

# IMPACT OF PSYCHO-SOCIAL STRESSORS IN PATIENTS WITH MYOCARDIAL INFARCTION

Dr. Charumathi Dasarathan, M.D(AM)., M.S (Psy)., PhD (Psy)., Mother Teresa University, Kodaikanal; Visiting Consultant Psychologist & Cognitive Behavioural Therapist – Lotus research Institute, Chennai; Physician Asst – Pediatric Cardiac Surgery & Intensive Care, Fortis Healthcare Pvt.Ltd

Dr. Sudhakaran M V, M.A., Ph.D, Head and Professor, Department of Social Sciences, Tamilnadu Open University, Chennai

Dr. Sivasailam S, M.B.B.S, DNB(Psy), MNAMS, Chief Psychiatrist, Rengasamy nursing home, Tuticorin

Dr. Sivasankari V, Msc., M.Phil., PhD, Chief trainer & Counselling Psychologist, Lotus research Institute, Chennai

## Abstract

**Background-** A decrease in supply of blood and oxygen to a portion of myocardium leads to a condition called Ischemic Heart Disease (IHD); an imbalance between myocardial oxygen supply and demand is an important cause for acute myocardial infarction (MI). This is a potentially life threatening event, hence a patient who had experienced MI, becomes vulnerable to psychological issues such as stress, fear, anxiety, depression to name a few. This study aims to assess the frequency of stressful life events in Myocardial Infarction patients (Recent MI group) and to compare their occurrence with control group (Non-patient attendees).

**Method-** This prospective study included 50 eligible and consented patients who had recent acute MI and 50 participants as control group, randomly selected from medical out-patient department (OPD). Both groups were administered Presumptive Stressful Life Event Scale (PSLES) to find out the role of stressful life events in causation of illness and were compared with each other. The number of stressors were calculated based on the responses recorded from PSLES.

**Results-** Subjects in the recent MI group had more stressors compared to the control group. This indicates that occurrence of Myocardial Infarction has a direct relation with increased number of psychosocial stressors in life. There is also an urgent need to have a closer look at the current psychosocial stressors affecting the community in the modern era and take preventive measures.

**Keywords** – Acute Myocardial Infarction (MI), Psycho-social stressors, Ischemic heart disease (IHD), Presumptive Stressful Life Event Scale (PSLES).

## INTRODUCTION

The world health organization (WHO) reports cardiovascular diseases (CVDs) are the number 1 cause of death globally: more people die annually from CVDs than from any other cause. Cardiovascular diseases (CVDs) take the lives of 17.7 million people every year, 31% of all global deaths. Of these deaths, an estimated 7.4 million were due to coronary heart disease (CHD) and 6.7 million were due to stroke. Stress being a major risk factor for CHD, WHO has called stress the “health epidemic of the 21st century.” 110 million people die every year as a direct result of stress. That is 7 people every 2 seconds.

Acute Myocardial Infarction (MI) is a potentially life threatening manifestation of CVDs. Myocardial Infarction is a result of Myocardial Ischemia. Acute myocardial infarction can develop at rest while doing normal activities or during strenuous work, and can be the first clinical manifestation of coronary heart disease. Most deaths associated with acute myocardial infarction occur during the first few hours after the onset of symptoms, and are mostly the result of ventricular fibrillation., Miles et al., Rozanski et al., conceptualize psychological stress is the most common precipitant of Myocardial Ischemia among patients with pre-existing coronary artery disease.

Chronic mental stress of any variety can also contribute to the development and progression of CAD. One study by Kuper et al., of over 9,000 British civil servants found that job strain, high job demands and to some

extent low decision latitude, contributed to the risk for new CAD. And in the largest case control study of predictors of MI, the INTERHEART study found that among 11,119 cases of MI in 52 countries, psychosocial factors, defined as a combination of stress and depression, ranked as the third-highest predictor of MI, raising the risk for MI by an odds ratio of 2.67, similar to smoking and diabetes.

Merz et al., Mental stress triggered ischemia was demonstrated by seventy-two percent of CAD patients in the laboratory, and a high proportion of ischemic episodes in ambulatory patients are associated with mental stress and light physical activity. Personally relevant stress, experienced as intense negative emotion, appears to be the most potent trigger for ischemia.

