

A Study on Myocardial Infarction in Female-Risk Factor Analysis

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Abstract- Coronary heart disease (CHD) is a major health problem, which imposes a significant burden on health care system because of high morbidity and mortality. We know that CVD—including heart disease, hypertension and stroke—also affects a substantial number of women. There is documented evidence that young Asian women develop CAD at a higher rate with respect to risk factor profile and clinical outcomes.

Keywords- : Cardiovascular Disease, Coronary Artery Disease, Acute Myocardial Infarction, Diabetes Mellitus, Hypertension, Metabolic Syndrome, Hyperlipidaemia

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Introduction- Coronary heart disease (CHD) is the leading cause of death among women in developed and developing countries^[1]. The incidence of CHD is markedly lower among women than men are prior to the age of 50 years after which time CHD increases and approaches that seen among men by the eighth decade^[2]. CAD first presents itself in women approximately 10 years later than in men, most commonly after menopause^[3]. It is important to classify women as being at high, intermediate, or low risk based on clinical criteria and the Framingham global risk score^[4]. The FRS is calculated by taking into account age, sex, smoking status, total cholesterol, high density lipoprotein, cholesterol and systolic blood pressure^{[5],[6]}. As obesity and DM are another important well-recognized risk factor for CHD^[7], we will also encounter them in addition to FRS in this study. It is generally believed that the later age of MI in women is due to the protective effects of female sex hormones, but differences in diet and smoking may also be important^{[8],[9]}.

The most important complication of Type 2 diabetes Mellitus (DM) is coronary heart disease (CHD). In the Framingham Heart Study, the presence of diabetes doubled the age-adjusted risk for cardiovascular disease in men and tripled it in women. The prevalence of diabetes in urban areas of Bangladesh is double that of rural area, 8% versus 4% and continuously rising in both^[10]. Diabetes is associated with a threefold to sevenfold elevation in CHD risk among women, compared with a twofold to threefold elevation among men^[11].

Regarding ethnicity, a comparative study on AMI among Chinese, Malay and Indian women in a multi-ethnic Asian country showed 45 Asian female patients aged 50 years and below admitted to the hospital with a diagnosis of ST-segment elevation myocardial infarction (STEMI) or non-ST-segment elevation myocardial infarction (NSTEMI), hyperlipidaemia more prevalent among Indians, while diabetes mellitus more common among Malay patients revealed many young Asian women with AMI have identifiable risk factors that are different from those found in the Western population.

HTN is one of the established cardiovascular risk factors for development of atherosclerosis^[12]. Epidemiological studies document a strong association between high levels of both systolic and diastolic blood pressure (BP) and risk of CHD in both women and men^[13]. Among US adults older than 45 years, 60% of white women and 79% of African-American women were classified as having hypertension (defined as either taking antihypertensive medication or having systolic BP ≥ 140 mm Hg or diastolic BP ≥ 90 mm Hg)^[13]. Of particular concern, for older women is isolated systolic hypertension, which is estimated to affect 30% of women older than 65^[14].

Increased total serum cholesterol and low-density lipoprotein (LDL) cholesterol are risk factors for CHD in both women and men. From 1980 to 1991 more than 50% of women older than 55 years had serum cholesterol levels that were considered high (≥ 240 mg/dL)^[15]. In a recent meta-analysis, these lipids predicted CHD mortality in women younger than 65 but not in older women^[16]. A low level of HDL- cholesterol, however, was a risk factor for CHD in both younger and older women and was a stronger predictor of CHD mortality in women than in men.

Excess intra-abdominal adiposity increases cardio metabolic risk directly, *via* altered secretion of adipokines and indirectly promote insulin resistance and the metabolic syndrome. According to WHO, the BMI cutoff for obesity in Asian to greater than 23kg/m² with waist circumference > 90cm for male and > 80cm for female^[17]. Obesity, particularly abdominal adiposity, is an important risk factor for CHD in women^{[18],[19]}. The prevalence of abdominal obesity, according to NCEP/ATPIII criteria (waist circumference >102 cm for men and >88 cm for women^[20]) is also high and growing.

Hypothyroidism, a progressive disorder of the thyroid gland, is a common condition affecting more women than men. Subclinical hypothyroidism (SH) is typically defined as asymptomatic, characterized by slightly increased serum TSH levels and normal serum T4 concentrations^{[21],[22]}.

