ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at:www.ijmacr.com

Volume – 6, Issue – 2, April - 2023, Page No. : 66 - 79

Association between emerging and sex specific risk factors and cardiac mortality in women with ischemic heart disease (IHD)- A cross sectional study

[1]Dr Mariyam Sherin V, Post Graduate student, Department of General Medicine, MES Medical College, Perinthalmanna

[2]Dr Mohammed P, Professor, Dept of General Medicine, MES Medical College, Perinthalmanna

[3]Dr Alavi K P, Professor and HOD, Dept of general medicine, MES Medical College, Perinthalmanna

Corresponding Author: Dr Mariyam Sherin V, Post Graduate student, Department of General Medicine, MES Medical College, Perinthalmanna

How to citation this article: Dr Mariyam Sherin V, Dr Mohammed P, Dr Alavi K P, "Association between emerging and sex specific risk factors and cardiac mortality in women with ischemic heart disease (IHD)- A cross sectional study", IJMACR- April - 2023, Volume – 6, Issue - 2, P. No. 66 – 79.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Aim and objectives: To study the association between emerging & sex specific risk factors and cardiac mortality in women with IHD.

Materials & Methods: A cross sectional descriptive study was conducted among 115 women of age more than 18 years with signs and symptoms suggestive of IHD and confirmed diagnosis of acute coronary syndrome or IHD admitted in General Medicine and Cardiology departments of MES Medical College during January 1st,2021, to December 31st, 2021. Data was entered in Microsoft excel and analysis was done using SSPS software.

Results: A total of 115 women with IHD were enrolled in the study, out of which 38.3% belonged to the age group of 61-70 years. The mean age group was 62.6+_9.6.74.8 % presented with chest pain as their primary complaint. Risk factors unique to women along with emerging risk factors were also analysed and it was identified that 87.8% had attained menopause, 16.5% had history of oral contraceptive pills use, 47% had depression, 62.6% had anxiety and 72.2 % had stress. Cardiac mortality was associated with 36.5% and was found in women who were more than 70 years of age and in women who had ST elevation Myocardial Infarction. Patients with STEMI had higher mortality when compared to NSTEMI and this relation was statistically significant (p value of 0.001). Other factors like menopause, OCPs, depression, anxiety and stress had no statistically significant relation with mortality.

Conclusion: OCP use, hormonal replacement therapy and smoking were not identified as strong risk factors, probably due to the characteristics of the study population. Cardiac mortality was found to be higher in

old females of age greater than 70 years and women with STEMI had a poor outcome.Hence, the traditional Framingham's risk factors are still the most important risk factors for IHD in women, even though emerging risk factors like depression, anxiety, work related stress and marital stress need to be assessed as the treatment of all these conditions may have a significant impact on reduction of morbidity associated with IHD.

Keywords: IHD, women, Traditional Framingham's risk factors, emerging risk Factors

Introduction

In both men and women, cardiovascular disease (CVD) is the leading cause of morbidity and mortality in the world, including India, with ischemic heart disease accounting for the majority of cases (IHD). Women continue to die from IHD at a higher rate than males, with an estimated 5,15,000 women dying per year, despite the fact that both genders' mortality rates have decreased. According to studies, the mortality rate from CVD is rising among young women aged 35 to 54[1]. Men and women have different IHD prevalence, clinical symptoms, and pathogenesis. Prior research indicates that clinical IHD symptoms in women typically manifest 10 or more years after those in males, and that women also experience longer hospital stays and more severe disability. There are differences between the sexes in terms of how patients and doctors recognise symptoms as well as in how IHD patients respond to treatment. According to a recent study, women are more likely than men to die in hospitals from IHD, with the in-hospital mortality rate for women being 16.7% and for males being 11.5%.[2]

Despite the fact that both traditional Framingham risk factors and novel risk factors can contribute to the development of IHD in both sexes, some of these variables are exclusive to women, such as problems associated to pregnancy and hormone imbalance after menopause. Throughout their fourth and fifth decades, more than 80% of women have one or more of the classic cardiac risk factors such hypertension, dyslipidemia, and diabetes[3]. Although the Framingham Risk Score (FRS) has been used by doctors to determine CVD risk, studies indicate that the FRS undervalues the risk in women and labels 90% of them as low risk4. It's possible that women are more likely than males to experience the effects of non-traditional risk factors such mental stress-induced ischemia, depression, and anxiety on IHD. Increased incidence of IHD has been linked to menopausal women's lower oestrogen levels [1]. Despite extensive research, the pathophysiological connection between IHD and non-traditional risk factors in women remains unclear. Thus, growing risk factors for IHD in women, including metabolic syndrome, pregnancy-related illnesses, sleep apnea, psychosocial factors like melancholy and anxiety, poor socioeconomic status, job-related stress, and marital stress, should be known to health care professionals. It has been demonstrated that risk variables specific to women, including as menopause, oral contraceptive pill use, and hormone replacement therapy, have significant effects on determining the risk factors of IHD in women. Finding the risk factors in women with IHD is crucial because they frequently present to clinicians later than males and with more unusual symptoms. The burden of acquiring IHD in both sexes can be greatly decreased with effective risk factor management. If any of the IHD risk factors are present in women, the patient might be closely followed up on to watch for the onset of IHD. The correct diagnosis of IHD is crucial because early treatment of IHD in women can lower the morbidity and

mortality linked to the condition, greatly lowering the global death rate.

