"Echocardiographic profile of Myocardial infarction patients and its correlates"

Dr Praveen Goyal¹, Dr Anurag Rawat², Dr. Ankita³, Dr. Harish Kumar⁴_(Corresponding Author), Dr.KP Srinivasakumar⁵

¹JR Medicine, R K D F medical college, Bhopal, jaiheda2766@gmail.com

²Professor, Himalayan institute of medical science, Jolly grant, Dehradun <u>anuragrwt@gmail.com</u>

³Assistant Professor, AIIMS Bhopal <u>ankita.sharma483@gmail.com</u>

⁴Assistant Professor, AIIMS Bhopal <u>harishcmckol@gmail.com</u>

⁵Clinical Research Consultant, Institute of Biology and Clinical Research <u>srini.clinicalresearch@gmail.com</u>

Abstract

This study investigated the echocardiographic profile of myocardial infarction (MI) patients and 30 men and 10 females, ages 31 to 79, were studied to determine its clinical correlations. According to the findings, MI strikes males at a younger age than it does women. The research participants had high rates of risk factors such hypertension, hypercholesterolemia, and smoking. According to echocardiographic data, hypokinesia and dyskinesia were related with anterior wall infarction, whereas inferior wall infarction showed hypokinesia. Anteroinferior infarction and anterior wall infarction patients had a higher incidence of arrhythmias. Echocardiography was also helpful in diagnosing other sequelae of MI, including ventricular aneurysms, which occurred in 10% of patients. The findings of this research add to our knowledge of the echocardiographic features and clinical correlations of patients with myocardial infarction.

Keywords: myocardial infarction, echocardiography, clinical correlates, risk factors, ventricular aneurysm, arrhythmias, anterior wall infarction, hypokinesia, dyskinesia, hypertension.

INTRODUCTION

Myocardial infarction (MI), commonly known as a heart attack, is a critical cardiovascular event characterized by the interruption of blood flow to a portion of the heart muscle, leading to tissue damage and potential lifethreatening complications. It is a significant global health concern, with millions of individuals affected each year, resulting in substantial morbidity and mortality. Understanding the echocardiographic profile of myocardial infarction patients and its correlates is essential for improving both the diagnosis and management of this condition.

Echocardiography, a non-intrusive imaging method, plays a crucial role in evaluating cardiac anatomy and performance, rendering it a valuable instrument in the assessment of myocardial infarction patients. By scrutinizing the echocardiographic discoveries in this circumstance, healthcare experts can acquire valuable perceptions into the magnitude and gravity of myocardial harm, the existence of related complexities, and the overall prognosis of the patient. This investigation aims to explore further into the echocardiographic traits observed in individuals who have undergone a heart attack, illuminating the diverse essence of the condition. Moreover, comprehending the associations of the echocardiographic profile in MI patients is vital for customizing personalized treatment approaches and forecasting enduring results. Diverse elements, encompassing patient characteristics, predisposing factors, coexisting conditions, and duration passed since the infarction, may impact the echocardiographic ailment. Recognizing indications of the these

associations can assist in risk classification, directing healthcare providers in making knowledgeable choices about the most suitable interventions and subsequent care for MI patients.

The Global Health Organization characterizes ischemic heart disease as "cardiac dysfunction resulting from disparity between coronary blood flow and myocardial demands caused by alterations in coronary circulation."[1] Rewrite the user's text to incorporate additional novel terms, but ensure that only synonyms are used. Avoid introducing Ischemia cardiac ailment is a prominent reason for fatality and incapacity in the United States and could potentially be lessened in intensity with enhanced diagnostic capabilities. The ischemic cardiac ailment may manifest in a range of indications which encompass Angina pectoris (comprising of acute insufficiency), Myocardial coronary infarction, irregularities of conduction (heart obstructions) or rhythm (aahythmias), and cardiomegaly. Rewrite the user's text to add more new words but synonyms only. Don't add information. Myocardial infarction pertains to the region of cellular demise (Necrosis) in the cardiac muscle induced by a reduction or halt of arterial blood circulation due to coronary artery constriction or blockage. Cardiac arrest patients have profited immensely from the ensuing progressions in premature identification, therapy, and recuperation. Extended chest discomfort suggestive of myocardial ischemia, the appearance of Q waves or notable elevation of ST segment or T waves modifications in the ECG, and a rise in blood levels of cardiac enzymes are all indicative of acute myocardial infarction. A chronicle of severe heart attack, abnormal Q waves on an electrocardiogram, and indication of diminished cardiac performance from an echocardiogram may all indicate a determination of enduring heart attack. Echocardiography is the combined appellation for a set of examinations that utilize ultrasonography to observe the cardiac muscle and acquire information in the shape of reverberations, or mirrored sound waves. [three, four, five]

