	52	0.53
Hypertension	77(70%)	33(30%)	110	0.069
Diabetic Mellitus	68(86.1%)	11(13.9%)	79	0.001
Acute Coronary Syndrome				
Unstable Angina	59(67.8%)	28(32.2%)	87	0.043
Non-SETMI	29(76.3%)	9(23.7%)	38	0.730
STEMI	30(88.2%)	4(11.8%)	34	0.035

Chi-square test applied for each variables

Similarly rate of vitamin D deficiency was also significantly high in diabetic patients and those patients who had unstable angina and STEMI as shown in Table 4.

DISCUSSION

Deficiency of vitamin D is quite commonly occurring around the globe [11]. 25-hydroxyvitamin D`s (25-OH D) low level, vitamin D`s main circulating storage form, is present in 1/3 to 1/2 of healthy middle-aged to elderly adults.[12] The cross-sectional association of lower vitamin D level and plasma renin activity has been reported by the clinical studies [13], blood pressure (BP),[14] coronary artery calcification (CAC),[15] and commonly occurring cardiovascular disease.[16] Furthermore, increased rates hypertension and coronary heart disease (CHD) has been reported by ecological investigations with the cumulative distance from the equator, IT has been indicated by the phenomenon which has been endorsed that greater commonness of deficiency of vitamin D is found in the regions which are less exposure to sunlight.[17].

Acute coronary syndrome (ACS) was presented in 159 patients for the first time and those patients were involved in this investigation. Patients were of the age of above 40 years mostly (41%). The commonness of acute coronary syndrome (ACS) has been reported to be increased with age in both males and females. The lifetime risk of developing CHD in the persons with the age of 40 years was computed to be 49% in males and it was 32% in females. The people with the age of 70

years, the lifetime risk was computed to be 35% in males and 24% in females [18]. 68.55% of the total respondents were males in the study and rest of 31.45% were females.

Cigarette smoking is the only most changing risk factor responsible for cardiovascular mortality and morbidity. It has been estimated that 30% of all deaths because of coronary heart can be due to cigarette smoking [19]. The influence of smoking of cigarette as coronary heart disease`s (CHD) risk factor was shown in the first Euroaspire research, a registration and and management survey of the main cardiovascular risk factors in comparatively young people (with the age of less than 70 years) hospital survivors of an acute coronary event (ACE) or first coronary interference which was found in 4800 patients of heart, greater than 85% patients having the age of less than 50 years were reported to be the past or present cigarette smokers. [20] In our study smoking habit was observed in 32.7% cases of acute coronary syndrome.

In our study it was observed that 71.07% of the patients were employed which is establishing the association of work stress and CAS in the context of underlying behavioural and biological mechanisms, and indicating the specificity of this relationship in the populations of working age. An essential case-control study (INTERHEART) comprised of 11,119 patients with a first myocardial infarction (MI) and with 13,648 age and gender-matched controls in the countries equal to 52; it was indicated by research that 'permanent' stress at work was in correlation with the magnitude of more than twice the odds of myocardial infraction (MI) in the comparison of those people who were facing no stress at work [21]. In this research, frequency of deficiency of vitamin D in patients having first episode of acute coronary syndrome (ACS) was seen in 74.21 percent of patients. In the same way, high deficiency of vitamin D was confirmed in patients (98%) having coronary syndrome by Luis et al in 2013[22]. It was stated by Satish K, et al in 2014,[23] that from the patients enrolled in the study, 67.5% of them were having the deficiency of 25- hydroxyl-vitamin D, and 16% of them were insufficient, 83.5% of them were with unusually low 25-vitamin D level. In the same way, it was reported by Mahdavi K et al [24] that 72% of patients with acute coronary syndrome to had serum 25-hydroxyvitamin D level of 20 ng/ml or less. In another investigation, 92% of the patients were having suboptimal levels of 25(OH) D, the percentage of severely deficient was 22.2% and it was reported that optimal 25(OH)D levels significantly lowered all cause and mortality related to cardiovascular disease in patients having metabolic syndrome [25].

CONCLUSION

Results indicated the substantial relationship of deficiency of Vitamin D in patients having acute coronary syndrome (ACS). Increasing evidence is there that vitamin D deficiency may be an essential and previously neglected factor in cardiovascular disease`s pathogenesis. Deficiency of vitamin D is associated with a broad spectrum of cardiovascular disease and the related risk factors. Moreover, it is related with greater mortality and morbidity. A role may be played by the supplementation of vitamin D in the reduction of cardiovascular disease`s morbidity and mortality.**.**

Author's Contribution:

Concept & Design of Study:	Faisal Ahmed
Drafting:	Imran Sandeelo
	Rubina Khan
Data Analysis:	Nouman Kakepoto,
	Gul Naz Mureed
	Mehfooz Ali
Revisiting Critically:	Faisal Ahmed,Imran
	Sandeelo
Final Approval of version:	Faisal Ahmed

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