Blood pressure and heart rate increase during mental stress, suggesting that increased oxygen demand may be an important precipitating mechanism for the ischemic episodes. Increase in heart rate during mental stress is not as high as that observed during stress exercise testing, but it has been associated with myocardial ischemia in both laboratory and the field; Folland et al., The blood-pressure surges observed during mental stress are frequently higher than those observed during regular exercise, Bairey et al.,

Decrease in coronary artery blood flow due to vasospasm also plays an important part in mental stress induced ischemia. In a study by Yeung and co-workers using quantitative coronary angiography, abnormal coronary artery constriction triggered by mental stress was demonstrated. During mental stress; a 24% average reduction in coronary artery diameter was observed angiographically at the sites of epicardial stenosis, compared with a 3% average increase in diameter observed at sites free of stenosis.

Stike et al., Mental stress-induced ischemia is mostly painless, and occurs at lower levels of oxygen demand than ischemia induced by physical exercise. Stress-induced hemodynamic changes, particularly increase in systemic vascular resistance, coronary artery vasoconstriction, and micro vascular changes, may all contribute to the pathophysiology of ischemia.

## LITERATURE REVIEW

Xu et al (2011) conducted a study to explore possible associations between psychological risk factors and AMI among the Chinese population with a large-scale case-control study. The study was part of the INTER-HEART China study, itself part of the large international INTER-HEART study of cardiovascular risk factors. In this case-control study, 2909 cases and 2947 controls were recruited from 17 cities. Psychological stress, negative life events, depression and controllability of life circumstances were assessed. They found that cases reported more psychological stress at home or work and odds ratios (ORs) were 3.2 (95% CI 2.1–4.9) for permanent stress and 2.1 (95% CI 1.5–2.8) for several periods of stress respectively. More cases experienced depression compared with controls (19.6% vs. 9.3%) and ORs were 2.2 (95% CI 1.9–2.6). Subjects with 1, 2 and 3 or more depressive symptoms had increased risk of AMI by 2.1, 2.2 and 2.6 fold, respectively, i.e., more depressive symptoms were associated with higher risks of AMI (P for trend <0.0001). Women had a greater risk of AMI from depression (OR 3.0, 95% CI 2.2–4.0) compared to men (OR 2.0, 95% CI 1.6–2.4), P for interaction =0.0364. Negative life events in subjects were associated with increased risk of AMI, OR 1.7 (95% CI 1.4–2.0) for one event and 1.8 (95% CI 1.3–2.4) for two or more events. High levels of controllability of life circumstances reduced the risk for AMI (OR 0.8, 95% CI 0.7–1.0). From the study, they concluded that several psychological factors were closely associated with increased AMI risk among Chinese population. Psychological stress had a greater AMI risk in men but depression was more significant among women.

## PATIENTS AND METHODS

This prospective observational study included a sample of 100 patients presenting at cardiovascular and thoracic sciences department at a super specialty hospital. 50 patients with first attack showing ECG changes and or positive cardiac markers suggestive of MI were included in the study. 50 non-patient attendees presenting at medical OPD, with no symptoms or history of CVD, were set as control group. Customized proforma was prepared for collecting the socio – demographic profile. All participants were obtained informed consent including the explanation of importance of the study being conducted. All the participants were administered Presumptive Stressful Life Event Scale (PSLES) to find out the role of stressful life events in

causation of illness and were compared with the control group. Patients were interviewed once they were stable and shifted from the ICU to ward / room.

## RATING SCALE USED

### Presumptive Stressful Life Event Scale (PSLES)

Singh et al., developed this scale suitable for assessing stressful life events for Indian patients in 1981 by using open-ended questionnaire on a sample of 200 adult subjects. It was based on fruitful collaborations of Holmes and Rahe who believed that some kind of a list of commonly encountered stressors would be more useful than the relatively unregulated process of taking an unstructured history. After considerable research, they developed a list of 51 life events relevant to Indian conditions, ranging in severity from death of a spouse to going on a pleasure trip/pilgrimage. Scale items are classified into desirable, undesirable, or ambiguous; and personal or impersonal.

## STATISTICAL ANALYSIS

The data from the proforma was transferred onto Microsoft Excel and then transferred to statistical software package SPSS Version 20.0.0. for analysis. The mean comparison between the groups was done using unpaired, 't' test. Proportional comparisons were done using Z test for two sample proportions. A p value of < 0.05 was taken as statistically significant. The data was represented in the form of tables and graphs.

