# Assessment of Risk Factors among Cardiovascular Disease Patients- A Retrospective Study 

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## ABSTRACT

Non-communicable diseases (NCDs) affect people in developing countries through several contributing factors such as genetic, physiological, environmental, and behavioral factors. Among several NCDs, cardiovascular diseases tend to cause an increase in morbidity and mortality rate. By thorough evaluation of co-morbidities and risk factors may aid in the proper management of cardiovascular diseases. About 120 patients were included in our study with a mean age of 60.8 years. Results have shown that the prevalence of cardiovascular diseases was found to be $75 \%$ in males and $25 \%$ in females. In every age group, the male population had a higher risk for the occurrence of CVD than females. The study patients were categorized into 2 groups, with co-morbidity ( $86.7 \%$ ) and without co-morbidity ( $13.3 \%$ ). Our study results conclude that optimal management of comorbidities and risk factors would help in delaying the disease progression through screening, prior diagnosis, prevention, and management of co-morbid conditions.

Keywords: Comorbidity, Cardiovascular diseases, Non-Communicable Diseases, Risk Factors

## INTRODUCTION

Non-communicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and the most commonly occurring are cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes.
It is influenced by many factors such as genetic, physiological, environmental, and behavioral factors.
NCDs disproportionately affect people in low and middle-income countries where more than threequarters ( 31.4 million) of global NCD deaths occur. (1)

Globally, non-communicable diseases kill 41 million people each year, equivalent to $71 \%$ of all deaths occur in low- and middle-income countries.
Of these, cardiovascular diseases account for most NCD deaths, or 17.9 million people annually,
followed by cancers ( 9.3 million), respiratory diseases ( 4.1 million) and diabetes ( 1.5 million). These four groups of diseases account for over $80 \%$ of all premature NCD deaths. ${ }^{(2)}$
Cardiovascular disease (CVD) is the group of disorders of heart and blood vessels that includes hypertension, coronary heart disease (heart attack), cerebrovascular disease (stroke), peripheral vascular disease, heart failure, rheumatic heart disease, congenital heart disease, and cardiomyopathies.
Over one-third of CVD deaths take place in developing countries. By 2030, almost 23.6 million people will die from CVDs, mainly from heart disease and stroke. These are projected to remain the single leading causes of death. ${ }^{(3)}$

Most cardiovascular diseases occur due to inevitable social history such as tobacco use, smoking, alcohol consumption, unhealthy diet and obesity, physical inactivity which can be prevented by addressing these issues among people.

Hypertension, diabetes, hyperlipidaemia or already established diseases are considered as high-risk factors for cardiovascular disease which requires early diagnosis and standard therapeutic intervention. (4)

People in developing countries who suffer from CVDs and other non-communicable diseases have limited access to health care services. As a result of delayed presentation to hospitals, many people die at younger and often in their most productive years due to CVDs and other non-communicable diseases. ${ }^{(4)}$

Several factors contribute to cardiovascular disease which can be either modifiable or non-modifiable risk factors.

Age, gender and family history are said to be nonmodifiable risk factors. Aging-related structural and functional dysfunction in the heart and vessels are seen in elderly people who are vulnerable to cardiac diseases. Men are at higher risk for CVDs than premenopausal women, whereas postmenopausal women may have a similar risk just like men. Typically, without any prior alarming symptoms, sudden cardiac death (SCD) often occurs. Of note, the high risk of premature death attributed to SCD among men and women is almost 1 in 9 and 1 in 30, respectively. ${ }^{(5)}$
The prevalence of cardiovascular disease and morbidity from it increases with the age of the population. When evaluating the elderly population, age-specific cardiovascular disease risk factors such as arterial stiffness, frailty, lipid profiles and depressive symptoms should be considered. ${ }^{(6)}$
The prevalence of cardiovascular disease in women is relatively less than in men before the age of 50 . While considering the cardiovascular risk for a woman, non-traditional factors that could increase the CHD risk of a woman including cardiovascular conditions associated with pregnancy such as preeclampsia, gestational hypertension, gestational diabetes mellitus, post-menopausal hormone changes and autoimmune diseases should be estimated. Risk factors for CVD are unique to women. During the
menopausal period, the female sex hormone named estrogen will drop to about one-tenth of the premenopausal levels which will negatively impact high-density lipoprotein levels. This is the main contributor to the further development of atherosclerotic lesions. ${ }^{(6)}$

The risk of cardiovascular events and mortality rate can be declined by appropriate prevention and therapeutic management of cardiovascular risk factors. ${ }^{(7)}$

Comorbidity is defined as the existence of one or more chronic diseases next to an index disease. In recent days, management of comorbidity, which often affects the quality of life, has become the primary step to rule out any disease prevention and it can be done through awareness and guidance among the patients. ${ }^{(8)}$ This will prevent the increased socioeconomic burden, decreases mortality and morbidity rate. The initial step is to assess the prevalence of comorbidity and to pave the way for future research. ${ }^{(9)}$

Hence our study aimed to evaluate the risk factors for the development of cardiovascular diseases and to identify the solution for improving the quality of life of the patients.

