Perceived Stress among Patients with Myocardial Infarction

Suryavanshi M[1], Shruti[2], YP Sharma[3]

Abstract

Recognising the factors leading to high perceived stress among individuals may help screen their cardiovascular risk and prevent major cardiovascular events like myocardial infarction. The current study was undertaken to assess perceived stress among patients with myocardial infarction. A descriptive research design and the consecutive sampling technique were adopted to collect data from 100 patients. Tools comprised of the socio-demographic profile, personal and clinical profile sheets and Pittsburgh sleep quality index Perceived stress scale. The findings revealed statistically significant higher perceived stress among patients above 51 years of age (p ≤0.05), males as compared to females (p = 0.005), working class as compared to non-working (p ≤0.005), and among patients with severe sleep difficulty than low sleep difficulty (p≤0.005). It was concluded that perceived stress among patients with myocardial infarction was associated with increased age (>51 years), male gender, working class, and those who had severe sleep difficulty. It is recommended to assess stress regularly among those who are at cardiovascular risk and those who have faced major adverse cardiac events like myocardial infarction to ensure that psychological and therapeutic measures are taken for secondary prevention.

Key words: Perceived stress, Myocardial infarction, Sleep difficulty

Stress is so common in everybody's life in modern era that it has become new normal and declared as health epidemic of 21st century by WHO. Brody (2022) highlighted that "Stress May be Your Heart's Worst Enemy". Stress causes health issues that initially cannot be bothersome but after a while can be manifested in the person and result in morbidities such as high blood pressure, diabetes and inflammatory disease etc. that can be worsened by chronic stress. Everyone is unique, and their reaction and the manifestation of stress are also different. Tawakol et al (2017) showed the association between the risk of cardiovascular disease and perceived stress by assessing the activation of the resting amygdala during emotional stress leading to artery inflammation. Faresjo et al (2020) in their case–control study discovered that persons who were diagnosed with an acute myocardial infarction (AMI) had elevated hair cortisol concentrations in the month before the acute event and concluded that chronic stress over a period of one month appears to be a novel and significant risk factor for myocardial infarction. Kosmas et al (2022) used a new biomarker-based approach to establish that levels of stress increase prior an AMI, peaks at 15 days before the events. Myocardial infarction is a fatal cardiovascular events experienced by 7 million people globally with 10 percent mortality rate each year. Man has higher prevalence of myocardial infarction than women with estimated death of 23.6 million by 2030 (WHO, 2020). Stress is an independent risk factor that often is underestimated and overlooked. Recognising the factors leading to high perceived stress among individuals may help screen their cardiovascular risk and prevent major cardiovascular events like myocardial infarction. The current study sought to assess perceived stress among patients with myocardial infarction.

The authors are: 1. Tutor, 2. Associate Professor, National Institute of Nursing Education, 3. Head, Department of Cardiology, Advance Cardiac Centre, all at PGIMER, Chandigarh.

Objective

The study was conducted to assess perceived stress among patients with myocardial infarction admitted at the Advance Cardiac Centre, Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh.

Methodology

A quantitative approach by using a non-experimental cross-sectional research design was adopted after obtaining formal permission from the concerned authority. The study was conducted on 100 patients when patients were admitted with confirmed diagnosis of myocardial infarction at cardiology units of the Advance Cardiac Centre, PGIMER, Chandigarh in year 2021. Patients who matched the inclusion criteria were selected by using the consecutive sampling tech-

nique. The investigator explained the purpose of the study to all the patients, and informed consent was obtained after assuring the anonymity of information.

