# Efficacy of Gensini Score in Assessing the Severity of Coronary Artery Disease

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## Abstract

**Background:** The present study was conducted to assess the efficacy of the Gensini score in the severity of CAD. **Subjects & Methods:** 100 hospitalized patients presenting as myocardial infarction (MI) (STEMI and NSTEMI), CAD without MI (CSA and UA) were recruited for the study. Plasma 25-OH Vit D level was measured by using the electrochemiluminesent immunoassay (ECLIA) method. Gensini score was recorded which was based on the percentage of luminal narrowing (25%: 1 point; 50%: 2 points; 75%: 4 points; 90%: 8 points; 99%: 16 points, and total occlusion: 32 points). **Results:** Severe vitamin D deficiency < 20ng/ml is seen in a total of 17 patients, out of which 9 patients were having SVD, 8 patients were having DVD, none of the patients having TVD and Normal Coronaries. Gensini score is calculated in all patients undergoing CAG. Mean Gensini score for DVD 34.75, for SVD 16. The mean vitamin D levels are correlated with the severity of coronary disease using the Gensini score. There is a trend towards increasing severity of coronary artery disease with decreasing levels of vitamin D levels with an odd ratio of 2.233. **Conclusion:** Authors found that Gensini score is useful in assessing severity of Coronary artery disease.

**Keywords:** Coronary artery disease, Gensini score, Vitamin D

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## Introduction

Coronary artery disease (CAD) and its complication, myocardial infarction arising from atherosclerosis, are the most common life-threatening cardiovascular disorders.[1] Vascular endothelial dysfunction, increased inflammatory cytokine release, immune cell infiltrates, and subsequent stimulation of vascular smooth muscle cell proliferation are the pathophysiological basis of atherosclerosis. The inflammatory signals are classically considered to originate from blood-borne immune cells.[2] However, accumulated data from the past decade indicate that pathogenic inflammatory adipokines from epicardial adipose tissue (EAT) contribute to the development and progression of CAD.[3] Vitamin D exerts anti-inflammatory activity and has a cardiovascular protective function in addition to its regulation of calcium and phosphorus metabolism. Vitamin D is synthesized in the skin by ultraviolet light exposure or from diet and hydroxylated in the liver to generate 25-hydroxyvitamin D, the plasma vitamin D marker.[4] Recent human studies have shown that vitamin D deficiency is an independent risk factor associated with CAD.[5] However, whether vitamin D deficiency directly causes the progression of CAD or vice versa remains unclear. It is possible that patients with progressive CAD reduce outdoor activity or vitamin D intake caused by low appetite, leading to vitamin D deficiency. It has been shown that vitamin D signaling inhibits NF-$\kappa$B activation in many kinds of cells including adipocytes.[6] The present study was conducted to assess the efficacy of the Gensini score in the severity of CAD.

## Subjects and Methods

An observational, both retrospective & prospective, case-control study was performed on a total of 100 hospitalized patients at the Department of Cardiology, Narayana Medical College and Hospital. Inclusion criteria were patients presenting as myocardial infarction (MI) (STEMI and NSTEMI), CAD without MI (CSA and UA), Negative angiographic findings that comprise the control group. Exclusion criteria were patients with renal failure, hepatic failure, and pregnancy, patients on vitamin D supplementation, Osteoporosis and patients not willing to participate. Consent for the study

was obtained from all patients after obtaining ethical clearance. A detailed history regarding symptoms and signs of the patients was recorded. A thorough physical examination including height, weight, body surface area, body mass index and required biochemical tests like renal function tests, Liver function tests were done. 2 ml of a blood sample for 25- OH Vit D was collected by venipuncture into tubes. Plasma 25-OH Vit D level was measured by using the electrochemiluminesent immunoassay (ECLIA) method. Gensini score was recorded which was based on the percentage of luminal narrowing (25%: 1 point; 50%: 2 points; 75%: 4 points; 90%: 8 points; 99%: 16 points, and total occlusion: 32 points). Each coronary lesion score was calculated using the percentage of luminal narrowing multiplied by the coefficient of the coronary segment: the left main coronary artery (LMCA) x5; the proximal segment of the left anterior descending coronary artery (LAD) x 2.5; the proximal segment of the circumflex artery (CX) x 2.5; the mid-segment of the LAD x 1.5; the distal segment of the LAD, all segments of the right coronary artery (RCA) and the obtuse marginal artery x 1; and other segments x 0.5. The Gensini score was calculated by summation of individual coronary segment scores. Results were statistically analyzed. P-value less than 0.05 were considered significant.

## Results

**Table 1: Distribution of Patients**

| Age group (Years) | Number | P-value |
|---|---|---|
| 25-30 | 2 | 0.15 |
| 31-40 | 10 | |
| 41-50 | 20 | |
| 51-60 | 30 | |
| 61-70 | 24 | |
| 71-80 | 14 | |

[Table 1] shows that age group 25-30 years had 2, 31-40 years had 10, 41-50 years had 20, 51-60 years had 30, 61-70 years had 24 and 71-80 years had 14 patients. The difference was non-significant (P> 0.05).

**Table 2: Presenting Complaint**

| Complaint | Number | P-value |
|---|---|---|
| Chest pain | 94 | 0.01 |
| SOB | 31 | |
| Palpitation | 14 | |

[Table 2] shows that chest pain was present in 94, SOB in 31 and palpitation in 14 patients.