## MATERIALS AND METHODS

A retrospective observational study design was used to evaluate the risk factors among cardiovascular disease (CVD) patients. The records of 120 patients who were diagnosed and treated with cardiovascular diseases in the cardiology department at Vivekanandha medical care hospital, Tiruchengode, Tamilnadu was collected from the medical records by maintaining proper sampling technique through structured case analysis form. Patients diagnosed with cardiovascular diseases like myocardial infarction, angina, congestive cardiac failure, dilated cardiomyopathy, left ventricular dysfunction, ischemic heart disease, cerebrovascular accident, Arrhythmia and rheumatic heart disease and with comorbid conditions like diabetes mellitus, hypertension, chronic obstructive pulmonary diseases, bronchial asthma, cerebrovascular accident, chronic kidney disease, hypothyroidism and coronary artery disease were included in the study. The data was collected from January 2020-December 2020
and evaluated through a Microsoft Excel sheet using descriptive statistics.

## RESULTS

Demographic findings and other data of 120 patients were reviewed systematically. Figure 1 represents the
age group of patients diagnosed with CVD. The number of patients diagnosed with CVD was increased as the age increased from 41-50 years to 71-80years.


FIGURE 1: Age distribution of patients
Gender-wise distribution among the study population indicates that cardiovascular diseases were seen among $75 \%$ of male patients $(\mathrm{n}=90)$ and $25 \%$ of female patients $(\mathrm{n}=30)$ as indicated in figure-2.


FIGURE 2: Gender distribution of patients
In this study, patients were differentiated into two groups. The first group consists of 104 patients (86.7\%) who had pre-existing comorbidity, in which 24 patients were male and 6 patients were female. The other group
comprised 16 patients (13.3\%) without comorbidity, out of which 10 patients were male and 6 female as indicated in figure-3.


FIGURE 3: Gender distribution based on co-morbidity
Figure - 4 indicates that male patients were more predominant with pre-existing comorbidity than females in almost all age groups.


FIGURE 4: Age group wise distribution of Patients
Out of 104 patients, $30.8 \%$ patients $(n=37)$ had one comorbidity, $34.2 \%$ patients ( $n=41$ ) had two comorbidity, $18.3 \%$ patients $(\mathrm{n}=22)$ had three comorbidity and $3.3 \%$ patients $(\mathrm{n}=4)$ had four comorbidity. In patients with comorbidity, males had higher chances of having comorbidity than females. Figures 5 \& 6 represent genderand age-wise distribution among patients with comorbidities.


FIGURE 5: Gender wise prevalence of co-morbidity


FIGURE 6: Age group wise prevalence of co-morbidity
The study results indicate that the patients had co-morbid conditions such as hypertension ( $\mathrm{n}=66$ ), diabetes mellitus ( $n=76$ ), coronary artery disease ( $n=33$ ), chronic obstructive pulmonary disease ( $n=5$ ), bronchial asthma $(\mathrm{n}=1)$, hypothyroidism ( $\mathrm{n}=4$ ), cerebrovascular accident ( $\mathrm{n}=8$ ) and chronic kidney disease ( $\mathrm{n}=4$ ). Table-1 and Figure-7 represent the gender-wise distribution of the different comorbid conditions among cardiovascular disease patients. Figure-8 demonstrates the age-wise distribution of comorbidity among CVD patients.

TABLE-1: Co-morbid conditions in study population

| CO-MORBIDITY | HITN | DM | CAD | COPD | BA | HYPO | CVA | CKD |  |
| :--- | :--- | :--- | :--- | :--- | :---: | :---: | :---: | :---: | :---: |
| No. of | MALE | $\mathbf{4 6}$ | $\mathbf{6 0}$ | $\mathbf{2 3}$ | $\mathbf{5}$ | $\mathbf{0}$ | $\mathbf{2}$ | $\mathbf{6}$ | $\mathbf{4}$ |
| Patients |  |  |  |  |  |  |  |  |  | FEMALE



FIGURE 7: Gender wise distribution of Co-morbid conditions


FIGURE 8: Age group wise distribution of Co-morbid conditions
Patients enrolled in the study were diagnosed with several cardiovascular diseases (CVDs) such as myocardial infarction ( $n=44$ ), angina ( $n=15$ ), congestive cardiac failure ( $n=5$ ), dilated cardiomyopathy ( $n=11$ ), left ventricular dysfunction ( $n=12$ ), ischemic heart disease ( $n=7$ ), coronary artery disease ( $n=22$ ), cerebrovascular accident ( $\mathrm{n}=4$ ), Arrhythmia ( $\mathrm{n}=4$ ) and rheumatic heart disease ( $\mathrm{n}=2$ ). Table-2 \& figure-9 represents the genderwise distribution of CVDs among the study population and the age-wise distribution is shown in figure-10.