Data were collected during hospital stay from participants using the interview schedule consisting of the socio-demographic data, personal and clinical profile of patients, WHO-Global physical activity questionnaire (GPAQ), Pittsburgh Sleep Quality Index (PSQI), Hill-Bonn medication adherence scale (HB-MAS), Perceived stress scale (PSS). WHO-GPAQ is "face-to-face interviews for collecting information on physical activity participation in three settings (or domains) as well as sedentary behaviour including 16 questions (P1-P16) and further evaluated by six sub domains: Vigorous work (codes P1-P3), Moderate work (codes P4-P6), Travel (codes P7-P9), Vigorous recreation (codes P10-P12), Moderate recreation (codes P13-P15), Sitting (code P16). MET is the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly, and is equivalent to a caloric consumption of 1 kcal/kg/hour. Sedentary activity=1, Cycling and walking=4 MET, Moderate activity=4 METs, vigorous activity=8 METs. Total physical activity MET-minutes/week = the sum of the total MET minutes of activity computed for each setting, Equation: Total Physical Activity MET-minutes/week = [(P2 * P3 * 8) + (P5 *P6 * 4) + (P8 * P9 * 4) + (P11 * P12 * 8) + (P14 * P15* 4)]. WHO recommends 150 minutes of moderate level of activity per week i.e. 600 METs per week. Output variable will meet WHO recommendation of physical activity (>600 METs) and doesn't meet WHO recommendation of physical activity (<600MET)". The PSQI contains 19 items on a 3-point Likert scale. The global PSQI score is classified into four categories depending upon the total score achieved: no difficulty (score = 0), mild sleep difficulty (score = 1–7), moderate difficulty (score = 8–14) and severe difficulty (score = 15–21). Adherence to drugs mean patient choice to follow prescribed treatment. HB-MAS 9 item scale was used for assessment of medication adherence of cardio protective drugs (for all patients). This scale consists of nine 4-point Likert items (all of the time= 1 point, Some of the time=2 points, Most of the time=3 points, None of the time=4 points. For the 9-item HB-MAS, the minimum scoring was 9 and the maximum score was 36. If a patient-reported "None of the Time" for all the 9 questions, his total adherence score could be 36 points indicating higher adherence, otherwise low adherence. WHO-Global physical activity questionnaire assesses level of physical activity. The Perceived Stress Scale (PSS) was used to measure the perception of stress. It measures the degree to which someone appraises life's situation as stressful. The scale also includes a number of direct queries about current levels of experienced stress. PSS assessed patients' feelings and thoughts during the last month; it is a 10-item 4 point Likert scale (0 = never, 1 = Almost never, 2 = Sometimes, 3 = Fairly often, 4 = Very often). Higher PSS scores also showed a failure to quit smoking, failure among diabetics to control blood sugar levels, greater vulnerability to stressful life-event-elicited depressive symptoms. PSS scores were found by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 and 4 = 0) to the four positively stated items (items 4, 5, 7, & 8) and then adding across all scale items. Total score is further divided into low moderate and severe stress depending upon the range of score. Total score in the range of 0-13, 14-26, 27-40 was classified as low, moderate, and severe stress respectively. Patients perceived life's situation as more stressful if scored higher in PSS, and vice versa. Lower is better. Patients were comfortably seated during data collection and interviewed as per the interview schedule after informed written consent was obtained. Ethical approval of project was sought from the Institute Ethics Committee, and permission from the head of the department was obtained. Collected data were coded using SPSS version 23 and analysed by using descriptive and inferential statistics.

Results

Data in Table 1 depict the socio-demographic profile of patients with MI. Nearly sixty percent (58%) of patients were above age 51 years and majority of them (85%) were male. More than two-third of patients studied upto 10 class and one-third of them studied above secondary school. Most of them (83%) were ever married. Approximately 70 percent of patients belonged to joint family, while 30 percent were from nuclear family. Nearly three-fourth of patients were working and one-fourth of them were not working. More than 60 percent were belonged to middles class.

Table 2 depicts the personal and clinical profile of patients with myocardial infarction. More than three-fourth of patients were diagnosed with ST segment elevated myocardial infarction and remaining one-fourth were having non-ST segment elevated myocardial infarction. Current smokers and alcohol drinkers were nearly 40 percent and 30

Table 1: Sociodemographic profile of patients with myocardial infarction (N=100)

Variables	f
Age (in years)#	
21-51	42
>51	58
Sex	
Male	85
Female	15
Education	
Upto 10th std	68
Above 10th std	32
Job status	
Working	74
Non-working	26
Marital status	
Ever married	96
Never married	04
Family type	
Nuclear	31
Joint family	69
Socioeconomic status$	
Upper class	09
Middle class	61
Lower class	30

