

# A Critical Study on the Identification of High Risks Groups Prone to Myocardial Infarction and its Impact on the Healthcare Delivery System at Navodaya Critical Care Hospital, Nanded

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**Abstract:** Heart attack still figures prominently among worldwide mortalities and disabilities causes list, and there also seems to be an increase in the incidence in particular in the developing countries like India. This paper sought to recognize susceptible groups having higher risk of myocardial infarct and assess the resulting healthcare system changes at Navodaya Critical Care Hospital Nanded Maharashtra. It was a six months' hospital based cross-sectional observational study among 100 myocardial infarction patients admitted to ICU who had been diagnosed with certainty. The data was collected on sociodemographic profile, physical measurements, clinical characteristics, risk factors related to lifestyle and preexisting conditions, and analyzed with the help of descriptive statistical measures. 70% were males and 30% were females. It was noticed that male patients presented MI at comparatively younger age than female patients; of whom 64% males and 53% females developed it before they turned 60 years of age. The most common risk factors found were obesity, hypertension (high blood pressure), diabetes mellitus smoking tobacco use, and alcohol consumption. Also, many patients had a combination of several risk factors. If healthcare systems are reinforced, people can be advised about their health lifestyle, and if the government health programs are combined with hospital work, it is possible to make healthcare more available, better use resources, and make tertiary health care systems more sustainable.

**Keywords:** Myocardial Infarction (MI), Cholesterol (CHL), Intensive Care Unit, Ischemic Heart Disease (IHD), Cardiovascular Diseases, Hypertension, Diabetes Mellitus, Public Awareness, Health Schemes.

## 1. Introduction

Cardiovascular disease (CVD) is still the top killer and the largest burden of ill health in the world. It continues to be one of the greatest challenges to public health systems and the delivery of healthcare. IHD (ischemic heart) is ranked among the top 5 causes of death globally as the World Health Organization, and it also contributes heavily to the number of disabled adjusted life years [1-4]. In the cardiovascular disease category, acute myocardial infarction (heart attack) remains one of the most dangerous and immediate-life-threatening medical problems that require a very prompt diagnosis followed by advanced treatment and intensive specialized care management [5].

If we take healthcare management as a point of view, myocardial infarction does not just cause clinical complications, but also A lot influences healthcare systems efficiency and their sustainability. The demand for emergency cardiac care is growing which, in turn, means constant investment in special facilities, intensive care units' doctors nurses pharmacies laboratory services, and state-of-the-art medical devices. The higher hospitalization trend also means that hospital beds are underutilized, and a lot of the medical staff has to work with patients. Operational cost, resource allocation challenges, and the financial strain on the healthcare institutions get bigger all the time [12-13]. Public health programs and government-backed health insurance schemes are playing a larger role in increasing the availability

of heart-related care services and in lessening the financial pressure not only on the health care facilities and the patients but also on the society at large. When these schemes are included in hospital management activities, it could bring better healthcare accessibility, greater patient satisfaction, a more sustainable financial system, as well as higher operational efficiency. However, it is also very important to note that preventive measures are essential for the future [14].

The paper outlines the main objectives of the study to describe the demographic and clinical features of the myocardial infarction patients, to single out the primary modifiable and non-modifiable risk factors, i.e. those related to lifestyle vs hereditary factors for the cause of heart attacks and to determine the impact of the rising tide of myocardial infarction admissions on the consumption of health facility inputs, requirements for human resources, efficiency of operations, and management within hospitals. This work includes only patients hospitalized in Navodaya Critical Care Hospital that caters to both rural and urban populations in Nanded district, Maharashtra. So, the findings mainly represent the features of the local healthcare environment and must be understood in this context [15]. As the research was carried out in a single tertiary care hospital with a cross-sectional observational design, the results may not be directly applicable to other healthcare facilities or geographical areas. And, the study's primary aim revolves around the influence of heart attacks on the functioning of medical services, and the operational hurdles of workforce stress, the use of resources,

and the burden on a hospital. Still they have merely relied on observational pieces of evidence to measure these factors a lot, without quantifying these, for example, measuring nurse-patient ratios, work overtime, or conducting extensive cost-benefit analyses. Yet, the results of this work shed some practical light on issues of hospital managers, healthcare workers, and government officials for designing preventive measures, making better use of the medical facilities, enhancing the state of readiness of clinics/hospitals, and upgrading the level and longevity of cardiac medical care offered by hospitals.