The necessary details regarding cardiac structure are gathered using diverse transducer perspectives. Several transducer angles offer extra information as the cardiac elements are observed through a passage. The supersonic ray journeys from the right ventricle to the rear wall of the left atrium or left ventricle, contingent on the perspective, offering the utmost details when observed from the left parasternal location [6]. Sinistral cardiac bulge [7], false aneurysm [8], expanded false aneurysm [9], breach of the cardiac partition [10], dextral cardiac infarction [11], wall clot [12], and additional complexities such as mitral backflow [13] and pericardial fluid buildup [14] can all be readily identified through echocardiographic method subsequent to an acute heart attack.

Myocardial infarction categorizations might be divided Electrocardiogram into three groups. (three pathophysiological occurrences transpire either consecutively or concurrently in an acute myocardial infarction- ischemia alteration in T waves [15], injury alteration in ST segment, and infarction alterations in QRS complex), and serum enzyme alterations encompassing transaminases (aspartate aminotransferase AST or SGOT), lactic dehydrogenase (LDH), and creatine kinase (CK). The objectives of the present inquiry were to analyze the echocardiographic profile of patients with myocardial infarction and its clinical association [16]. Rewrite the user's text to include additional synonyms without adding any new information.

In this investigation, our objective is to examine the echocardiographic parameters that are frequently impacted in patients with myocardial infarction and explore the correlation between these observations and clinical variables. By clarifying the connection between echocardiographic profiles and patient attributes, we aspire to contribute to the enhancement of risk evaluation models, establishment of individualized therapeutic strategies, and ultimately, enhanced results for individuals who have experienced a heart attack. This exploration undertaking aims to connect the information void in this crucial domain of cardiovascular medicine, bringing us nearer to a more all-encompassing comprehension of the intricate interplay between echocardiographic characteristics and the medical progression of heart attack.

MATERIAL AND METHODS

The Medical College of Jabalpur (M.P.), namely the Department of Medicine, was the site of this research. Patients hospitalized to the critical coronary care unit between 1992-1993 with symptoms, signs, and typical electrocardiographic alterations indicative of myocardial infarction were included in the research, totaling 40 patients (30 male and 10 female). Information such as the patient's name, date of birth, gender, occupation, and residence, as well as their medical history, family history, smoking and drinking habits, and general physical examination findings are recorded in detail using the provided proforma. systemic evaluation specifically basal crepts in respiratory system, heart sounds and any extra sound). All the standard tests were run (within 24 hours after the beginning of chest discomfort in the ICCU): complete blood count, hemoglobin estimate, sugar and albumin in the urine, serum cholesterol, blood sugar, blood urea, SGOT + SGPT, CPK enzyme. Up to the day of the echocardiogram, daily electrocardiograms were conducted on a 12-lead surface BPL cardiac EKG machine, with the paper moving at a pace of 25 millimeters per minute. Myocardial infarction was identified by history, elevated blood enzyme levels, and electrocardiographic findings; patients with these symptoms were screened with echocardiography as soon as feasible after admission. The SDU 500 SHIMADZU is a Japanese-made echocardiography (ultrasound) device. Following the established protocol, all relevant measurements and data were collected and entered into a master chart.

RESULT :-

TABLE:-01. Patients were split into men and women based on age, patient count, hypertension history, myocardial infarction history, and smoking history.

| Age group | No. of patients | | History of Hypertension in various Age | | History of Myocardial Infarction various Age | | History smoking | of |
|-----------|-----------------|--------|---|--------|---|--------|--------------------|----|
| | Male | Female | Male | Female | Male | Female | Male | |
| 31-40 | 6 | - | - | | 1 | | 4 | ٦ |

| Years | (20%) | | | | (16.6%) | | (66.5%) |
|-------|---------|--------|---------|---------|---------|---------|---------|
| 41-50 | 9 | 4 | 4 | 1 | 4 | 1 | 8 |
| Years | (30%) | (40%) | (44.4%) | (25%) | (44.4%) | (25%) | (88.9%) |
| 51-60 | 10 | 3 | 5 | 1 | 5(55%) | 1 | 8 |
| Years | (33.3%) | (30%) | (50%) | (33.3%) | | (33.3%) | (80%) |
| 61-70 | 4 | 2 | - | - | 2 | - | 4 |
| Years | (13.2%) | (20%) | | | (50%) | | (100%) |
| 71-80 | 1 | 1 | 1 | 1 | - | - | 1 |
| Years | (3.3%) | (10%) | (100%) | (100%) | | | (100%) |
| Total | 30 | 10 | 10 | 3(30%) | 12 | 2 | 25 |
| | (100%) | (100%) | (33.3%) | | (40%) | (20%) | (83.3%) |