Cardiovascular clinical trials continue to enroll fewer women than males, and the fundamental concerns about prevention and treatment methods for heart disease in women remain unsolved. [5]. Due to industrialization, urbanisation, and associated lifestyle changes—collectively referred to as the epidemiological transition—the death rate from IHD is increasing in India compared to western nations. Improved cardiac event management and secondary preventive practises can help prevent premature morbidity and mortality in IHD-affected women. There is a dearth of high-quality epidemiological data from India because the results of earlier studies do not support the expected rise in IHD incidence. Although the evidence is poor, India may be on the eve of an explosive IHD epidemic, especially among women. Therefore, this study is designed to assess the clinical profile of IHD in Indian women and to concentrate on traditional and new risk variables that are especially relevant to Indian women.

Ischemic heart disease (IHD) is characterised by a condition in which a section of the myocardium receives insufficient blood flow and oxygen, which commonly happens when there is an imbalance between myocardial oxygen supply and demand6. The most frequent cause is epicardial coronary artery atherosclerosis, which results in localised blood flow decrease and insufficient myocardial perfusion in the area of the artery implicated. Whereas it was previously believed that men were more likely to have IHD, research is now showing that women can also have IHD. Even while women have lower rates of structural coronary artery disease, it can be connected to aberrant coronary reactivity, including microvascular dysfunction, since they experience greater symptoms, ischemia, and deleterious consequences.[7] Although the classic Framingham risk factors have a significant impact on the rising prevalence of IHD in women, emergent risk factors, such as psychosocial ones, need to be looked into and controlled with equal priority in order to reduce the incidence of IHD in women. IHD is the leading sickness in the world in terms of mortality and morbidity. Due to the widespread adoption of a western diet and sedentary lifestyle, IHD has recently become the major cause of mortality and morbidity, even in emerging nations like India. IHD is a significant global economic burden since it causes 7 million deaths and 129 million disability adjusted life years (DALYs), or 1.72% of the world's population.[8] IHD affects 15.5 million people in the US, and angina pectoris affects roughly 3.4 million people under the age of 406. South America has had the greatest number of rises in the incidence of IHD, followed by the middle east and then the far east. Because of effective acute phase therapies, mortality has started to drop in wealthy nations. Due to improvements in primary and secondary preventative measures, the incidence has also decreased.

Around 60% of deaths in India are caused by non-communicable diseases, with IHD topping the list. In 2015, IHD caused 26.9% of deaths with a medical certificate. In a study conducted in 2017 by Khan et al, it was determined that 1,197 out of every 100,000 people had IHD.[9]

Women are more likely than men to have high blood pressure, diabetes, and obesity when they present with IHD, and they also tend to receive less aggressive interventions and pharmacological treatment after an episode of acute coronary syndrome[10]. Sex-specific patterns of risk factors have become apparent throughout the world. According to the Global Burden of Disease in

2004, IHD was responsible for roughly 32% of all global fatalities in women compared to 27% in men[11,12]. Almost 80% of middle-aged women in a research by Mokdad A.H et al. had one or more conventional cardiac risk factors[13]. The 30-year death rates for people with 0 to 2 risk factors range from 1.5 to 9.1 (per 10,000), but the IHD-based mortality increases with the number of classic Framingham risk factors. [14]. Clustering of risk variables is common in post-menopausal women, and this may be due to hormonally induced metabolic abnormalities..

Just 5% of deaths were attributed to communicable diseases, while roughly 25% of deaths were associated with IHD, according to the PROFILE Research carried out in Kerala[15]. Risk factors for IHD in the Framingham study include high blood pressure, dyslipidemia, smoking, diabetes, and obesity.

Other risk factors

a) Depression

The prognosis following a myocardial ischemia event, which is believed to be caused by arrhythmogenic mechanisms, is said to be severely affected by depression. If it may be cited as an independent risk factor[16] is still up for dispute. Neither cognitive behavioural therapy nor selective serotonin uptake inhibitors improved post-myocardial infarction patient mortality in the ENRICHD (Enhancing Recovery in Coronary Heart Disease Patients) trial[17], nor did they prevent repeat infarction.. According to the Nurses' Health study[18], women with depressive symptoms were more likely to be obese, smokers, and sedentary, and their risk of cardiovascular events was also increased. Higher sympathetic activation, greater basal heart rates, and lower variability of heart rate may be the cause of the increased risk of ventricular arrhythmias and sudden cardiac death in individuals with depression following an acute coronary syndrome[19]. Ventricular arrhythmias may become more common as a result of depression treatment. However, it was observed in a study by Larrson PT[20] et al. that endothelial dysfunction was caused by altered platelet function brought on by the elevated serum levels of serotonin and adrenaline found in depressed patients. Hence, treating depression can be seen as addressing endothelial dysfunction and decreased platelet function.

