International Journal of Applied Research 2015; 1(7): 532-535

ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2015; 1(7): 532-535
www.allresearchjournal.com
Received: 01-04-2015
Accepted: 04-05-2015

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To study of dilated cardiomyopathy and echocardiography: A cross sectional study

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Abstract
Background and Objectives: Cardiomyopathies are pathological disorders that impact the myocardium and can arise from genetic abnormalities, myocyte destruction, or invasion of cardiac tissues. Dilated cardiomyopathy is the most common phenotype and often the final common pathway of various heart injuries. The current state of knowledge on echocardiography, histology, and genetic testing is predominantly limited.
Material and Methods: This study conducted an analytical cross-sectional analysis of hospital data pertaining to Echocardiographic findings in a sample of 70 patients with DCM who sought assessment of their Echocardiograms at the Department of Anaesthesiology, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram, Andhra Pradesh, India over the period of January 2014 to December 2014. Individuals who were below the age of 18 and those who declined to provide consent were omitted from the study.
Results: Of the total sample size of 70 participants, 45 were identified as male and 25 as female, yielding a male to female ratio of 1.6:1. The study observed a high prevalence of congestive heart failure among individuals aged 61-75 years, with an average age of 60. The echocardiography findings indicated that patient 28 exhibited a little dilation of the Left Ventricle. The majority of individuals exhibited poor Left Ventricular Systolic Function, as indicated by an average Ejection fraction of 39.6%. There was no statistically significant disparity observed in the mean upper respiratory (EF%) percentage between males and females, and no statistically significant correlation was found between age and average EF%.
Conclusion: Dilated cardiomyopathy, characterized by congestive heart failure, is the most commonly observed manifestation of cardiomyopathy. Echocardiography is a reliable method for detecting this condition, although it is often misdiagnosed in our region.

Keywords: Dilated cardiomyopathy, echocardiography, electrocardiographic

Introduction
Cardiomyopathies encompass a collection of medical conditions characterized by the impairment of cardiac muscle function. There are several factors that can contribute to the development of coronary myocarditis (CM), including genetic abnormalities, damage to cardiac myocytes, and invasion of myocardial tissues [1]. Dilated cardiomyopathy (DCM) is widely recognized as the prevailing form of cardiomyopathy. Ventricular hypertrophy, systolic dysfunction, and a poor ejection fraction are distinguishing characteristics that set it apart from other forms of cardiomyopathy. The current knowledge of the natural progression of the disease is limited due to the diverse range of causes and clinical manifestations associated with DCM. Cardiomyopathy is a pathological disorder that specifically impacts the myocardium, characterized by poor myocardial performance, rather than being attributed to failure in other cardiac components. The medical term for this ailment is cardiomyopathy. Because it is not attributed to pericardial, valvular, hypertensive, or congenital disorders, it exhibits a unique characteristic [2-4].
The development of dilated cardiomyopathy involves a combination of ischemic, toxic, metabolic, and immunological mechanisms. Diabetic cardiomyopathy (DCM) is a prominent contributor to the development of heart failure, accounting for approximately 25 percent of all instances of this pathological state. Based on certain estimations, the annual incidence of DCM is reported to be 5-8 cases per 100,000 individuals [5]. The probability of being affected by the illness is three times higher in males than to females.

This condition exhibits a significantly higher prevalence among individuals of African descent in comparison to individuals from any other demographic. As patients' condition deteriorates, they frequently report suffering heart failure, particularly left ventricular (LV) failure. It is conceivable that a patient's unforeseen demise, cardiac arrhythmias, or cerebrovascular accident may manifest with same symptoms. The motivation behind doing this study stems from the limited availability of literature pertaining to DCM, as well as the significant incidence of chronic heart failure associated with DCM [6, 7].

The mortality rate exhibits significant fluctuations on an annual basis, frequently ranging from 10 to 50 percent. The condition of heart failure is attributed to DCM in 70% of patients, whereas the remaining cases are associated with ischemia, hypertensive, or non-systolic etiologies. The other instances are classified as idiopathic variants, denoting alterations that lack a genetic or other specific study explanation, as determined by specialized centers. Approximately 50% of the cases are classified as a diagnostic of exclusion [8-10]. The objective of this study is to ascertain the prevalence of DCM through an examination of the results obtained from echocardiographic investigations.

