ejpmr, 2018,5(2), 109-113

SJIF Impact Factor 4.161

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

PREDICTORS OF DISEASE PROGRESSION IN IDIOPATHIC DILATED (CONGESTIVE) CARDIOMYOPATHY IN PEDIATRIC AGE

Abd El Mohsen A. M[1], Antonios M. A.[2] and Abd-El-Fattah N. A.*[3]

[1,2,3]Pediatric Department, Alexandria University, Alexandria, Egypt.

***Corresponding Author: Abd-El-Fattah N. A.**

Pediatric Department, Alexandria University, Alexandria, Egypt.

Article Received on 05/12/2017 **Article Revised on 26/12/2017** **Article Accepted on 16/01/2018**

ABSTRACT

Idiopathic dilated cardiomyopathy (IDCM) is a severe illness which carries a high mortality rate in the pediatric population. In order to characterize IDCM evolution and identifyprognostic predictors in the pediatric cardiology outpatient clinic of Alexandria University Children's Hospital, allpatients with IDCM (n=22) were evaluated clinically and by echocardiography. They were followed for one year. Patients less than 10 years represented 72.7% of the cohort (n=16). Gender distribution revealed 59.1% male (n=13) and 40.9 % female (n=9). Outcomes were divided into four groups: 13.6% of patients (n=3) cured, 27.3% of patients (n=6) compensated, 50%patients (n=11) decompensated and 9.1% ofpatients (n=2) died. In this study, we found a significant correlation of prognosis with ejection fraction, end diastolic dimension of left ventricle, and shortening fraction on presentation. Also results suggested that pulmonary congestion in chest x- ray at presentation was significantly related to unfavorable outcome. Medical treatment and good compliance were associated with a statistically better prognosis. We concluded that further multi-center studies arenecessary to verify predictors of outcome in IDCM patients. Identification of markers affecting early myocardialfunction is essential to achieving improvements in treatments and consequently outcomes in this pediatricpopulation.

KEYWORDS: dilated cardiomyopathy, children, natural history, predictors of prognosis, echocardiography.

FUNDING: No funding was obtained for this study.

CONFLICT OF INTEREST: All authors declare that they have no conflict of interest.

INTRODUCTION

Idiopathic dilated cardiomyopathy (IDCM) is a heart muscle disorder characterized by systolic dysfunction and dilation of the left or both ventricles in the absence of any other possible cause.[1]

IDCM is the most common form of cardiomyopathy in children which is a diverse disorder with outcomes that depend largely on cause, age, sex, race and heart failure status at presentation.[2,3]

In the USA (2006), the reported incidence of IDCM is 0.57 cases per 100000 children per year.[4]

IDCM is still considered a multifactorial disease, in which different genetic, immunological, and acquired factors (especially infective, toxic, and metabolic) may interact reciprocally, leading to the polymorphic clinical picture of the disease. The viral infective, the autoimmunologic, and the genetic theories are the most valid.[5]

The outcome depends on severity of myocardial dysfunction, improvement during the first year after onset, compliance with therapy, and availability of timely transplant. The degree of depression of fractional shortening (FS) or left ventricular ejection fraction (LVEF) on initial echocardiography and elevation of left ventricular end-diastolic pressure, have all been applied as predictors of outcome.[6,7]

The aim of this study was to assess the presenting features, the clinical and laboratory findings, the outcome and the predictors of disease progression in children with IDCM.

PATIENTS AND METHODS

This prospective cohort study was conducted on all children suffering from IDCM attending cardiology outpatient clinic of Alexandria University Children's Hospital after getting the approval of Ethical committee of Alexandria University (serial number: 0104625).

After assurance of the confidentiality of data, an informed consent was signed by the patients' parent or legal guardian as first step in recruitment. Both sexes were included and age ranged between 2 months - 12 years. The data (either from patients or records) included: Full history taking, clinical examination, recent echocardiography,

treatment received and children were followed up for one year (July 2016 -July 2017) to record their fate.

