

# Association of type D personality with cardiovascular disease and its prognosis

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## Author's Contribution

<sup>1,3</sup>Drafting the work or revising it critically for important intellectual content, final approval of the version to be published

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## ABSTRACT

**Objective:** To evaluate the association of Type D personality with cardiovascular disease and its prognosis.

**Methodology:** This cross-sectional study was conducted in department of cardiology, Fazia Medical College, Air University, Islamabad from February 2019 to February 2020. A total of 281 patients with cardiovascular diseases were included. Demographic information and risk factors were noted. Screening for metabolic syndrome was done using international diabetes federation criteria based upon central obesity. The assessment of type D personality was made through DS-14, type D scale, which is the most widely used instrument for type D personality measurement. In which all the 14 items are score on a 5-point Likert scale.

**Results:** There were 77 (27.40%) patients having type D personality, with significantly less mean age ( $45.36 \pm 6.2$  vs.  $53.45 \pm 9.6$ ) in comparison to patients without type D personality. No significant ( $p$ -value  $> 0.05$ ) difference was noted in gender, education, occupation and marital status of the patients having type D personality. The rate of diabetes mellitus (44.46% vs. 37.25%), hypertension (59.74% vs. 47.06%), smoking status (62.34% vs. 53.43%) and metabolic syndrome (48.05% vs. 40.69%) were similar in both groups. The mean values of systolic ( $124.53 \pm 12.35$  vs.  $116.28 \pm 14.30$ ,  $p$ -value = 0.000) and diastolic ( $78.44 \pm 6.92$  vs.  $74.62 \pm 7.48$ ,  $p$ -value = 0.0001) blood pressure were significantly higher in patients having type D personality.

**Conclusions:** A considerable number of cardiac patients in our study had type D personality trait. This trait was more common in younger age and male patients showing raised levels of blood pressure and HDL cholesterol.

**Keywords:** Cardiovascular disease, Type D personality, low HDL cholesterol, Prognosis

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## Introduction

Cardiovascular diseases are one of the major hazards for human life and health with a very high rate of morbidity and mortality throughout the world. More than 50% of the deaths in developed countries are attributed to CVDs. It is becoming an important contributor to mortality and morbidity in underdeveloped and developing countries. Atherosclerosis and its complications are usually the

main cause of cardiovascular diseases. Framingham heart study was initiated in 1948 and it revealed that different parameters were associated with the development of CVD and some of them became established risk factors for CVD.<sup>1,2</sup>

Cardiovascular diseases are the most common cause of death around the world and about 31% of deaths worldwide are attributed to CVDs. As a result of CVDs around 17.5 million deaths occur every year. The main cardiovascular diseases include coronary heart disease,

cerebrovascular disease, peripheral arterial disease, congenital heart disease, rheumatic heart disease, and deep vein thrombosis causing mortality and morbidity like stroke.<sup>3</sup>

The distressed personality type or type D personality is defined as a joint tendency toward negative affectivity and social inhibition is characterized as type D personality. Negative emotions on different times and situations are experienced by people with high negative affectivity, while social inhibition mostly constrain social interactions and self-expression. The type D personality is observed commonly and its estimated prevalence is 21% in the general population and have even higher prevalence among cardiovascular disease patients ranging from 28%-53%. The patients with type D personality have an increased risk of adverse health outcomes with a significantly increased risk of cardiovascular disease.<sup>4,5</sup>

Negative emotions develop in individuals having type D personality across different times and situation, because such individuals have fear of social rejection and other types of disapproval from respondents due to which they avoid an expression of emotions and social interactions.<sup>6</sup> Type D personality has its many negative impacts on health along with these, it has also been reported that significant association was reported with negative medical outcomes like cardiac death, myocardial infarction and revascularization among the subjects already suffering from cardiovascular diseases. The adaptation of unhealthy behaviors make individuals with type D personality and having diabetes mellitus, more prone to cardiovascular disease because diabetes mellitus is entirely a clinically relevant risk factor for cardiovascular complications.<sup>7</sup> The individuals with type D personality encounter adverse clinical outcomes because they feel reluctant to consult with medical staff regarding their disease.<sup>8</sup>

The negative health outcome has been associated independently with type D personality in cardiac and non-cardiac patients.<sup>9</sup> A significant association of type D personality was found with mortality and nonfatal myocardial infarction in a meta-analysis of prospective cohort studies. The association of type D personality with prognosis might be different in different types of cardiac diseases. Regardless of many studies on type D personality and adverse outcomes in CVD patients the pathophysiological mechanisms and biological pathways linking type D personality trait with

unfavorable outcomes in CVD patients is largely unknown.<sup>10,11</sup>

The type D personality increases the risk of cardiac event by two-fold but the prognosis of cardiac patients having type D relates to the type of cardiac disease. The relationship of type D personality and cardiac disease and its prognosis has not been studied extensively in our population. So, this study was planned to find out the association of type D personality and cardiac diseases in our population.

