

RISK FACTORS ASSOCIATED WITH CORONARY HEART DISEASE: AN ANALYSIS OF WHAT PREDICTS THE MOST?

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All the authors contributed significantly to the research that resulted in the submitted manuscript.

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ABSTRACT

Objective: To identify the most contributing group of risk factors associated with CHD.

Methodology: This retrospective cross-sectional study was conducted from March 2014 to May 2015 at Cardiology Centre Multan. Various risk factors were grouped and studied in major six categories at one time to identify the most contributing risk factors in progression of CHD. The major risk factors were categorized into six groups; individual, psychosocial, dispositional, life-style, acute and chronic stressors and work-related risk factors. Data was collected on a booklet comprising measures of all risk factors rated on continuous and categorical variables.

Results: About 204 male patients were included. Findings from regression analysis demonstrated that age ($B=0.11$, $p<.05$), depression ($B=0.27$, $p<.001$), anxiety ($B=0.20$, $p <0.01$), stress ($B = 0.13$, $p < .05$), low social support ($B=0.23$, $p<.01$), Type A behavior ($B=0.17$, $p .05$), and work-related stress ($B=0.27$, $p<.01$) were the major predictors of CHD. However, the group of psychosocial risk factors was identified as the most leading predictor ($R^2= .31$, $p > .01$) as whole for CHD than the other groups of risk factors.

Conclusion: Findings indicated that individual risk factors depression, anxiety, stress, low social support, Type A behavior, and work-related stressors are the major risk factors to CHD.

Key Words: Coronary Heart Disease, Psychosocial Risk Factors, Type A Behavior, Life-style Patterns

INTRODUCTION

Coronary heart disease (CHD) also known as coronary artery disease is one of the most principal health concerns of present century, and the most significant reasons of death in any society.¹ Coronary disease is basically a formation of plaques in the major coronary arteries which is a chronic and progressive condition. Usually the progression of atherosclerosis commence on the second or third decade of life, but the disease generally does not trouble males unless they are of 40s or 50s and females even later.² In contrast to developed countries where this disease afflict people in the sixth decade of their lives, in developing countries like in Pakistan, people are exposed to this disease during the fifth decade of their lives.

Since over the last 40 years, a decline rate in deaths from coronary disease has been observed due to the advancement in treatment and an increase in people health awareness, occurrence ratio of coronary disease still stay unchanged, signifying that we have contributed little to preclude the start of coronary disease. No doubt an extensive literature review is already available on investigating the biological, psychological, social, and life styles risk factors in CHD, but it is still in thrust to explore the most significant predictor amongst the all types of factors. Several studies have indicated that psychiatric and psychosocial risk factors play a very significant role in the etiology, progression, duration, and outcome of CHD.³ While other various studies propose that psychological factors and life styles are the independent risk factors and contribute significantly in CHD. Depression, anxiety, and stress. Are the most prominent factors.^{4,5,6,7}

Generally the onset of CHD begins at the age of late 50s in life and the men exposed to CHD earlier than women.² The premenopausal period in females is a main aspect of CAD. Though this feature in females is sometimes called as female protection, it is more appropriately described as a delay in the onset of CHD.⁸ The impacts of estrogen are considered as contributor for gender difference in CHD and atherosclerosis.⁹

Depression has been evidenced to be a risk determinant in the etiology of CHD especially following acute coronary syndrome.^{5,10} Depression is common among CHD patients; there is ample evidence that prevalence of depression is 20% higher in patients with heart failure than in healthy individuals.¹¹ Previous researches indicated that depression is a disorder that results in an increase in cardiovascular diseases, morbidity, CHD mortality, and readmission to hospital.¹⁰

Anxiety has been found as another risk factor in progression of CHD in most of the studies. Though literature review confirmed that anxiety affects the prognosis adversely in CHD patients independent of depression, the part of anxiety

as an etiological risk factor still needs to be further established.¹² In a meta-analysis, the link between anxiety and the risk factors of CHD was studied, and anxiety was declared as an independent risk factor for CHD and cardiac mortality.⁴ However, the connection between anxiety and CHD was somewhat smaller than the consistent link between depression and CHD.