## 2. Literature Review

Although there have been many developments in the prevention, detection, and management of myocardial infarction (MI), research from recently published studies still show that MI remains as one of the top contributors to cardiovascular disease related deaths in the world.

### Demographic Characteristics and High-Risk Population

Lately, some new epidemiological studies have pointed out that age distribution of myocardial infarction is gradually changing, with growing rates of the disease seen among younger people. In a study done in 2021 by Cyril Pellaton et al. young adults (18-40 years) with chest pain and elevated cardiac troponin were investigated. Besides, Rohit Kumar et al. (2022) discovered that men, compared with women, get heart attacks when they are still in their youth, this is mostly because of higher smoking rates, greater levels of obesity, hypertension, and poor lifestyle choices.

### Lifestyle and Clinical Risk Factors

The main contributors worldwide to myocardial infarction in most cases are hypertension, diabetes mellitus, abdominal obesity, dyslipidaemia, tobacco use, smoking and physical inactivity together. These results highlight that lifestyle modification is still the main way to prevent myocardial infarction [17]. Another multi-centre Indian study conducted by Sanjay P. Zodepy et al. (2022) identified mainly smoking, obesity, diabetes, hypertension and alcohol consumption to be heavily linked to increased likelihood of acute myocardial infarction. They suggested the expansion of community-based awareness programmes and regular cardiovascular screening to high risk population.

### Myocardial Infarction in the Indian Context

Cardiovascular disease has become one of the fastest-growing public health problems in India. The findings of the studies, which were carried out in various areas of the country, revealed that with the shift of lifestyle, the spread of cities and the gradual change of the population into senior citizens, the numbers of people requiring admission for the condition have risen. Vinay Rao et al. (2021) performed a prospective study and they mentioned that the main risk factors for myocardial infarction in Indian patients were tobacco, smoking, hypertension, diabetes mellitus, overweight, and dyslipidaemia. In a similar line, hospital-based study by Sushma Pandey et al. (2023) found that smoking, high blood pressure, and diabetes and hyperlipidaemia were highly common among people who had sudden chest caused by blockage of coronary arteries [18]. These findings show that behavioural and metabolic risk factors, which could have

been prevented, are mainly behind increasing number of MI cases in both rural and urban parts of India.

### Impact on Healthcare Delivery Systems

Recent studies have moved beyond looking only at clinical results and begun to look at ways the disease of coronary heart attack is affecting the healthcare systems. Papers published in the times of the ongoing Coronavirus pandemic and after it found that increasing patients suffering from cardiovascular emergencies being admitted to the hospitals has been responsible for heavy utilization of hospital resources, increased number of intensive care patients, increased manpower needs of the healthcare workers and increased hospital costs [19-20]. World Health Organization (2023) noted that cardiovascular diseases keep on costing healthcare systems a lot with money and organization worldwide, and Mostly in developing countries where healthcare resources are still very limited. In the same way, the American Heart Association (2024) highlighted that efficient cardiovascular programs with emphasis on prevention, timely diagnosis, a team approach to treatment, and rational resource distribution, are the best ways to achieve good results for the patient and still keep the healthcare system financially viable.

## 3. Methodology

### 3.1 Study Design

At a hospital, one did the study using a cross-sectional observational design based research for six months only through the hospital.

### 3.2 Study Setting

The study was carried out among the ICU patients of Navodaya Critical Care Hospital, Nanded, Maharashtra, India, a tertiary healthcare institution offering specialized cardiac emergency services. It serves both the urban as well as rural population and keeps comprehensive electronic and manual records which make it possible to carry out an ordered analysis of clinical and health data [22].

### 3.3 Study Population and Sample Size

During the study period a total of 100 consecutive myocardial infarction patients who needed Intensive Care Unit admission were surveyed as study participants.

### 3.4 Data Collection

Information was collected with the help of a structured and pre-tested case record form, through patient interviews, clinical examinations, and by reviewing hospital medical records. The data obtained were: Demographic characteristics - age, gender, religion, occupation, and residence. Personal history - diet, smoking, use of tobacco in other forms, alcohol consumption, and physical activity. Clinical history - hypertension, diabetes mellitus, dyslipidemia, previous cardiovascular disease, and family history. Body Mass Index (BMI) and The Waist-to-Hip Ratio (WHR) is the ratio of waist and hip measurements which is taken through standard anthropometric methods. Based on the World Health Organization standard classification of BMI [23-24].