b) Anxiety and stress

Studies have shown that cardiovascular morbidity and mortality are higher in women 50 years of age and beyond, and are described as a hidden epidemic. When compared to physical activity, worry, as well as mental and emotional stress, is more likely to cause cardiovascular disorders in women. Compared to men, women are more likely to experience psychosocial problems. Many studies have demonstrated that anxiety spectrum disorders significantly affect the etiopathogenesis and prognosis of IHD in females. Also connected to the typical Framingham risk factors is anxiety. Anxiety is a risk factor for the development of hypertension in women [21,22,] and patients with anxiety are frequently found to have hypercholesterolemia. Also, it was shown that nearly two-thirds of women who had myocardial infarction experienced high levels of anxiety, with one-fourth of them having levels that were even higher than those of patients who had other mental illnesses. [23]. After myocardial infarction, anxiety attacks do happen, but they happen much more frequently in women than in males. Even when there are no symptoms of an anxiety attack, persons with a history of anxiety disorder have increased adrenergic tone, which results in greater heart rates, elevated levels of serum adrenaline,

cortisol, and growth hormone, as well as a modest increase in noradrenaline[24]. Anxiety and sudden cardiac fatalities have been linked, according to a prospective research among women [25]. As a result, anxiety can be considered a separate risk factor for female cardiovascular disease.

C) Hormonal imbalance, OCP use and menopause

Menopause is the lack of menstruation for a full year following the last menstrual cycle, which causes an oestrogen deficiency. Women who are 45 years of age and older have hormonal dysregulation related to menopause and related abdominal obesity, which puts them at a high risk of developing IHD. Moreover, post-menopausal women had high blood pressure and an unfavourable lipid profile, both of which were linked to cardiovascular disease [26]. Several studies also found that post-menopausal women with diabetes, hypertension, dyslipidemia, a history of depression, anxiety, smoking, and binge drinking had a greater chance of developing IHD, necessitating ongoing monitoring by medical professionals. The lipid profile also changes when women enter menopause, with total cholesterol, triglycerides, and LDL rising and HDL, particularly the HDL2-C subfraction, falling[27].

Several studies also found that post-menopausal women with diabetes, hypertension, dyslipidemia, a history of depression, anxiety, smoking, and binge drinking had a greater chance of developing IHD, necessitating ongoing monitoring by medical professionals. The lipid profile also changes when women enter menopause, with total cholesterol, triglycerides, and LDL rising and HDL, particularly the HDL2-C subfraction, falling. The existence of more comorbities in women than in men may possibly contribute to the unusual symptoms. 53% of women in the GUSTO IIB28 research received coronary angiography compared to 59% of males, and women frequently had less serious coronary artery blockage than men. Typical chest pain was linked to an increased risk of cardiac mortality in people 65 years of age or older, with a relative risk of 2.4 for men and 2.7 for women[29]. Because of the unusual presentation and the inability of angiography to detect coronary blockage, the prognosis for IHD in women was worse compared to males. Therefore this study aims to find out the association between emerging and sex specific risk factors and cardiac mortality in women with IHD

Materials And Methods

This study was conducted considering the research ethics and obeying all the ethical regulations laid down by the institutional ethical committee and had got approval from the institutional ethics committee (IEC/MES/38/2019 dt. 22/10/2019). Informed written consent was obtained from the patients in English and regional language. Patients who were not willing to comply were not forced to enroll in the study and were not denied of any treatment. No additional expenses were incurred from the patient as a part of the study.

This cross sectional study was conducted among all female patients admitted in General Medicine and Cardiology departments in MES Medical College and Hospital during the study period from 1st January 2021 to 31st December 2021 with the diagnosis of IHD, , satisfying the inclusion criteria were considered as the study population through convenient sampling

The ACC/AHA/AATS/PCNA/SCAI/STS Focused Update of the Guideline for the Diagnosis and Treatment of Patients with Stable Ischemic Heart Disease will be utilised to diagnose IHD cases[30]. Women who haven't had a monthly period in the past year are considered to be menopausal[31]. The Depression Anxiety Stress Scores

(DASS21)[32] will be used to assess depression, anxiety, and stress. All women of age more than 18 years with signs and symptoms suggestive of IHD and confirmed diagnosis of acute coronary syndrome or IHD admitted in General Medicine and Cardiology departments during the study period in MES Medical College were included in the study.

Patients with known cardiac premorbidities like valvular heart diseases, pericarditis, pericardial effusion, congestive heart failure, aortic aneurysm, vascular disorders, thromboembolic disorders, previous history of cardiac surgery and those on pacemakers.,Patients with connective tissue disorder,Pregnant women, Patients with liver or renal disease, Patients with hypothyroidism or hyperthyroidism and those who were not willing to give informed consent to participate in study were excluded. In a study by Mohan V et al.[33], the prevalence of hypertension as one of the risk factors for IHD in Indian women is reported to be 17 %. Using the formula Sample size =4pq/d2 where p =prevalence=100-p, d =precision (10)

Sample size =4x17x83/7x7= 115

Once a participant has been enrolled in the study, a comprehensive clinical history will be obtained, and a thorough examination will be performed. A full hemogram, thyroid, liver, and renal function test, a urine routine check, a chest X-ray, and an electrocardiogram are all routine tests that will be performed. Cardiovascular biomarker (Troponin I) and echocardiography tests that are performed as part of the work-up for IHD will be analysed for the study. Collected data from the proforma was entered in Microsoft Excel & further analysis was done using SPSS (Statistical Package for Social Science) software. Statistical differences were measured using appropriate parametric and non-parametric tests

Results

A total of 115 cases were included in this study.

