PSYCHOSOCIAL STRESS PRECEDING MYOCARDIAL INFARCTION

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SYNOPSIS

Twelve patients with diagnosed myocardial infarction were compared with individually matched controls to ascertain the number of life events experienced in the six months prior to infarction and the psychosocial stress they were experiencing. The cardiac patients were found to have an excess of life events ($p<0.05$). The psychosocial stress they experienced was also much higher than controls ($p< 0.0001$) as assessed by the Social Adjustment Scale (SAS). SAS appeared to be a good predictor of a potential infarction than life events ($p<0.05$). It was concluded that psychosocial stress has an etiological role in the genesis of myocardial infarction. Psychosocial assessment of cardiac patients is considered to be useful for both therapeutic and preventive purpose.

INTRODUCTION

Research in the West has established that prior to an acute attack of myocardial infarction, there is invariably some degree of psychosocial stress experienced by the victim of the infarction (1, 2, 3, 4). This stress can often be demonstrated even when physical risk factors are controlled and accounted for (5, 6).

Earlier work has emphasized on the buildup of life events prior to infarction. Thus studies done mainly with the use of life events inventories have shown that infarct patients have significantly higher life changes (eg. 7, 8). Using an interview schedule instead of an inventory to assess life events, Connolly was able to show that in the weeks before the onset of infarct, there was a significant increase in the prevalence of life events experienced by infarct patients (9). Prospective studies like those of Parkes (10) on widowers, have demonstrated that cardiac death accounted for a substantial proportion of the mortality seen during the 10 months directly following bereavement. All these studies would therefore indicate that life events are a significant source of stress to precipitate cardiac disease in those prone to it.

The effect of life events may be quantified by means of a measure of objective impact. Holmes and Rahe (11), for example, made use of Life Change Units (LUC), while interview measures of life events make use of some scale to assess the impact (12). How reliable such measures of impact are is indeed debatable so that some authorities would simply stick to a frequency count to determine the effects of life events (13). Another methodological issue of concern is that most studies of life events are by necessity retrospective, and this means that there will always be problems of accuracy and validity associated with it. To some extent, prospective studies like those of Parkes (10) went some way in meeting these objections, but such a method of study is feasible only for specific types of life events and not life events in general.

There have also been studies that examined variables related to other types of psychosocial stress. Among these are studies on stress in relation to work, family, social environment and social class in those at risk for myocardial infarction. Some of the more well-known studies in this category are the Western Collaborative Group Study (14), the Framingham Heart Study (15) and the Swedish study of Theorell et al (16). All these studies indicated that coronary artery disease tended to be associated with the lower social class, and in those facing excessive stress in married life, family relationships and in the working environment. Insofar as the work environment is concerned, various factors contributing to stress have now been identified and these include: work overload or underload, physical environment and the type of work being done (17).

In the above group of studies just quoted, it was also noted that certain behavioural traits tended to be associated with a high risk of cardiac disease. These traits include aggressiveness, ambitiousness, competitive drive and emotional lability. Together with some other attributes, these were collectively classified as traits of Type A personality or behaviour pattern (18). The general belief is that people exhibiting Type A behaviour pattern have a higher risk of cardiac disease. But Type A behaviour pattern has been difficult to conceptualise theoretically (19) and increasingly researchers have tended to look at particular personality attributes believed to be associated with Type A behaviour. The attributes most studied are hostility/aggression and denial in heart patients (20, 21). The understanding that emerged is that the Type A person by exhibiting traits as aggressiveness, drive and tension have a greater risk of myocardial infarction. However, while the tendency of Type A behaviour persons for denial and self-control may actually help them to recover from a specific heart attack, their overall general prognosis is observed to be poor (21). All these would seem to indicate that personality and environmental factors both contribute towards the psychosocial stress experienced by the potential cardiac patient and together they interact with genetic and physiological predisposition to produce the final outcome — namely the myocardial infarction.

With these consideration in view, this study was carried out to assess the psychosocial stress experienced by patients prior to infarction. The survey method was eschewed in favour of an interview method, for while a survey may demonstrate broad trends that prevailed, the interview method has the advantage that the instruments used are relatively more sensitive.

SUBJECTS

The subjects for this study were twelve patients who were admitted to hospital for treatment of Acute Myocardial Infarction. Patients admitted into this had to fulfill the following criteria for the diagnosis of an infarct: a certain pattern of a history of chest pain, a certain pattern of biochemical changes, and a certain pattern of ECG changes all believed to be diagnostic of the illness.

Their ages range from 37 to 63 years, with a mean of 51.4 years. There were eleven males to one female patient. All were married except for a single male of 47 years. The patients were all Chinese except for two Malays and one Indian. Their occupation ranged from skilled labourers, taxi-driver, clerks, technicians to managers and executives.

For controls, normal healthy volunteers were chosen from the general public and matched individually with patients on variable of age, sex, race, marital status, educational standard and occupation.