Mean age=52.6±11 (24-75), $ as per Kuppuswamy socio-economic status -2021.

percent respectively. More than half of patients (54%) were overweight and obese along with normal fasting blood glucose level. Majority of them had raised serum triglyceride level (86%) and low HDL level (80%) while >60 percent had raised serum cholesterol level. Nearly 45 percent of patients were normotensive and more than half of patients were prehypertensive (33%) and hypertensive 23 percent. Nearly one-fifth of patients had not taken treatment for controlling blood pressure while only 5 percent were on antihypertensive drugs. Nearly 60 percent of patients has mild sleep difficulty and only 6 percent had severe sleep difficulty. More than half of patients (54%) were taking drugs (antihypertensive, antidiabetic and hypolipidemic agents), only 36 percent of them were adhere to treatment. More than two-fifth of patients had high level of physical activity while one-fourth were low active.

Fig 1 shows the percentage distribution of presence of comorbidities (hypertension, diabetes mellitus, asthma, COPD, renal disease, TB, stroke and others (back pain, anxiety, type A aortic dissection, joint pain, hypothyroidism, obesity, migraine, hepatitis C virus, spondylitis, DVT, peripheral artery disease, allergy and depression) among patients with myocardial infarction. Patients with no co-morbidities were only 22 percent while 41 percent had three co-morbidities and 1 percent reported four co-morbidities.

Frequency and mean score of each item of perceived Stress scale assessed among patients with MI is shown in Table 3. Nearly 40 percent of patients felt nervous and stressed in last month and almost all (99%) never felt that they were on top of things and nearly one-fifth of them never felt that things were going their way.

Data in Table 3 depicts the frequency of perceived stress level among patients with myocardial infarction. More than 60 percent reported moderate level of stress while only less than 20 percent had perceived severe stress.

The association of perceived stress with selected demographic, personal and clinical profile variables Table 4 has been shown in. Patients aged >51 years reported statistically significant higher level of stress compared to patients younger than 51 years of age at the level of significant p value (<0.05). Males observed statistically significant higher level of stress than females (p=0.005). Though there is no statistical significant difference noted in the level of stress among patients with presence of co-morbidities and without co-morbidities (p>0.05) but higher level of stress was observed in patients with co-morbidities (82%) as compared to patients with no co-morbidities(17.6%). Though higher level of stress patients was reported by patients with raised serum cholesterol (64.7%), triglyceride (94.1%) and low HDL (82.7) than among patients with normal lipid profile but no statistically significant association was found (p>0.05). Patients with severe sleep difficulty had significantly severe stress at the level of significance p value <0.005.

Table 2: Personal and clinical profile of patients (N=100)

Variables	Freq.
Diagnosis	
STEMI	76
NSTEMI	24
Current smoker	
No	62
Yes	38
Currently drink alcohol	
No	71
Yes	29
Raised BMI (>25 kg/m^2)	
No	54
Yes	46
Fasting blood sugar (FBG) level (mg/dl)	
Normal FBG (70-99)	54
Impaired FBG (100-125)	23
Raised FBG (>126)	23
Raised serum triglyceride level (>150 mg/dl)	
No	14
Yes	86
Serum HDL Level	
<40mg/dl	80
>40 mg/dl	20
Raised serum cholesterol (>200 mg/dl)	
No	37
Yes	63
Blood pressure (in mmHg)	
Normotensive (<120/80)	44
Pre-hypertensive (121-139/81-89)	33
Hypertensive (>140/90) and /or taking antihypertensive treatment	5
Hypertensive but not taking antihypertensive treatment	18
Global Sleep quality index score[q]	57
Mild sleep difficulty (1-7)	37
Moderate sleep difficulty (8-14)	06
Severe sleep difficulty (15-21)	
On cardiac drugs (antihypertensive, antidiabetic and hypolipidemic agents)	36
No	54
Yes	
Drug Adherence score[d]	n=54
High Adherence (36)	36
Low adherence (<36)	18
Total physical activity level (MET -minutes/week)[g]	
Doesn't meet recommendations of physical activity (<600)	26
Meets WHO recommendations of physical activity (>600)	74

q- Sleep quality as assessed by Pittsburg, Sleep Quality Index, g- Assessed as per global physical activity questionnaire,
D- Drug adherence as assessed by Bonn Hill Medication Adherence Scale,
BMI= Body mass index, HDL=High density lipoprotein, MET=Metabolic equivalents.