### 3.5 Variables Assessed

*Modifiable Risk Factors:* Hypertension, Diabetes mellitus, Obesity, Dyslipidemia, Smoking, Tobacco chewing, Alcohol consumption, Dietary habits, Physical inactivity.

*Non modifiable Risk Factors:* Age, Gender and Family history of the patient.

Besides the characteristics of the patient, we looked at the indicators that reflect the delivery of healthcare services - the use of intensive care, nursing work, and the demand on hospital resources. By dividing the nursing care hours given only to the myocardial infarction patient group by the average daily patient census, the Nursing Care Hours per Patient Day (NCH/PPD) was calculated to evaluate the nursing workload [25].

### 3.6 Inclusion Criteria

The study subjects were those that were 18 years old and above, had been diagnosed with myocardial infarction after clinical assessment and investigative tests, had their ICU admissions recorded within the duration of this study; and were willing to provide signed consent forms as part of their enrollment into this research project.

### 3.7 Exclusion Criteria

Patients were not included if they had been brought there after getting a treatment that resolved the main issue at another facility, and without medical history; or expired within hours of being admitted to the hospital before a proper evaluation; or decided to withdraw from the research.

### 3.8 Statistical Analysis

The gathered data were transferred to Microsoft Excel and the analysis process was carried out with the help of IBM SPSS Statistics. Demographic characteristics, clinical profiles, and risk factors were represented numerically using descriptive statistical analysis. Continuous variables were described by mean standard deviation (SD) and categorical were displayed as frequencies and percentages [26-27]. We mainly relied on

visual representations via tables and figures to support the discussion. A statistical significance level of  $p < 0.05$  was decided for the study. In situations that fitted, a chi-square test was used to determine associations among categorical variables.

## 4. Results

### 4.1 Age and Gender Distribution

Out of 100 patients 55% of patients were 40, 60 years of age, while 37% of the respondents were older than 60 years, and only 8% of them were less than 40 years of age.

About 30% of the subjects of the study were women and 70% of them were men. More men being involved in the study implies that men are more likely to experience myocardial infarction than women.

### 4.2 Body Mass Index (BMI) and Waist-to-Hip Ratio

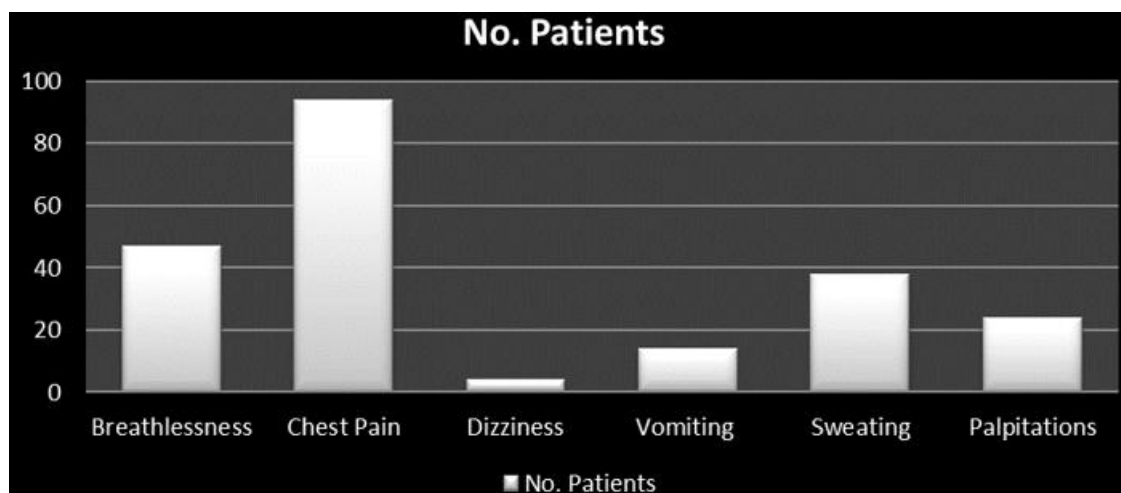
Body mass index measurement revealed 52% of the patients to be in the healthy weight category as per their BMI while 45% of the patients were either overweight or obese. Only 3% of the patients were underweight.

Also, the distribution of waist-to-hip ratios among males showed that 62% were highly waist-focused while 37% were balanced and 1% were slightly lean. In contrast, the ratio analysis for females found that 77% of them were waist-heavy and only 4% were waist-light. These statistics reveal that central obesity is a prevailing condition, mostly seen in female individuals.