## RESULTS AND DISCUSSION

There were 36 males and 14 females in the study group, showing a male preponderance in comparison to females. Majority of the males and females both belonged to the age group 41-50 years and 51-60 years. 36 (72.0%) patients were illiterate, 1 (2.0%) had done their education upto 5th standard, 10 (20.0%) had done their education up to 10th standard and only 3 (6.0%) of the patients had done their inter / graduation.

Majority of the patients in our study were having low level of education. Majority of the patients 28 (56.0%) belonged to the nuclear family, while rest 22 (44.0%) of them belonged to the joint family.

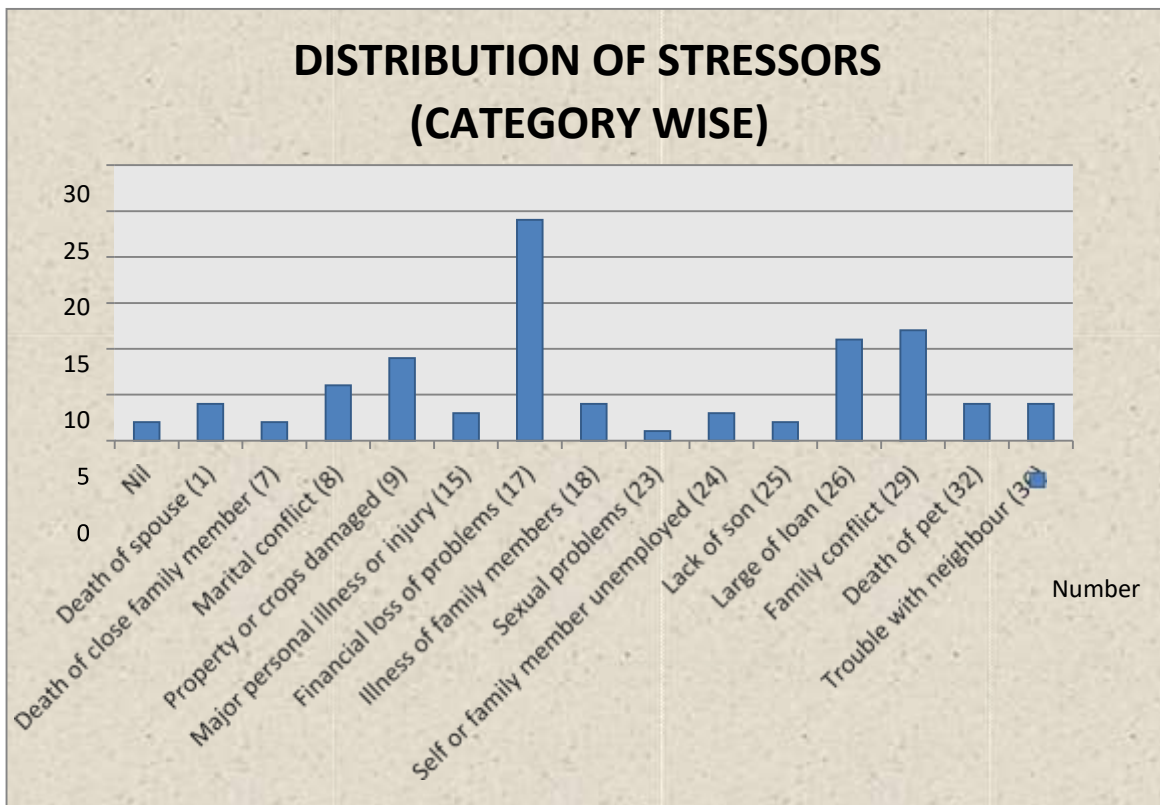
Number of Stressors	No	%
No stressors	2	4.0
One stressor	8	16.0
Two stressors	32	64.0
Three stressors	8	16.0
4 and more stressors	0	0.0
Total	50	100.0

**Table 1: Distribution of number of psychosocial stressors in Recent MI patients group**

The above table shows the distribution of number of stressors recent MI patients group.