Discussion

Stress is almost experienced by everyone and

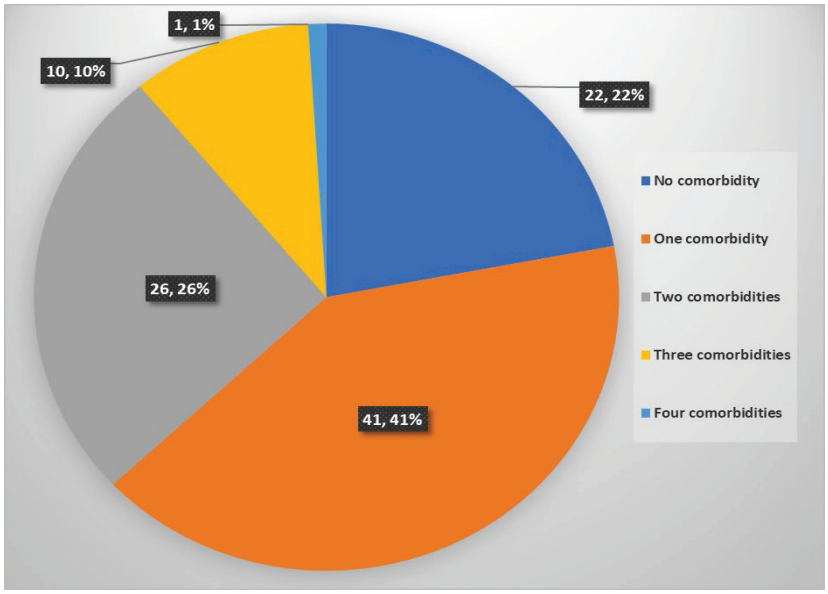

Fig 1: Presence of co-morbidities (HTN, DM, Stroke, Asthma, TB and others) among patients with myocardial infarction. *Notes*: COPD=Chronic obstructive pulmonary disease, TB=Tuberculosis, DVT=Deep vein thrombosis.

how severely we perceive stress affecting the body to a great extent. Recent studies concluded that Perceived stress carries the cardiovascular risk similar to known risk factors such as advanced age, male gender, high BMI, high waist-hip ratio, hypertension, diabetes mellitus, disturbed sleep, unhealthy diet, abnormal lipid profile and smoking (Yusuf et al, 2005; Sarkar & Mukhopadhyay, 2008; Anand et al, 2008; Arnold et al, 2012). Majority of studies have been conducted to assess perceived stress post MI, however in present study, perceived stress has been assessed among MI patients one month prior to MI. This has provided insight into the factors associated with stress that might contribute to myocardial infarction. As none of the studies have assessed stress before MI, comparison have been made with the studies which assessed perceived stress post-MI.

In present study, majority of patients were male (85%) similar to the findings of Anand et al (2008) and Manoj et al (2018). Mean age of the patients was 56±11 years similar to mean age reported by Anand et al (2012) and Vaswani (2020). In our study, significant higher stress was found among patients aged >51 years similar to study at US whereas in contrast to present study, perceived stress was significantly higher among patients age >61 years in study conducted at Telangana India. In current study, stress was statistically significantly higher among males as compared to females. Similar to the by Arnold et al (2012) and Vaswani (2020); in the current study, the mean perceived stress score was 19.4±7.6 similar to study findings of Xu et al (2015). In present study, no statistically significant higher level of severe stress was noted among patients with ST-segment elevated myocardial infarction (STEMI) (p value >0.05) in contrast to findings of Anand et al (2012) that reported significantly higher level of stress among patients with STEMI, their study also concluded that it was significantly associated with post-MI mortality. Present study reported statistically highly significant higher level of moderate and severe stress among patients with sleep difficulty similar to the findings of the study conducted by S et al (2021) at Wuhan that showed significant association of higher level of moderate stress with poor sleep quality. In the present study, though the stress was comparatively higher among the patients with co-morbid conditions but it was not statistically significant. On the other hand, Vaswani (2020) reported a significant association of anxiety with diabetes mellitus and hypertension but not with other conditions like asth-