Stress like depression and anxiety is also a negative factor in CHD. The association between stress and cardiovascular disease is not as simple, however evidence suggests a connection between the mind and heart.¹³ Most of the researchers are agreed upon that a number of variables are consistently considered as elements of stress such as depression, anxiety, lack of social support, social isolation, negative life events, personality type A, hostility, and work related stressors.¹⁴

Several studies evidenced that social isolation and lack of social support are the predictors of beginning and development of CHD, and also the risk factors for CHD mortality among both gender. However, the rate is high for males than females.^{15, 16} This connection of CHD with low social support and high social isolation has been found more consistent in people living in different countries and of different ages.¹⁵

Type A behavior pattern, mainly characterized by anger and hostility, time urgency, intense desire for success, competitive drive, and constant preoccupation with deadlines, was associated with the progression of CHD. Studies have provided the affirmation that higher the levels of anger and hostility, higher the rate of mortality due to CHD.¹⁶

The people life styles including smoking, drugs, high-fat diet, physical inactivity, poor adherence to medication are the major risk factors associated with CHD. Literature provides the supportive account on the behavioral pathways to CHD that are low physical activity, smoking, substance use, high-fat and high-carbohydrate diets, and poor adherence to medication, and loneliness. One's life styles and behavior patterns are connected with onset of clinical depression and anxiety.¹⁷

A number of researches have reported that there is a strong positive relationship between acute and chronic psychological stressors CHD.¹⁸ Acute stressors such as earthquakes, trauma, flood, negative life events such as loss of a child may cause death.¹⁹ Case studies and many anecdotal reports have demonstrated an association between acute stress and the onset of cardiac disease. Moreover, various epidemiological investigations conducted on natural and life events have well supported the impacts of acute stress on heart disease. The bereavement is the most common acute stressor linked to high rates of prognosis of cardiac failure.²⁰

The work related environment and job characteristics are also another group of risk factors associated with CHD. High job demands, low job autonomy, low decision making, and job strain are the risk factors associated with increased levels of CHD.²¹ A study indicated the adverse relationship between work related stressors and risk of coronary heart disease among males and females with low job control.²²

An extensive previous literature available on exploring the risk factors of CHD indicate that several agents of life are playing individual role in the development of CHD. However this is difficult to decide from this review of literature that which factor is most significant predictor of CHD. This study, therefore focused exclusively on analyzing all groups of risk factors in one time in a sample of patients with CHD. To achieve this objective, we first, have categorized the risk factors in different groups and then studied to examine the most prominent predictor.

METHODOLOGY

This study was completed with CHD patients within a period of 14 months from March 2014 to May 2015 at Cardiology Centre of Multan. All the participants were selected through convenient sampling technique wherein subjects are approached on the basis of availability and willingness of participants.

Patients provided information on the following data collection tools. Coronary Artery Disease Symptoms Checklist (reference, 2015) was used to check the level of severity of symptoms of CHD.²³ Gender, age, marital status, and socioeconomic status were asked in this group of risk factors. Socioeconomic status was categorized as low=1 (up-30,000/), middle=2 (30,000-100,000), and high=3 (100,000-above). Depression, anxiety and stress were measured using a 12-item. Depression, Anxiety, and Stress Scale rated on 0-3.²⁴ Perceived social support was assessed through a 12-item Perceived Social Support rated on 1-7.²⁵⁻²⁸ Type A behavior pattern was measured using a 12-item Type A Behavior Pattern Scale rated on 0-1.²⁶ To measure life style risk factors, the information was collected on the use of smoking, drugs, high-fat diet, and physical inactivity. In the present study, acute and chronic stressors were asked in the form of any losses in business or in other domains and death of any dear one. The 8-items Workplace stress scale rated on 5-point likert scale was used to measure the work-related stressors.²⁷

Prior to approach the cardiac patients, an institutional permission and informed consents were obtained to collect the data. A booklet containing all questionnaires and information was administered to the CHD patients. Researchers personally collected data from patients in hospital by asking the questions verbally. Respondents were assured about the confidentiality of their responses. Collected information then was analyzed using SPSS-20 at

0.05 level of significance.

RESULTS

A correlation analysis was performed to see the relationship between different variables of 204 patients of CHD aged

Table 1: Baseline Characteristics and Risk Factors

	Mean	SD	Frequency
Individual Factors			
Gender	--	--	Male=113 Female=91
Age	51.71	20.1	36-45=37 46-55=88 56-65=43 66-75=36
Marital status	--	--	Married=180 Unmarried=24
Socioeconomic Class	--	--	Low=98 Middle=66 High=40
Psychosocial Risk Factors			
Depression	22.24	5.72	--
Anxiety	18.62	7.51	--
Stress	24.53	6.42	--
Low social support	61.41	7.47	--
Dispositional Risk Factors			
Type A behavior	11.01	1.00	--
Life style Risk Factors			
Smoking (for male)	--	--	Yes=86
Drugs (for male)	--	--	Yes=57
High-fat diet	--	--	Yes=135
Physical inactivity	--	--	Yes=183
Acute and Chronic Factors			
Lose in business & others	--	--	Yes=141
Death of dear one	--	--	Yes=101
Work-related risk factors	32.66	4.01	--

