

**Original article:**

## Assessment of Vitamin D, hs CRP, hs Trop I and its association with Myocardial Infarction

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### Abstract

**Background:** The aim of our study was to estimate the levels of Vitamin D, hs CRP and hs Trop I in patients of Myocardial Infarction & to compare it with normal individuals of both sexes.

**Material and Methods:** A hospital based cross sectional study was conducted on patients admitted in the Emergency and Medicine ward of SMI Hospital, Dehradun(UK) for a period of 04 months from June 2018 to September 2018. A total no of 91 cases (65 Male & 26 Female) in the age group with 35-70 years H/o chest pain of more than 20 minute, ST elevation in ECG and elevated Hs Trop I were included in the study. 48 controls (24 Male & 24 Female) which were age matched and without any Myocardial disease were included in the study. Exclusion criteria was age less than 35 years and above 70 years, chronic inflammatory disorders like Rheumatoid Arthritis, SLF etc. 5ml of venous blood was drawn from cases within 06 hrs of Acute Myocardial Infarction and controls and were subjected to Biochemical analysis Vitamin D, hs CRP and hs Trop I on a fully automated Analyzer 5600 of Ortho Clinical Diagnostics. The data so obtained was statistically analyzed.

**Results:** We observed significantly raised levels of hs Trop I and hs CRP and significantly low levels of Vitamin D in both male & female cases when compared with their controls respectively.

**Conclusion:** These findings indicate that Hypovitaminosis D and raised hs CRP play an important role in the aetiopathogenesis of Myocardial Infarction. hs Trop I levels are raised in AMI. Which is highly indicative of MI.

**Keywords:** Myocardial Infarction, hs CRP, hs Trop I, Vitamin D.

**Introduction:**

Cardiovascular disease and specifically acute myocardial infarction is the main cause of morbidity and mortality in western countries, despite current preventive and therapeutic strategies (1,2). Besides the traditional, most recognized risk factors for AMI development, new risk factors are emerging with potential relevant therapeutic implications. Among them hypotaminosis D and raised hs CRP has been the focus of recent interest.

Vitamin D is involved in cardiovascular disease and plays an important role in reducing CVD risk. It may be involved in the regulation of gene expression through the presence of Vitamin D receptors in several cells, in the regulation of Blood pressure through the Renin-angiotensin system and in the modulation of cell growth and proliferation including vascular smooth muscle cells and cardiomyocytes(3).

There are possible mechanisms by which vitamin D reduces vascular damage. Experimental observations indicate that vitamin D suppresses the renin gene as well as having direct vascular effects such as modulating smooth muscle cell proliferation, inflammation, and thrombosis. Vitamin D inhibits cholesterol uptake in macrophages, and a vitamin D-deficient-environment leads to foam cell development in patients with diabetes. The high-sensitive C-reactive protein assay is a quantitative analysis, that is increasingly used as a marker for cardiac risk assessment as well as a prognostic tool in heart disease(4). hs CRP is an acute phase protein that appears in circulation in response to inflammatory cytokines such as Interleukin-6 and serves as a biomarker for systemic inflammation(5,6). Due to paucity of literature, we decided to evaluate the status of Vitamin D levels and hs CRP levels in patients suffering from Acute Myocardial Infarction.

**Material & Methodology:**

A hospital based cross sectional study was conducted on patients admitted in the Emergency and Medicine ward of Shri Mahat Indiresk Hospital, Dehradun(UK) for a period of 04 months from June 2018 to September 2018. The sample collection and processing was done in Biochemistry department in our hospital.

A total no of 91 cases (65 Male & 26 Female) in the age group with 35-70 years H/o chest pain of more than 20 minute, ST elevation in ECG and elevated Hs Trop I were included in the study. 48 controls (24 Male & 24 Female) which were age matched and without any Myocardial disease were included in the study.

Exclusion criteria was age less than 35 years and above 70 years, chronic inflammatory disorders like Rheumatoid Arthritis, SLF etc. 5ml of venous blood was drawn from cases within 06 hrs of Acute Myocardial Infarction and controls and were subjected to Biochemical analysis Vitamin D(7), hs CRP(8) and hs Trop I(9) on a fully automated Analyzer VITROS 5600 of Ortho Diagnostic.