Table 3: Frequency and mean score of each item; Stress among patients with post MI before and after interventions (N=100)

Negative stated items	Score					
	Never = 0	Almost never = 1	Sometimes = 2	Fairly often = 3	Very often = 4	Mean score
Been upset because of something that happened unexpectedly	28	07	11	25	09	2.2±1.6
Felt that you were unable to control important things in your life	41	14	12	19	14	1.5±1.5
Felt nervous and 'stressed'	22	02	11	41	36	2.5±1.4
Found that you could not cope with all the things that you had to do	49	24	12	11	04	0.97±1.1
Been angered because of things that were out of your control	20	11	12	34	23	2.29±1.4
Felt that difficulties were piling up so high and you couldn't overcome	32	11	12	29	16	1.86±1.5
Positive stated items	**Never = 4**	**Almost Never = 3**	**Sometimes = 2**	**Fairly often = 1**	**Very often = 0**	**Mean score**
Felt confident about your ability to handle your personal problems	02	06	22	41	29	1.1±0.9
Felt that things were going your way	19	05	17	37	22	1.6±1.3
Been able to control situations in your life	12	08	12	42	26	1.38±1.2
Felt that you were on top of the things	99	-	-	01	-	3.97±0.3

Table 3: Frequency of perceived stress level among patients with myocardial infarction (N=100)

Level of stress (Score range) #	Freq.
Low stress (0-13)	21
Mod Stress (14-26)	62
Severe stress (27-40)	17

Mean score: 19.4±7.6

ma, COPD, CVA.

In present study, perceived stress was not affected by raised blood pressure, overweight and obesity (p>0.05) in contrast to the findings of Sarkar et al (2008) who found significant difference in the level of perceived stress among patients with raised blood pressure, overweight and obesity. Regarding the association of serum cholesterol with perceived stress, though present study observed higher level of stress among patients with raised fasting serum total cholesterol but it was not statistically significant similar to the findings of Sarkar et al (2008). In present study patients with low HDL and raised triglyceride had higher level of perceived stress but was not statistically significant contrary to the findings of Sarkar et al (2008) that had significant association of perceived stress with raised serum triglyceride level. In present study, patients who were working had significantly higher level of moderate stress (p <0.005) compared to non-working similar to the study conducted at Quebec, Canada (2007) that found significant association of job strain with recurrent coronary heart disease. Contrary to expectations present study didn't find association with medication adherence which was not in line with the study conducted by Ajose et al (2022) in Nigeria that showed significant association of low drug adherence with higher perceived stress. There was a statistically significant association of higher level of stress among patients aged >51 years (p<0.05), male gender (p=0.005) working class (p<0.005), and sleep difficulty (p <0.005) but contrary to expectations no association was found with raised BMI, low physical activity (p>0.05), raised blood pressure (p=>0.05), abnormal lipid profile (p >0.05), drug adherence (p>0.05), co-morbidities (p >0.05). This may be attributed to some confounding variables and less sample size.

Conclusion

Perceived stress among patients with myocardial infarction was associated with increased age (>51 years), male gender, working class, and sleep difficulty. It is recommended to assess stress regularly among those who are at cardiovascular risk and those

Table 4: Association of perceived stress with selected demographic, personal and clinical profile variables

