

## ORIGINAL ARTICLE

# ANXIETY, DEPRESSION AND PSYCHOSOCIAL STRESS IN PATIENTS WITH CARDIAC EVENTS

Anne John Michael, \*Saroja Krishnaswamy, \*\*Tamil Selvan Muthusamy,  
\*\*Khalid Yusuf, Jamaludin Mohamed

Department of Biomedical Science, Faculty of Allied Health Science, Universiti Kebangsaan Malaysia

\*Department of Psychiatry, Faculty of Medicine, Universiti Kebangsaan Malaysia

\*\*Department of Internal Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia

Stress tends to worsen the prognosis of patients with coronary heart disease. The aim of the study is to determine the relationship between stress related psychosocial factors like anxiety, depression and life events and temporally cardiac events specified as acute myocardial infarction and unstable angina 65 subjects with confirmed myocardial infarction or unstable angina were interviewed using 2 sets of questionnaire, the Hospital Anxiety and Depression Scale (HADS) and Life Changes Stress Test, a segment of the Rahe's Stress and Coping Inventory first at time of occurrence of their cardiac event and the second time was 6 months later. Anxiety, depression and life events scores were calculated for both and recurrence of cardiac event for the 6 month duration was also recorded. Patients who had significant levels of depression and or life events were ten times more likely to have recurrence of cardiac events as compared to those without risk for either of these psychological symptoms. Anxiety, depression and stress levels are significantly increased after the onset of ischemic heart disease and could be contributing or predisposing factors for the recurrence of cardiac events for these patients

*Key words : Acute myocardial infarction, unstable angina, stress, life events, depression*

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## Introduction

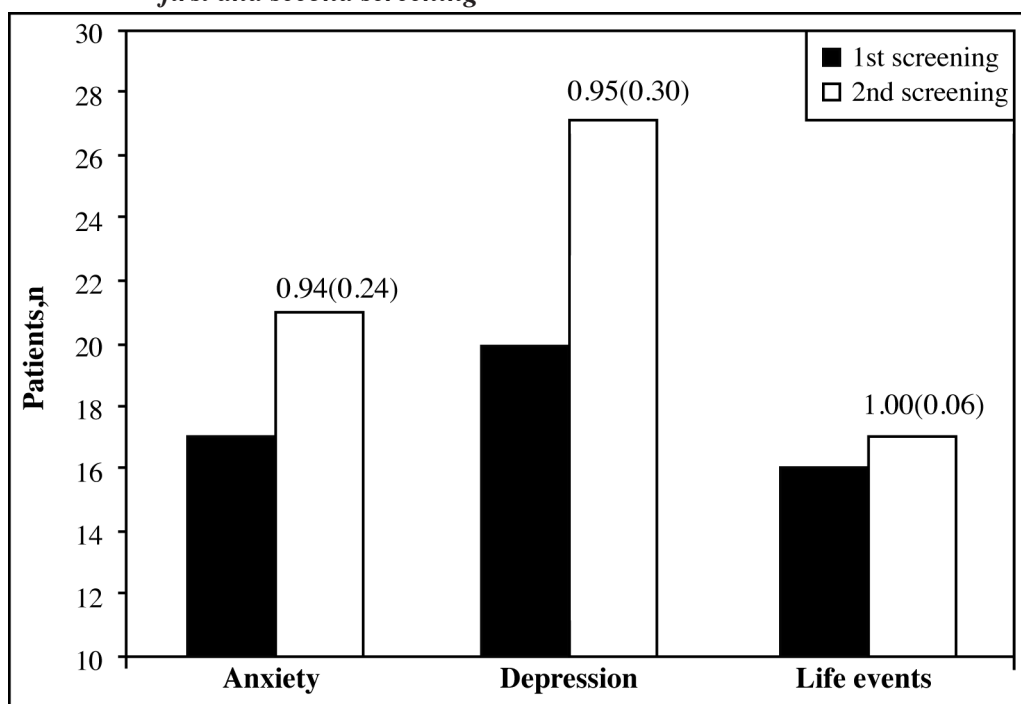
Psychological factors can be as detrimental to the recovery of disease among patients with confirmed cardiac events as to the disease development (1). Stress in particular if not managed with proper intervention in the aftermath of myocardial infarction predicts 1-year mortality and rehospitalization (2, 3). Many cardiovascular patients with high levels of stress continue to show increase in morbidity as stress affects mechanisms related to cardiac events especially clustering of traditional cardiovascular risk factors, endothelial dysfunction, myocardial ischemia, plaque rupture, thrombosis and malignant arrhythmias (4).