Table 1: Distribution of Study Subjects According to their Age Group (N=115)

Age in years	Frequency	Percent
≤50	14	12.2
51-60	35	30.4
61-70	44	38.3
>70	22	19.1
Total	115	100

In this study, 38.3 % belongs to 61-70 years, 12.2 % belongs to age group less than 50, 30.4 % to 50-60 years and 19.1 % to more than 70 years.The mean age of distribution was 62.6 ± 9.6 and IQR was 56-69. Out of the study participants, 98.3 % were married and 1.7 % were unmarried.

87.8 % had attained menopause, 5.2 % had irregular menstrual periods and 7 had regular menstrual periods.

Table 2: Distribution of Study Subjects According to contraceptive use (N=115)

Contraceptive Use	Frequency	Percent
Nil	96	83.5
OCP	19	16.5
Total	115	100

83.5 % did not give the history of OCP use. Rest 16.5 % gave history of using contraceptives.

Table 3: Distribution of Study Subjects According to presence of depression (N=115)

Depression	Frequency	Percent
Normal	61	53
Mild	38	33
Moderate	14	12.2
Severe	2	1.7
Total	115	100

Fig 1: Distribution of Study Subjects According to presence of anxiety

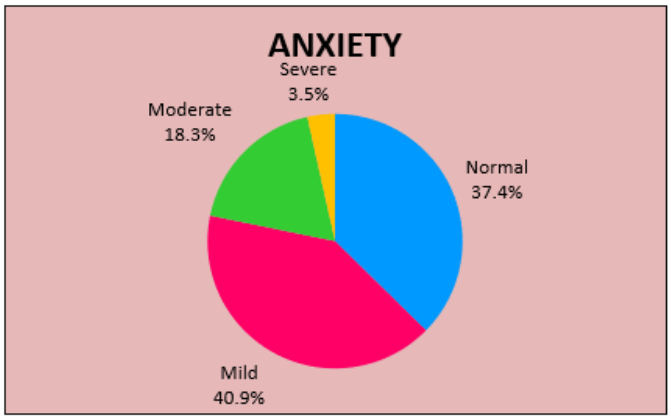

Table 4: Distribution of Study Subjects According to presence of stress (N=115)

Stress	Frequency	Percent
Normal	32	27.8
Mild	44	38.3
Moderate	33	28.7
Severe	5	4.3
Very severe	1	0.9
Total	115	100

Fig 2: Distribution of Study Subjects According to ECG

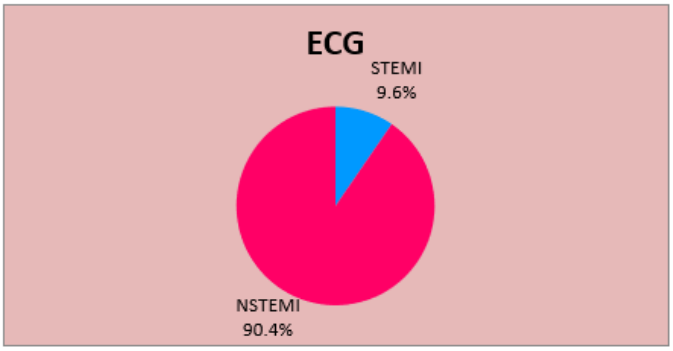

Table 5: Emerging and sex specific risk factors affecting cardiac mortality

	Mortality				Total		χ^2	df	p
	Yes		No						
	N	%	N	%	N	%			
MARITAL STATUS									
Unmarried	0	0	2	2.7	2	1.7			
Married	42	100	71	97.3	113	98.3	1.17	1	0.279
MENSTRUAL HISTORY									
Regular menstrual periods	3	7.1	5	6.8	8	7			
Irregular menstrual periods	3	7.1	3	4.1	6	5.2			
Menopause	36	85.7	65	89	101	87.8	0.51	2	0.776
ORAL CONTRACEPTIVE USE									
Nil	34	81	62	84.9	96	83.5			
OCP	8	19	11	15.1	19	16.5	0.31	1	0.580
ANXIETY									
Normal	16	38.1	27	37	43	37.4			
Mild	17	40.5	30	41.1	47	40.9			
Moderate	8	19	13	17.8	21	18.3			
STRESS									
Normal	9	21.4	23	31.5	32	27.8			
Mild	20	47.6	24	32.9	44	38.3			
Moderate	11	26.2	22	30.1	33	28.7			
Severe	2	4.8	3	4.1	5	4.3			
ECG									
STEMI	9	21.4	2	2.7	11	9.6			
NSTEMI	33	78.6	71	97.3	104	90.4	10.77	1	0.001*

Test Applied: Chi square test

P value<0.05 statistically significant

Patients with STEMI had higher mortality when compared to NSTEMI and this relation was statistically significant (p value 0.001). Other factors like menopause, OCPs, depression, anxiety and stress had no statistically significant relation with mortality.

Discussion

IHD is a significant factor in the mortality of women everywhere, including India. The unfavorable character of IHD in women may be attributed to a delay in diagnosis brought on by unusual presentations as well as normal coronary angiography. The main risk factors for IHD have historically been those associated with the Framingham study, but new risk factors such depression, anxiety, and stress, as well as the hormonal changes that occur in women during menopause, contribute to the burden of IHD in women. As a result, health care systems need to be very watchful in recognising the risk factors linked to IHD and offering all the tools necessary to manage them with frequent follow-ups. Also, it is

important to promote everyone's mental health in order to maintain a stress-free environment and stop the development of illnesses like IHD..