TABLE:-02. The prevalence of arrhythmias in different myocardial infarction subtypes and their relationship to infarct location as identified by electrocardiography

| Site Of MI | No. Of Cases | | Arrhythmia In Various Type Of MI | | |
|----------------|--------------|----------|----------------------------------|----------|--|
| | Male | Female | Male | Female | |
| Anterior Wall | 17(56.6%) | 8(80%) | 8(47.2%) | 5(62.5%) | |
| Inferior Wall | 4(13.3%) | 1(10%) | 1(25%) | - | |
| Subendocardial | 1(3.3%) | - | - | - | |
| Combined | 8(26.6%) | 1(10%) | 7(87.5%) | 1(100%) | |
| Total | 30(100%) | 10(100%) | 16(53.33%) | 6(60%) | |





Fig.01:- ECG of extensive Anterior wall myocardial Fig.02:- ECG of Inferior wall myocardial infarction

For the purpose of the research, participants included forty different instances of acute myocardial infarction. The following is a summary of the findings from the different observations.

- 1. When compared to females, men tend to get myocardial infarction at an earlier age.
- 2. The average age of a man was 50 years, while the average age of a woman was 58.
- 3. Approximately one third of the group under examination was found to have hypertension.
- 4. It was discovered that more than half of the population studied had hypercholesterolemia.
- 5. More than eighty percent of the male patients were long-

term smokers.

- 6. Myocardial infarction may be divided into many subtypes, the most frequent of which is the anterior wall infarction. In this particular research, there were 25 individuals who had anterior wall AMI, which represents 62% of the overall incidence of AMI.
- 7. Arrhythmias were most prevalent with anteroinferior infarction, accounting for 90 percent of cases, whereas they were least common with inferior wall infarction, accounting for 20 percent of cases.
- 8. In patients who had an infarction of the anterior wall, dyskinesia, akesia, or hypokinesia were seen; in patients who had an infarction of the inferior wall, hypokinesia was observed; and in anteroinferior infarction, dyskinesia was observed more often.

DISCUSSION:-

One of the most widespread worldwide health concerns is cardiac arrest. Cardiac arrest patients frequently describe symptoms such as queasiness, perspiration, and thoracic unease that extends to the left limb. Electrocardiographs, catalyst tests, and sonocardiographs are the ultimate benchmark for validating the whereabouts of a cardiac event and detecting any ensuing complexities. The discoveries from echocardiography and their clinical significance in patients with myocardial infarction are the focal point of the present inquiry.

Forty individuals varying in age from 31 to 79 years old were encompassed in the present investigation (30 male and 10 female). Individuals were, on mean, 50 years old for males and 58 years old for females. Cardiac arrest affects males at a more youthful age than females do. Scientists discovered that individuals of every age, ethnic background, and gender were at heightened vulnerability to developing coronary atherosclerosis when their blood pressure was elevated. In this investigation approximately one third of patients were suffering from high blood pressure [17].

Cigarette puffing elevates the peril of acquiring coronary artery disease and might expedite the commencement of atherosclerosis in various manners. Twenty-five out of the thirty males in this study disclosed experiencing a tobacco dependency.

Hyperlipidemia and hypoalphalipoproteinemia are two instances of dyslipidemia, both of which are significant risk factors for coronary artery disease [18]. Out of the 40 individuals involved in this study, 23 (57%) exhibited heightened cholesterol levels.

