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PSYCHOLOGICAL RISKS FOR CORONARY HEART DISEASE (CHD) - A CASE - CONTROL ANALYSIS

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The focus of this study is to evaluate the relative risk of negative psychological states in predicting the cardiac status. Using a case - control design on a random sample of 186 cardiac cases and 138 controls the biomedical and psychological risks were evaluated. A single discriminant function characterised by Trait Anger and Hostility emerged. This function could positively discriminate the cases from controls. Further, the logistic Multiple Regression analysis revealed that higher Trait Anger scores (<22) and high Hostility score (<9) significantly increases the risk for the coronary status. The relative risk for psychological variable increased when all other traditional factors were statistically controlled.

The research into the personality and psychological factors could improve our ability to predict the outcome and management of diseases, so as to intervene and potentially prevent its occurrence. Identifying risk factors have become primary priority in health research. Based on a review on 409 studies, Sussman and colleagues (1996) have identified psychological characteristics such as beliefs, attitudes, behaviour patterns as main risk variables used in studying physical health and disorders and a shift towards functional factors rather than structural factors in risk analysis.

Epidemiological studies, very marginally, focus on the psychological characteristics in the onset and progress of cardiovascular diseases. Both retrospective and prospective studies have shown a predictive model where age, total serum cholesterol, systolic blood pressure, smoking behaviour, obesity and physical activity are introduced in a multiple logistic equation, can detect population groups with large differences in the risk for coronary heart diseases [CHD]. But not all the diffeences in the risks for CHD is explained by these factors. One of the first discoveries in bio behavioral research on CHD was that the traditional risk factors explained only 50 percent of the variance in CHD (2) and Psychosocial factors directly or indirectly contribute to the occurrence of CHD.

One of the most researched aspects of personality disease link is the Type A Coronary prone behaviour. In recent years the emphasis is on the "Toxic" component of Type A which are charecterised by Repressed hostility and anger (3) in the onset of CHD Intervention studies in modifying Type A Style of functions and negative emotions have shown a relationship between changes in psychological status and CHD outcome. Psychosocial vulnerability theory of health suggests that individuals with lower social support; higher interpersonal distress, greater depression and high life events are susceptible to the onset of CHD (4). Studies have also pointed out that hostile cognition and emotional states can lead to hostile environment and poorer health habits and compliance. The psychosocial factors are in fact linked to the biomedical risks (5,6,7).

The most recent evidence is gathered by Amsterdam Growth and Health Study (8), who have found a moderately strong relation with personality characteristics and biological risks. The specific traits investigated were "social inadequacy and Dominance". Deullot and his colleagues (9) have identified a Type D personality disposition (the tendency to suppress emotional distress) as a significant predictor of long term mortality in CHD, independently of established biomedical risks. Several lines of evidence, using different tools and designs, have found, what a statistician calls, a "moderate correlation" between psychological states and the disease onset and progress. But there is a need for understanding how definite and large a role the psychological variables play in Coronary Heart Diseases.

This case control study, focus [attempts] to understand the relative importance of specific psychological factors in enhancing the probability of a cardiac condition.

METHOD

Sample A case control design was used to understand the personality determinants of coronary status. The cardiac patients were selected from the Cardiology Units of Apollo Hospitals, Madras Medical Mission and Thillaivallal's Heart Care Centre all based at Chennai.

The following criteria were set up for inclusion in the case group:

i. A definite diagnosis of coronary artery disease.
ii. Both male and female patients in the age group of 30-70 years were included.
iii. Those who had other heart conditions such as Rheumatic heart disease, cardiomyopathy, valve dysfunction were excluded from the case group.
iv. Those patients satisfying above criteria under medical supervision constituted the case group.

The control group was uniformly matched with the case group for age, sex and occupational status. In addition, the following criteria were set up.

1. The control group subjects must be free from a diagnosis of cardiac condition such as myocardial infarction, angina pectoris etc.
2. They must be free from any other known degenerative conditions such as cancer, ulcer, asthma etc.
3. Though the cardiac risks in these subjects could not be directly assessed, people who were relatively free from diabetes & hypertension were included.
4. Only those subjects satisfying above clinical criterion and within statistical norms were selected for the control group.

Table 1 Showing the distribution of the two samples.

		Cardiac group	Noncases
		N=186	N=138
SEX	Males	130	85
	Females	56	53
Non graduates		127	26
Graduates		41	64
Professionals		18	48
Mean Age		56.32	46.50
SD		10.92	11.79

Tools The cardiac and control groups were assessed individually on the following variables:

a. Anxiety State and Trait using Speilberger's State Trait Anxiety Scale (10).
b. Anger experience and expression - Speilberger's State Trait Anger Expression Inventory (11).
c. Hostility - Overt Hostility Scale extracted from MMPI by Schultz (12).
d. Type A behaviour pattern - Bluementhal's Type A Screening Inventory (13).

Data Analysis The data obtained on a sample of 324 subjects (186 cardiac patients and 138 control subjects) were analysed using Descriptive Statistics and multivariate analysis. Logistic Multiple Regression Analysis was carried out to understand the relative risk of personality factors determining cardiac condition.

RESULTS AND DISCUSSION

Age and sex The cardiac group had a higher mean age range of 56.32=10.92 years. The Non case group were younger with a mean age of 46.50+11.79 years. This reveals the higher prevalence rate of CHD among older subjects. This representation confirms the earlier evidence (14.15) in India where the incidence rate progressing with age and higher incidence in the age range of 46-66 years. Though, in this study, care has been taken to include equal representation of gender the prevalence rate is higher among males compared to females. (69.9% males and 30% females).