A cross-sectional study centred in hospitals was undertaken between January 1, 2021, and December 31, 2022. A total of 115 patients with IHD were examined while taking into account the inclusion and exclusion criteria, and the data was analysed to determine some of the emerging risk factors with a focus on psychosocial risk factors, as well as to estimate the prevalence of traditional Framingham risk factors.

Age group

The average age of the participants in this study was 62.6 9.6, and 38.3% of them were between the ages of 61 and 70, while 30.4% were between the ages of 50 and 60. About 12.2% of the population was under 50 years old.. The INTERHEART[28] experiment found that the mean age for acute myocardial infarction was 53 years old in South Asian nations, including India, and 63 years old in Western nations. The majority of females with IHD were found to be between the ages of 55 and 64 in a study done in Kerala[34], while the minority were found to be between the ages of less than 35 and 35 to 44. This matched the findings of the current study.

Psychosocial factors

In the present study, depression was prevalent in 46.9% with 1.7% having severe depression and 33% having mild depression.

Table 6: comparison of studies assessing the prevalence of depression in women with IHD

First author and reference	Country	Prevalence of depressior
Shanmugasegaram S[35]	Canada	18.7%
Bante A[36]	Southern Ethiopia	11.09%
Bhatt P [37]	India	39.8%
Present study	India	46.9%

This study's observation was comparable to research conducted in India. Because mental diseases have less societal stigma today than they did in earlier research, there may be a higher frequency. Anxiety was found to be prevalent in 62.7% of people, with moderate anxiety present in 18.3% and severe anxiety present in 3.5%. The elevated frequency may be brought on by the inclusion of more vulnerable older females.

The prevalence of stress in the present study was 72.2%, while 38.3% had mild stress, 28.7% had moderate stress and 4.3 % and 0.9% had severe and very severe stress, respectively. Most of the women being married home makers had marital stress. In a study conducted in Kerala[38], the prevalence of stress was noted to be 36%.

According to the Kuppuswamy scale[39], the majority of the patients in this study (61.7%) belonged to the upper lower economic class, which was followed by the lower middle (30.4%). In a research by Bettegowda S[40], 30% of participants were from the upper middle class. Almost 50% of patients in a different study by Janati A[41] had poor socioeconomic level, although Singh RB[42] observed that the prevalence of CAD was higher in upper and medium class people than in lower class people because traditional risk factors were more prevalent in them. But in the present study, though most of the women belonged to lower socioeconomic status, prevalence of traditional risk factors was noted to be high, which may be due to the lifestyle of women in South India.

Risk Factors specific to women

In this study, 98.3% were married, and about 87.8% had achieved menopause. This is consistent with the study by Bettegowda S [40] where 88% women with IHD had achieved menopause. In a study by Dosi R et al.[43], it was discovered that postmenopausal women had a higher

prevalence of dyslipidaemia, which in turn raised the risk of IHD. 83.4% of women with IHD had reached menopause in a different study by Dave T. H. et al.[44]. These studies all point to postmenopausal women having a significant risk of IHD.Only 16.5 % of the participants in this study used oral contraceptive pills and none had the history of hormone replacement therapy. According to a study by Al-Juhaishi AM et al. [45], 67.5% of IHD-afflicted women used OCP. OCP enhanced the incidence of IHD in women who were smokers, according to a study by Vessely M et al.[46]. Most of the women in my study had two to three children and regular cycles, therefore most of them did not use OCPs.

It was found in the current study that the majority of the mortalities in the study population were over the age of 70, and this was statistically significant. This was consistent with the Sharma R et al. study[47], which discovered that elderly people had significantly higher cardiovascular mortality than younger people. Given that the majority of the research population was between the ages of 61 and 70 and that those who lived had likewise reached menopause, the relationship between menopause and mortality was minor. The current investigation found no statistically significant correlation between standard Framingham risk variables and cardiac death. Diabetes and hypertension, on the other hand, were found to have a significant impact on IHD-related mortality in the Million Death study[48], which was carried out in India. It may be challenging to predict how these risk factors may link to cardiac mortality given that the majority of the women in our study who survived also had these risk factors and were receiving treatment for them. Also, none of the participants in the research had liver or chronic kidney disease. In a study by Kivimäki M et al.[49], it was discovered that work-related stress had a significant association with cardiac mortality, while psychosocial factors did not have a statistically significant association with cardiac mortality. Although stress was a significant risk factor for IHD in women in this study, a statistically significant association with cardiac mortality was not found because the majority of the subjects did not have a job. This may also be because people are more likely to seek medical attention for these conditions now that the stigma surrounding psychiatric illnesses is slowly fading. OCP use and HRT were not associated with cardiac mortality in the study's location, where the majority of women do not get HRT. While older women made up the majority of the study sample, OCP use was less common.