The patients were divided according to their fate:

- Patients were considered cured when they made full recovery i.e. clinical improvement plus EF> 60% and normal LVEDD without treatment.
- Patients were considered compensated when they showed clinical improvement and absence of symptoms and signsplus EF> 60% and LVESD and LVEDD> 2SD above normal due to medication received.
- Patients were considered decompensated if they showed chronic symptoms and signs of heart failure and no improvement in clinical picture or echocardiographic parameters despite of receiving all medications appropriate for their condition.
- Those who died.

Patients with cardiomyopathy related to systemic or metabolic disorders, toxic causes, incessant arrhythmias, congenital coronary artery anomalies, valvular disease, and familial myopathy were excluded from the study.

RESULTS

The study was conducted on 22 patients diagnosed as IDCM following in the outpatient cardiology clinic of Alexandria university children's hospital. Table (1) shows the demographic and clinical data of the studied population. After one year, all patient were contacted to assess their fate. Authors considered that patients with compensated cardiac condition or those cured had favorable outcome (40.9%, n=9 patients). While the remaining 59.1% of patient (n=13 patients) were found unfavorable outcome since they had decompensated cardiac function and two patients among them died within this year. On comparing the different predictors among the group of patients with farorable outcome versus those with unfavorable outcome, it was proved that pulmonary congestion, bad echographic findings at diagnosis and compliance to treatment were the statistically significant predictors of worse outcome as shown in table (2).

Table (3) presents the multiple logistic regression modelling studying all the significant risk factors in relation to unfavorable prognosis. It was proven that none of the studied predictors proved to be an independent risk factor related to bad prognosis.

Table (1): Descriptive analysis of the studied patients (n = 22).

	n	%
Age (years)		
<10	16	72.7
10 – 12	6	27.3
Mean (SD.)	6.73 (3.79)	
Gender		
Male	13	59.1
Female	9	40.9
Clinical presentation		
Clinical signs of heart failure	9	40.9
Recurrent chest infection	8	36.4
Clinical signs of heart failure and chest infection	5	22.7
Age at diagnosis of DCM (months)		
Mean (SD.)	14.86 (24.51)	
Previous hospitalization	13	
Duration of disease (years)		
Mean (SD.)	5.52 (3.41)	
Cardiac examination		
Pericardial bulge	7	31.8
Heart rate		
Normal	14	63.6
Tachycardia	8	36.4
Murmur	13	59.1

Arrhythmia	00.0	
Chest x-ray at presentation		
Cardiomegaly	19	86.4
Pulmonary congestion	14	63.6
ECG findings at presentation		
Left ventricular hypertrophy	14	63.6
ST segment and T-wave changes	14	63.6
Treatment		
ACEIs	19	86.4
Diuretics	13	59.1
Digitalis	13	59.1
L. carnitine	16	72.7
Acetyl salicylic acid	13	59.1
β Blocker	1	4.5
Outcome		
Cured	3	13.6
Compensated	6	27.3
Decompensated	11	50
Dead	2	9.1

SD: Standard deviation ACEIs: Anti converting enzyme inhibitors

Table (2): Relation between outcome and risk factors (n = 22).

	Outcome				p
	favorable prognosis (n = 9)		unfavorable prognosis (n = 13)		
	n	%	n	%	
Age (years)					
<10	6	66.7	10	76.9	^{FE}p=0.655
10 – 12	3	33.3	3	23.1	
Mean (SD.)	6.86 (4.35)		6.65 (3.54)		0.947
Gender					
Male	6	66.7	7	53.8	^{FE}p=0.674
Female	3	33.3	6	46.2	
Clinical presentation					
Clinical features of heart failure	2	22.2	7	53.8	^{MC}p=0.343
Recurrent chest infection	4	44.4	4	30.8	
Clinical featuresof heart failure and chest infection	3	33.3	2	15.4	
Age at diagnosis (months)					
Mean (SD.)	11.56 (8.68)		17.15 (31.42)		0.524
Previous hospitalization	6	66.7	7	53.8	^{FE}p=0.674
Duration of disease (years)					
Mean (SD.)	5.96 (3.81)		5.22 (3.24)		0.713
Chest x-ray at presentation					
Cardiomegaly	7	77.8	12	92.3	0.544
Pulmonary congestion	3	33.3	11	84.6	0.026*
ECG findings at presentation					
Left ventricular hypertrophy	5	55.6	9	69.2	0.622
ST segment and T-wave changes	5	55.6	9	69.2	0.622
Two- dimension ECHO (mitral valve)					
At presentation					
Normal	2	22.2	0	0.0	0.130
Mild MR	7	77.8	10	76.9	
Moderate MR	0	0.0	3	23.1	
EF (%) mean (SD.)	**33.67 (3.2)**		**27.85 (5.21)**		**0.008***
LVEDD (mm) mean (SD.)	**45.36 (3.27)**		**51.97 (3.53)**		**<0.001***
FS (%) mean (SD.)	**15.89 (1.62)**		**13.15 (2.23)**		**0.005***
Compliance to treatment					