Education and Occupation There were more highly educated persons in the Non case group than in the case group. The control group were gainfully employed compared to the cardiac cases. This difference in the educational and occupational status though could not be controlled, they are considered to play a role while interpreting psychological factors and also cardiac status.

Discriminant function Analysis The Psychological variables on these groups were measured, and tested for their power to discriminate and classify the cases and controls . A single factor emerged significantly contributing to classification.

Table 2 showing connonical Discriminant function on the psychological variables.

Variables	Single Function Correlation Coefficient	Naming the Function
Trait Anxiety	0.57	Emotional Reactivity
State Anxiety	0.51	
Hostility	-0.46	
Anger state	0.35	
Anger trait	-0.29	
Cardiac cases	-0.85	
Non cases	0.87	

The variables significantly positively related to the function were generalised anxiety (0.57), anxiety state (0.51), irritablility state (0.35) or anger state.

Hostility and generalised anger experience had a significant negative correlation with the function with a contribution of 46% and 29% of variance respectively. The cardiac group had A negative association (-0.85) with the function, however the Non cases were positive (0.87) on the same Function. 78.40% of the sample were correctly classified hased on this function with the cases being low in the function (-0.85).

Negative relation of hostility and trait anger on this function shows that they are predictors of the cardiac condition. The Mean hostility score 6.35+2.33 in case group was significantly higher than 4.82+1.85 in control group. The function was named as Emotional Sensitivity and Reactivity, where anxiety trait, state and state anger relating to sensitivity component whereas trait anger and hostile reactions determining the emotional reactivity.

The findings in this study demonstrate the role of negative emotional factors such as Anger and hostility as a major variable possibly associated with coronary condition. Type A personality hardly had any role differentiation in the group.

The function named as emotional reactivity reflects that cardiac patients are more reactive, either suppressing their reactions to situations or showing through cardiac symptoms (sympathetic activation), even though they reflect a relatively stable state of arousal as measured through other dimensions.

The findings support the evidences at Duke University, Mohan Wemrepery et al. (1997) reflecting the role of Anger and hostility in relation to cardiac condition. The findigs confirm the role of all other traditional factors as risks. The concept of Type A as a predictor of coronary disease is negated in this study, adding further support to the evidence on this line.

Risk analysis Risk is a term usually associated with estimating the probability of some events styles or habits in relation to occurrence of a disease and illness. The risk factor in this study is defined as an attribute that is associated with specific clinical condition and not necessarily a causal factor.

Table 3 Showing the clinical features of the group and risk values.

Variables	Categories	Case Group Frequency	Control Group -Frequency	Relative Risk
Family History	Positive	69	89	0.26
	Negative	113	49	
Food Habits	Non-vegetarian	99	43	1.49
	Vegetarian	83	95	
Smoking Behaviour	Smoker Ex-smoker	67	89	0.61
	Non-smoker	115	49	

Physical Activity	Sedentary	74	28	1.46
	Active	108	110	
Hypertension	Hypertensive	94	25	1.80
	Normotensive	88	113	
Diabetic Condition	Diabetic	70	12	2.48
	Non-diabetic	66	126	

The clinical risk factors were analysed to understand the relative risks of each of the variables in the case and control group. For calculating the risk values for biomedical factors cut off points were chosen based on clinical criteria. The results showed that a diabetic condition (RR 2.48), hypertension (RR 1.86), non-vegetarian food habits (1.49) and sedentary life style (RR 1.46), predicted the probability of being in a cardiac condition. The findings confirm the traditional biomedical risks for coronary conditions in India.

Table 4 Showing the risk index for clinical factors

Clinical Variables	Odds Ratio	Confidence Interval
IV Blood Pressure (Hypertensive)	2.7	96%(0.04)
III Blood Sugar (Diabetic)	5.2	99%(0.002)
II Gender (Being a male)	5.5	99%(0.01)
I Smoking (Smoker & ex-smoker)	7.35	99%(0.0002)

The smoking behaviour increases the odds becoming a cardiac case 7 times, being a male increases the odds 5 times; in addition to having a diabetic condition increases the risk 5 times, however being a hypertensive increases the odds of being at risk only two times.

To assess the psychological factors contributing as a risk the statistical criteria was chosen. A score above 75th pecentile in hostility scale and anger scale was considered as cut off scores.

Table 5 showing the relative risk scores on psychological variables.

Psychological Variables	Odds Ratio	Confidence Interval
Anger Trait (Scores above 22)	5.49	99%(0.01)
Hostility (Scores above 9.29)	12.13	99%(0.01)

Table 6 showing the classification of groups - prediction based on the Logistic Model:

Observed	Predicted Controls	Cases	Percent Correct
Controls	122	16	88.41%
Cases	15	167	91.76%
		Overall	90.30%

An individual with a generalised tendency to be angry or a low threshold for provocation will have 5 items risk for coronary heart disease. However, a hostility score greater than 9 increases the risk 12 times for a cardiac condition. Based on this logistic model, the predicted population group of cases and controls showed an overall 90% accuracy.

Results of the present study indicate the function of emotional reactivity reactivity, cynical attitude and resentment as predictor of coronary condition. The Logistic regression model also suggests the possible association of psychological factor specifically anger and hostility in coronary status. Though this is a retrospective study, the evidence obtained indicates incorporating personality factors in developing educational, counselling programs both in cardiac health promotion and cardiac rehabilitation can enhance the effectiveness of the program.

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