Variables	Low stress	Moderate stress	Severe stress	χ2/Fischer exact (df) p value
Age (years)				
<51	06 (28.6)	32 (51.6)	04 (23.5)	6.287 (2) 0.047*
>51	15 (71.4)	30 (48.4)	13 (76.5)	
Sex				
Male	18 (85.7)	57 (91.9)	10 (58.8)	9.688 f (2) 0.005**
Female	03 (14.3)	05 (8.1)	07 (41.2)	
Education				
Upto 10th std.	16 (76.2)	41 (66.1)	11 (64.7)	0.832 (2) 0.66
Above 10th std.	05 (23.8)	2 1(33.9)	06 (35.3)	
Work status				
Non-working	08 (38.1)	10 (16.1)	08 (47.1)	8.655 (2) 0.013*
working	13 (61.9)	52 (83.9)	09 (52.9)	
Marital status				
Married	20 (20.8)	60 (62.5)	16 (16.7)	0.963f (2) 0.797
Never Married	01 (25)	02 (50)	01 (25)	
Family type				
Nuclear	03 (9.7)	21 (67.7)	07 (22.6)	3.882 (2) 0.146
Joint	18 (26.1)	41 (59.4)	10 (14.5)	
Socioeconomic status				
Upper class	-	08 (12.9)	01 (5.9)	4.087 (4) 0.37
Middle class	16 (76.2)	35 (56.5)	10 (58.8)	
Lower class	05 (23.8)	19 (30.6)	06 (35.3)	
Diagnosis				
STEMI	15 (19.7)	47 (61.8)	14 (18.4)	0.619 (2) 0.711
NSTEMI	06 (25)	15 (62.5)	03 (12.5)	
Co-morbidities (HTN, DM, stroke, alcoholism and others)				0.376 (2) 0.834
No	04 (19)	15 (24.2)	03 (17.6)	
Yes	17 (81)	47 (75.8)	14 (82.4)	
Current alcoholic				
No	15 (21.1)	41 (57.7)	15 (21.1)	3.114 (2) 0.218
Yes	06 (20.7)	21 (72.4)	02 (6.9)	
Current smoker				
No	16 (25.8)	37 (59.7)	09 (14.5)	2.523 (2) 0.263
Yes	05 (13.2)	25 (65.8)	08 (21.1)	
Body mass index Raised BMI (>25kg/m^2)				1.359 (2) 0.507
Yes	12 (57.1)	27(43.5)	07 (41.2)	
No	09 (42.9)	35(56.5)	10 (58.8)	
Fasting blood sugar (FBG) level(mg/dl)				
Normal FBG (70-99)	10 (47.6)	37 (59.7)	07 (41.2)	3.116f (4) 0.546
Impaired FBG (100-125)	06 (28.6)	13 (21)	04 (23.5)	
Raised FBG (>126)	05 (23.8)	12 (19.4)	06 (35.3)	

who have faced major adverse cardiac events like myocardial infarction to ensure that psychological and therapeutic measures are taken for secondary prevention.

Table 4 continued...

Variables	Low stress	Moderate stress	Severe stress	χ2/Fischer exact (df) p value
Raised serum triglyceride level (>150mg/dl)				1.286 [f] (2) 0.595
No	04 (19)	09 (14.5)	01 (5.9)	
Yes	17 (81)	53 (85.5)	16 (94.1)	
Serum HDL level				0.619 [f] (2) 0.824
<40 mg/dl	18 (85.7)	48 (77.4)	14 (82.4)	
>40 mg/dl	03 (14.3)	14 (22.6)	03 (17.6)	
Serum cholesterol level				1.298 (2) 0.523
Raised cholesterol(>200mg/dl)				
No	10 (47.6)	21(33.9)	06 (35.3)	
Yes	11 (52.4)	41(66.1)	11 (64.7)	
Blood pressure (in mmHg)				5.045 [f] (6) 0.518
Normotensive (<120/80)	10 (47.6)	28 (45.2)	06 (35.3)	
Pre-hypertensive (121-139/81-89)	07 (33.3)	18 (29)	08 (47.1)	
Hypertensive (>140/90) and /or taking treatment	02 (9.5)	02 (3.2)	01 (5.9)	
Hypertensive but not taking treatment	02 (9.5)	14 (22.6)	02 (11.8)	
Total physical activity level (MET - minutes/week)[g]				1.306[f] (2) 0.521
Doesn't meet recommendations of physical activity (<600)	04 (15.4)	16 (61.5)	06 (23.1)	
Meets WHO recommendations of physical activity (>600)	17 (23)	46 (62.2)	11 (14.9)	
Sleep quality				15.485[f] (4) 0.002**
Mild sleep difficulty	14 (24.1)	41 (70.7)	03 (5.2)	
Moderate sleep difficulty	07 (18.9)	19 (51.4)	11 (29.7)	
Severe sleep difficulty	--	02 (40)	03 (60)	
Drug prescribed to patients	n=54			0.931[f] (2) 0.60
No = 46				
Yes = 54				
Drug Adherence[d]	09 (25)	22 (61.1)	05 (13.9)	
High adherence (36)				
Low adherence (<36)	03 (16.7)	11 (61.1)	04 (22.2)	

d: Assessed by Bone Hill medication Adherence scale, f- Fischer exact test,*- Significant p value **- Highly significant p value.