FEp: p value for Fisher Exact for Chi square test DCM: Dilated cadriomyopathy
MCp: p value for Monte Carlo for Chi square test EF: Ejection fraction
SD: standard deviation *: Statistically significant at $p \leq 0.05$

LVEDD: Left ventricular end diastolic dimension FS: Fractional shortening
MR: Mitral regurgitation ACEIs: Anti converting enzyme inhibitors

Table (3): Multivariate logistic regression analysis for predictors of bad outcome.

					95% CI	
	B	**SE**	**Sig.**	**OR**	**LL**	**UL**
Pulmonary congestion	2.629	3.867	0.497	13.858	0.007	27140.063
EF at presentation	0.493	0.800	0.538	1.638	0.341	7.860
LVEDD at presentation	2.989	2.689	0.266	19.870	0.102	3866.952
FS at presentation	0.309	2.051	0.880	1.362	0.024	75.784
Digitalis	-0.054	2.767	0.984	0.947	0.004	214.626

B: Unstandardized Coefficients EF: Ejection fraction OR: Odds ratio
CI: Confidence interval LVEDD: Left ventricular end diastolic dimension
LL: Lower limit UL: Upper Limit FS: Fractional shortening

DISCUSSION

The total number of included patients was 22, who were distributed as 59.1% males and 40.9 females. The patients' mean age at diagnosis was 14.86±24.51 months. This goes in parallel with Al-Hamash et al[8] study it was found that there was male predominance (58 %) of cases. While, Vitor et al[9] reported mean age later (26.4±39.5 months) and female predominance (55.3%) of cases. This variability of results could be attributed to the great variability of presentation of the disease between the different populations.[10]

In the present study, age at presentation was not found a predictive factor for outcome. This coincided with, AL Jarallah AS et al[11] who reported that age was not found a predictive factor for outcome. In contrast Azhar et al[12] found that older age at presentation was a predictor of unfavorable outcome in children with IDCM.

In the present study, cardiomegaly was present in 86.4 % of cases however; pulmonary congestion was present in 63.6 % of cases. In the study conducted by Vitor et al[9], cardiomegaly was found in 94.1% of cases and pulmonary congestion was diagnosed in 75.6% of cases. These findings highlighted the importance of chest x-ray findings in diagnosis and could be used as predictors of prognosis.

In the present study, the echocardiography done at diagnosis showed that the mean of EF% was 30.23±5.29, the mean of LVEDD was 49.26±4.72 mm and that of FS% was14.27±2.39 %. In

Azhar et al[12] study, similar findings were reported: the mean of diagnostic EF% was 28.1 ± 10%, the mean of LVEDD was 45.4 mm and that of FS% was12.1±5.2%.

The predictors of outcome of patients with IDCM have been variable and the finding in this study pointed out that marked LV dysfunction on presentation is associated with poor prognosis and this is in agreement with Jorge and colleagues study.[13]

In the present study, mitral regurgitation was seen at presentation in 90.9% of patients (n=20). It was mild in 77.3% of patients (n=17), moderate in 13.6% patients (n=3) and it was not found to be a significant predictor of outcome. In Al-Hamash et al.[8] Mitral regurgitation was seen in 38% of patients (n=19). It was mild in 26.3% of patients (n=5), moderate in 47.3% of patients (n=9), and severe in 26.3% of patients (n=5).

In the present study, the most common outcome of patients with IDCM was the decompensated group (50%) which persistently showed clinical derangement desspite of conservative treatment. In agreement with this finding, Al-Hamash et al.[8] found that the most common outcome of patients with IDCM was the chronic group (54%). And this is self - explanatory because in the studied population no one had the access to cardiac surgery which is extremely difficult due to technical, financial and legal issues regulating cardiac donation.

