Stress, Anger, Hostility and Locus of Control as Risk Factors for Acute Myocardial Infarction

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Abstract— Currently ample research proof exists that proves the fact that biological factors are very vital but cannot solely elucidate the entire variance for Coronary heart disease. Epstein [1] documented that classic, traditional or reputable risk factors only explained 50% of variance for CHD and residual 50% still needs to be explored by researchers. It is clear now, that far less attention has been given by researchers from varied fields to investigate psychological risk factors, although copious proof exists that psychosocial risk factors in some cases bestow more if not alike risk to clinical or demographic risk factors for CHD [2], [3]. Objective of present study is to assess whether stress, anger, hostility and locus of control are psychological risk factors for acute myocardial infarction, and also to find whether these psychological factors differ in cases with CHD and their controls.

Method: Case control research design was used to conduct the present study. It was hypothesized that there is significant connection between psychological factors (stress, anger, hostility, locus of control) and risk for Myocardial Infarction. Patients with acute AMI (both male and female), age ranged 45 to 65 years were included in the study. Controls from the community were matched for age and gender up to 5 years. Cases and controls were recruited in the study through the purposive sampling technique. Structured tools were used to measure study variables; The Perceived Stress Scale (PSS) [4], anger was measured by State-Trait Anger Expression Inventory (Trait Anger) [5], hostility was measured by items from PDS & PDS-R Bedford-Foulds Personality Deviance Scales [6] and Locus of Control. Locus of control was assessed by responses to six items that have been used expansively in studies conducted in east of Europe [7].

Results: from the study point that there exists significant association between locus of control and hostility with AMI. Furthermore significant differences on all factors were observed between cases and controls.

Conclusion: Identification of psychological risk factors will help in laying grounds for formulating preventive strategies as well as setting foundations for psychological rehabilitation for individual at risk for acute myocardial infarction. The long term focus of this present research will be to give new direction for Psychocardiology in Pakistan.

I. INTRODUCTION

Coronary Heart Diseases (CHD) affects people in their most productive years, hence affecting their capacity to earn, and further bear the medical cost of the disease.

The leading cause of death estimated globally in 2030 is projected to be CAD (Acute myocardial infarction) [8]. Coronary
Heart Disease claims more lives each year than next five causes of death collectively [9].

Though, it is interesting to note that the trend in mortality from C H D has been decreased since mid 1960’s in developed countries [10]. However no such drift is seen within the countries with developing economies. The decline in cardiovascular indicates that the major cause of mortality is controllable. By year 2020, CHD is projected to be the number one reason of death worldwide [11]. Role of psychological risk factors has now been much recognized by global research on cardiovascular disease [12],[13],[14],[15]. Stress has found to be associated with MI [3],[16], [17],[18].

Besides stress psychoanalytical and psychodynamic research literature has acknowledged role of anger, hostility, aggressiveness with heart diseases and hypertension [19]–[21]. Basically two sub components of type A, anger and hostility were found to be associated with CHD [22]–[24], [25].

For more than one decade researchers have found locus of control as a significant risk factor for diseases, especially related to heart. Locus of control construct originated from the work of Rotter’s social learning theory [26]. Since then many researchers found that Coan and James, Woodruff, and Werner found that individuals with internal locus of control attempt to overcome health damaging behaviors more rapidly than externals [27], [28]. INTERHEART researchers in their case control study found that individuals with perceived control over their environments are found to be protective for AMI [7].

A. Aims and Objectives of the Study

Aim of present study is to assess whether stress, anger, hostility and locus of control are psychological risk and protective factors for acute myocardial infarction. Present study will help to identify cardiovascular psychological risk factors for myocardial infarction with acute onset, so to efficiently target high risk candidates of cardiovascular disease for preventive measures.

B. Justification and Likely Benefits

This research will provide new vision for emphasis on education and counseling about potential psychological risk factors for AMI for public at large

This information can help lay foundation for primary as well as secondary preventives strategies. It will lay grounds for psycho-cardiology in Pakistan.

II. METHODOLOGY

A. Hypotheses

There is significant association between high level of stress and risk of AMI.

There is significant association between high level of anger and risk of AMI.

There is significant association between high level of hostility and risk of AMI.

There is significant association between high level of locus of control and lower risk of AMI.

B. Secondary Hypotheses

There is significant difference on stress between cases and controls.

There is significant difference on anger between cases and controls.