The risk of myocardial infarction appears to be highest in women who smoke while using oral contraceptive pills with at least 50 mg of estrogen^{[23],[24]}. However, more recent studies have suggested that there is no interaction between smoking and low-dose oral contraceptive pills with respect to the myocardial infarction risk^{[25],[26],[27]}. Royal College of General Practitioners' oral contraception study revealed current use of the pill increased the risk only among women who also smoked.

Family history of MI is positively associated with the risk of early MI in women. A case control study among female 18 to 44 years old residents of western Washington State revealed the rate of MI among first-degree relatives of MI cases was twice as high as among first-degree relatives of controls^[28].

Cigarette smoking remains the leading preventable cause of CHD in women, with more than 50% of MIs among middle-aged women attributable to tobacco^[29]. It is estimated that by the year 2020 smoking rates will be higher in women (23%) than in men (20%)^[30]. The prevalence of smokeless chewable tobacco is very high in south Asia with over 16% men and 21% women in Bangladesh^[31].

Acute myocardial infarction is a rare event in women of reproductive age, pregnancy increases the risk 3- to 4-fold. Acute myocardial infarction has been reported to occur with a frequency of 3 to 10 cases per 100 000 deliveries^{[32],[33]}. Although rare, acute pregnancy-related myocardial infarction is a devastating event that may claim the life of a mother and her unborn baby.

Depression, anxiety disorders, anger suppression, and stress associated with relationships or family responsibilities are associated with elevated CHD risk among women. According to data from the World Health Organization, by the year 2020 depression will be the second-leading cause of disability in developed countries (after heart disease)^[34].

Rationale of the research- Acute Myocardial Infarction its incidence, risk Factors and outcome has been reported in many studies in different regions of the world. To document the risk factors regarding Acute MI the study conducted in Rajshahi medical college hospital, Rajshahi, which drains northern part of Bangladesh. The laboratory techniques for estimation of cardiac enzymes, documentation of ECG, echocardiogram, 24 hours cardiac monitoring all were available here. Therefore, the purpose of this study is to analyze the risk factors related to CAD among women was rational.

Objectives-

General objectives:

- To identify the risk factors of acute myocardial infarction in Female patients at any age.

Specific objectives:

- To know the modifiable risk factors (eg. Smoking, dyslipidaemia, obesity, hypertension, DM) of female MI patients.
- To know the non modifiable risk factors (eg. age, sex) of MI
- To see the demographic profile of female Acute MI patients
- To describe the clinical features at presentation in these patients.

Materials and Methods-

a. Main outcome variables to the studied:

The following variables or procedures recorded for or performed in female patients: risk factors for coronary artery disease, Initial and subsequent ECG recording, Echocardiograph findings, Troponin I level, S.electrolytes

b. Study population:

Age: Patients of any age

Sex: Only female

c. Sample size:

Consecutive 30 female patients having acute coronary syndrome but no prior history of angina & none of them having preceding ECG changes(history of heart attack or nitroglycerin use) who fulfill the inclusion and exclusion criteria enrolled in this study. Sample size was estimated by using following formula-

$$n = \frac{Z^2 pq}{d^2} = \frac{(1.96)^2 \times 0.02 \times 0.98}{(0.05)^2}$$

[z=1.96 at 95% confidence level.

p=prevalence of coronary heart disease =2%=0.02³⁵

q=1-p=1-0.02=0.98, d=0.05(5% acceptable error).

According to this formula, the estimated final size was 30.]

$$= \frac{3.8416 \times 0.02 \times 0.98}{0.0025} = 30.1181436$$

Estimated sample size was 30.(Considering 10% dropout and exclusion)

d. Screening methods-NA

e. Sample method:

Purposive sampling.

f. Inclusion and exclusion Criteria

Inclusion criteria

- Patients with acute Myocardial Infarction
- Established diagnosis of ACS based on history, ECG changes and Cardiac Marker
- Any age and Female patients.

Exclusion criteria:

- Patient with previous history of MI.
 - Patients who will not agree to be included in this study.
 - Patients of more than 40 years of age.
 - Patient known to have hypercoaguable state.
 - Congenital or valvular heart diseases.
 - Cardiomyopathies
- g. Operational definitions:

Acute coronary syndrome:

Acute coronary syndrome refers to the group of thrombotic coronary artery conditions that result in myocardial ischemia or necrosis. Collectively, unstable angina (UA), non ST segment elevation myocardial infarction (NSTEMI), and ST segment elevation myocardial infarction (STEMI) are identified as acute coronary syndrome (ACS).

