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ORIGINAL ARTICLE

A PROSPECTIVE OBSERVATIONAL STUDY ON CLINICAL PROFILE AND OUTCOMES OF DILATED CARDIOMYOPATHY PATIENTS IN A TERTIARY CARE CENTER IN NEPAL

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ABSTRACT

Introduction: *Dilated cardiomyopathy is the most common cause of congestive heart failure in patients with different cardiac insults. This study aims to explore the signs, symptoms, and outcome of dilated cardiomyopathy in the tertiary level of health care of Nepal.*

Materials and methods: *It was a prospective observational study in a cardiology department of the National Medical College, Birgunj. This study was conducted on 152 patients admitted to the cardiology department of the medical college. Demographic data was gathered from each patient in the performed sheet at the presentation time. Signs and symptoms, electrocardiographic and echocardiographic findings were also recorded. Patients' outcomes were recorded in terms of mortality discharge toward, and leave against medical advice. The descriptive data are presented as the number and percentage for categorical data and mean ± standard deviation for continuous data according to their distribution.*

Results: *One hundred and fifty-two patients were included in this study. 84(55.3%) were males and 68(44.7%) were females. Mechanical ventilation was used in 36.8% and inotropes in 73.0% of patients. Chest pain, cough, dyspnea, swelling of limbs, and palpitation were present in 8(5.26%), 27 (17.76%), 64 (42.1%), 29 (19.07%), 9(5.9%) of patients. Bilateral Infiltrates, Cardiomegaly, Normal, and Consolidation in left lower zone were present in 29 (19.07%) 107 (70.39%), 12 (7.89%), 4(2.63%) in our study. 98(64.5%) were discharged to home, 52(34.2%) expired and 2(1.3%) of patients underwent leave against medical advice. The use of inotropes, mechanical ventilation, and presence of cardiomegaly on chest x-rays was associated with mortality.*

Conclusion: *The most common presentation was cough and basal crackles. Cardiomegaly, RS pattern with Left Bundle Branch Block, and global hypokinesia were the most common radiological presentations.*

Keywords: *Developing Countries, Dilated Cardiomyopathy, Echocardiography, Heart Failure*

INTRODUCTION

Cardiomyopathies are a heterogeneous group of diseases of the myocardium associated with mechanical and/or electrical dysfunction that usually exhibit inappropriate ventricular hypertrophy or dilatation and are due to a variety of causes, many of which are genetic.

World Health Organization and American Heart Association have categorized cardiomyopathy as dilated cardiomyopathy, hypertrophic cardiomyopathy, restrictive cardiomyopathy, obliterative cardiomyopathy, and arrhythmogenic right ventricular cardiomyopathy. The primary cardiomyopathy group has dilated, restrictive, and hypertrophic phenotypes. The secondary cardiomyopathies are those associated with known cardiac or systemic processes. They are distinctive because they are not the result of valvular, hypertensive, congenital, or ischaemic heart disease.

Dilated cardiomyopathy is the most common variety of cardiomyopathy. The most common dilated cardiomyopathy is ischemic dilate cardiomyopathy followed by idiopathic/familial, diabetic, and alcohol cardiomyopathy. Patients with cardiomyopathy may have asymptomatic left ventricular systolic dysfunction, left ventricular diastolic dysfunction, or both.

Dilated Cardiomyopathy (DCM) is characterized by an enlarged left ventricle with decreased systolic function as measured by left ventricular ejection fraction.[1] Dilated cardiomyopathy is the most common phenotype and is often a final common pathway of numerous cardiac insults. Mostly it remains unknown in the absence

of echocardiography, histopathology, and genetic evaluation.

The causes of DCM are diverse and include idiopathic causes, viral myocarditis, genetic mutations, alcohol toxicity, autoimmune conditions, nutritional deficiencies, and peripartum cardiomyopathy.

Dilated cardiomyopathy presents with symptoms of heart failure like weakness, shortness of breath, orthopnea, paroxysmal nocturnal dyspnea, and lower limb swelling. Signs include raised jugular venous pressure, hepatojugular reflux, tenderness in the hepatic region, bilateral lower limb pitting edema, and basal crepitation. Frothing from the mouth may also be present along with a third heart sound. There are no specific changes in DCM on electrocardiography; it may present as bundle branch blocks, arrhythmias, or low voltage. Cardiomegaly may be seen with pulmonary infiltration suggestive of pulmonary edema on Chest X-rays. Echocardiography is used to confirm the diagnosis by evaluating ejection fraction and ventricular dilatation with global hypokinesia.

The incidence of DCM in Nepal, Bangladesh, and India is 21.6%,12.2%, and 9.8%, respectively.[2] The incidence of DCM is 5 to 8 cases per 1,00,000 population per year in United States of America. 25% of congestive heart failure is caused by DCM.[3-6] It causes 90% of sudden cardiac death and is 3 times more common in males.[7-12] It is a common cause of morbidity and mortality in developing countries like Nepal due to overlap in signs and symptoms with a disease like Chronic Obstructive Airway Disease, a lack of cardiologists, and echocardiography services in most parts of Nepal.

