



## Research Article

### STRESS- IS IT A CAUSATIVE OR PRECIPITATING FACTOR FOR ACUTE CORONARY SYNDROME IN YOUNG PATIENTS?

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#### ABSTRACT

**Objective:** Severe mental stress leads to enhanced platelet activation and endothelial dysfunction leading to Acute Coronary syndrome. This study is a population based, of subjects less than 40 years along with controls who are more than 40 years. **Method:** Young patients ( $\leq 40$  years) and old patients ( $>40$  years) admitted in hospital, during 2007-08 for ACS were chosen. After obtaining informed consent, they were administered Perceived stress scale and Life event stress scale questionnaire and based on the scores they were categorized as mild, moderate, and severely stressed. **Results:** The study population consisted of 88% males and 12% females. According to perceived stress scale, in young ( $\leq 40$  years), almost 67 % of them had moderate stress and 24% of them had high stress, whereas in old ( $>40$ years), 78% of them had moderate stress and 20% had high stress. According to life event stress scale, in young almost 50% are moderate stressors and 33% are high stressors. However, in old 35% are having moderate stress and 60% are having severe stress. Though stress cannot be quantified this descriptive analysis, with the stress scales clearly showed that it is the precipitating factor in most of the young and old patients. It is also a causative factor for ACS in young patients (30%) without any significant risk factors. **Conclusion:** Stress seems to be significantly associated with ACS irrespective of age. It is acting mainly as precipitating factor and in certain cases as causative factor also.

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#### INTRODUCTION

Acute Coronary Syndrome (ACS) is a sudden Cardiac Ischemia due to Myocardial Infarction (STEMI and NSTEMI) and Unstable Angina<sup>[1]</sup>. Extensive research provides evidence that psychological stressors are at increased risk of CAD including MI and Stroke. Young patients who are less than 40 years are also developing ACS due to increased levels of stress. Stress is always difficult to measure as it is a qualitative measure.<sup>[2]</sup> Though studies have assessed the pathophysiological development of ACS by stress<sup>[3,4]</sup> structures interviewed approach is not widely used. Observation that cardiac event rate increasing with psychological stress has focused our interest in forming this study. The aim of this study is to

evaluate the association between stress and acute coronary syndrome especially in young adults, in those who are less than 40 years.

#### MATERIALS AND METHODS

This study was done in Intensive Coronary Care unit, PSG Hospitals and Research Institute, Coimbatore. Institutional (PSG Hospitals) ethics committee approved this study.

#### Cases and Controls

80 patients admitted in intensive coronary care unit of PSG Hospitals, during the period of 2007-08 where chosen. Subjects with typical or atypical symptoms suspicious for CAD (e.g., chest pain, chest tightness, chest burning, shoulder pain, palpitations, jaw pain, or non -chest pain symptoms,

such as dyspnea or worsening effort tolerance) were included in the study. Patients with signs and symptoms of acute chest pain with ECG Changes and Troponin T positive were also included in the study. Patients who have had previous revascularization (CABG, PTCA, stenting) are excluded.

They were classified into 2 subgroups as cases (n=40) of less than 40 years and controls of patients more than 40 years (n=40). This study was done for a period of 6 months.

**Data Collection**

After obtaining informed consent, demographic details and clinical history relevant to Coronary artery disease like hypertension, diabetes, smoking, dyslipidemia, and obesity were noted. The levels of stress were measured by administering a self-reported questionnaire form to the individuals. Two such questionnaires like Perceived Stress Scale<sup>[5]</sup> and Life Event Stress Scale<sup>[6]</sup> were given to them. The scoring was done by summing individual points and based on the points they are

classified as mild, moderate and severely stressed individuals.

**Statistical Analysis**

The data was fed into SPSS version 13 software and analyzed. Frequencies, mean, percentages and 'p' values were calculated.

**RESULTS**

**Demographic and Risk Factor Analysis**

This study included 40 cases and 40 controls among which 88% males and 22 % females in the study population. Analysis of risk factors like Hypertension, Diabetes, Smoking, obesity, dyslipidemia and Family History is highlighted in the bar diagram Figure (1).

**Assessment of Stress Levels**

For the impact of stress level in ACS, they were divided into two subgroups. Young ( $\leq 40$  years); Old ( $>40$  years). Table (1) and (2) shows stress level in young and old according to PSS and LESS level.

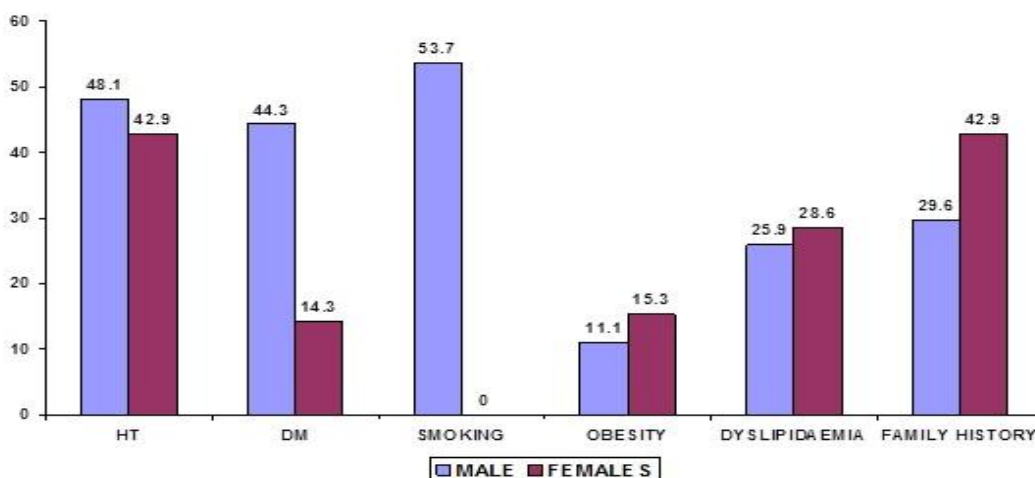
**Table (1) Showing Percentage of Perceived Stress Level in Study Population**

