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STUDY OF ELECTROCARDIOGRAPHIC AND ANGIOGRAPHIC PROFILE OF ISCHEMIC HEART DISEASE PATIENTS ADMITTED IN TERTIARY CARE HOSPITAL.

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Abstract:

Background: Cardiovascular diseases have emerged as an epidemic in India. The study was undertaken to understand the electrocardiographic and coronary angiographic presentation of ischemic heart disease subjects admitted in a tertiary care hospital.

Methods: The study was done in 100 IHD patients admitted in medicine ward of tertiary care hospital. Subjects were evaluated based on detailed clinical data like symptoms, signs, and associated illnesses, general and systemic examination. Subjects were diagnosed with IHD as per the guidelines of Joint National Committee 7.Each subject had undergone ECG and angiography to find out exact pathology.

Results: Maximum38% subjects were in age group of 61-70yrs and mean age of 60.11+10.32yrs. M: F was 17:1. Half of the subjects showed T wave inversion and 36% had normal ECG. Maximum 43% had single vessel disease, 24% had double vessel disease and 5% had triple vessel disease.

Conclusions: The patients without significant ECG change may have extensive coronary artery involvement or sometime even normal coronaries on angiography so each case of IHD should undergo coronary angiography to identify future risk and reduce complication.

INTRODUCTION:

India is going through an epidemiologic transition whereby the burden of communicable diseases have declined slowly, but that of non-communicable diseases (NCD) has risen rapidly, thus leading to a dual burden. There has been a 4-fold rise of Coronary heart disease (CHD) prevalence in India during the past 40 years. Current estimates from epidemiologic studies from various parts of the country indicate a prevalence of Coronary Heart Disease (CHD) to be between 7% -13% in urban[1-3] and 2% - 7% in rural[4,5] populations.

Signs, symptoms, and complications of CHD vary based on the type of ischemic heart disease and some people report severe symptoms of ischemic heart disease, but others have no signs or symptoms at all. Many patients present daily to the emergency department with the chief complaint of chest pain. The challenge for the physician is to identify patients who require intervention, particularly when acute coronary syndromes (ACSs) present with atypical symptoms or nondiagnostic electrocardiogram (ECG) changes or normal cardiac enzyme levels. Since the mortality and morbidity of ischemic heart disease improves following early treatment, timely diagnosis is of vital importance not only to help thepatient but also to reduce hospital stay and economic costs.[6]

Although coronary angiography is the "gold standard" for determining the infarct-related artery in acute myocardial infarction, the ECG can be a useful tool in identifying which artery is involved at the first point of care. We can confirm the ECG prediction by angiogram. In many Centres of our country, early intervention is not possible. By examining ECG, we can predict the infarct related artery and upcoming complications. For these groups, we can refer them to a centre where early revascularization facility is present. With this background and in order to improve optimal utilisation of health resources in many less equipped health care facilities in country like India we tried to find out correlation of electrocardiography (ECG) findings with coronary angiography among ischemic heart diseases subjects admitted to tertiary care centre.

MATERIAL AND METHOD:

Cross sectional observational study was carried out for the duration of 2yeras (Aug 2017 to July 2019) in a medicine department of tertiary care centre among 100 diagnosed cases of IHD. Subjects were diagnosed with IHD as per the guidelines of Joint National Committee 7. The sample size was estimated based on single population proportion formula using a confidence interval (CI) of 95% and a 57.1% previous prevalence [92] of single vessel disease (SVD) among IHD patients and acceptable difference of 10% using sample size formula was 95.A total of 100 subjects were included in study. IHD subjects >18 Years of age irrespective of gender admitted and undergoing coronary angiography were included and Patients with previously known primary valvular heart disease, valve replacement, congenital heart disease, non-ischemic cardiomyopathy, and those who had previously undergone coronary artery bypass graft surgery were excluded from the study.Ethical and institutional scientific committee approval was taken before the start of study.Written informed consent was taken from patients.Patients were informed about purpose, procedure, risk and benefits of involvement in study in their own language of understanding.

Each patient had evaluated for detailed history and clinical examination including assessment for coronary risk factors. Cardiac investigation like ECG, 2D-Echo and Coronary angiography were carried out among study subjects.