Numerous studies have also associated the presence of depression with the worsening of the prognosis of patients with cardiac events (5). One of these studies further stresses that depression

clearly affects the condition of patients with established coronary artery disease (CAD) but its role in the initial development of coronary disease is less evident (5). Studies done on psychiatric patients also showed higher rates of heart disease among depressed patients (6) and lithium treatment for two years have reduced the mortality from cardiovascular disease in these patients (7) Studies have also linked other treatment of depression with reduced risk of myocardial infarction among depressive patients (8, 9).

The paper aims to determine the various associations between stress symptoms as determined by the Hospital Anxiety and Depression Scale and Life Changes Stress Test and temporally cardiac events specified as acute myocardial infarction and unstable angina. The questions we seek to answer are whether anxiety depression and life events considered as higher risks for cardiac events

**Chart 1 : Distribution of patients for anxiety, depression and life events risk during first and second screening**



notwithstanding the existence of other physical and psychosocial variables in these patients.

## Methodology

### Subjects

The subjects comprised of 65 patients with either first episode unstable angina or myocardial infarction. These patients drawn from all the patients admitted in the cardiac care unit and in Hospital Universiti Kebangsaan Malaysia, an urban government hospital were selected from the following criteria: 1) was admitted within a few days and diagnosed with either unstable angina or myocardial infarction, 2) their cardiac events was confirmed as a first episode and 3) they gave signed consent to participate in study. Cardiologists determined presence of either cardiac event based on typical clinical symptomatology, ECG evidence and typically elevated serum levels of myocardial enzymes. The 65 consenting patients with 30 men (46%) and 35 women (53%) ranging from 22-86 years had a mean age of 60 and consisted of 44% Malays, 29% Chinese, 26% Indian. 21% of the subjects were below 50 years while the majority were in the 50-65 age group (45%). 30% were patients with myocardial infarction while the remaining had unstable angina. There were no fatalities among the 65 patients and all returned for second screening.

### Measures

Demographic data gathered were gender, age and recurrence of cardiac event during the six months after hospital admission. The psychological measures were done using 2 questionnaires, the Hospital Anxiety and Depression Scale and Life Changes Stress Test. Both questionnaires were designed to be self-rated, however due to the low literacy rate among the participants; the questionnaires were interview-aided. Only one interviewer administered the questions to avoid bias. The Hospital Anxiety and Depression Scale (HADS) (10) identifies risk for both anxiety and depression separately by having scores divided into cut-off points which indicates ranges from normal to severe. The normal rate is below 8, while 8-10 indicates mild symptoms, 11-14; moderate and 15-21 points to a severe state of depression/anxiety. It was chosen as the sample size was small and it has undergone validation for usage in non-psychiatric units. During the interview, participants are required to give prompt answers and not to dwell too long on each question. Immediate answers are integral as HADS screens for severity of both these conditions during that instant. The Life Changes Stress Test, the first part of the Stress Coping Inventory had undergone reliability testing on a sample of 1772 individuals (11). It comprised of a 50-item questionnaire, which identifies life events for the past six months in five different categories; health, work, finance, personal

*Table 1: Anxiety, depression and life events scores for patients during first and second screening*

| Score              | 1 <sup>st</sup> | 2 <sup>nd</sup> | T value |
|--------------------|-----------------|-----------------|---------|
| <b>Anxiety</b>     |                 |                 |         |
| Mean ( $\pm$ SD)   | 6( $\pm$ 4)     | 7( $\pm$ 4)     | -4.446* |
| Minimum value      | 0               | 1               |         |
| Maximum value      | 15              | 15              |         |
| Mod value          | 3               | 6               |         |
| <b>Depression</b>  |                 |                 |         |
| Mean ( $\pm$ SD)   | 6( $\pm$ 3)     | 7( $\pm$ 3)     | -2.998* |
| Minimum value      | 0               | 1               |         |
| Maximum value      | 15              | 15              |         |
| Mod value          | 6               | 8               |         |
| <b>Life events</b> |                 |                 |         |
| Mean ( $\pm$ SD)   | 123( $\pm$ 102) | 143( $\pm$ 104) | -6.946* |
| Minimum value      | 0               | 20              |         |
| Maximum value      | 441             | 441             |         |
| Mod value          | 44              | 20 <sup>a</sup> |         |

and social as well as home and family. However, questions on health was excluded in this study to avoid inclusion of factors due to cardiac events. The scores for each group were totaled as Life Changes Unit with several cut-off points to indicate susceptibility to illnesses. The grand totals between 201 and 300 connote a moderate risk and grand totals of 300 and 450 signify an elevated risk to illnesses, although not specifically cardiac diseases.