It was discovered that women who experienced STEMI had a statistically significant connection with cardiac mortality. This might be the case because women frequently view their symptoms as less serious than men do, and they might not be getting to the emergency as quickly. This resembled the research conducted by Rodrguez-Padial L et al.[50]where higher mortality rates were found for women with STEMI and lower mortality rates for women with NSTEMI. Mortality was observed in 8.2% of patients with STEMI and just 1.8% of individuals with NSTEMI in a research conducted in Kerala by PP Mohanan et al.51. However, the majority of the women in this study presented to the clinician with NSTEMI, which may be related to the fact that cardiac biomarkers like high sensitivity troponin helped in the diagnosis of NSTEMI. This was in line with the study by Sharma et al.[52], which found that NSTEMI was more prevalent in women than STEMI when compared to men.The study was not short of limitations as Sample size is relatively small compared to other studies and the present study is based on data from a single hospital but

major one in the city.The study is cross-sectional in design. Hence, follow up data on the disease course and therapeutic outcomes were not assessed.

According to the study, we advise teaching women with multiple comorbidities about their risk of getting IHD as well as the key signs of IHD. To lessen the impact of psychological risk factors linked to IHD, mental health should be prioritised equally with medical assistance provided to people in need. For a better illness prediction, novel biomarkers like high-sensitivity CRP and N-terminal pro-BNP should be used in addition to the standard cardiac biomarkers like Troponin-I..

Conclusion

IHD was discovered to be more common in postmenopausal women between the ages of 61 and 70. Indicating their role in the development of IHD in women, about three-fourths of the women with IHD experienced stress, and more than half of them had anxiety. Compared to anxiety and stress, depression was less common in the study population. Smoking, OCP usage, and hormonal replacement medication were not recognised as significant risk factors, perhaps as a result of the study population's features. Women with STEMI fared poorly, and cardiac death was shown to be higher in elderly females older than 70 years. Therefore, even though emerging risk factors like depression, anxiety, work-related stress, and marital stress need to be evaluated as the treatment of all these conditions may have a significant impact on reducing morbidity associated with IHD, the traditional Framingham risk factors are still the most important risk factors for IHD in women.

References

1. Mulle JG, Vaccarino V. Cardiovascular disease, psychosocial factors, and genetics: the case of depression. Prog Cardiovasc Dis. 2013 May-Jun;55(6):557-62.
2. Vaccarino V, Parsons L, Every NR, Barron HV, Krumholz HM. Sex-based differences in early mortality after myocardial infarction. National Registry of Myocardial Infarction 2 Participants. N Engl J Med. 1999 Jul 22;341(4):217-25.
3. Mokdad AH, Ford ES, Bowman BA, Dietz WH, Vinicor F, Bales VS, Marks JS. Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. JAMA. 2003 Jan 1;289(1):76-9.
4. Pasternak RC, Abrams J, Greenland P, Smaha LA, Wilson PW, Houston-Miller N. 34th Bethesda Conference: Task force #1--Identification of coronary heart disease risk: is there a detection gap? J Am Coll Cardiol. 2003 Jun 4;41(11):1863-74.
5. Kim ES, Carrigan TP, Menon V. Enrollment of women in National Heart, Lung, and Blood Institute-funded cardiovascular randomized controlled trials fails to meet current federal mandates for inclusion. J Am Coll Cardiol. 2008 Aug 19;52(8):672-3.
6. Antman EM, Selwyn AP, Braunwald E, Loscalzo J. Ischemic heart disease. Harrison's principles of internal medicine. 2008;18:2000-13.
7. Shaw LJ, Bugiardini R, Merz CN. Women and ischemic heart disease: evolving knowledge. J Am Coll Cardiol. 2009 Oct 20;54(17):1561-75.
8. Ralapanawa U, Sivakanesan R. Epidemiology and the Magnitude of Coronary Artery Disease and Acute Coronary Syndrome: A Narrative Review. J Epidemiol Glob Health. 2021 Jun;11(2):169-177.
9. Khan MA, Hashim MJ, Mustafa H, Baniyas MY, Al Suwaidi SKBM, AlKatheeri R, Alblooshi FMK, Almatrooshi MEAH, Alzaabi MEH, Al Darmaki RS, Lootah SNAH. Global Epidemiology of Ischemic

Heart Disease: Results from the Global Burden of Disease Study. Cureus. 2020 Jul 23;12(7):e9349.