Acute Myocardial Infarction:

According to the WHO definition when the patients had at least two of the following three criteria: typical chest pain for myocardial ischaemia, initial and serial conventional electrocardiographic changes in standard or precordial leads, and enzymatic evidence of myocardial necrosis.

Atherosclerosis:

It is characterized by intimal plaques called atheromas that produce into the lumen, weakened the underline major acquired risk factors that play an important role in process of atherosclerosis.1-Hyperlipidemia 2-Hypertension 3-Cigarette smoking 4-Diabetes.

Type 2 diabetes mellitus:

Type 2 DM comprises an array of dysfunctions resulting from the combination of resistance to insulin action and inadequate insulin secretion. It is characterized by hyperglycemia and associated with microvascular (ie, retinal, renal, possibly neuropathic), macrovascular (ie, coronary, peripheral vascular), and neuropathic (ie, autonomic, peripheral) complications.

Metabolic Syndrome (Insulin Resistance Syndrome):

This syndrome is a precursor of diabetes consists of hyperinsulinemia, atherogenic dyslipidemia, glucose intolerance, prothrombotic state, central obesity, and hypertension.

HDL-cholesterol (HDL-C):

HDL-C has been identified as a lipoprotein that protects against atherosclerosis and its levels are inversely proportional to the risk for developing ischemic coronary disease and venous thromboembolic disorders.

Hypertension:

Patients with a history of hypertension in their medical records or with three or more successive blood pressure measurements exceeding 140/90 mmHg during hospitalization were considered hypertensive. Age 45-62 whose blood pressure exceeds 160/95 mm Hg have more than fivefold greater risk of IHD than those with blood pressure of 140/90 mm of hg or lower.

Subclinical hypothyroidism (SCH):

Subclinical hypothyroidism defined as a serum thyroid-stimulating hormone (TSH) level above the upper limit of normal despite normal levels of serum free thyroxine.

h. Equipment to be used:

ECG recorder, Echocardiograph, Cardiac monitor, Spectrophotometer.

i. Procedure of collecting data:

Data was collected from female patients of any age with acute MI as determined by clinical features, ECG evidence and biochemical report. After admission to CCU every patient were under continuous cardiac monitoring to see and record any arrhythmia within 48 hours of onset of symptoms. Then the tracing was evaluated and cross checked by a cardiologist. Detailed history and thorough clinical examination was performed in a prefixed questionnaire form or data collection sheet after taking informed consent of the patients. They were then subjected to a battery of some investigations to rule out the risk factors that may be associated with Acute MI

Investigations:

- ECG
- Echocardiogram
- Troponin I
- Serum T4, TSH
- Serum lipid profile

- RBS
 - Serum creatinine
 - X-ray chest P/A view.
- j. Professional assistance from experts:
Cardiologist and Biochemist.
- k. Procedure of data analysis of interpretation:
Data will be processed in computer using SPSS 16.0 for windows. Descriptive analytical technique involving frequency, distribution, computation of percentage, mean, SD, etc. will be applied. P value < 0.05 will be considered significant.

Ethical Implication- Eligibility of each patient assessed and asked for informed consent. All patients were informed about the procedure and study objectives that there would be no chance of any harm to the patient by inclusion in the study. The patients were also informed that they are free to refuse to participate or to withdraw from the study at any time without compromising their medical care. Complete the principal investigator would keep data collection form to which no one would have any access.

Conclusion- Cardiovascular diseases are the leading causes of morbidity and mortality and CVD in women will continue to be a public health priority as significant numbers of aging women are at increased risk. The risk in mortality from CAD around the age of menopause has led to speculation that endogenous estrogen in premenopausal women has a protective effect. Although risk of CHD does not abruptly increase at the moment of natural menopause, rates of heart disease rise sharply during the period of the climacteric. A woman found to have coronary calcification or increased carotid intimal thickness may be at low risk for CAD based on the Framingham risk score, but she may be actually at intermediate or high risk for a future event. Maternal Placental Syndrome in combination with risk factors for example: prepregnancy, hypertension, DM, obesity, dyslipidemia & metabolic syndrome, may be additive in defining CAD risk in women. Overall; the strongest risk factors for women appear to be advancing age, low HDL cholesterol, tobacco use and DM. Diabetes in women less than 60 years is more strongly associated with AMI than the presence of diabetes in women over the age of 60 years. The same pattern is observed for abnormal lipids, hypertension, and smoking. This indicates that when these risk factors are present in young women they should be aggressively modified. Among women, adherence to lifestyle guidelines involving body weight, diet, exercise and abstinence from smoking is associated with an 80% lower risk of CHD.

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