Materials and Methods

This was an analytical cross-sectional study of hospital data on Echocardiographic findings in 70 DCM patients who visited the cardiology unit for Echocardiographic evaluation between the January 2014 to December 2014 in Department of Anaesthesiology, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram, Andhra Pradesh, India. Patients under the age of 18 and those who refused to give consent were excluded.

Inclusion criteria

This study covered patients with heart failure symptoms and signs.

Exclusion criteria

- Heart valve disease
- Congenital cardiac defect

Results

In the sample of 70 patients, the distribution of gender was around 45 males and 25 girls. Half of the cases lack a definitive etiology. Echocardiography revealed a moderate degree of left ventricular dilatation in ten cases. Furthermore, a total of 15 individuals exhibited a dilated left atrium, whereas 12 individuals displayed a dilated right atrium and right ventricle. A total of 48 out of the 56 patients diagnosed with functional mitral regurgitation exhibited grade I diastolic dysfunction of the left ventricle. A significant proportion of individuals exhibited reduced left ventricular systolic performance, as evidenced by an average ejection fraction of 39.6%. Patients belonging to the senior age group, characterized by an average age of 60, were frequently observed at the age of 30. The most commonly observed clinical presentation was congestive heart failure. In addition, two of our cases exhibited slight pericardial effusion, and none of the patients had any intra-cavitary thrombus or growth.

Table 1: Ejection fraction score descriptive statistics

Gender	N	Mean	Std. Deviation	Std. Error Mean
Male	45	40.3137	14.5651	1.39854
Female	25	37.1320	9.5241	1.93552

There was no statistically significant difference in average EF% between male and female when the two sample means't-test' was used (Table 1).

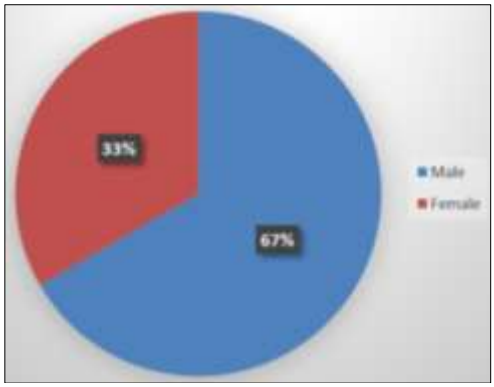

Fig 1: Ejection fraction score descriptive statistics

Table 2: Analysis of variance

	SS	MS	F	Significance F
Regression	485.0211538	597.3211	2.912546	0.09548457
Residual	10532.31311	154.3544		
Total	10325.24137			

ANOVA (Analysis of Variance) revealed no association between age and average EF% (Table 2).

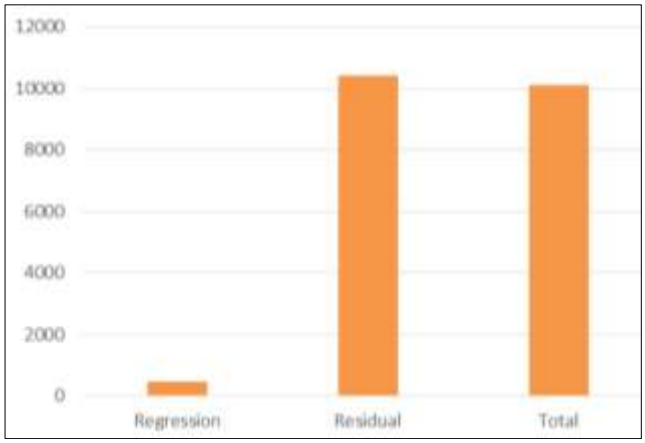

Fig 2: Analysis of variance

Discussion

Among the 70 patients, there was an approximate gender distribution of 45 men and 25 females, resulting in a ratio of 1.6:1. Half of the cases lack a definitive etiology. Echocardiography revealed a moderate degree of left ventricular dilatation in ten cases. Furthermore, a total of 15 individuals exhibited a dilated left atrium, whereas 12 individuals displayed a dilated right atrium and right ventricle. A total of 48 out of the 56 patients diagnosed with functional mitral regurgitation exhibited grade I diastolic dysfunction of the left ventricle. A significant proportion of individuals exhibited reduced Left ventricular systolic function, as evidenced by an average Ejection fraction of 39.6% (range from 21.0% to 30.0%) [11, 12].