Notes: HTN=Hypertension, DM=Diabetes mellitus, BMI= Body mass index, HDL=High density lipoprotein, MET=Metabolic equivalents, STEMI=ST segment elevated myocardial infarction, NSTEMI= Non-ST segment elevated myocardial infarction.

References

1. Brody JE. Stress may be your heart's worst enemy. The New York Times January 3, 2022.
2. Tawakol A, Ishai A, Takx RA, Figueroa AL, Ali A, Kaiser Y, et al. Relation between resting amygdalar activity and cardiovascular events: A longitudinal and cohort study. *Lancet* 2017 Feb; 389 (10071): 834-845
3. Faresjö T, Strömberg S, Jones M, et al. Elevated levels of cortisol in hair precede acute myocardial infarction. *Sci Rep* 2020 Dec; 10 (1)
4. Kosmas N, Zapantiotis D, Kitridis D, Kiouri E, Rallidis LS. Gradually increased stress levels in the days leading to an acute myocardial infarction, detected by a new biomarker-based approach. *European Heart Journal* 2022 Oct; 43 (Supplement_2)
5. White HD, Chew DP. Acute myocardial infarction. *Lancet* (London, England) 2008; 372(9638): 570-84
6. Pedersen F, Butrymovich V, Kelbæk H, Wachtell K, Helqvist S, Kastrup J, et al. Short- and long-term cause of death in patients treated with primary PCI for STEMI. *Journal of the American College of Cardiology* 2014; 64(20): 2101-08
7. https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds), WHO, accessed on 06-12-2020
8. Yusuf S, Hawken S, Ounpuu S. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (The Interheart Study): Case-Control Study. *Journal of Cardiopulmonary Rehabilitation* 2005; 25(1): 56-57
9. Sarkar S, Mukhopadhyay B. Perceived psychosocial stress and cardiovascular risk: observations among the Bhutias of Sikkim, India. *Stress and Health* 2008; 24(1): 23-34
10. Anand SS, Islam S, Rosengren A, Franzosi MG, Steyn K, Yusufali AH, et al. Risk factors for myocardial infarction in women and men: Insights from the Interheart study. *Eur Heart J* 2008 Apr; 29 (7): 932-40
11. Arnold SV, Smolderen KG, Buchanan DM, Li Y, Spertus JA, Smolderen KGE. Perceived stress in myocardial infarction: Long-term mortality and health status outcomes. *J Am Coll Cardiol* 2012 Oct; 60(18): 1756-63
12. Manoj MT, Joseph KA, Vijayaraghavan Govindan. Association of depression, anxiety, and stress with myocardial infarction: A case–control study. *Journal of Clinical and Preventive Cardiology* 2018 Jan; 7(3): 86-92
13. Daya Vaswani. Psychological stress in myocardial infarction Patients. *Ind J Car Dis Wom* 2020 Feb; 5 (01): 27-37
14. Xu X, Bao H, Strait K, Spertus JA, Lichtman JH, D'Onofrio G, et al. Sex differences in perceived stress and early recovery in young and middle-aged patients with acute myocardial infarction. *Circulation* 2015 Feb; 131(7): 614-23
15. Si G, Xu Y, Li M, Zhang Y., Peng S, Tan X. Sleep quality and associated factors during the COVID-19 epidemic among community non-medical anti-epidemic Workers of Wuhan, China. *BMC Public Health* 2021 Jun; 21(1)
16. Ajose A, Odukoya OO and Akodu B. Perceived stress, depression and medication adherence among hypertensive patients attending a secondary care hospital in Lagos, Nigeria. *J Hypertens* 2022 Jun; 40 (Suppl 1): e312