### 4.3 Clinical Presentation

#### 4.3.1 Chief Complaints

Among the presenting symptoms, chest pain was the most frequently reported one, with 94% of the patients experiencing it. These symptoms included, in decreasing order: chest pain, shortness of breath sweating palpitations, and vomiting, followed by dizziness (4%). (**Figure 1**)



**Figure 1:** Presenting symptoms among patients with myocardial infarction

#### 4.4 Risk Factor Profile

Table 1 shows the distribution of the main risk factors. The highest number of people had obesity as their main risk factor, which can be modified (45%), followed by increasing age (37%), smoking (36%), history of cardiovascular or metabolic disease (25%), use of tobacco other than smoking (15%), regular consumption of alcohol (9%), and heredity factors (3%). Three percent (3%), of the total patients were considered to be in a separate risk factor category (idiopathic myocarditis), because no such risk factor for the disease was visible at all.

**Table 1:** Distribution of risk factors among myocardial infarction patients

| Risk Factors    | No. of Patients | Percentage (%) |
|-----------------|-----------------|----------------|
| Age             | 37              | 37             |
| Obesity         | 45              | 45             |
| Tobacco Chewing | 15              | 15             |
| Smoking         | 36              | 36             |
| Alcoholic       | 9               | 9              |
| Family History  | 3               | 3              |
| Idiopathic      | 3               | 3              |
| Medical History | 25              | 25             |

##### 4.4.1 Menopausal Status

Among the 153588 women, 57% were postmenopausal while the remaining 43% were premenopausal. The larger proportion of elderly women may be attributable to the effect of changes in hormone levels on the risk of cardiovascular disease.

**Table 2:** Menopausal status of female participants

| Menopausal Status | Number of Patients (n) | Percentage (%) |
|-------------------|------------------------|----------------|
| Postmenopausal    | 17                     | 56.67          |
| Premenopausal     | 13                     | 43.33          |

##### 4.4.2 Obesity Profile

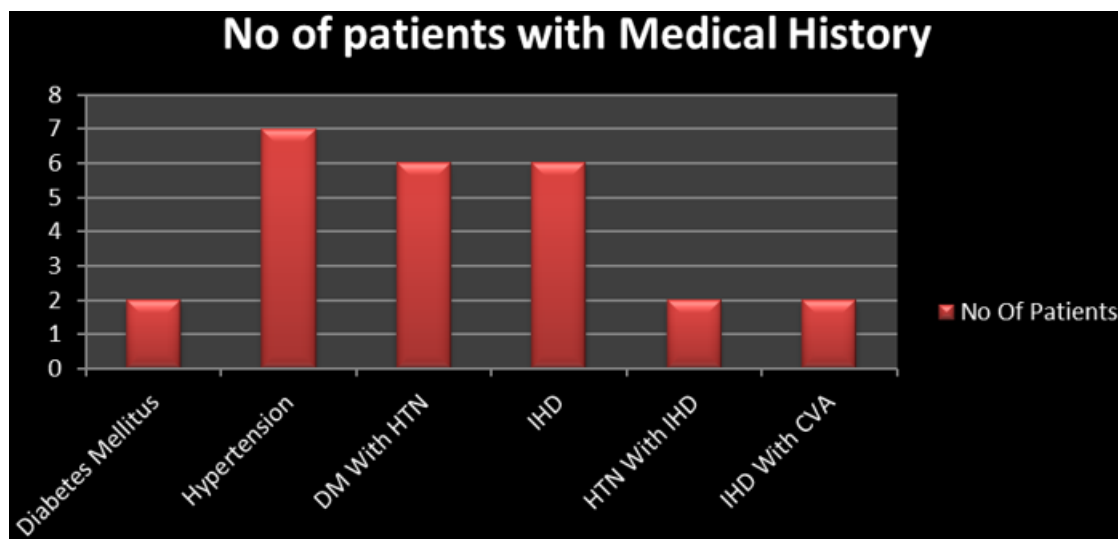
Using BMI and the waist-to-hip ratio, it was found that most of the those studied were suffering from obesity issues. Even though only 45% of the participants were classified as overweight or obese by using BMI, it could be seen that central obesity was the main problem for 62% of the male patients and 77% of the female patients (Table 3), This way showing that abdominal fat accumulation is a major cardiovascular risk factor.