METHOD

All subjects in the patient and control groups were administered the following:

1. *A simple questionnaire* on basic personal variables such as age, sex, race, marital status, educational level and occupation.
2. *A Life Event Interview* using a structured interview schedule prepared by the Division of Mental Health of WHO (22). This version is specially suitable for Singapore as it was designed for use in Third World country and the list of items are somewhat open-ended. Events were elicited in the area of Personal affairs, Work and livelihood, Immediate family, Extended family and Social network. Other life events not covered in the above areas were included in a miscellaneous section. Events were dated from a point of onset which for cardiac patients was the time of onset of the infarction. For controls, the point of onset was taken to be the time of interview.

Life events were rated by a simple frequency count. This was estimated for four weeks prior to onset (LE4), eight weeks prior to onset (LE8), twelve weeks prior to onset (LE12), and the total number of life events experienced in the six months prior to the point of onset (LET).

The objective impact of the life events were rated by the interviewer after careful consideration of the circumstances surrounding a particular event. Impact was rated as 0-3-7, (22) with 0 indicating little or no impact, 3 indicating moderate impact, and 7 as severe impact. In order to give a realistic idea of the threat of

life events, the impact given was assigned weights of 4, 3 and 2 for events occurring within 4, 8 and 12 weeks from the point of onset. Events outside the 12 week period was not assigned any weights at all.

3. *A Social Adjustment Scale (SAS)* which is a structured interview to assess psychosocial stress. This scale was originally devised by Paykel et al (23) to assess the social adjustment of depressed women. It is however also an assessment of psychosocial stress experienced by the individual as a result of the interaction of the environmental pressures and his own personal responses (24). It can therefore be considered an indirect measure of the manifestation of Type A behaviour. The SAS Scale measures adjustment in the areas of Work role, Social and leisure area, Extended family (including relations not staying with the subject), Marital role, Parental role, Family unit (taken to be the nuclear family unit). Scores range from 1 to 5 with higher scores indicative of psychosocial stress. The average of scores in all the areas is then calculated to give a measure of overall adjustment or the overall stress he is facing from the various areas listed above.

All results obtained from both measures of Life Events (LE) and the Social Adjustment (SAS) are subjected to a non-parametric one-way analysis of variance test (ANOVA) each to determine their statistical significance.

RESULTS

1. *Life Events*

The mean number of life events experienced by both patients and controls in the six months prior to onset (LET) and the number of events within 4 weeks (LE4), 8 weeks (LE8) and 12 weeks (LE12) prior to onset are tabulated in table 1. The calculated means of weighted impact are also given together with their F value and its significance. The results are also presented graphically in the bar-chart in Figure 1.

Cardiac patients therefore experienced a significantly higher number of life events compared with controls both within a six month period and four weeks prior to infarction. There is not only an excess of life events during the six months period before onset, but there is also an excess of events immediately preceding the infarct which have the effect of pushing the patient into the brink of ill-health. The mean scores of patients on weighted impact is also significantly higher than that of controls and this would indicate that not only cardiac patients have an excess of life events, but also the life events they experienced were also more severe in nature. Thus the combined weight of the stress of the number of events and their severe impact caused the cardiac patient to be unable to cope resulting in decompensation and myocardial infarction.

TABLE 1
MEAN NUMBER OF LIFE EVENTS AND THEIR IMPACT ON PATIENTS AND CONTROLS

	Patient	Control	F value	P
LE4	1.83	1.08	4.48	0.05
LE8	2.58	1.67	3.30	n.s.
LE12	3.00	2.25	2.30	n.s.
LET	4.50	3.17	5.03	0.03
Impact	43.75	18.92	5.12	0.03

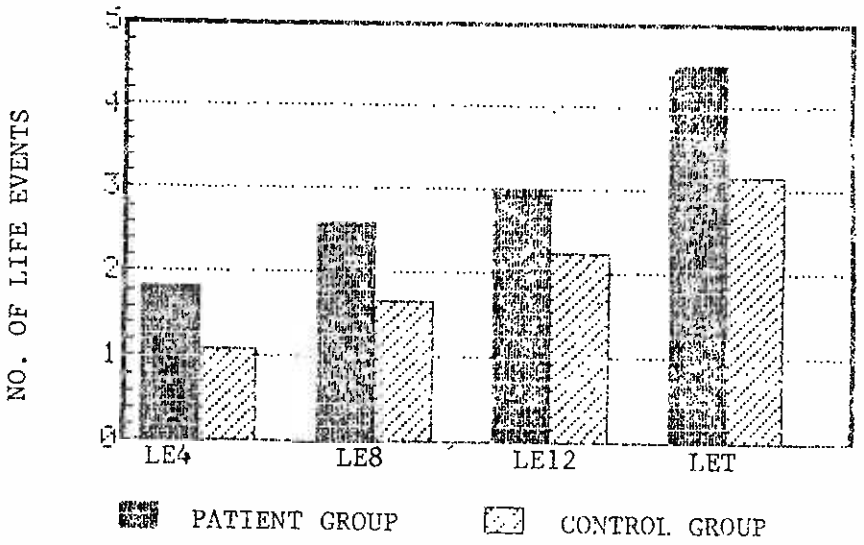

Figure 1: MEAN NUMBER OF LIFE EVENTS EXPERIENCED BY BOTH PATIENTS AND CONTROLS

2. *Social Adjustment Scale.(SAS)*

The mean scores of both patients and controls on the SAS in the various areas of social functioning, together with their F values and significance level are listed in Table 2.