There are few studies on etiology and echocardiographic findings of dilated cardiomyopathy conducted in Nepal which showed the diverse findings. In spite of such a large number of patients, no studies have been conducted with regard to the clinical profile and outcomes in tertiary center.

Therefore, this study aims to explore the signs, symptoms, and outcome of dilated cardiomyopathy in the tertiary level of health care of Nepal which will be valuable in better understanding the clinical profile and outcome of dilated cardiomyopathy in Madhesh Pradesh.

MATERIALS AND METHODS

It was a prospective observational study at the cardiology department of the National Medical College and Teaching Hospital between November 1, 2024 to April 30, 2025. The ethical approval from the Institutional Review Committee was obtained before enrolment in this study. The ethical approval number was F-NMC/702/080-081. Written informed consent was obtained from the patients or surrogate decision-makers.

Inclusion and Exclusion Criteria

Patients ≥18 years admitted to the Cardiology Department of National Medical College having signs and symptoms of dilated cardiomyopathy, with ECHO finding left ventricular ejection fraction <45%, left ventricular end-diastolic dimension >3cm/body surface area, global hypokinesia and dilation of all chambers of the heart were included in this study. Patients who were younger than 18 years, surrogate decision-makers, patients who not give written informed consent, diagnosed to have valvular heart disease, congenital heart disease, and systemic hypertension were not included in this study.

The following information was collected from each patient meeting inclusion criteria on the day of study. Age, sex, ethnicity, occupation, education, diagnosis, ECHO, chest X-ray, ECG finding, and other information including co-morbidity, use of inotropes, length of stay, and use of mechanical ventilation were recorded.

The outcomes of the patient was defined as leave against medical advice, death, and discharge. At the time of discharge from the hospital duration of mechanical ventilation, and length of stay in the hospital were recorded. The convenient sampling method was used in this study.

Sample Size calculation

The sample size was calculated using the formula

$n= Z^2*pq/e^2$

$= (1.96)^2 *0.9*0.1/(0.05)^2$

$= 139$

Considering drop-out rate 10%

The sample size was 152

Where, n= the minimum required sample size, Z= 1.96 at a 95% Confidence interval (CI), p= prevalence from a previous study,[4] q= 1-p, e= margin of error, 5%.

Bias was reduced by collecting data from all groups of patients.

Statistics and Data Analysis

Data collection was done in a preformed sheet. The preformed sheet included all physiologic variables and demographic variables. All data was transferred to the Excel sheet and transferred to SPSS-16. The descriptive data are presented as the number and percentage for categorical data and mean ± standard deviation for continuous data according to their distribution. The Chi-square test was used to detect the difference between groups as appropriate. The level of significance was $P<0.05$.

RESULTS

One hundred and fifty-two patients were included in this study.

Table 1:Demographic characteristics of the study population

Parameters	n (%)
Age (Years)	
18-35	9(5.9)
36-60	91(59.9)
>60	52(34.2)
Sex	
Male	84(55.3)
Female	68(44.7)
Ethnicity	
Hindu	120(78.9)
Muslim	32(21.1)
Occupation	
Farmer	58(38.2)
Housewife	62(40.8)
Businessman	10(6.6)
Shopkeeper	13(8.6)
Student	09(5.9)
Education	
Bachelor	5(3.3)
Illiterate	101(66.4)
Primary Level	6(3.9)
SLC	40(26.3)

SLC: School Leaving Certificate

Table 1 shows the socio demographics characteristics of the study population. Middle-aged patients were admitted more than younger and older aged patients. 84(55.3%were males and 68(44.7%) were females. Most of the patients in this study were Hindus, housewives, and Illiterate.

The mean age, and duration of illness of patients in our study were 61.2 ± 14.3 years and 3 ± 1.7 days, respectively.

Table 2: Clinical characteristics of the study population

Parameters	n (%)
Inotropes	
No	96(63.2)
Yes	56(36.8)
Mechanical Ventilation	
No	111(73.0)
Yes	41(27.0)
Co Morbidity	
Chronic Kidney disease	12(7.89)
Chronic obstructive airway disease	13(8.55)
Diabetes Mellitus	74 (48.68)
None	53 (34.86)
Length of stay , days	
<2	5(3.3)
>2	147(96.7)
Symptom	
Chest pain	8 (5.26)
Cough	27 (17.76)
Dyspnea	64 (42.1)
Swelling of limbs	29 (19.07)
Palpitation	17 (11.18)
Sign	
Added Heart Sound	16 (10.52)
Arrhythmia	34 (22.36)
Basal Crackles	63 (41.44)
Raised Jugular Venous Pressure	39 (25.65)

Table 2 shows clinical characteristics of the study population Most of the patients were not on inotropes 96(63.2%) and mechanical ventilation 111(73.0%). Diabetes mellitus 74(48.68%) was the most common comorbidity in our study. Dyspnea and basal crackles was present in 64 (42.1%), 63 (41.44) of patients respectively.