## Methodology

This cross-sectional study was conducted in outpatient department of cardiology, Fazia Medical College, Air University, Islamabad. The patients presenting with any cardiac disease to the OPD or ward were enrolled for the study. All the patients were briefly described the purpose of the study and informed written consent was taken.

A total of 281 patients with cardiovascular diseases were included. The sample size was calculated by using WHO sample size calculator taking confidence level of 95%, Anticipated population proportion (rate for type D personality in heart disease patients) P= 24.0%. The patients were selected from the department of cardiology by the researcher. The inclusion criteria for participants were patients with age ranging from 25 to 65 years, both genders, and presented with any coronary artery disease were enrolled for the study. The patients with psychosis or any other diagnosed psychological disease were excluded from the study.

Demographic information including patient number, name, age, gender, risk factors like diabetes, dyslipidemia, hypertension and smoking were noted. Screening for metabolic syndrome was also done using international diabetes federation criteria based upon central obesity defined as > 90cm for men and > 80 cm for women, with any two deranged lipid parameters, like reduced HDL cholesterol, raised triglyceride, or raised plasma glucose, or raised blood pressure, or taking treatment for any of these complications. The assessment of type D personality was made through DS-14, type D scale, which is the most widely used instrument for type D personality measurement. In which all the 14 items are score on a 5-point Likert scale. Two subscale score named as SI and NA are yielded by DS-14, ranging from 0 to 28. The diagnostic

criteria for type D personality was based on the cutoff value of  $\geq 10$  on both subscales.

All this information was noted on a predesigned Performa. The collected data was entered and analyzed with SPSS v. 21. Descriptive statistics were used to calculate mean and standard deviation for quantitative data along with independent sample t-test and frequency with percentages for qualitative data along with chi-square test. A p-values of  $\leq 0.05$  was taken as significant.

## Results

The mean age of cases in this study was  $55.57 \pm 8.76$  years with minimum and maximum age of 30 and 70 years. The mean weight, height, and BMI was  $78.81 \pm 12.04$  kg,  $1.67 \pm 0.09$ cm, and  $28.27 \pm 4.09$  respectively. (Table 1)

Characteristics	Type D Personality		Non-type D personality		P-value
	N	%	N	%	
<b>Age of patients</b>					
Mean $\pm$ SD	$45.36 \pm 6.2$		$53.45 \pm 9.6$		0.000
<b>Gender</b>					
Male	48	62.33%	147	72.06%	0.115
Female	29	37.67%	57	27.94%	
<b>Education</b>					
Illiterate	20	25.97%	63	30.88%	0.400
Primary	26	33.77%	78	38.24%	
Intermediate	16	20.78%	38	18.63%	
Graduation and above	15	19.48%	25	12.25%	
<b>Occupation</b>					
Unemployed	25	32.47%	71	34.80%	0.775
Job	16	20.78%	46	22.55%	
Business	19	24.68%	53	25.98%	
Retired/house wife	17	22.08%	34	16.67%	
<b>Marital Status</b>					
Single	6	7.79%	11	5.39%	0.213
Married	58	75.32%	172	84.31%	
Divorced	13	16.88%	21	10.29%	

The mean ejection fraction before surgery was  $32.13 \pm 3.94$  % and after 5 days of surgery the mean ejection fraction was significantly improved to  $36.15 \pm 4.11$ %, p-value  $< 0.0001$ . (Table III)

**Table II: Comparison of comorbidities of patients with and without type D personality.**

Characteristics	Type D Personality		Non-type D personality		P-value
	N	%	N	%	
<b>Diabetes Mellitus</b>					
Yes	34	44.16%	76	37.25%	0.290
No	43	55.84%	128	62.75%	
<b>Hypertension</b>					
Yes	46	59.74%	96	47.06%	0.058
No	31	40.26%	108	52.94%	
<b>Smoking</b>					
Yes	48	62.34%	109	53.43%	0.180
No	29	37.66%	95	46.57%	
<b>Metabolic Syndrome</b>					
Yes	37	48.05%	83	40.69%	0.265
No	40	51.95%	121	59.31%	

**Table III: Comparison of risk factors for cardiovascular diseases between type D and non-type D personality patients.**