**Table 3:** Distribution of obesity indicators

| BMI Category     | Number of Patients (n) | Percentage (%) |
|------------------|------------------------|----------------|
| Underweight      | 3                      | 3.0            |
| Normal Weight    | 52                     | 52.0           |
| Overweight/Obese | 45                     | 45.0           |

##### 4.4.3 Medical History

2% of patients had medical histories, as recorded. Hypertension was by far the most common accompanying illness, trailed by diabetes, a combination of diabetes and hypertension, ischemic heart disease, and cerebrovascular accident (**Figure 2**). This observation draws attention to the role of chronic metabolic and heart-related conditions as risk factors for heart attack.



**Figure 2:** Distribution of previous medical history among patients

## 5. Discussion

Most of the patients who suffered from a myocardial infarction were between 50 and 60, and the oldest of them were identified as the leading demographic of the disease through this study. The hospital admissions are mainly male, as it. As shown by these research data, the major factors among modifiable risks for myocardial infarction that should be addressed are obesity smoking hypertension, diabetes mellitus, and central adiposity. These findings also align with recent worldwide evidence that, in fact, lifestyle related risk factors are responsible for a large portion of cardiovascular

diseases burden. In particular, since both of the high rate of obesity and the large waist-to-hip ratio of this study indicate a strong tendency of having coronary artery disease, this means central obesity is the best indicator for the occurrence of coronary artery disease in the study population. In a similar way, the existence of both hypertension and diabetes in a large number of the respondents was a sign of the cumulative effect of having multiple cardiovascular risk factors. This result is in line with the earlier reports which claimed that the combined control of hypertension diabetes obesity and bad lifestyle habits is necessary to cut the risk of heart attack really [28-30]. From a healthcare management standpoint, the rising

admissions of elderly and high-risk heart attack patients will likely lead to a higher demand for ICU beds, specialized healthcare staff, and hospital resources. These results indicate further the importance of optimally using hospital resources, setting up preventive cardiac programmers, as well as enhancing community level screening.

**Table 4:** Distribution of Major Risk Factors among Patients with Myocardial Infarction and Comparison with Previous Studies

| Risk Factor                               | Present Study (% of Patients) |
|-------------------------------------------|-------------------------------|
| Age (>60 years)                           | 37                            |
| Gender                                    | Male: 64 Female: 53           |
| Central Obesity (Waist-to-Hip Ratio)      | Male: 62 Female: 77           |
| Tobacco Use                               | 51                            |
| Alcohol Consumption                       | 9                             |
| Family History of CAD                     | 25                            |
| Diabetes Mellitus                         | 32                            |
| Hypertension                              | 60                            |
| Ischemic Heart Disease (Previous History) | 40                            |

Table 4 summarizes the share of main risk factors that lead to myocardial infarction in study participants and contrasts these results with other authors who had published their work before. The two main risk factors that the paper identified that can be changed or controlled in this study were hypertension and central obesity. Male participants had a high waist-to-hip ratio in 62% and females in 77% of cases, which is a big figure for abdominal obesity. Tobacco (51%) and diabetes mellitus (32%) were some of the other factors shared by most subjects in this study.

## 6. Conclusion

The authors of this hospital-based cross-sectional investigation sought to determine the most prominent demographic anthropometric lifestyle, and clinical risk factors linked to myocardial infarction in patients who were admitted to Navodaya Critical Care Hospital, Nanded. The results highlighted that people in their middle age or elderly age are more likely to suffer myocardial infarction whereas it's comparatively younger age for men to suffer such a condition than for women. Hypertension, obesity, diabetes mellitus smoking tobacco use, alcohol consumption and central obesity are considered the major modifiable risk factors. This combination of various risks factors among many patients shows that myocardial infarction is mostly related to multiple risk factors or multifactorial disease and Because of This Make sure to conduct comprehensive cardiovascular risk assessment to prevent the disease at early stages.

In a healthcare management light, the rising prevalence of myocardial infarctions not only adds to the workload but also changes how healthcare services are delivered. Because these patients require more help, there will be a greater need for things like specialized equipment, professional medical teams, diagnostic equipment, and hospital resources. These results highlight the importance of improving healthcare systems by focusing on disease prevention measures, encouraging lifestyle changes, providing cardiovascular screenings in the risk groups, and informing people about

lifestyle factors they can change to reduce disease risk. Besides that, well implemented Government-backed Health Insurance Schemes with hospital resource planning and multi-disciplinary patient management is going to contribute Really to making healthcare available, lessening patient financial load and, above all, elevating the Quality, Efficiency, and Sustainability of tertiary level health services.

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