Table 2: Correlations Matrix among Risk Factors Associated with CHD

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Individual Risk Factors																	
1	Gender	1															
2	Age	-.12*	1														
3	Marital Status	.17*	-.13*	1													
4	Socioeconomic class	-.02	.19*	.10*	1												
Psychosocial Risk Factors																	
5	Depression	.57**	.32**	.23**	.19*	1											
6	Anxiety	.36**	.26**	.14*	.12*	.46**	1										
7	Stress	.39**	.21**	.26**	.21**	.37**	.19*	1									
8	Low social support	.40**	.28**	.13*	.24**	.41**	.21**	.13*	1								
Dispositional Risk Factors																	
9	Type A behavior	.33**	.19*	.05	.08	.15*	.43**	.07	.11*	1							
Life Style Risk Factors																	
10	Smoking (for males)	.31**	.16*	.02	.29**	.18*	.16*	.10*	.14*	.07	1						
11	Drug (for males)	.19*	.11*	.05	.03	.07	.08	.04	.04	.02	.14*	1					
12	High-fat diet	.15*	.13*	.12*	.06	.12*	.16*	.06	.03	.03	.02	.05	1				
13	Physical inactivity	.22**	.25**	.03	.03	.05	.02	.05	.07	-.18*	.06	.09	-.18*	1			
Acute & Chronic Factors																	
14	Loos in business	.14*	.12*	.02	.02	.23**	.20**	.04	.19*	.05	.13*	.07	.04	.12*	1		
15	Death of dear one	.04	.13*	.04	.05	.15*	.13*	.05	.04	.07	.02	.04	.06	.07	.02	1	
Work-related Factors																	
16	Workplace stress	.31**	.07	.11*	.08	.19*	.17*	.12*	.15*	.22**	.16*	.05	.06	.11*	.18**	.02	1
Severity of CHD		.13*	.21**	.09	.15*	.33**	.31**	.26**	.29**	.23**	.14*	.09	.11*	.16*	.09	.07	.16*

*p<0.05, **p<0.01

between 38-71 years (Table1). Further a simple step wise linear regression analysis was done for the assumed prediction of CHD from individual, psychosocial, dispositional, life style behaviors, chronic and acute stressors, and work related factors (Table2).

Table 1 presents the descriptive statistics and frequency ratio of risk factors to CHD. Findings demonstrate the higher means of psychosocial, dispositional, and work-related risk factors. Analysis of frequency distribution explains that individual factors such as male gender, older age, marital status, and lower class account more for CHD. Life style factors and acute-chronic factors are also found with higher frequency in terms of their existence in CHD.

Table 2 shows the correlation matrix among all groups of risk factors and severity of symptoms of CHD. Results indicate the highly significant positive relationships of psychosocial and dispositional risk factors with CHD. However, the life style behavioral patterns and work-related stressors are also found positively associated with CHD.

Table 3 demonstrates the results from the computation of step-wise regression analyses which was run to examine the six different groups of predictors of CHD including individual, psychosocial, dispositional, life-style patterns, acute and chronic factors and work-related stressors. To achieve the objective of present study, these six groups of predictors comprising further variables were entered one by one into regression pan for six models. Model 1 explains the

Table 3: Step-wise Regression Analysis for Prediction of CHD from Six Groups of Risk Factors

Predictors	Predictors of CHD					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Personal Factors						
Gender	.19*	.17*	.14*	.09	.03	.01
Age	.21**	.18*	.16*	.15*	.12*	.11*
Marital Status	.18*	.17*	.14*	.09	.04	.007
Socioeconomic class	.26**	.23**	.17*	.14*	.12*	.08
Psychosocial factors						
Depression		.37**	.35**	.33**	.29**	.27**
Anxiety		.29**	.26**	.25**	.21**	.20**
Stress		.24**	.23**	.20**	.15*	.13*
Low social support		.34**	.33**	.29**	.26**	.23**
Dispositional Factor						
Type A behavior			.32**	.25**	.21**	.17*
Life Style Factors						
Smoking (for males)				.17*	.13*	.09
Drug (for males)				.05	.01	.003
High-fat diet				.11*	.04	.004
Physical inactivity				.13*	.10*	.06
Acute & Chronic Factors						
Lose in business					.12*	.05
Death of dear one					.04	.001
Work-Related Factor						
Work related stress						.14*
R ²	.22**	.31**	.35**	.37**	.36**	.38**
Adjusted R ²	.19	.28	.31	.32	.31	.34
F-statistics	18.65**	33.91**	21.7**	11.34**	6.32**	13.85**
ΔR ²		.18	.22	.23	.23	.27

*p < = 0.05, **p < = 0.01

role of individual risk factors in CHD and reports 22% of variance in CHD. Model 2 describes the contribution of second group of psychosocial risk factors that explains the 31% of variance in CHD. Likewise model 3, model 4, model 5, and model 6 indicate the significant quantity of variations in CHD as of 35%, 37%, 36%, and 38% respectively.