Characteristics	Type D Personality		Non-type D personality		P-value
	N	%	N	%	
<b>Systolic Blood Pressure</b>					
Mean $\pm$ SD	$124.53 \pm 12.35$		$116.28 \pm 14.30$		0.000
<b>Diastolic Blood Pressure</b>					
Mean $\pm$ SD	$78.44 \pm 6.92$		$74.62 \pm 7.48$		0.0001
<b>Fasting Blood Sugar</b>					
Mean $\pm$ SD	$132.80 \pm 60.85$		$118.65 \pm 42.35$		0.062
<b>Central Obesity</b>					
Yes	52	67.53%	138	67.65%	0.985
No	25	32.47%	66	32.35%	
<b>Triglyceride</b>					
Raised	63	81.82%	158	77.45%	0.425
Normal	14	18.18%	46	22.55%	
<b>HDL status</b>					
Low	64	83.12%	145	71.08%	0.039
High	13	16.88%	59	28.92%	

## Discussion

Cardiovascular disease is considered to have a strong relationship with psychosocial factors for decades, but the link between individual cardiovascular disease and particular personality type is yet uncertain. Three main personality types based on different personality traits are high strung (type A), easy going (type B) and distressed type (type D). All of these types have shown a various associations with different cardiovascular diseases. The most significantly associated personality type with cardiovascular disease is type D personality.<sup>12</sup>

Type D personality has been associated with the incidence of cardiovascular disease and its poor prognosis. The poor prognosis of CAD patients have several mechanisms through which type D personality may worsen the outcome. Among the patients of type D personality, the dysregulation of hypothalamic pituitary adrenal axis in acute coronary syndrome patients may elevate the cortisol awakening response.<sup>13</sup> A strong relationship was observed between type D personality and reduced heart rate recovery, which might indicate autonomic dysfunction among patients of chronic heart failure. Plasma levels of inflammatory cytokines may increase due to these abnormalities in the adrenergic endocrine system.<sup>14</sup>

There are some traits of personalities like emotions, may change easily but type D personality trait is quite hard to figure out. Negative states of personality are triggered by type D trait, including depression and anxiety, which have a continued impact on behavioral patterns as well as biological responses in the body. Recent international studies have reported that type D personality have a strong association with cardiovascular diseases like coronary artery disease, heart failure and hypertension.<sup>15</sup> The chances of cardiac events may increase significantly in patients having type D personality. Type D personality also increases the chance of low quality of life among the patients identified with coronary artery disease in presence of type D personality. Specific behavioral patterns and biological pathways are involved in the negative effects of type D personality on the poor prognosis of heart diseases.<sup>16</sup>

There is a huge variation in the results of international studies in which the prevalence of type D personality was studied. The prevalence of type D personality among cardiovascular disease patients ranges from 15% to 34.5%.<sup>17,18</sup> In this present study the prevalence of type D personality among CVD patients was found to be 27.40%, which is adjacent to results of an Indian study recorded the prevalence of 24%.<sup>19</sup>

According to the results of this present study, a comparison of comorbid diseases showed that there was no significant ( $p$ -value  $>0.05$ ) difference in cardiovascular disease patients having type D personality or non-type D personality based on diabetes mellitus, hypertension rate, smoking status, and metabolic syndrome. But the systolic and diastolic

blood pressure and HDL cholesterol levels showed significant association with type D personality trait. Previous studies comparing these parameters noted a higher risk of metabolic syndrome among participants with Type D personality. It was found that hypercholesterolemia, hypertriglyceridemia, and hypertension were more common in Type D participants.<sup>18,20</sup>

Type D personality has been associated with a number of plausible biological and behavioral mechanisms through which heart disease incidence and progression is affected. Cardiovascular diseases are multifactorial in nature and it results from many interacting mechanisms and there are chances that type D personality may affect the CVD by increasing interactions of different mechanisms which could contribute in cardiovascular events. These mechanisms include poor health behavior of patients with type D personality which increases the risk of heart disease, early onset and poor prognosis of the patient. The biological mechanisms develop a system for poor outcome and these should be managed itself.<sup>21</sup>

The incidence of coronary artery disease and its risk factor is more common among patients having type D personality, so these patients are more prone to develop cardiovascular disease and cardiac events as compared to individuals of non-type D personality but it is not clear that the presence of more risk factors for cardiovascular disease cause type D personality or type D personality increases the chance of these events lead to cardiovascular diseases. In recent studies, it has been observed that chronic mental stress is a major contributor to the development of atherosclerosis which can result in myocardial infarction.<sup>22</sup> Type D personality is a common trait present in the general population and it is hard to change it. Different studies have shown that markers of disease severity do not affect the incidence of type D trait in cardiovascular disease patients, revealing that the severity of cardiovascular disease can not cause type D personality.<sup>23</sup>

## Conclusion

A considerable number of cardiac patients in our study had type D personality trait. This trait was more common in younger age and male patients. The presence of type D personality was significantly

associated with higher systolic and diastolic blood pressure as well as metabolic syndrome with significantly low level of HDL cholesterol, indicating a very high chance of cardiac event and poor prognosis of the disease.

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