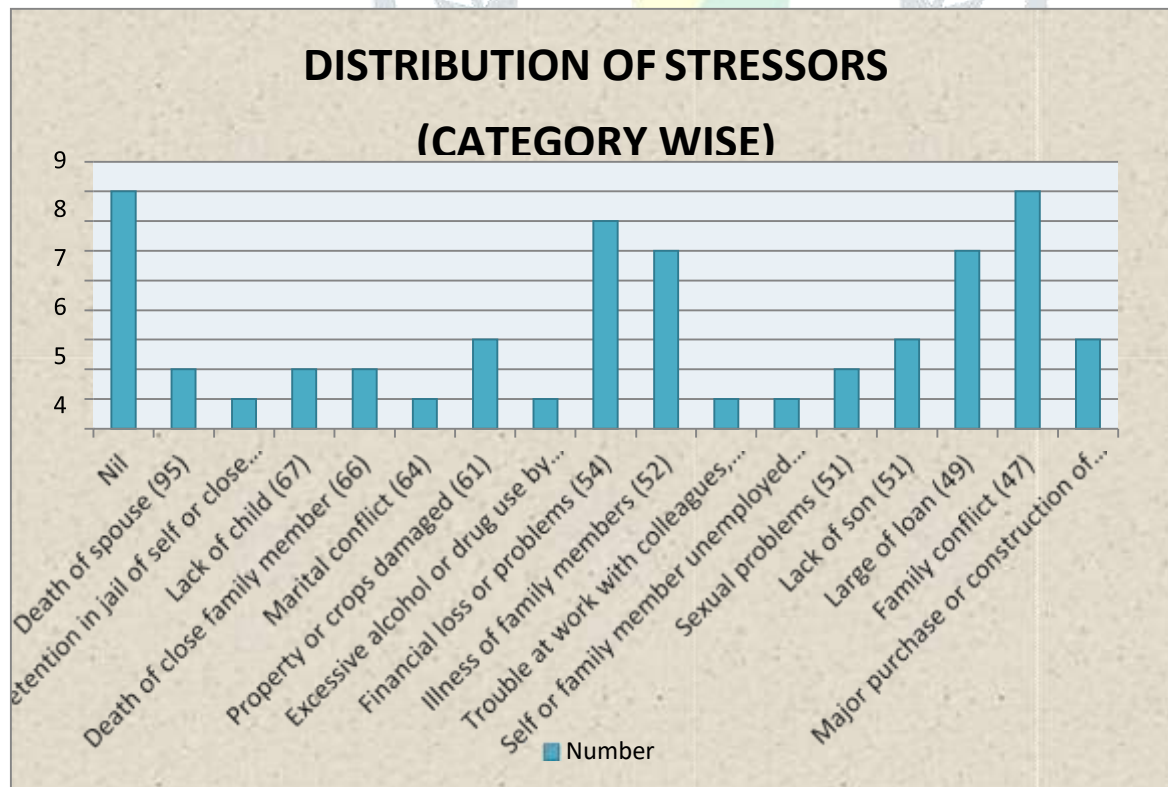
There were 2 (4.0%) patients who had no stressors, 8 (16.0%) had at least one stressor, 32 (64.0%) had two stressors, 8 (16.0%) patients had three stressors and there were no patients who had 4 or more stressors.

Majority of the patients had two stressors.