The result of non invasive test as ECG & Echo were reported for each patient and sorted as following:

Positive ECG for ischemia considered if the resting or exercise ECG showed ST-depression, ST-elevation; T-wave inversion or LBBB.Coronary angiography was done for each patient under local anaesthesia from femoral approach using Phillips Cath. Lab. machine. Coronary angiograms were visually assessed in different orthogonal views and analyzed by expert interventional cardiologist for atherosclerotic involvement & severity assessment.The angiographic result sorted to assess the severity of atherosclerotic disease as normal coronary angiogram, single vessel

disease, two vessel disease &three vessel disease.Normal coronary angiography is considered if the three coronary arteries (right, left anterior descending; circumflex &left main stem coronary arteries) had (0%) Stenosis.Single vessel disease considered if one of the three coronary arteries had at least 70%degree of luminal narrowing on angiography.Double vessel disease was considered if two coronary arteries had at least 70%stenosis on angiography. Triple vessel disease was defined as three coronaries LAD; RCA &LCX had at least 70% Stenosis in each.[7]

Data analysis: Data was entered into computer Microsoft Excel and exported to SPSS version 20 for analysis. Continuous variables were expressed as mean ± standard deviation or median (inter quartile range) and categorical variables were expressed as number (percentage). For categorical variable association between exposure and outcome variable was analysed using Chi square or Fisher exact test. P value < 0.05 was considered statistically significant.

RESULTS:

A total f 100 subjects diagnosed with IHD irrespective of gender above 18yrs were involved maximum38% subjects were in age group of 61-70yrs. Overall 67% study subjects were in age range of 51-70yrs and mean age of 60.11±10.32yrs.M: F 1.7:1.Most common complaint was dyspnea among 77% followed by chest pain 56% and palpitation 24%.Risk factors among study subjects weretobacco uses (39%), alcoholism (35%), obesity (25%) and hyperlipidemia (25%). Most of them (50%) showed T wave inversion on ECG. Majority of patients suffered from acute MI predominantly anterior wall myocardial infarction (74.6%) followed by inferior wall myocardial infarction (10%). About 8.6% of patients had unstable angina. Maximum 43% had single vessel disease on angiography. Most common affected vessel was LAD (20%) and LAD with RCA (12%). Among T wave inversion on ECG 48% were found single vessel disease, among normal ECG findings 38.89% were found single vessel disease, among qS pattern 100% had double vessel disease, among ST depression findings 43% each had normal and double vessel disease while 100% ST Elevation were found single vessel disease on coronary angiography.

DISCUSSION:

Coronary heart disease is a worldwide health epidemic. Worldwide 30 percent of all deaths can be attributed to cardiovascular disease of which more than half are caused by coronary heart disease. Globally of those dying from cardiovascular disease, 80 percent are in developing countries. Acute myocardial infarction (AMI) is one of the most common presentations of CAD.Earlier CAD was usually found in the older population; however, nowadays, it is often encountered by young adults. An estimated 4%–10% of individuals with documented CAD are seen to be <45 years of age.[8,9] In present study 19% of subjects were below 50years of age indicating alarming signal for early intervention to reduce burden of disease among young adults.

In present study mean age of study subjects was 60.11±10.32yrs. There were 63% male and 37% female. Study by Sannani A et al. found mean age of 64±13 years in their study.[10]Study by Mamun KSA et al had mean age of 51 ± 8.6 years among their study subjects involving inferior wall MI.[11]

Various factors that are thought to contribute to this rising epidemic include urbanization of rural areas, large-scale migration of rural population to urban areas, increase in sedentary lifestyle, abdominal obesity, metabolic syndrome, DM, dyslipidemia (high TGs and low HDL-C), tobacco abuse, inadequate consumption of fruits and vegetables, increased use of fried, processed and fast foods. Male sex is more prone to CAD when compared to their premenopausal female counterparts. It was observed in the INTERHEART study that South Asian men encountering AMI were 5.6 years younger than women.[12]In present studyyoungest male was 30yrs and youngest female was of 45years. Study finding conclude that male in their early 30yrs were diagnosed with IHD so along with age, gender is most important risk factor for occurrence of IHD among younger one.

ECG findings form the basis on which acute coronary syndromes are classified into STEMI, NSTEMI, or unstable angina, a classification which provides information regarding the extent of myocardium at risk and guides initial therapy. ST-segment elevation is a sign of transmural ischemia and identifies patients who are likely to benefit from urgent revascularization. The relation between ST-segment elevation on the ECG and the occluded coronary artery has been established in multiple clinical studies in patients with ACS.[13]

In present studyhalf of the subjects showed T wave inversion, 36% had normal ECG, ST depression was found among 7% and ST elevation in 4% subjects. Majority of patients suffered from acute MI predominantly anterior wall myocardial infarction (74.6%) followed by inferior wall myocardial infarction (10%). About 8.6% of patients had unstable angina.

The invasive coronary angiography is the gold standard in coronary artery disease evaluation.

It is one of the most common operative procedures to assess territory and amount of block among diseased subjects. Depending on the amount and diseased vessel most of the time we can go for CABG/PCI, so this has diagnostic and therapeutic role among AMI subjects.