**STATISTICAL ANALYSIS:**

Descriptive statistical analyses were performed using SPSS software (version 20, 2008). Data were summarized as Mean ± SD of Groups (cases vs controls) compared by unpaired or independent t test.

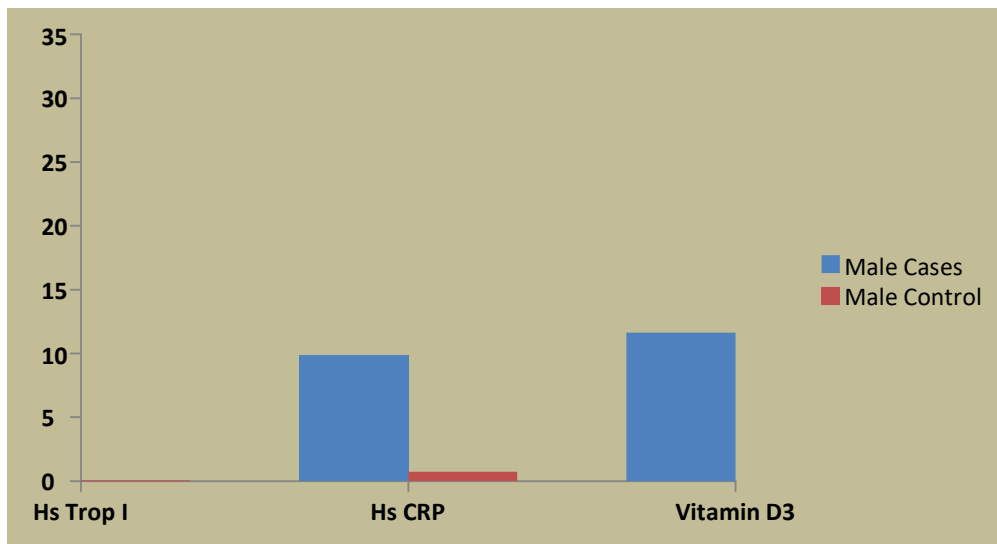
**Results:**

In Table 1 and figure 1 the hs Trop I is significantly raised in male Cases than in male controls, hs Crp is significantly raised in male Cases than in male Control, Vitamin D3 is significantly raised in male Cases than in male Control.

**Table: 1**

Parameter	Male cases (65) Mean±SD±SE	Male Control (24) Mean±SD±SE	t-value	P-value	Significant
HsTrop I	0.661±0.519±0.661	0.014±0.0057±0.002	-6.22	<0.0001	ES
Hs CRP	9.842±6.31±0.74	0.728±0.744±0.239	-7.01	<0.0001	ES
Vitamin D3	11.62±2.76±0.326	32.45±7.83±2.51	18.6	<0.0001	ES