TABLE-2 Prevalence of Cardiac Diseases

| No. of | MALE | 35 | 12 | 3 | 8 | 7 | 6 | 16 | 3 | 2 | 1 |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Patients | FEMALE | 9 | 3 | 2 | 3 | 5 | 1 | 6 | 1 | 2 | 1 |



FIGURE-9 Gender wise distribution of cardiovascular diseases


FIGURE-10 Age wise distribution of cardiovascular diseases
Insufficient data was obtained for body mass index (BMI) among the study population. Out of 45patients, 2 patients were underweight, 20 patients were having normal BMI, 17 patients were overweight and 6 patients were found to be obese. Table $-3 \&$ Figure-11 represent the BMI distribution of CVD patients.

## TABLE-3 BMI distribution

| BMI |  | $\begin{gathered} \text { UNDERWEIGHT } \\ <18.9 \end{gathered}$ | $\begin{aligned} & \text { NORMAL } \\ & \text { (19-24.9) } \end{aligned}$ | OVERWEIGHT (25-29.9) | $\begin{gathered} \text { OBESE } \\ >30 \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| No. of | MALE | 1 | 15 | 16 | 3 |
| Patients | FEMALE | 1 | 5 | 1 | 3 |



FIGURE-11 Gender wise BMI distribution

## DISCUSSION

The proportion of CVD is increasing nowadays. There has been a significant increase in the prevalence of comorbid conditions such as diabetes mellitus, hypertension, chronic obstructive pulmonary diseases, bronchial asthma, cerebrovascular accident, chronic kidney disease, hypothyroidism among cardiovascular disease patients.
The study consists of 120 CVD patients with a previous history of with and without co-morbidity. The overall mean age of the study population was 60.8 years. In every age group, male patients had a higher risk for the occurrence of CVD than females. The prevalence of CVD is about $75 \%$ in males and $25 \%$ in females.

The study population was categorized into 2 groups, with co-morbidity ( $86.7 \%$ ) and without co-morbidity ( $13.3 \%$ ). In both groups, male patients dominated over female patients. In particular patients with preexisting comorbidity, male patients were higher in
number in the age group of 51-60 years ( $\mathrm{n}-26$ ) followed by the age group 61-70 years ( $\mathrm{n}=24$ ).

Only a few population-based studies in India have been conducted to assess the prevalence of various cardiovascular risk factors in patients with type 2 diabetes patients. ${ }^{(10,11)}$
About $30.8 \%$ and $34.2 \%$ of patients had a minimum of one and two pre-existing co-morbid conditions respectively. Among these patients, the peak age group was seen especially in 51-60 years and 61-70 years in which male patients were higher. These results are supported by the reports of Chamberlain et al which state that more than two co-morbid conditions were associated with cardiovascular disease. ${ }^{(12)}$

The study conducted by Bayliss et al had reported that people with multiple chronic illnesses were observed with several limiting factors towards their health care such as physical limitations on daily activities, lack of knowledge about diseases, socioeconomic burden, accessing health care facility and requirement of emotional support. ${ }^{(13)}$

In our study, diabetes mellitus, hypertension and coronary artery disease were found to be the most common co-morbid conditions in CVD patients. While assessing the prevalence of co-morbid conditions, $73.1 \%$ of patients had diabetes mellitus, $63.5 \%$ of patients had hypertension and $31.7 \%$ of patients had coronary artery disease. The higher prevalence was seen specifically in males with the age group of 51-60 years and 61-70 years as supported by the reports of a previous study stating that the incidence of cardiovascular disease among diabetic men was higher when compared with nondiabetic men. ${ }^{(14)}$

Among the cardiovascular diseases, $36.7 \%$ of myocardial infarction, $21.1 \%$ of coronary artery disease and $12.5 \%$ of angina were seen widely in the male population with the age group of 51-60 years and 61-70 years in our study. It was found earlier that diabetic people have increased chances of cardiovascular morbidity and mortality rate. ${ }^{(15)}$

Patients were presented to the emergency department due to life-threatening cardiovascular disease conditions. Owing to this reason, there were incomplete data on BMI among which 17 patients were overweight and only 6 patients were found to be obese.

## CONCLUSION

The study results conclude that optimal management of comorbidities and risk factors would help in delaying the disease progression over a while and helps to ensure good quality of life. Optimal management can be achieved through screening, prior diagnosis, prevention and management of comorbid conditions which in turn would improve the health outcomes of the patients. Health care providers should observe these patients with well-planned concerns minimize the burden of cardiovascular risk.

## LIMITATIONS

The study has a limited study population and patient follow up was not performed. Only patients having specific comorbidities were included as aforementioned in the study. Incomplete data in some patient's records pose difficulties in the accurate interpretation of our results.

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