[Table 3], graph I shows that severe vitamin D deficiency < 20ng/ml is seen in a total of 17 patients, out of which

**Table 3: Clinical Characteristics**

| Characteristics | Normal | SVD | DVD | TVD |
|---|---|---|---|---|
| No. of patients | 4 | 48 | 34 | 14 |
| No. of patients with Vit-D level < 20 | 0 | 9 | 8 | 0 |
| Mean Gensini Score | 0 | 16 | 34.75 | 0 |

9 patients were having SVD, 8 patients were having DVD, none of the patients having TVD and Normal Coronaries. The Gensini score is calculated in all patients undergoing CAG. Mean Gensini score for DVD 34.75, for SVD 16.
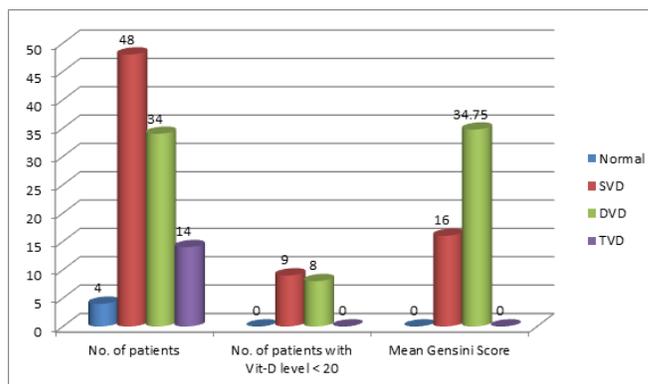


**Figure 1: The graph I Clinical characteristics**

**Table 4: Vitamin D and Gensini S core**

| LV systolic function | Vit D level | Genuine Score |
|---|---|---|
| Normal | 26.6 | 18.67 |
| Mild LV dysfunction | 26.94 | 22.16 |
| Moderate LV dysfunction | 31.74 | 37 |
| Severe LV dysfunction | 33.56 | 47 |

[Table 4] shows that mean vitamin D levels are correlated with the severity of coronary disease using the Gensini score. There is a trend towards increasing severity of coronary artery disease with decreasing levels of vitamin D levels with an odd ratio of 2.233, with CI (1.149 – 4.341), with Z value of -3.297 and p-value obtained statistically significant 0.017.

## Discussion

Clinical studies have generally demonstrated an independent association between vitamin D deficiency and various manifestations of degenerative cardiovascular disease including

vascular calcification.[7] However, the clinical profile & the role of vitamin D in the management of cardiovascular disease & coronary angiographic correlation remains to be established.[8] In NHANES III, there was a U-shaped relationship between vitamin D and mortality risk, with an apparent increase in mortality, particularly in women, with 25(OH) D levels >50 ng/L.[9] In the Framingham Offspring Study, there was a nonlinear relationship between baseline vitamin D status and the adjusted hazard ratio for incident cardiovascular events.[10] The present study was conducted to assess the efficacy of the Gensini score in the severity of CAD. In the present study, age group 25-30 years had 2, 31-40 years had 10, 41-50 years had 20, 51-60years had 30, 61-70 years had 24 and 71-80 years had 14 patients. Common features were chest pain present in 94, SOB in 31 and palpitation in 14 patients. Avci et al,[11] evaluated the association between the extent of coronary artery disease assessed by the Gensini score and/or the SYNTAX score and the significant carotid stenosis in patients undergoing coronary artery bypass grafting (CABG). A total of 225 patients who had carotid doppler ultrasonography prior to CABG were included retrospectively. Significant coronary artery disease was assumed as a lumen diameter stenosis of ≥50% in any of the major epicardial coronary arteries. The severity of carotid stenosis was determined by B-mode and duplex ultrasonography. Clinically significant carotid stenosis was defined as peak systolic velocity greater than 125 cm/s. The mean value of the SYNTAX score and Gensini score was highest in patients allocated to significant carotid stenosis. The other risk factors for significant carotid stenosis were found to be male gender ($p=0.029$), carotid bruit ($p<0.001$), diabetes ($p=0.021$), left main disease ($p=0.002$), 3-vessel disease ($p=0.008$), chronic total coronary occlusion ($p=0.001$), and coronary artery calcification ($p=0.001$) in univariate analysis. However, only the Gensini score, carotid bruit, and male gender were the independent predictors. The Gensini score cut-off value predicting significant carotid stenosis was 50.5 with 77% sensitivity ($p<0.001$). We found that severe vitamin D deficiency < 20ng/ml is seen in a total of 17 patients, out of which 9 patients were having SVD, 8 patients were having DVD, none of the patients having TVD and Normal Coronaries. The Gensini score is calculated in all patients undergoing CAG. Mean Gensini score for DVD 34.75, for SVD 16. The mean vitamin D levels are correlated with the severity of coronary disease using the Gensini score. There is a trend towards increasing severity of coronary artery disease with decreasing levels of vitamin D levels. Carotid artery disease is related to the extent of CAD. Multi-vessel CAD has shown to be an independent predictor for carotid stenosis. However, the distribution of coronary atherosclerosis has been limited to the number of significantly stenotic coronary arteries in previous studies. 3-VD terminology is insufficient to represent the entire extent of coronary atherosclerosis. For instance, a significant lesion in the mid or distal portion of any coronary artery is pooled together with a lesion in the proximal portion despite the fact that the latter represents a higher atherosclerotic burden. Whereas, considering the number of coronary stenosis and degree of luminal narrowing with a combination of geographic importance of the lesion position provides a more complete evaluation for the atherosclerotic burden. Therefore, an angiographic score such as the Gensini score can quantify and correlate the extent of Coronary Artery Disease.[12]

## Conclusion

Authors found that Gensini score is useful in assessing severity of Coronary artery disease.

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