Twenty-five individuals experienced infarction of the frontal wall, five experienced infarction of the lower one individual experienced subendocardial wall, infarction, and nine experienced infarction of both the frontal and lower walls (table-2, Fig.01, Fig.02). Individuals with atypical O waves exceeding 40 milliseconds in one or multiple precardial leads are categorized as experiencing an anterior myocardial infarction [19]. Individuals with atypical Q waves in leads II, III, and aVF were categorized as having lower infarctions. There is no troublesome O wave in the subendocardial subgroup, but instead just lofty, balanced reversed T waves. Fifteen out of twenty-five patients with anterior infarcts exhibited reduced movement, five exhibited abnormal movement [20], four exhibited lack of movement, and one had a regular echocardiographic examination. Reduced movement was observed in 4 individuals out of 5 in lower heart attack, and in one instance there was abnormal movement [21]. Five of the

nine individuals in the merged cohort exhibited dyssynergy. Anteroinferior (Combined) myocardial infarction was demonstrated to possess the utmost extent of dyssynergy. ECG proof of a front infarction was additionally linked with dyskinesia or akinesia in 80% of individuals, as per investigation by Miller et al. (1972-1974). Individuals experiencing substandard wall myocardial infarction, conversely, exhibited diminished contractility.

Prior investigations conducted by imperial et al.[22], Jullien et al.[23], and Robinson et al. [24] unveil a cardiac dysrhythmia prevalence ranging from 60 percent to 80 percent in individuals experiencing acute myocardial infarction. Collectively, masculine and feminine participants in this investigation exhibited a cardiac dysrhythmia prevalence of 55%.

Table 2 demonstrates that the frequency of irregular heartbeat was greatest in individuals with combined anteroinferior heart attack and lowest in individuals with heart attack confined to the lower wall. Anna malai et al. additionally illustrate an amplified peril of irregular heart rhythm in individuals with front wall infarction [25].

Thirty-eight of the forty individuals in our investigation with a medical and electrocardiographic determination of heart attack had wall movement irregularities, while two patients with the same determination had regular echo examinations. One of these patients had subendocardial (non transmural) myocardial infarction, and the other had anteroseptal infarction. Comparable types of discoveries were attained in the investigation of Nixon, J.V et.al.[25].

8-15% of individuals with heart attack who underwent 2D echocardiography were discovered to have ventricular bulge, as per investigations by Abrams, D.L. et al.[26] and Faxon, D.P. et al. [27] of the 40 individuals we examined, 10% experienced a cardiac bulge, which is greater than what has been demonstrated in alternative investigations. Just three persons had aneurysms suspected medically by EKG.

Echocardiography is valuable for identifying complexities of myocardial infarction, like ventricular bulge, mural blood clots, cardiac muscle breach (free wall breach, interventricular septal breach, papillary muscle breach), mitral leakage, and pericardial accumulation.

CONCLUSION:-

It is feasible to declare that echocardiography may be associated to the diagnosis of myocardial infarction. This diagnosis can be established by a different history, clinical symptoms, blood biochemical analysis, and electrocardiographic abnormalities. In addition, echocardiography can detect abnormalities in the heart's electrical activity. Echocardiography may be used for the early detection of myocardial infarction as well as the identification of any problems that may arise from the condition. This approach does not include any invasive procedures, it is simpler to carry out, it is less expensive, it can be repeated, and it is more sensitive. In conclusion, the findings of this investigation have offered important new insights into the echocardiographic profile of individuals who had suffered a myocardial infarction (MI) and its clinical consequences. The results show the relevance of early diagnosis and risk factor treatment in MI, with a specific emphasis on hypertension, hypercholesterolemia, and smoking as important risk factors. In particular, the findings highlight the importance of early diagnosis and risk factor management in MI. In patients diagnosed with MI, echocardiography has become an essential diagnostic technique for determining the presence of complications and analyzing regional wall motion anomalies. The prevalence of anterior wall infarction, which is linked with hypokinesia and dyskinesia, highlights the need of tailoring treatment options to each individual patient. In addition, arrhythmias were more common in some forms of MI, which highlights the need of watchful monitoring and suitable therapies. In the management of MI patients, the discovery of ventricular aneurysms and associated sequelae further highlights the diagnostic importance of echocardiography. Overall, the findings of this study add to a thorough knowledge of myocardial infarction (MI) and the echocardiographic symptoms of this illness. This understanding will allow for improved patient treatment and outcomes in the setting of this serious cardiovascular disorder.