The most prevalent clinical presentation observed in individuals aged 60 and above was congestive heart failure (30). In addition, two of our cases exhibited slight pericardial effusion, and none of the patients had any intra-cavitary thrombus or growth. Within our sample, DCM exhibited a higher incidence rate among the elderly population (with an average age of 60 years) and was more commonly observed in males compared to females [13-15]. Our study, as well as the study conducted by Suha M. A. *et al*., both concluded that the proportion of males compared to females was 53% to 47%. Consistent with the findings of Animasahun B. A. *et al*. (2014), a significant proportion of our patients exhibited congestive heart failure upon initial evaluation. The diagnosis of DCM necessitates the presence of a dilated left ventricle (LV), although it is worth noting that the right ventricle (RV) may also exhibit damage, as evidenced by the research conducted by Mathew T. *et al*. RV dilation was observed in 18% of the participants in our study [16, 17]. Our investigation revealed that 48% of patients exhibited functional magnetic resonance (MR). Functional mitral regurgitation (MR) is a prevalent issue observed in individuals diagnosed with dilated cardiomyopathy (DCM), as indicated by Jun K *et al*., Meese RB *et al*., Ballester M *et al*., and Chandraratna PA *et al*. The presence of MR is indicative of an unfavorable prognosis. Mitral regurgitation (MR) occurs due to focal or widespread left ventricular (LV) failure, even in the presence of a structurally intact mitral valve. A. E. Donal and colleagues. LVDD can manifest at any stage of DCM, ranging from moderate to severe. 86% of patients exhibited LVDD of one grade. Researchers Nishimura RA *et al*.19, Lavine SJ *et al*., Appleton CP *et al*., and Pinamonti B *et al*. [18-21] have linked measurements of LV systolic dysfunction to evaluations of diastolic function in DCM.

Shah PM posits that the determination of percentage ejection fraction and estimated EF% is predicated upon the notion of global or uniform left ventricular function. Additional support is provided by the research conducted by Folland ED *et al*. and Stamm RB *et al*. While intra-cavitary thrombus is frequently observed in persons with DCM, our cases did not exhibit any instances of it, as reported by Asinger RW *et al*. and Gottdiener JS *et al*. The present investigation is subject to some limitations, including its dependence on data obtained from a singular institution and the lack of definitive causation evidence [22, 23].

The study found that ischemic DCM was the predominant subtype of DCM, affecting 33.3% of the patients. Diabetic cardiomyopathy, on the other hand, was the second most prevalent subtype, affecting 23.3% of the patients. Peripartum cardiomyopathy, which impacted 16.6% of patients, ranked as the third most prevalent condition. 13.3% of the cases were attributed to idiopathic conditions, whereas 6.6% were associated to alcohol. Two individuals were classified under the "other" group, with one patient diagnosed with beta-thalassemia intermedia necessitating regular blood transfusions, and the other patient diagnosed with polymyositis [24-26].

Establishing a link to DCM. Approximately 50% of individuals diagnosed with polymyositis will subsequently develop DCM. Hazebroek *et al*. conducted study on DCM and found that up to 50% of cases have an unknown cause, classified as idiopathic DCM [27, 28]. Advancements in diagnostic processes, particularly in molecular and immunohistological biopsy techniques and genetic studies, have revolutionized the identification and classification of patients with idiopathic DCM. The patient results have been enhanced by novel therapeutic techniques that are grounded in the fundamental causes elucidated by these studies. In our study, biventricular failure was the most common symptom, observed in 80% of patients. Ischemic DCM was seen in 16.6% of individuals with isolated LV failure. A single patient diagnosed with alcohol cardiomyopathy exhibited mostly right ventricular failure. The most commonly reported symptom among all patients was breathlessness, with the majority falling into NYHA Class IV and Class III, while 16.6% were classified as NYHA Class II. A total of 18 instances of PND and 16 instances of orthopnea were documented [29-31].

Conclusion

Echocardiography is typically used to diagnose congestive heart failure when patients exhibit the characteristic symptoms and signs of the condition. Nevertheless, in the majority of resource-limited situations, it is not feasible to determine the cause. The objective should be to detect preclinical cases of DCM in order to reduce significant mortality and morbidity. Additional study is required to gain a deeper understanding of this common heart failure disease.

Funding

None

Conflict of Interest

None

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