There is significant difference on hostility between cases and controls.

There is significant difference on locus of control between cases and controls, locus of control of controls will be higher than that of the cases.

C. Research Design

Case control research design was employed for the present study.

D. Sample

Patients with acute AMI (both male and females), aged between 45 to 65 years were included in the study. Controls were
community based and matched for gender and age up to an age of 5 years.

1) Inclusion criteria for Cases diagnosed with (AMI): Currently patients who have been hospitalized and given a confirmed diagnosis of AMI by the cardiologist in charge; diagnosis based on clinical symptoms. Only literate patients who can read and understand Urdu language, and were willing to give consent in a written form were included in the current study.

2) Exclusion criteria for Cases diagnosed with (AMI): Patients not having a diagnosis of any other significant chronic medical illness including: Chronic liver, renal failure, cancer of any kind or having HIV. Women who were pregnant were excluded from the study. Patients who had ever been diagnosed with any psychiatric illness were also excluded.

3) Inclusion criteria for Controls (matched controls): Controls were drawn from the community they were the visitors of the patients aged 45 – 65 years.

4) Exclusion criteria for Controls (matched controls): Blood relatives were not included in the study protocol, beside them individuals with a prior diagnoses of any noteworthy chronic medical complaint including: liver and renal failure, cancer or HIV (AIDS), etc. were also not included in the study. Any individual with a prior or current psychiatric history were also excluded.

E. Sampling Strategy

Purposive sampling was used. Sample was collected from five different hospitals in Punjab particularly designed for cardiovascular diseases and those with a serviceable cardiology unit.

F. Measures

Standardized measures to assess all the psychological variables were included in the study.

The Perceived Stress Scale (PSS) [4] was used to determine stress. It has 10 items and is a four point likert scale. Internal reliability of the scale is α = .84 for national sample.

Anger was measured by State-Trait Anger Expression Inventory (Trait Anger) [5]. Trait Anger (T-Ang) was measured by10 items on a 4 point likert scale

Hostility was measured by items from PDS & PDS-R Bedford-Foulds Personality Deviance Scales [6]. Hostility was measured by 8 items of the four point likert scale

Locus of Control was assessed by responses to six items that have been used comprehensively in studies conducted in Eastern Europe [7].

All scales were translated into national language for use with the national population.

G. Procedure

Institutional consent was taken from five hospitals in Punjab, Lahore. Patients admitted for AMI both male and females aged between 45 and 65 were asked to participated in the study. Controls taken from the community were matched for age and gender. Psychological tools to assess stress, anger, hostility and locus of control were administered to both cases and controls. Demographic information was taken by a brief self constructed questionnaire. Psychometric properties of the translated tools were predetermined with the help of a pilot study. Reliability coefficients for each study variable were calculated separately for the study measures.
### TABLE I
MEAN DIFFERENCE BETWEEN PATIENTS DIAGNOSED with AMI and THEIR MATCHED CONTROLS on STRESS

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases (n=75)</td>
<td>33.90</td>
<td>18.11</td>
<td>4.6</td>
<td>148</td>
<td>.001**</td>
</tr>
<tr>
<td>Controls (n=75)</td>
<td>21.33</td>
<td>15.21</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$t = 4.6, df = 148, * * p \leq .01$

### TABLE II
MEAN DIFFERENCE BETWEEN PATIENTS DIAGNOSED with AMI and THEIR MATCHED CONTROLS on ANGER

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases (n=75)</td>
<td>28.90</td>
<td>4.566</td>
<td>6.17</td>
<td>148</td>
<td>.000**</td>
</tr>
<tr>
<td>Controls (n=75)</td>
<td>22.66</td>
<td>7.467</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

$t = 6.17, df = 148, * p < 0.01$

### TABLE III
MEAN DIFFERENCE BETWEEN PATIENTS DIAGNOSED with AMI and THEIR MATCHED CONTROLS on HOSTILITY

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases (n=75)</td>
<td>26.45</td>
<td>8.3</td>
<td>3.47</td>
<td>148</td>
<td>.003**</td>
</tr>
<tr>
<td>Controls (n=75)</td>
<td>21.63</td>
<td>8.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$t = 3.47, df = 148, * * p < 0.01$