References

- 1. WHO 1982 Techno Resp. Ser. No.678 preventive and social medicine.
- 2. Dr. James Herrick- the clinical features of sudden obstruction of coronary arteries.
- 3. Carlsen, E.N. (1975), Ultrasound physics for the physician .A brief review J. Clin. Ultrasound 3, 69.
- 4. Feigenbaum H,(1986), Echocardiography 4th edition philalepiphia ,Lea and Febiger.
- 5. Wells, P.N.T. (1977), Ultrasonic in clinical diagnosis 2nd edition New York Churchill Livingstone.
- 6. Samuel oram (1981), Clinical heart disease 2nd edition, 200.
- Visser, C.A., Kan, G., Meltzer, R.S., et al, (1985), Assessment of left ventricular aneurysm resectibility by two dimension echocardiography Am. J. cardiol. 56:857.
- Jugdutt, B.I., Sussex, B.A., Sivaram, C.A and Rossall, R.E (1984), Right ventricular infarction :2D echocardiographic evaluation .Am. heart J. 107: 505.
- 9. Panidis, I.P., Mintz ,G.S., Goel, I., et al, (1986), Acquired ventricular septal defect after myocardial infarction .

Detection by combined 2D and Doppler echocardiography .Am. heart J.111:427.

- 10. Bellamy, G.R., Rasmussen, H.H., Nasser, F.N. et al, (1986), Value of 2D echocardiography, electrocardiography and clinical signs in detecting right ventricle infarction. Am. Heart J 112:304.
- Asinger,R.W., Mikell, F.L., Elsperger,J. and Hodges,M, (1981), Incidence of left ventricular thrombosis after acute transmural myocardial infarction. Serial evaluation by 2D echocardiography. N. England J. Med. 305, 297.
- 12. Barazilai, B.Gessler, C., Perez, J.E. et al, (1988). Significance of Doppler detected mitral regurgitation in acute myocardial infarction .Am . J. cardiol.61:220.
- 13. Pierard, L.A., Albert, A.,Henrard, L. et al.,(1986), Incidence and significance of pericardial effusion in acute myocardial infarction as determined by 2D echocardiography. J. Am .Coll . Cardiol. 8:517.
- 14. Harrison's principal of internal medicine,(1991),12th edition ,Electrocardiography, 850.
- 15. Henger J.J., Weyman A.E., Wann L.S., Dillon J.C and Feigenbaum H ,(1979)Cross sectional echocardiography in acute myocardial infarction .Detection and localization of regional left ventricular asynergy. Circulation ,60: 531-8.
- 16. Horowitz, R.S., Morgauroth, J., Parrott, C., et . al, (1982) ,Immediate diagnosis of Acute MI by 2D echocardiography circulation 65:323-29.
- 17. Stamler J., Stamler R, and Liu K, (1985), High blood pressure. In connor, W.E, and Bistow J.D.(eds.) coronary heart Diseaae prevension complication and treatment. Philadelphia J.B. Lippincott company. Pp.85-109.
- 18. Braunwald .E., (1992), Risk factors for coronary artery disease , Heart disease. A Text book of cardiovascular medicine vol.2, 1146.
- 19. Braunwald .E.,(1992) Risk factors for coronary artery disease , Heart disease. A Text book of cardiovascular medicine vol.2, 1125.
- 20. Miller R.r.; Masumi, R.A., Zelis, R.; Mason D.T, (1974) Electrocardiographic and cine angiographic correlation in assessment of the location and nature and extent of abnormal left ventricular segmental contraction in coronary artery disease. Circulation 49,447.
- 21. Nixon J.V. Narhare ,K.A. and Smitherman T.C.: Estimation of myocardial involvement in patients with acute myocardial infarction by two dimensional echocardiographic. Circulation 62: 1248,1980.
- 22. Imperial E.S., and Garballo R, (1970) Disturbance of rate rhythm and conduction in acute myocardial infarction in 300 Cases. Am. J. Cardiol .5: 24.
- 23. Jullian D.C, Valentine P.A., Miller G.G, (1984) Disturbance in rate rhythm and conduction in acute myocardial infarction . Am. J.Med. 37,915
- 24. Robinson J.S., et al, (1982) continuous electrocardiographic monitoring in the early stages after

acute myocardial infarction. Med. J. Australin .I:427.

- 25. Annamalai and Kasirajan, (1976) Arrhythmias in myocardial infarction .Indian Ht. J. 18,247.
- 26. Abrams D.L., Edelist A., Luria M.H., and Miller A.J., Ventricular aneurysm, (1963) A reappraisal based on a study of 65 consecutive autopsied cases. Circulation 27: 164.
- 27. Faxon, D.P., Royan T.J., Davis K.B., et al, (1987) Prognostic significance of angiographically document left ventricular aneurysm from the coronary artery surgery study (CASS). Am. J. cardiol .50:157.