In the current study, the cured and compensated patients represented 40.9% of cases involved in the study. In agreement with this finding, AL Jarallah et al.[11] found that improved patients represent 37% of cases.

In the current study, the multivariate analysis proved that there was no parameter considered independently predictive of worse outcome. The small sample size might be the basis of these negative results. Whereas, in the study conducted by Al-Hamash et al.[8] the severity of LV dysfunction expressed by EF and severity of MR were found to be the only factors which determined the patient's outcome.

One limitation of this study was the small number of patients recruited. This small sample size could have caused some statistical bias and results of this study could not be generalized unless it is repeated on multicenter basis to recruit sufficient number of patients.

CONCLUSIONS

we concluded that: Children below 2 years of age were the most common affected group, pulmonary congestion in initial chest x-ray is a major predictor of disease progression in children with IDCM, This study revealed clearly that the severity of LV dysfunction at presentation is the most common predictor of outcome of patients with IDCM, Medical treatment and good compliance were

associated with a statistically better prognosis and the diagnosis of IDCM in children is associated with a generally poor prognosis. However, authors recommend to repeat the research in a multicenter studies in order to solidify these results.

REFERENCES

1. Maron BJ, Towbin JA, Thiene G, Corrado D, Arnett D, Moss AJ. et al. Quality of Care and Outcomes Research and Functional Genomics and Translational Biology Interdisciplinary Working Groups; and Council on Epidemiology and prevention.Circulation, 2006; 113: 1807-16.
2. Towbin JA, Lowe AM, ColanSD.Incidence, causes, and outcomes of dilated cardiomyopathy in children. JAMA, 2006; 296(15): 1867-76.
3. Forleo C, Resta N, Sorrentino S. Association of β-adrenergic receptor polymorphisms and progression to heart failure in patients with idiopathic dilated cardiomyopathy. Am J of Cardiology, 2004; 117(7): 451-8.
4. Taylor MR, Carniel E, Mestroni L. Cardiomyopathy, familial dilated Orphanet J Rare Dis., 2006; 1: 27.
5. Sangiorgi M. Clinical and epidemiological aspects of cardiomyopathies: a critical review of current knowledge. Eur J Intern Med., 2003; 14: 5-17.
6. Badertscher A, Bauersfeld U, Arbenz U. Cardiomyopathy in newborns and infants: a broad spectrum of aetiologies and poor prognosis. Acta Paediatr, 2008; 97; 1523-28.
7. Pahl E, Sleeper LA, Canter CE. Incidence of and risk factors for sudden cardiac death in children with dilated cardiomyopathy: a report from the Pediatric Cardiomyopathy Registry. J Am Coll Cardiol, 2012; 59: 607-15.
8. Al-Hamash SM. Idiopathic dilated cardiomyopathy in children: Prognostic indicators and outcome. J Cardio Surg, 2013; 1(3); 57-61.
9. Vitor M.P. Azevedo, Francisco M. Albanesi Filho, Marco A. Santos et al. Prognostic value of chest roentgenograms in children with idiopathic dilated cardiomyopathy. J Pediatr (Rio J), 2004; 80(1): 71-6.
10. Harmon WG, Sleeper LA, Cuniberti L. Treating children with idiopathic dilated cardiomyopathy (from the pediatric cardiomyopathy registry). Am J Cardiol, 2009; 104: 281-6.
11. AL Jarallah AS, AL Abdulgader AA, Saadi MM, Nasser AA, Zahraa JN. Outcome of dilated cardiomyopathy (DCM) in saudi children: A survey over a decade. J Saudi Heart Assoc, 2008; 20: 1–5.
12. Azhar AS. Pediatric idiopathic dilated cardiomyopathy: A single center experience. J Nat Sci Biol Med., 2013; 4(1): 145–8.
13. Jorge A, Alvarez E, Orav J. Competing Risks for Death and Cardiac Transplantation in Children with Dilated Cardiomyopathy: Results from the Pediatric Cardiomyopathy Registry. Circulation, 2011; 124: 814–23.