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**Original research article**

# Role of magnetic resonance imaging (MRI) in dilated cardiomyopathy (DCM)

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**Abstract**

**Background:** Cardiac MRI (CMR) has recently considered an important imaging modality for assessment of patients with cardiomyopathy. The present study was conducted to evaluate the role of magnetic resonance imaging (MRI) in dilated cardiomyopathy (DCM)

**Methods:** In two reputable medical institutions in South India, an observational study was done in the Department of Radiodiagnosis and Imaging. This research is based on data collected from June 2013 to April 2015, a period of one year and eleven months. The study comprised a total of 40 patients. All the recruited patients underwent cardiac MRI.

**Results:** In present study, 70% of DCM patients had no scar on delayed enhancement imaging while 30% patients (18.8% of females and 37.5% of males) had scar in non-ischemic distribution. Among the idiopathic cases, 70.6% of cases had no scar (80% of females and 63% of males) on delayed enhancement. All cases of idiopathic DCM with scar, had mid wall fibrosis pattern of enhancement.

**Conclusion:** In summary, magnetic resonance imaging is an accurate, non-invasive, safe and advanced modality for evaluation of myocardial scarring and prognostication.

**Keywords:**cardiac patients, dilated cardiomyopathy, MRI

## Introduction

Dilated cardiomyopathy is defined by a dilated and poorly functioning left ventricle or both left and right ventricles. It's a poorly known condition that's linked to abrupt cardiac death [1, 2]. The interstitium is changed and collagen content is elevated in dilated cardiomyopathy [3, 4]. Dilated cardiomyopathy is inherited in 20-50% of cases, and abnormalities on echocardiograms are frequently detected in asymptomatic relatives [5]. Primary types of illness account for half of all cases (50%) and have a high hereditary prognosis (30%). Ventricular dilation occurs as a result of significant cardiac injury in secondary dilated cardiomyopathy. In such circumstances, etiopathogenesis is exceedingly diverse, encompassing a wide range of systemic disorders such as autoimmune, cytotoxic, and metabolic diseases [6, 7]. The annual incidence of DCM is believed to be between 5 and 8 per 100,000 people in India, North America and Western Europe and it is rapidly growing [8].

Although plain radiography can detect dilated cardiomyopathy, it cannot provide any additional information. The standard method for clinically studying dilated cardiomyopathy is echocardiography. Due of the poor apical visibility, volumetric measures are difficult to determine [9]. When it comes to quantifying left ventricular volumes and ejection fraction, MR imaging has proven to be more trustworthy than echocardiography [10]. Furthermore, MRI aids in the characterisation and classification of various kinds of dilated cardiomyopathy, which is important for directing patients' therapy and improved risk stratification due to the fact that different forms of the illness have varying prognoses. Cardiac MR imaging can help predict how patients with heart failure and DCM will respond to cardiac resynchronization therapy. According to contemporary scientific literature, knowing the location, size, and distribution of scarring can help us anticipate clinical outcomes and prognosis.

## Materials and Methods

In two reputable medical institutions in South India, an observational study was done in the Department of Radiodiagnosis and Imaging. This research is based on data collected from June 2013 to April 2015, a period of one year and eleven months. Consecutive patients with a clinical suspicion of dilated cardiomyopathy were included in the study. Acute chest discomfort, palpitation and stroke-like symptoms

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were among the symptoms experienced by the individuals. All the recruited subjects underwent cardiac MRI. The study comprised a total of 40 patients.

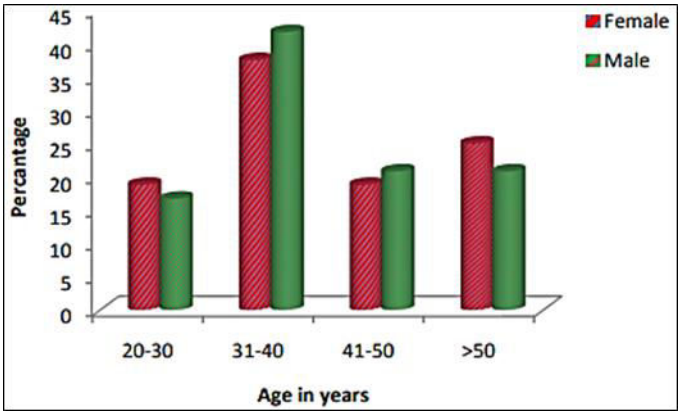
Inclusion criteria:
1) Patients having ejection fraction <35%.
2) Both male and female of any age.

Exclusion criteria:
1) Coronary artery disease.
2) Congenital heart disease.
3) Significant valve disease 35.
4) Other non-cardiac cause of heart failure (e.g. hyperthyroidism).
5) Contraindication to cardiac MRI study.

The chairman, academic committee, scientific committee, and ethical committee all gave their approval for the study. Patients/guardians gave their informed consent for MRI scanning.

**Statistical analysis:** In this study, descriptive and inferential statistical analysis was performed. Continuous measurement findings are displayed as Mean SD (Min-Max), while categorical measurement results are presented as a number (%). The significance is determined at a 5% level of significance.

**Results:** The study group comprised 40 patients, out of which 60% were males and 40% were females. In the present study, the peak age of presentation was 31-40 years of age (40%) in both male and females. 22.5% of patients were in the age group > 50 years and 20% of patients were in the age group of 41-50 years. 17.5% of patients are seen in the age-group 20-30 years (graph 1). 7.5% patients had diabetes (100% male) and high serum cholesterol level (100% male). None of the patients gave the family history of similar illness. High normal (121-140 mm of Hg) blood pressure was seen in 75% of male patients. In present study 7.5% patients are chronic alcoholic (>10 years of alcohol intake) and all are male. Dyspnoea was the most common symptom, seen in all the patients. Palpitation was the second most common presenting symptom, seen in 85% of the patients (93.8% of females and 79.2% of males). Atypical chest pain was noted as the third most common presenting complaint and seen in 32.5% of the patients (18.8% females and 41.7% males). 25% of the patients had all three symptoms at the time of presentation.