### **Procedure**

The questionnaires were administered twice, first during hospital admission at the initial diagnosis of cardiac events (1<sup>st</sup> screening). A follow up was conducted six months later. The recurrence of cardiac event during that period was also recorded. Paired t test were applied to the group to obtain differences. Odds ratio was calculated to determine the odds of an individual to have a recurrent cardiac event if they are at risk of anxiety, depression or life events.

### **Results**

Anxiety and depression was totaled separately from HADS and life events was totaled from the Life Changes Stress Test. Each bar represents total patients with scores  $\geq 8$  (anxiety and depression risk) and scores  $\geq 201$  (life events risk). Values above each graph were recurrence rate (new cases rate) for second screening. Rates for recurrence was

calculated for second screening based on total from 1<sup>st</sup> screening and rates for new cases from total of 2<sup>nd</sup> screening.

Comparisons were done using paired sample t test. \* $P < 0.01$ . <sup>a</sup>The smallest value is shown as multiple modes exist.

### **Characteristics of sample population**

Both men and women when considered separately had an almost similar mean score. All three ethnic groups scored similar mean scores for depression and life events although a slight difference was observed in anxiety scores for Indians. There was also no difference between patients with unstable angina and myocardial infarction. The remaining results sections were analyzed using all 65 patients regardless of ethnic group, gender or type of cardiac event.

### **Anxiety**

Most participants had normal range of anxiety levels with only 26% and 32% of them scoring above normal levels during the first and second screening. However, despite a small percentage of patients scoring 8 and higher, a mere 6 month duration from first and second screening saw a 6% increase. A detail analysis indicated all patients except one had a recurrence of higher than normal anxiety levels (rate of 0.94) (Chart 1). Comparison of scores indicated a significant increase ( $P < 0.001$ ) for second

**Table 2:** Odds ratio for recurrent cardiac events in patients with mild-severe anxiety and depression (scores  $\geq 8$ ) and moderate-high life events score (scores  $\geq 201$ )

|                                | Recurrence of cardiac events within 6 months of 1 <sup>st</sup> episode |          | Odds ratio<br>(at 95% confidence limit) |
|--------------------------------|---|----------|---|
|                                | Yes   | No       |   |
| <b>Anxiety, n(%)</b>           |   |          |   |
| score $\geq 8$                 | 6(35.3)   | 11(64.7) | 1.325                                   |
| score $< 8$                    | 14(29.2)  | 24(70.8) | (0.410-4.283)                           |
| <b>Depression, n(%)</b>        |   |          |   |
| score $\geq 8$                 | 13(65.0)  | 7(35.0)  | 10.082                                  |
| score $< 8$                    | 7(15.6)   | 38(84.4) | (2.969-34.229)                          |
| <b>Total life events, n(%)</b> |   |          |   |
| score $\geq 201$               | 11(69)  | 5(31)    | 9.778                                   |
| score $< 201$                  | 9(18)   | 40(82)   | (2.716-35.194)                          |

screening (Table 1) and this is mostly caused by increases in scores for the normal range than the increases in the scores for the risk range. Another indication would be that the mod values for both interviews were in the normal range. However, patients with anxiety scores 8 and higher were as likely as normal patients to have a recurrent cardiac event six months later (Table 2).

### Depression

Participants with depression scores of 8 and above (31% for first screening and 42% for second screening) for both screenings were more than those with similar anxiety scores. However, for the second screening, there were 9% more patients for depression risk compared to anxiety risk than the first screening which saw a 5% increase. Individually, only 40-41% of those who had depression risk also had anxiety risk for both screenings. Like anxiety, all patients except one experienced a recurrence of depression risk (0.95) (Chart 1). However, unlike anxiety, the patients with decreased depression scores from risk range to normal range had normal anxiety scores for both screenings. The earlier described patient with decreased anxiety scores had depression scores above 8 for both screenings.

Comparison of scores indicated a significant increase ( $P < 0.001$ ) for second screening (Table 1). For depression, the mod values indicated that the most frequent score was within the normal range for the first screening but this changed during the second screening in which the most frequent score was in the risk range (Table 2). This difference from anxiety could be a factor for the ten-time likelihood (odds ratio= 10.082) (Table 2) for those scoring 8

and higher to have a recurrent of cardiac event compared to those scoring less than 8.

### Life Events

Only 25-26% of the patients had life events score of 201 and above for both screenings. There were a small increase of new cases (rate of 0.06) (Chart 1) and all patients at risk in the first screening remained in the risk range for the second interview. This was expected as life events scores was calculated based on events for duration of six months prior to the interview and not like the HADS scale that recorded most recent anxiety and depression conditions. Although changes in the number of risk cases have not increased, there were significant changes in the individual scoring ( $P < 0.001$ ) (Table 1). Mod values were not any indication for life events as there were more than a few different values. Life events like depression had a ten times odds (odds ratio=9.778) (Table 2) for those scoring in the risk range to develop a recurrent cardiac event than those scoring in the normal category.