**Figure: 1**

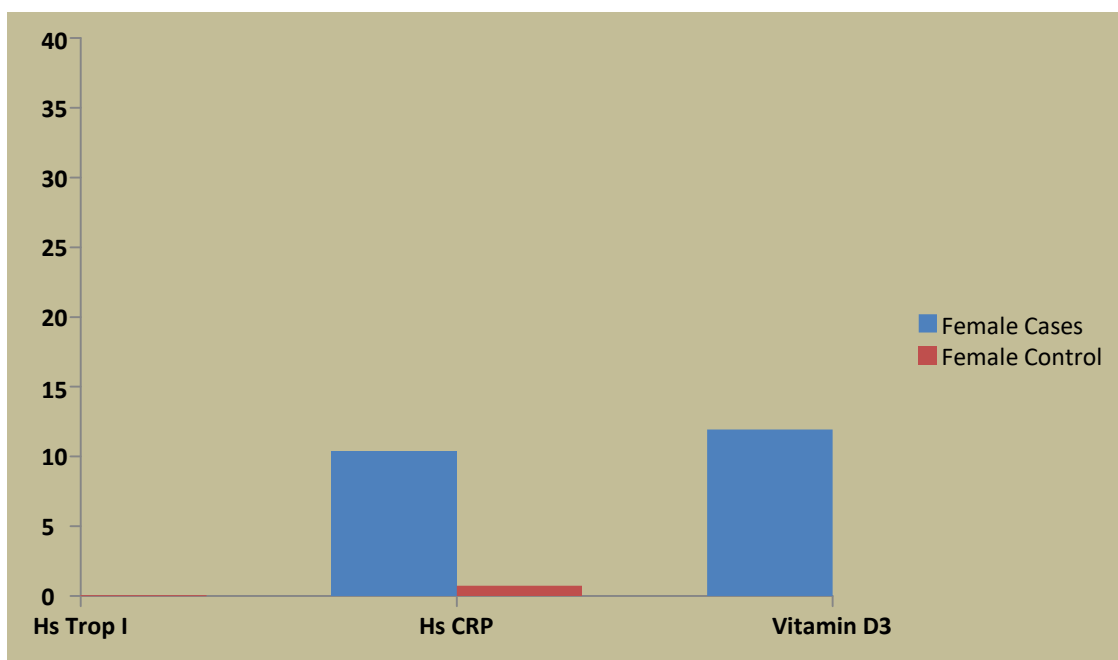


In Table2 and figure 2 the hs Trop I is significantly raised in female cases than in female controls ,Hs CRP is significantly raised in female cases than in female control, Vitamin D3 is significantly raised in female cases than in female control.

**Table: 2**

Parameter	Female cases (26) Mean±SD±SE	Female Control (24) Mean±SD±SE	t-value	P-value	Significant
HsTrop I	0.547±0.488±0.106	0.012±0.0005±0.000	-5.40	<0.0001	ES
Hs CRP	10.33±6.105±1.327	0.739±0.472±0.152	-7.6	<0.0001	ES
Vitamin D3	11.92±2.47±0.53	37.858±5.80±1.86	20.8	<0.0001	ES

**Figure: 2**



**Discussion:**

The role of Vitamin D deficiency in cardiovascular disease is a new field of interest. Well founded experimental, epidemiological & observational data<sup>(10)</sup>, describe in a convincing way, the regulatory effects of Vitamin D in relation to several factors of cardiovascular risk such as hypertension & Type II Diabetes. They correlate Vitamin D deficiency with incidence, degree & prevalence of cardiovascular risk factor.

Our results are in accordance with the previous results shown by pasupathi et al and Luizzo in 1994. Our data suggested that there is high prevalence of Vitamin D deficiency in AMI patients. This data is consistent with data associating CAD and many of its risk factors with Vitamin D deficiency<sup>(11,12)</sup>. Studies have shown that individuals with Vitamin D deficiency were at higher risk of Ischemic heart disease<sup>(13,14,15)</sup>.

There are barriers to optimal trials of vitamin D supplementation in cardiovascular disease prevention. Randomizing patients with moderate to severe vitamin deficiency to a long-term placebo arm could be considered unethical once hypovitaminosis is identified in an individual. Also, a primary prevention trial of vitamin D supplementation would require a

very large sample. Therefore, it seems reasonable to search for surrogates that might identify subgroups most likely to benefit from hypovitaminosis D correction.

Another contributory factor to increased CEA levels in our study is that CEA levels are affected by metabolic syndrome of which impaired glucose tolerance and insulin resistance are components. A study by Kim K-N et al, revealed that increasing sum of metabolic syndrome components were significantly associated with linear increasing trends in CEA<sup>(24)</sup>. The possible explanation is that insulin effects growth of normal and neoplastic epithelial cells and has mitogenic actions in-vitro either directly or through IGF-1. Thus, IR in diabetes may be associated with increase of CEA<sup>(25)</sup>. Similar results were observed by Lee et al in Korean females.

Studies have shown that inflammation plays a key role in the pathogenesis of Atherosclerosis. More than 20 large prospective trials have shown that the inflammatory biomarker hs CRP is an independent predictor of future cardiovascular events in addition to predicting the risk of incident hypertension & diabetes.

#### **Conclusion:**

Hs CRP is highly significant in CAD and is an independent and better predictor of CAD. Vitamin D deficiency is present in most of the patients with AMI and its association with many of its risk factors. We suggest screening of Vitamin D deficiency and Hs-CRP levels for prevention of CAD.

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