**Graph 1:** Age distribution among the study groups

In present study, 70% of DCM patients had no scar on delayed enhancement imaging while 30% patients (18.8% of females and 37.5% of males) had scar in non-ischemic distribution (table 2).

**Table 2:** Delayed enhancement findings

| Scar | Female | Male | Total | P value |
|---|---|---|---|---|
| No | 3(81.3%) | 15(62.5%) | 28(70%) | 0.114 |
| Yes | 3(18.8%) | 9(37.5%) | 12(30%) | |
| Total | 16(100%) | 24(100%) | 40(100%) | |

Most common pattern of enhancement in DCM found to be mid wall fibrosis which is seen in 83% of patients with scarring on delayed enhancement (graph 2).

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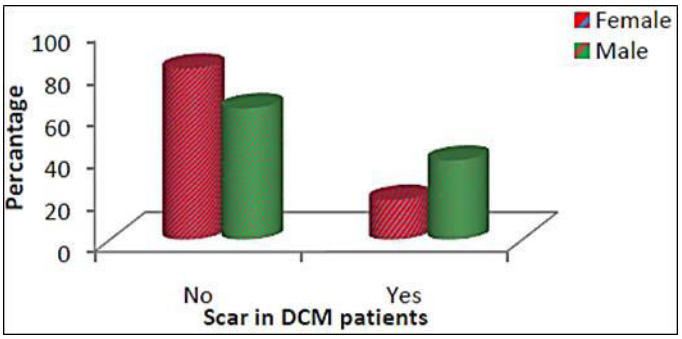
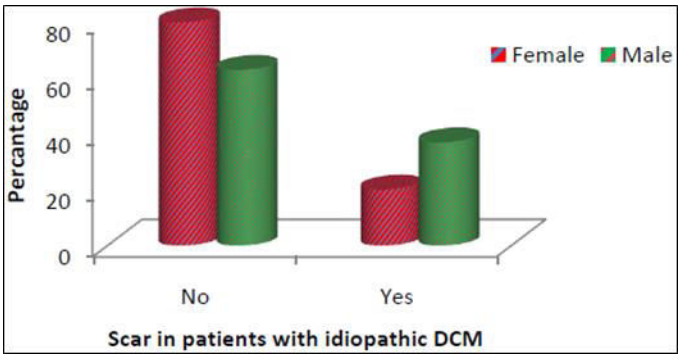



**Graph 2:** Scar in DCM patients

Among the idiopathic cases, 70.6% of cases (80% of females and 63% of males) had no scar on delayed enhancement. All cases of idiopathic DCM with scar, had mid wall fibrosis pattern of enhancement (graph 3).




**Graph 3:** Scar in patients with idiopathic DCM

**Discussion**

The most prevalent type of non-ischemic cardiomyopathy is dilated cardiomyopathy. Patients with DCM who are diagnosed as idiopathic are found to have familial disease in 50 percent of cases, and at least 25-30 percent of patients who are labelled as idiopathic are found to have familial disease. In this study, 85 percent of the patients were found to be idiopathic, and none of the patients had a family history of heart disease. The high proportion of idiopathic cases in this study could be explained by the inability to detect familial instances.

In terms of gender, 60 percent and 40 percent of patients were male and female, respectively, with a sex ratio of 1.5: 1. Nallari P *et al.* [11] observed the same thing, despite the fact that few previous researches have reported a female majority [12]. The male preponderance can be explained by hormonal differences, genetic background, and their differing living styles. Because estrogens are generally known to be cardioprotective, it is likely that male hormones contribute to higher sensitivity to stimuli that change membrane integrity [13]. The majority of female patients under the age of 20 can be attributed to genetics, but the majority of females over 50 can be explained by oestrogen depletion in the menopausal age range. In the current study, 40% of patients were between the ages of 31 and 40, 20% were between 41 and 50, and 22.5 percent were over 50, indicating the potential role of secondary risk factors such as alcohol and smoking, as well as age-related systemic disorders such as diabetes mellitus (7.5 percent of patients) and hyperlipidemia (7.5 percent of patients) in the disease.

Delayed gadolinium enhancement has been shown to be present in 12-35 percent of DCM patients in prior studies. In the current study, delayed enhancement was observed in 30% of DCM patients. The mid wall linear distribution incorporating the septal segments is the most typical pattern of amplification. McCrohon *et al.* and Assomull RG *et al.* [14, 15] made similar observations in prior research. In this study, the mid wall pattern of enhancement was seen in 25% of DCM patients, whereas McCrohon *et al.* [14] found that it was seen in 28% of DCM patients. The study excluded patients who had signs of infarct/ischemia on adenosine perfusion imaging or a transmural pattern of enhancement on delayed enhancement imaging. In 12.5 percent of DCM patients, intracavitary apical thrombus is found, which is likely owing to sluggish flow in the apex area. Another possible cause in postpartum DCM patients is hypercoagulability.

**Conclusion**

In a relatively young population, dilated cardiomyopathy causes major morbidity and mortality. The majority of cases are idiopathic, implying a hereditary component in disease etiopathogenesis. We also recommend screening first-degree blood relations for early diagnosis of subclinical DCM if it exists, based on this observation. MRI can detect intracavitary thrombi, as well as the location and extent of myocardial

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scarring, all of which aid in predicting clinical outcomes. In conclusion, magnetic resonance imaging (MRI) provides is an advanced method for assessing DCM patients and gives us valuable information helping in management and prognostication of these patients.

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