From the above it can be seen that patients experienced more psychosocial stress than controls in relation to work, leisure and extended family ($p < 0.001$). As far as work is concerned, the difference is highly significant ($p = 0.0004$) and very much in agreeement with the literature which indicated that work stress is a major factor in the genesis of infarcts (8, 17). The stress experienced in the family unit is also significantly higher than controls ($p = 0.03$) while in their marital and parental role, the stress experienced is not significantly higher. Overall, the psychosocial stress experienced by patients is very significantly higher than that of their matched controls ($p < 0.0001$).

A logistic regression analysis was carried out on the total number of life events (LET) and the overall SAS scores of both patients and controls with the presence/absence of infarction as a dependent categorical variable. The result of the analysis is detailed in Table 3.

From the analysis, it is obvious that the SAS score is a good predictor of a potential infarct ($p < 0.05$) when compared to life events. Surprisingly life events did not appear to predict the onset of an infarct. This is perhaps understandably so, for life events are but a particular type of stress experienced by all unlike the SAS score which is more like a composite measure of environmental pressure and personality attributes. Hence a potential infarct is more likely to be predictable from high psychosocial stress reflected in the SAS score than in the number of life events experienced.

TABLE 2
MEAN SCORES OF PATIENTS AND CONTROLS ON THE SOCIAL ADJUSTMENT SCALE (SAS)

	Patient	Control	F value	P
Work Role	2.12	1.30	17.19	0.0004
Social and Leisure Area	2.56	1.61	12.67	0.001
Extended Family	1.95	1.36	14.52	0.001
Marital Role	1.84	1.52	1.32	n.s.
Parental Role	1.79	1.31	2.99	n.s.
Family Unit	1.86	1.19	5.53	0.03
Overall Scale	3.03	1.69	26.47	0.0001

TABLE 3
LOGISTIC REGRESSION OF SAS AND LET SCORES ON PRESENCE/ABSENCE OF INFARCTION

Source/Effect	β estimate	Chi-square
Intercept	− 15.32	4.98*
SAS	5.70	3.91*
LET	0.72	1.87

* $p < 0.05$

DISCUSSION

From a review of research done in the west on social causes of coronary heart disease, Eyer (25) was able to confidently assert that "broad social forces are its main causal factors." This sum total of psychosocial stress experienced by cardiac patients accounted far more in excess of the general population than all the other physical risk factors put together (6, 8). Hence it is important that we are able to elicit and identify the psychosocial risks involved. In our study here, we have used two measures of psychosocial stress, namely life events and social adjustment.

While most authorities would agree that cardiac patients generally have an excess of life events, they disagreed on the significance of this excess. Thus it has been held that life events interact with other factors such as controllability, predictability and social support to produce its effects (3, 4). If so, this would account for our findings that although life events are significantly higher in cardiac patients, its predictive value is non-significant. But the elicitation of life events has its value. Ell et al (26), for example, has demonstrated that increased stressful life events is associated with poor recovery due possibly to other mediating mechanisms. Because of this Theorell (27) suggested a routine interview for life events for two reasons:

1 it is therapeutic for the patient to discuss the events that took place before his/her onset of illness.
2 preventive action can be taken if a particular life event is consistently associated with cardiac disease in a particular population.

The Social Adjustment Scale has been demonstrated in our study here to discriminate highly between cardiac and normal controls and is also predictive of a potential infarct. It therefore serves a useful function in psychosocial stress assessment particularly when some forms of Type A measure are sometimes not accurate or meaningful. It has also the merit of assessing several areas at one time so that we do not have to resort to sophisticated measures of work, marital and other social stressors (6, 8). In our study, stress manifested in the areas of work, leisure and extended family appeared to be the more significant, while marital stress appeared to be not a factor although other studies have implicated marital dissatisfaction as a source of stress (15). Whether the pattern of significant differences in the area of work, leisure, extended family and family unit in our present study is an artefact because of the smallness of our sample requires to be tested by further and larger studies. Perhaps marital and parental role stress do indeed play a part in our society but is not elicited here. Only a full scale epidemiological study of psychosocial stress will be able to demonstrate the patterns of stress faced by both the general public and cardiac patients in particular. But there is, no doubt, that considerable psychosocial stress experienced by the cardiac patients is far in excess of normal controls. There is therefore a case for the assessment of stress, if not for the therapeutic effect outlined above, then certainly for preventive purposes.

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