### Discussion

This prospective study had good representation of all three ethnic groups and had an equal distribution of both sexes. A study done on Malay, Chinese and Indian residents in Singapore found strong ethnic differences in myocardial infarction (MI) event with Indians having the highest MI rates and Malays with the highest case-fatality (13). Several factors likely to cause the inter-ethnic differences were probably caused by environmental factors or genetic factors but these explanations were still inconclusive (14). As the sample size in our

study was small, we grouped all races together as studies have indicated that the risk factors for cardiovascular diseases bring about adverse effects in all races, although the relative importance of these factors may vary across populations (15).

For this study, risk for either anxiety or depression was set at scores 8 and above which indicated mild to severe symptoms while for life events, risk of susceptibility to illness was set at moderate to severe which were scores 201 and above. Recurrent of cardiac events are common especially after an acute myocardial infarction (AMI) (16). The results indicated that the likelihood of recurrent cardiac events is much more linked to depression and life events compared to anxiety. Carney et al reported 16-22 % of post-MI patients having major depression and 45% of them having some form of unipolar depression (17,9). The absence of severe risk cases for depression and no deaths among the patients for the 6-month follow up was similar to another study that found an association between major depression and mortality in the first six months after an acute MI (3). It was not unusual for patients who reported no risk of depression during the first screening having higher scores consequently 6 months later as 1 in 3 develop major depression 12 months after an acute MI (17).

Depression also has a strong relationship with other ischaemic heart diseases besides myocardial infarction. One study in particular found that patients who developed depression after an episode of unstable angina had an increased risk of major cardiac events during the following year (18). During exercise testing, incidence of angina develops sooner and lasts longer in depressed patients (19). The stronger association of depression and coronary heart disease exceeds even the one between the cardiac diseases and type A behavior, which was the most prominent psychological risk factor. The association between depression and coronary heart disease is explained through numerous mechanisms. One possible explanation is that depressed individuals normally adopt unhealthy behaviors such as smoking, alcoholism, tend to live a sedentary lifestyle or eat an unhealthy diet (20). Depression and coronary risk could also be linked via personality characteristics such as hostility (21).

A correlation between depression and coronary risk can also be linked with life events. Psychosocial factors such as low socioeconomic status can lead to depression. Prolonged exposure to the stressors like these life events can ultimately lead to vital exhaustion, a state of fatigue. This

condition is often present in the weeks prior to a myocardial infarction. Cortisol reactivity is also known to occur during stressful circumstances (22). Another theory claimed that depression may induce hypothalamic-pituitary-adrenal axis hyperactivity (23) independently without these associated factors. Depression can also influence other biochemical and physiological changes like the sympathoadrenal hyperactivity, diminished heart rate variability, ventricular instability and myocardial ischaemia (24).

The association of anxiety in myocardial infarction (MI) and unstable angina is similar to another study that found no relationship between phobic anxiety and non-fatal MI (25). However, an association exists between anxiety and fatal coronary heart disease (26). This suggests a different mechanism involved for anxiety and coronary heart disease than for depression and coronary heart disease. Sudden cardiac death, which is death due to non-cardiac causes and occurring 1 hour after onset of symptoms, is less frequently associated with acute myocardial infarction (27). This indicates different risk factors for sudden cardiac death and AMI (28). Anxiety disorders are associated with hyperventilation that increases the susceptibility to arrhythmias, one of the causes for cardiac death (29).

## Conclusion

Recurrence of cardiac events for ischemic heart patients is resulted from traditional risk factors as well as predisposing factors. Although levels of blood cholesterol, elevated blood pressure, diabetes mellitus and advancing age are unchangeable, factors such as diet, physical activity and psychosocial factors can be managed if not treated. Singapore in a recent nationwide 10-year study suggested the implementation of therapeutic programs the reason for a significant fall in mortality from MI (30). A simple change of life style incorporating basic stress management programs or relaxation techniques could lead to a significant improvement in the morbidity and mortality of ischemic heart patients. Any program fitted into a daily schedule might at best improve the chances of survival or the very least upgrade the quality of life of these patients.

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## Correspondence :

Prof. Dr. Jamaludin Mohamed Bsc (Hons) (Clin. Biochemistry) (UKM), PhD (St. Andrews), FABI, MACB

Deputy Dean (Academic & Students' Affairs)

Faculty of Allied Health Science,

Universiti Kebangsaan Malaysia,

Jalan Raja Muda Abdul Aziz,

50300 Kuala Lumpur,

Malaysia.

Tel: +603 40405601

Fax: +603 26938719

Email: [ajohn28@hotmail.com](mailto:ajohn28@hotmail.com)

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