DISCUSSION

Until the year 2020, the major cause of death will remain coronary heart diseases that are generally caused on account of the deficient blood and low flow of oxygen to the muscles of heart.²⁸ Review of literature has provided the detailed and extensive work on the risk factors of CHD.

Several studies have mentioned the various risk factors contributing in progression of CHD. Different studies have addressed the different risk factors for their individual roles in CHD. Few of them have addressed the gender, age, and genetic factors, while many of them have covered the depression, anxiety, stress, and Type A behavior pattern as risk factors to CHD. Researches investigating the use of smoking, drugs, and high fats have also been found in explaining the causes of CHD. However, some of them also have directed the attention to the job related stress as a significant risk factor for CHD.

Though a rich literature is available to understand the risk factors of CHD, but the present study is one of paramount significance because of studying the all risk factors at a time to explore which one group of risk factors contribute the most in CHD. This study has grouped the risk factors into six categories and has presented a clear picture of most eminent group of risk factors in CHD. It was assumed that patients of CHD will be score high on psychosocial and dispositional factors than the other groups. Results confirmed the assumption and findings from descriptive analysis suggested that psychosocial and dispositional factors of depression, anxiety, stress, and low social support were found higher in CHD patients (Table 1). However, findings also revealed that life style behaviors and work related factors were also associated with CHD (Table 2).

The present study addressed the individual risk factors at first in terms of gender, age, marital status, and socioeconomic class. Findings indicated the significant independent contributions from the individual risk factors in model 1 (22%). However, in the presence of all other groups of risk factors, only the age retained its significant position in model 6. These findings are in consistent with the findings of 113 who presented the evidences that age and genetic factors explain one half of the variance in CHD. Psychosocial risk factors including depression, anxiety, stress, and low social support were included in model 2 and were found highly significant in predicting the CHD. Nowadays, for most of the chronic diseases, the independent risk factors are psychological factors.²⁹ The psychosocial risk factors explained the 31% variance in CHD which is an indication of greater prediction from this set of risk factors than the other factors.

Several researches reported depression and anxiety as common problems that always results in CHD, hospitalization, and mortality in CHD patients.³⁰ Depression is very common among patients of CHD. Most studies empirically confirmed the prevailing of depression among patients having heart diseases.³¹

Psychosocial risk factors are clinically not acknowledged and currently cardiologists consistently express that the psychosocial factors investigated in researches are not

obvious in clinical settings. This may be due to the reason that psychosocial factors are only risks not the rooted causes. However, it is imperative to note that psychosocial factors may be related with some other risk factors such as aggression, loneliness, and lack of autonomy at workplace.³² Most studies have described that anxiety, stress and low social support were also the independent agents of death rate in CHD.³³ Low social support is one of the most risk factor for CHD and can decrease the level of depression during hospitalization of patients.³⁴

The model 3 describing the dispositional factor also illustrated the Type A behavior as a strong predictor of CHD. This finding is in tune with the previous studies that confirmed the impact of Type A behavior as major risk factor for CHD.³⁵ The group of life style risk factors including smoking, drug, high-fat diet, and poor physical activity was studied in model 4. All the factors accounted an increase in the variance of CHD, though it was not that great. Previous studies have supported the findings of present study because most of the studies investigating CHD are centered on the biological and life style risk factors. Evidences from these studies demonstrate that life style factors play eminent role in causes, progression, and the outcomes of CHD.³⁶

The present study has also highlighted the influence of stress resulted from acute and chronic life events in CHD (model 5). Literature demonstrated that acute life stressors can activate the CHD, however, the impact of chronic stressors for prognosis of CHD still needs more investigations.³⁵ Finally, the work related stress was documented in model 6 and a significant account was found from this risk factor in CHD as well.

LIMITATIONS

Beside the very significant findings of the present study, some limitations need to be acknowledged. This study lacks the external validity due to a small sample of patients with CHD approached through convenience sampling technique and the findings cannot be generalized to the other population of this kind. Therefore, it is suggested to replicate the study with a larger sample of CHD.

CONCLUSION

Today, the health psychology recently introduced in the field of psychology, and broadened investigation have supported this matter. Hence, the prevention, treatment, and control can be offered when protective factors and psychosocial risk factors of CHD will be fully understood. This may result in diminishing the risk factors, controlling the expenses of treatment, and increasing the quality of life of patients of CHD. Considering the present findings, it appears absolutely essential that psychological factors should be studied extensively in respect of its treatment that in turn will result in a decrease of CHD and improvement of quality of life of

patients.

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