### TABLE IV
MEAN DIFFERENCE BETWEEN PATIENTS DIAGNOSED with AMI and THEIR MATCHED CONTROLS on LOCUS of CONTROL

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases (n=75)</td>
<td>16.88</td>
<td>6.61</td>
<td>3.78</td>
<td>148</td>
<td>.002**</td>
</tr>
<tr>
<td>Controls (n=75)</td>
<td>11.15</td>
<td>5.43</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$t = 3.78, df = 148, * * p < 0.01$

### TABLE V
FORWARD STEPWISE BINARY LOGISTIC REGRESSION. PSYCHOLOGICAL VARIABLES INDEPENDENTLY ASSOCIATED with AMI

<table>
<thead>
<tr>
<th>Variable</th>
<th>B (S.E.)</th>
<th>Exp (B)</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>16.77***</td>
<td>(3.66)</td>
<td></td>
</tr>
<tr>
<td>Locus of Control</td>
<td>-1.90***</td>
<td>(0.41)</td>
<td>0.14 (.06 - 0.33)</td>
</tr>
<tr>
<td>Final Model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>19.19**</td>
<td>(5.17)</td>
<td></td>
</tr>
<tr>
<td>Hostility</td>
<td>0.42**</td>
<td>(0.14)</td>
<td>1.52 (1.14 - 2.02)</td>
</tr>
<tr>
<td>Locus of control</td>
<td>-2.70***</td>
<td>(0.69)</td>
<td>.06 (0.01 - 0.259)</td>
</tr>
</tbody>
</table>

Note. *p < .05. **p < .01. ***p < .0

A Binary logistic regression analysis was performed by using forward conditional method, with IHD as the DV and psychological variables (perceived stress, anger, hostility, and locus of control) as predictor variables. A total of 105 cases were analyzed and the full model significantly predicted presence of IHD (Omnibus chi-square =111.12, df =2 , p <.001). The model accounted for between 65% and 87 % of variance in IHD.

### III. DISCUSSION

The purpose of present study was to find association of several psychological factors i.e. stress, anger, hostility and locus of control with AMI. Overall result from the study showed that patients with MI had more stress, anger and were significantly more hostile, and had less perceived locus of control as compared to their age and gender matched controls. Results from the current study are much in line with the work of international researchers, many researchers have found significant differences between the cases and controls on all these psychological constructs [7] [29].
Relationship between stress and AMI has been proved by many researchers globally [30]–[32]. However, some conflicting findings exist in this regard. In a research undertaken by Ramochandruni et al., [33] documented that stress was not a significant risk factor for AMI within the national population; however significant differences were noted between cases and control group.

Social support has found to have buffering effect for stress [34], [35], and people within the indigenous culture enjoy greater social support. Cases as compared to controls in the current study reported more anger and hostility. Though in the binary logistic regression analysis hostility only survived the level of statistical significance. Results of the current study are much in line with the work of earlier researchers, and ample evidence from researches carried out globally have identified that hostility is a significant risk factor for AMI [36] [37] [38] [39] [40] [41].

Though hostility was found to be a significant risk factor for AMI within the national population anger did not reach statistical significance in the model constructed to ascertain risk and protective factors for AMI. Current study measured trait anger and already inconclusive research evidence exists regarding trait anger as a risk factor for AMI. Trait anger has found to be a significant risk factor AMI by some researchers [42], [13] but others have failed to find a significant association [43][44]. Further research in this area on the national population is warranted; longitudinal and prospective studies can help identify the true association, if there exists any between trait anger and AMI.

Significant differences were found between cases with AMI and their age matched controls on perceived locus of control, and locus of control was found to be significant protective factor of MI in our study. Results of the current study are in line with much of the work of earlier researchers [7] [45] [46]. Research on the relationship between locus of control and health-facilitating behavior as a whole, point toward internal locus of control as a mediating factor of actions taken to prevent health problems and responsible in indulgence in health facilitating behaviors [47] [48].

The current research like any other research also has certain limitations. Sample size was small and the sample was taken from only five hospitals situated within Lahore city, which may not be considered as a true representative of the whole population. Secondly many other well established risk factors known as traditional risk factors like smoking, obesity, etc. were not studied in this research. Furthermore one case per control was recruited that was age and gender matched, ideally at least two controls per case are recommended for a case control study design.

With all its limitations the study hold imperative implications for designing psychological assessments and interventions for patients diagnosed with AMI. The study can be considered as a forerunner for designing further studies focusing on psychosocial risk factors for MI in countries with developing economies like Pakistan.

REFERENCES