Group	% of mild stress	% of moderate stress	% of severe stress	P value
Less than 40 years	9.5	66.7	23.8	>0.05
More than 40 years	2.5	77.5	20	

**Table (2) Showing the Percentage of Life Event Stress Level in Study Population**

Group	% of mild stress	% of moderate stress	% of severe stress	P value
Less than 40 years	19.1	47.6	33.3	>0.05
More than 40 years	5	35	60	

**SEX WISE DISTRIBUTION OF RISK FACTORS**



**Figure -1 Showing distribution of baseline variables among the study population**

In young, almost 67 % of them had moderate stress and 24% of them had high stress, whereas in old, almost 78% of them had moderate stress and 20% had high stress. This is according to perceived stress scale. In life event stress scale,

young ( $\leq 40$  years) almost 50% are moderate stressors and 33% are high stressors. But in old ( $>40$ years) 60% are having severe stress. Statistical analysis by student 't' test showed that there is no significant stress level between old and young

subjects. But still it is precipitating the pre-existing illness.

## DISCUSSION

Stress is one of the modifiable risk factor for the development of acute coronary Syndrome. Young patients of less than 40 years are at risk for the development of adverse vascular events due to stress. This study deals with the how stress act as a risk factors among young subjects causing ACS. Only limited numbers of studies have been carried out in the past in assessing the risk factors and stress levels among young ACS patients especially from developing countries like India.

Atherosclerosis is the major event, which leads to the development of ACS. One of the emerging risk factor for atherosclerosis at an earlier age group is stress. Identifying its impact in causing ACS may help in its prevention. In order to achieve this aim, the levels of the routine risk factors were compared between Young ACS patients and subjects of more than 40 years.

In our study, the risk factor distribution showed hypertension obesity, dyslipidemia were almost equally distributed whereas smoking is present only in males and family history was more among female subjects (Figure -1). Subjects of less than 40 years had significantly lower levels of all risk factors when compared to controls.

The level of stress was assessed by 2 different scales as perceived stress scale and Life event stress scale. According to Perceived stress scale the 67% of the patients had moderate stress and 24% had severe stress when compared to the subjects of more than 40 years where 78% had moderate stress and 20% with severe stress. This says stress factor is almost equally distributed between the 2 groups. With respect to Life event stress scale, moderate stress is present in 48% and 35% in the cases and controls, 34%, and 60% of severe stress levels in cases and controls.

In one meta-analysis of studies examining depression and the incidence of coronary heart disease (CHD) events, the presence of depressive symptoms conferred a relative risk of 1.49 for CHD events (95% confidence interval [CI], 1.16 to 1.92), and the presence of clinical depression conferred a relative risk of 2.69 (95% CI, 1.63 to 4.43), which suggests a dose-response-like association between depression and ACS onset.<sup>[7]</sup> Similarly, in a study conducted by Mathews to find the association between hostility and CVD mortality risk, it concluded that hostility is a risk factor for CVD mortality among high risk males.<sup>[8]</sup> Many studies have concluded that increased stress doubles the

risk of Myocardial Infarction and also it worsens the survival of patients with MI.<sup>[9, 10]</sup>

In as many as 50% of STEMI patients, a precipitation factor or prodromal symptom can be identified. Unusually heavy exercise in an emotionally stressed individual may play a role. Patients with known ischemic heart disease, who report a high level of stress in life, have increased risk of re-hospitalization and also for hard events like ACS or death. This may be due marked increase in oxygen demand, in combination with prothrombotic state of stressed individual.<sup>[11]</sup>

Mental activities leading to increase in anger, frustration, anxiety or sadness can trigger acute myocardial infarction. Anger and hostility are associated with platelet adhesion. Hostility is also associated with parasympathetic withdrawal and anger exhibit greater sympathetic response in presence of hostility. In recent prospective study<sup>[12]</sup> of 430 CHD patients, those with less social support had a 2.4 times greater risk of cardio vascular mortality after adjusting for difference in age disease severity, psychological distress, smoking and income. In our study also, two young MI cases came with a history of death of spouse. This lack of support had caused ACS on them within a month. One more patient came with ACS because of severe loss in business.<sup>[13]</sup>

Prolonged proinflammatory cytokine production may also adversely affect mental health in vulnerable individuals. During times of illness (e.g., the flu), proinflammatory cytokines feed back to the CNS and produce symptoms of fatigue, malaise, diminished appetite, and listlessness, which are symptoms usually associated with depression. It was once thought that these symptoms were directly caused by infectious pathogens, but more recently, it has become clear that proinflammatory cytokines are both sufficient and necessary (i.e., even absent infection or fever) to generate sickness behavior.<sup>[14-18]</sup>

## CONCLUSION

Stress is precipitating ACS mainly and not as causative factor. The study showed following results.

1. Stress seems to be significantly associated Acute Coronary Syndrome irrespective of age.
2. Males dominate the ACS population in stress also
3. Risk factor distribution analysis showed HT, DM and smoking are common in males whereas obesity, dyslipidemia and family history in females.



### Limitations of the Study

The limitations of this study are only forty subjects were studied in each group and it is subjective.

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