10. Reda A, Ashraf M, Soliman M, Ragy H, El Kersh A, Abdou W, Mostafa T, Hassan M, Farag E, Khamis H, Wadie M, Elbahry A, Salama S, Kazamel G, Sadaka M, Mostafa M, Abd El-Bary A, Sanad O, Rafla S, Abd El-Hady Y, Selim M, Farag N, El-Ghawaby H, El-Araby H, Emil S, Beshay M, Shawky A, Yusef M, Abd El-Ghany M, Gamal A, Baghdady Y, Mostafa T, Zahran M, El Rabat K, Bendary A, El Shorbagy A. The pattern of risk-factor profile in Egyptian patients with acute coronary syndrome: phase II of the Egyptian cross-sectional CardioRisk project. Cardiovasc J Afr. 2019 Mar/Apr 23;30(2):87-94.
11. Writing Group Members, Lloyd-Jones D, Adams R, Carnethon M, De Simone G, Ferguson TB, Flegal K, Ford E, Furie K, Go A, Greenlund K. Heart disease and stroke statistics—2009 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation. 2009 Jan 27;119(3):e21-181.
12. Vaccarino V, Badimon L, Corti R, de Wit C, Dorobantu M, Hall A, Koller A, Marzilli M, Pries A, Bugiardini R; Working Group on Coronary Pathophysiology and Microcirculation. Ischaemic heart disease in women: are there sex differences in pathophysiology and risk factors? Position paper from the working group on coronary pathophysiology and microcirculation of the European Society of Cardiology. Cardiovasc Res. 2011 Apr 1;90(1):9-17.
13. Mokdad AH, Ford ES, Bowman BA, Dietz WH, Vinicor F, Bales VS, Marks JS. Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. JAMA. 2003 Jan 1;289(1):76-9.
14. Daviglus ML, Stamler J, Pirzada A, Yan LL, Garside DB, Liu K, Wang R, Dyer AR, Lloyd-Jones DM, Greenland P. Favorable cardiovascular risk profile in young women and long-term risk of cardiovascular and all-cause mortality. JAMA. 2004 Oct 6;292(13):1588-92.
15. Soman CR, Kutty VR, Safraj S, Vijayakumar K, Rajamohanan K, Ajayan K; PROLIFE Study Group. All-cause mortality and cardiovascular mortality in Kerala state of India: results from a 5-year follow-up of 161,942 rural community dwelling adults. Asia Pac J Public Health. 2011 Nov;23(6):896-903.
16. Nicholson A, Kuper H, Hemingway H. Depression as an aetiologic and prognostic factor in coronary heart disease: a meta-analysis of 6362 events among 146 538 participants in 54 observational studies. Eur Heart J. 2006 Dec;27(23):2763-74.
17. Berkman LF, Blumenthal J, Burg M, Carney RM, Catellier D, Cowan MJ, Czajkowski SM, DeBusk R, Hosking J, Jaffe A, Kaufmann PG, Mitchell P, Norman J, Powell LH, Raczynski JM, Schneiderman N; Enhancing Recovery in Coronary Heart Disease Patients Investigators (ENRICHD). Effects of treating depression and low perceived social support on clinical events after myocardial infarction: the Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) Randomized Trial. JAMA. 2003 Jun 18;289(23):3106-16.
18. Whang W, Kubzansky LD, Kawachi I, Rexrode KM, Kroenke CH, Glynn RJ, Garan H, Albert CM. Depression and risk of sudden cardiac death and coronary heart disease in women: results from the

Nurses' Health Study. J Am Coll Cardiol. 2009 Mar 17;53(11):950-8.

19. Carney RM, Freedland KE, Veith RC. Depression, the autonomic nervous system, and coronary heart disease. Psychosom Med. 2005 May-Jun;67 Suppl 1:S29-33.
20. Larsson PT, Hjemdahl P, Olsson G, Egberg N, Hornstra G. Altered platelet function during mental stress and adrenaline infusion in humans: evidence for an increased aggregability in vivo as measured by filtragometry. Clin Sci (Lond). 1989 Apr;76(4):369-76.
21. Bajwa WK, Asnis GM, Sanderson WC, Irfan A, van Praag HM. High cholesterol levels in patients with panic disorder. Am J Psychiatry. 1992 Mar;149(3):376-8.
22. Markovitz JH, Matthews KA, Wing RR, Kuller LH, Meilahn EN. Psychological, biological and health behavior predictors of blood pressure changes in middle-aged women. J Hypertens. 1991 May;9(5):399-406.
23. Frasure-Smith N. In-hospital symptoms of psychological stress as predictors of long-term outcome after acute myocardial infarction in men. Am J Cardiol. 1991 Jan 15;67(2):121-7.
24. Nesse RM, Cameron OG, Curtis GC, McCann DS, Huber-Smith MJ. Adrenergic function in patients with panic anxiety. Arch Gen Psychiatry. 1984 Aug;41(8):771-6.
25. Eaker ED, Pinsky J, Castelli WP. Myocardial infarction and coronary death among women: psychosocial predictors from a 20-year follow-up of women in the Framingham Study. Am J Epidemiol. 1992 Apr 15;135(8):854-64.
26. Innes KE, Selfe TK, Taylor AG. Menopause, the metabolic syndrome, and mind-body therapies. Menopause. 2008 Sep-Oct;15(5):1005-13.
27. Toth MJ, Tchernof A, Sites CK, Poehlman ET. Menopause-related changes in body fat distribution. Ann N Y Acad Sci. 2000 May;904:502-6.
28. Hochman JS, Tamis JE, Thompson TD, Weaver WD, White HD, Van de Werf F, Aylward P, Topol EJ, Califf RM. Sex, clinical presentation, and outcome in patients with acute coronary syndromes. Global Use of Strategies to Open Occluded Coronary Arteries in Acute Coronary Syndromes IIb Investigators. N Engl J Med. 1999 Jul 22;341(4):226-32.
29. LaCroix AZ, Guralnik JM, Curb JD, Wallace RB, Ostfeld AM, Hennekens CH. Chest pain and coronary heart disease mortality among older men and women in three communities. Circulation. 1990 Feb;81(2):437-46.
30. Fihn SD, Blankenship JC, Alexander KP, Bittl JA, Byrne JG, Fletcher BJ, Fonarow GC, Lange RA, Levine GN, Maddox TM, Naidu SS, Ohman EM, Smith PK. 2014 ACC/ AHA/ AATS/ PCNA/ SCAI/ STS focused update of the guideline for the diagnosis and management of patients with stable ischemic heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines, and the American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. J Am Coll Cardiol. 2014 Nov 4;64(18):1929-49.
31. Greendale GA, Lee NP, Arriola ER. The menopause. Lancet. 1999 Feb 13;353(9152):571-80