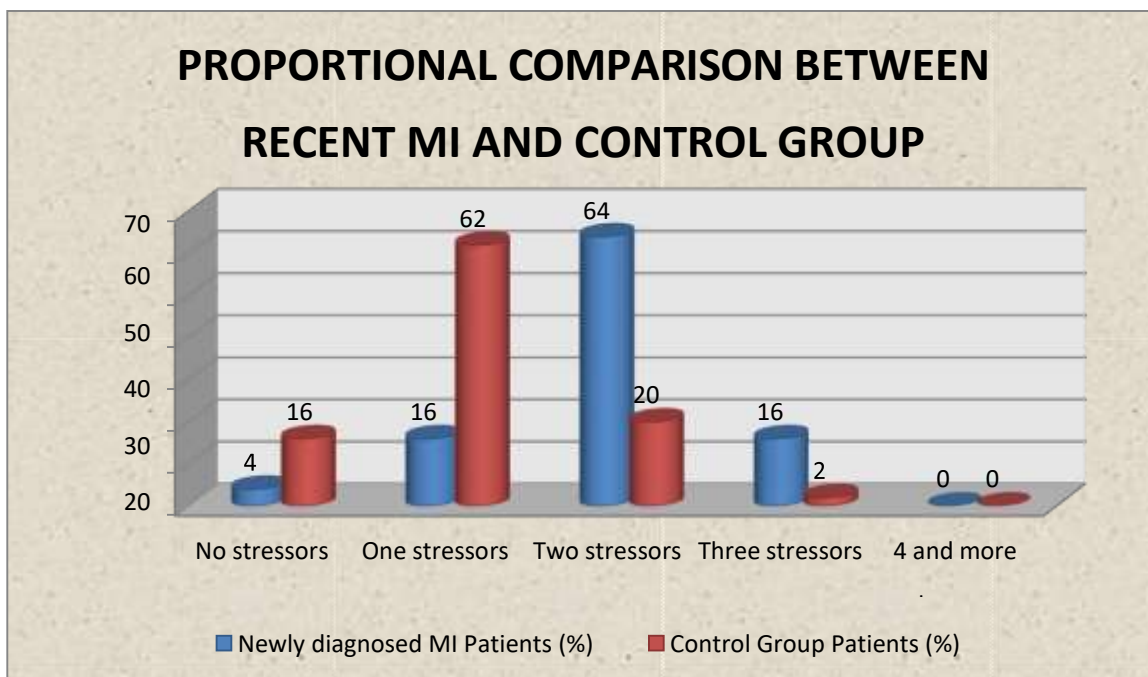
**Figure 1: Graphical representation showing distribution of stressors (category wise) in recent MI group**

The above graph shows that among the number of stressors, the commonest stressor was financial loss that was present in 48% of the patients, this was followed by family conflict (24%), large of loan (22 %), property or crops damaged (18 %), marital conflict (12%), 8% contributes to death of spouse, illness of family members, death of pet, trouble with neighbor, major personal illness or injury.



**Figure 2: Graphical representation of distribution of stressors (category wise) in control group**

Figure 2 shows that among the number of stressors, 8 controls had no stressor. The commonest stressor was family conflict present in 8 controls.



**Figure 3: Graphical presentation of psycho-social stressors with proportional comparison between recent MI and control group**

As represented in figure 2, 2 stressors and 3 stressors were higher in controls than the recent MI group. The commonest stressor being family conflict present in 16% of the controls, where as recent MI group had financial loss or problems (28%) as comm.

**COMPARISON BETWEEN PATIENT AND CONTROL GROUP FOR STRESSORS**

‘No stressors’ were present in more number of individuals in control group than the recent MI group. Distribution of stressors showed that more number of patients in the recent MI group had two and three stressors as compared with the control group which had more people with a single stressor. Subjects in the recent MI group had more stressors compared to the control group. For all stressors, statistically significant difference was seen between recent MI group and control group ( $p < 0.05$ ).

Number of Stressors	Recent MI Group		Control Group		‘Z’ value	P value
	No.	%	No.	%		
No stressors	2	4.0	8	16.0	-2.04	0.041*
One stressor	8	16.0	31	62.0	-5.35	0.000*
Two stressors	32	64.0	10	20.0	4.98	0.000*
Three stressors	8	16.0	1	2.0	2.52	0.012*
4 and more stressors	0	0.0	0	0.0	-	-

Total	50	100.0	50	100.0		
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**Table 2: Comparison of stressors between recent MI group and Control Group**

More number of stressors was present in recent MI group in comparison to the control group. Our findings were comparable with the sample in Inter Heart Study, China, in which 0-8 years of education in 1557 cases (53.5%) and 1300 controls (44.1%) and >8 years of education in 1352 cases (46.5%) & 1647 controls (55.9%).

Majority of the patients 28 (56.0%) belonged to nuclear family, while rest 22 (44.0%) of them belonged to joint family.

Another study by Ohlin et al (2004) was conducted to investigate the association between self-reported psychosocial stress and long-term cardiovascular (CV) morbidity and mortality in a population based cohort. Under the Malmo Preventive Project, a total of 13,609 (2741 women) individuals, mean age 45 years, had self-reported chronic stress determined by questionnaire. It was concluded that self-reported chronic stress is an independent risk factor for CVD, particularly fatal stroke, in middle-aged men; it continues to be a risk factor after adjustment for several other known risk factors.

## CONCLUSION

Psycho social stressors are strongly associated with the occurrence of myocardial infarction (MI). Hence it is high-time to educate the modern era on this major life threatening risk factor and prevent it by conservative measures to handle the stressors.

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