In present study maximum 43% had single vessel disease, 28% normal findings, 24% had double vessel disease and 5% had triple vessel disease. Kumbhalkar SD, et al[14]study showed SVD in 57.1% of the cases followed by DVD (11.5%) and TVD (7.1%). Jankar A et al [15]found SVD in 29% of the cases followed by DVD in 31% and TVD in 17%. These variations may be due to difference in age of study subjects.

In patients with SVD, LAD was predominantly involved (20/43 SVD) followed by LCX (11/43) and RCA (9/43). Jankar A et al [15] also found LAD involvement was seen in 23 (79.31%) patients. LCx involvement in 3 (10.34%) and RCA involvement seen in 3(10.34%) patients. Our findings corroborate the results of different studies.[14,16]

No patient had LMCA involvement in our study, while other studies [17,18]showed a low prevalence of LMCA involvement.

On analysing association between ECG findings with coronary angiograph, it was found that among most common ECG findings i.e. T wave inversion 48% were found single vessel disease, among normal ECG findings 39% were found single vessel disease; among qS pattern 100% had double vessel disease; among ST depression findings 43% each had normal and double vessel disease while 100% ST elevation myocardial infarction were found single vessel disease on coronary angiography. From these findings we can conclude that among more than one fourth (39%) study subjects had single vessel diseased. Subjects with normal ECG(36) also had single(14/36=38.3%) or double(9/36=25%) vessel disease when they underwent coronary angiography, so symptomatic patients with normal ECG cannot be ignored and screening for vascular involvement should be carried out to avoid future risk of complications.

CONCLUSION:

Ischemic heart disease is common in middle age patients with male predominant. Hypertension, diabetes mellitus, dyslipidaemia, obesity andSmoking are important cardiovascular risk factors for ischemic heart disease.

ECG is for identifying the presence of acute myocardial ischemic event but Coronary angiography remains the "gold standard" for identifying the infarct related artery. The patients without

significant ECG change may have extensive coronary artery involvement or sometime even normal coronaries on angiography. ECG reflects the physiology of the myocardium during acute ischemia, whereas coronary angiography identifies vessel anatomy. For this reason, it is possible to observe severe coronary artery stenosis on angiography without ECG evidence of acute ischemia.

Table 1: Baseline characteristics of study subjects

Variables	Frequency	Percent
Age group		
<40yrs	3	3.00%
41-50yrs	16	16.00%
51-60yrs	29	29.00%
61-70yrs	38	38.00%
71-80yrs	14	14.00%
Gender		
Female	37	37.00%
Male	63	63.00%
Complains		
Dyspnea	77	77.00%
Chest pain	56	56.00%
Palpitation	24	24.00%
Giddiness	21	21.00%
Sweating	14	14.00%
Risk factors		
Alcoholism	35	35.00%
Obesity	25	25.00%
Hyperlipidemia	25	25.00%
Smoking	19	19.00%
Tobacco chewing	20	20.00%

Table 2: ECG findings among study subjects

ECG Findings	Frequency	Percent
T Wave Inversion	50	50.00%
Normal	36	36.00%
ST Depression	7	7.00%
qS Pattern	3	3.00%
ST Elevation	4	4.00%
Total	100	100.00%

Table 3: Coronary angiography findings among study subjects

Diagnosis on Angiography	Diseased Vessels	Frequency	Percent
Normal	No Vessel	28	28.00%
SVD	LAD	20	20.00%
	LCX	11	11.00%
	RCA	9	9.00%
	OM	3	3.00%
DVD	LAD-RCA	12	12.00%
	LCX-RCA	7	7.00%
	LCX-LAD	3	3.00%
	LAD-OM	2	2.00%
TVD	LAD LCX RCA	5	5.00%
	Total	100	100.00%

SVD-Single vessel disease, DVD-Double vessel disease, TVD-Triple vessel disease, LAD-left anterior descending, RCA-Right coronary artery, LCX-Left circumflex, OM-Obtuse marginal

Table 4: Association of ECG and Coronary angiography findings among study subjects

ECG findings	Coronary Angiography				Total
	Normal	SVD	DVD	TVD	
T Wave Inversion	12(24.00%)	24(48.00%)	9(18.00%)	5(10.00%)	50
Normal	13(36.11%)	14(38.89%)	9(25.00%)	0	36
qS Pattern	0	0	3(100.00%)	0	3
ST Depression	3(42.9%)	1(15.2)	3(42.9%)	0	7
ST Elevation	0	4(100.00%)	0	0	4
Total	28	43	24	5	100

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