32. Antony MM, Bieling PJ, Cox BJ, Enns MW, Swinson RP. Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. Psychological assessment. 1998 Jun;10(2):176.
33. Mohan V, Deepa M, Farooq S, Datta M, Deepa R. Prevalence, awareness and control of hypertension in Chennai--The Chennai Urban Rural Epidemiology Study (CURES-52). J Assoc Physicians India. 2007 May;55:326-32.
34. James C. Risk factors for coronary artery diseases: a study among patients with ischemic heart disease in Kerala. Heart India. 2013 Jan 1;1(1):7.
35. Shanmugasegaram S, Russell KL, Kovacs AH, Stewart DE, Grace SL. Gender and sex differences in prevalence of major depression in coronary artery disease patients: a meta-analysis. Maturitas. 2012 Dec;73(4):305-11.
36. Bante A, Mersha A, Zerdo Z, Wassihun B, Yeheyis T. Comorbid anxiety and depression: Prevalence and associated factors among pregnant women in Arba Minch zuria district, Gamo zone, southern Ethiopia. PLoS One. 2021 Mar 10;16(3):e0248331.
37. Bhatt P, Parikh P, Patel A, Parikh R, Patel A, Mehta JL, Parikh K. Unique Aspects of Coronary Artery Disease in Indian Women. Cardiovasc Drugs Ther. 2015 Aug;29(4):369-76.
38. Manoj MT, Joseph KA, Vijayaraghavan G. Association of depression, anxiety, and stress with myocardial infarction: A case–control study. Journal of Clinical and Preventive Cardiology. 2018 Jul 1;7(3):86.
39. Mishra D, Singh HP. Kuppuswamy's socioeconomic status scale--a revision. Indian J Pediatr. 2003 Mar;70(3):273-4.
40. Bettegowda S. Clinical profile of ischemic heart disease in women with special reference to the risk factors. Sch J App Med Sci. 2014;2(6C):3020-5.
41. Janati A, Matlabi H, Allahverdipour H, Gholizadeh M, Abdollahi L. Socioeconomic status and coronary heart disease. Health Promot Perspect. 2011 Dec 20;1(2):105-10.
42. Singh RB, Sharma JP, Rastogi V, Niaz MA, Ghosh S, Beegom R, Janus ED. Social class and coronary disease in rural population of north India. The Indian Social Class and Heart Survey. Eur Heart J. 1997 Apr;18(4):588-95.
43. Dosi R, Bhatt N, Shah P, Patell R. Cardiovascular disease and menopause. J Clin Diagn Res. 2014 Feb;8(2):62-4.
44. Dave TH, Wasir HS, Prabhakaran D, Dev V, Das G, Rajani M, Venugopal P, Tandon R. Profile of coronary artery disease in Indian women: correlation of clinical, non invasive and coronary angiographic findings. Indian Heart J. 1991 Jan-Feb;43(1):25-9
45. Al-Juhaishi AM, Al-Shehristani RM, Al-Obaidi ZM. The Correlation of the Use of Oral Contraceptive Pills and the Risk of Ischemic Heart Disease in Perimenopausal Women. Journal of Pharmaceutical Sciences and Research. 2018 Jun 1;10(6):1464-7.
46. Vessey M, Painter R, Yeates D. Mortality in relation to oral contraceptive use and cigarette smoking. Lancet. 2003 Jul 19;362(9379):185-91.
47. Curtis AB, Karki R, Hattoum A, Sharma UC. Arrhythmias in patients≥ 80 years of age:

pathophysiology, management, and outcomes. Journal of the American College of Cardiology. 2018 May 8;71(18):2041-57.

48. Ke C, Gupta R, Shah BR, Stukel TA, Xavier D, Jha P. Association of hypertension and diabetes with ischemic heart disease and stroke mortality in India: The Million Death Study. Global heart. 2021;16(1).
49. Kivimäki M, Leino-Arjas P, Luukkonen R, Riihimäi H, Vahtera J, Kirjonen J. Work stress and risk of cardiovascular mortality: prospective cohort study of industrial employees. Bmj. 2002 Oct 19;325(7369):857.
50. Rodríguez-Padial L, Fernández-Pérez C, Bernal JL, Anguita M, Sambola A, Fernández-Ortiz A, Elola FJ. Differences in in-hospital mortality after STEMI versus NSTEMI by sex. Eleven-year trend in the Spanish National Health Service. Revista Española de Cardiología (English Edition). 2021 Jun 1;74(6):510-7.
51. Mohanan PP, Mathew R, Harikrishnan S, Krishnan MN, Zachariah G, Joseph J, Eapen K, Abraham M, Menon J, Thomas M, Jacob S. Presentation, management, and outcomes of 25 748 acute coronary syndrome admissions in Kerala, India: results from the Kerala ACS Registry. European heart journal. 2013 Jan 7;34(2):121-9.
52. Sharma R, Bhairappa S, Prasad SR, Manjunath CN. Clinical characteristics, angiographic profile and in hospital mortality in acute coronary syndrome patients in south Indian population. Heart India. 2014 Jul 1;2(3):65.