The mean length of stay of our patients in this study was 3.9±0.9 days.

Table 3: Radiological and Electrocardiographic findings of patients with Dilated Cardiomyopathy

Parameters	n (%)
Chest X-ray	
Bilateral Infiltrates	29 (19.07)
Cardiomegaly	107 (70.39)
Normal	12 (7.89)
Consolidation in left lower zone	4 (2.63)
Electrocardiogram	
Left Bundle Branch Block	17 (11.11)
Irregular Rhythm	15 (9.86)
Left axis deviation with low voltage	10 (6.57)
Left axis deviation with RS pattern	16 (10.52)
Right Bundle Branch Block	11 (7.23)
Sinus Tachycardia	15 (9.86)
ST depression and T wave inversion	19 (12.5)
ST elevation	18 (11.84)
V1-V6 elevation	7 (4.6)
RS pattern with Left Bundle Branch Block	24 (15.78)
Echocardiography	
Global Hypokinesia	73 (48.02)
Ejection Fraction 10-20%	08 (5.26)
Ejection Fraction 21-30%	15 (9.86)
Ejection Fraction 31-40%	14 (9.21)

Ejection Fraction 41-50%	9 (5.92)
Ejection Fraction >50%	3 (1.97)
Severe Mitral Regurgitation	14 (9.21)
Mild Mitral Regurgitation, Mild Tricuspid Regurgitation	16 (10.52)

Table 3 shows the echocardiographic and radiological findings of the study population. Most of the patients were having cardiomegaly 107 (70.39%), ST depression and T wave inversion 19 (12.5%), and global hypokinesia 73 (48.02%).

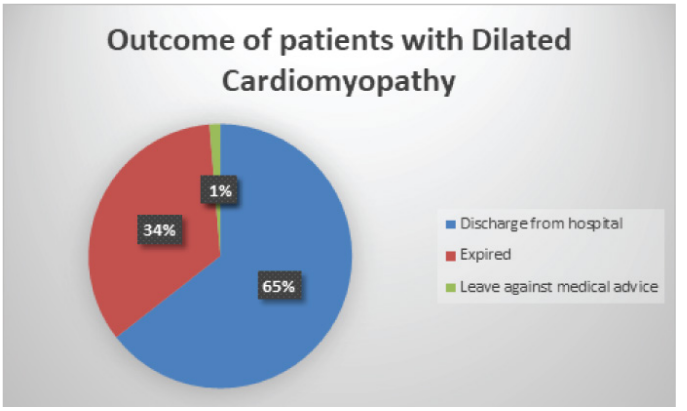

Figure 1: Outcome of patients with Dilated Cardiomyopathy.

Figure 1 shows the outcome of patients with dilated cardiomyopathy. 98(64.5%) were discharged to home, 52(34.2%) expired and 2(1.3%) of patients underwent leave against medical advice.

Age, sex, duration of illness, use of inotropes, mechanical ventilation, chest pain, cough, dyspnea, arrhythmia, basal crackles, bilateral infiltrates, cardiomegaly on chest x-ray, left bundle branch block, ST and T wave inversion in electrocardiography, global hypokinesia, ejection fraction 35% in echocardiography, and diabetes mellitus on were analysed as a risk factor for mortality. All other factors except the use of inotropes, mechanical ventilation, and cardiomegaly on chest x-rays were found to be statistically insignificant (P > 0.05).

Table 4: Risk factor for mortality in dilated cardiomyopathy patients.

Characteristics	Expired	Survived	P-value
Cardiomegaly	28	79	0.001
Mechanical Ventilation	32	9	<0.001
Inotropes	35	21	<0.001

Table 4 shows that the use of inotropes, mechanical ventilation, and cardiomegaly on chest x-rays were statistically significant to cause mortality.

DISCUSSION

This was a prospective observational study of 152 patients admitted with dilated cardiomyopathy in a tertiary care hospital in Madhesh province, Nepal. We have characterized the demographic profile, clinical profile, electrocardiographic and radiological patterns, and hospital outcomes and identified key predictors of mortality. This study's results have shown important consideration for diagnosis, management, and outcome in the region of Madhesh province.

The mean age of our study was 61.2 ± 14.3 years, with a majority of middle-aged patients (36-60 years: 59.9%). This is similar to the study by Mishra S et al [5]which other studies[1-4,7,10] have shown that DCM occurs more in older patients.This difference may be due to differences in the study population and the geographical location of patients where the study was done.

The male predominance (55.3% vs 44.7% female) in our study is similar to other studies[1,6,7,9,10] done global observation of a roughly two to one male to female ratio in dilated cardiomyopathy while in a study by Mobib AK et al[10] females were affected more than males. This difference may be due to differences in the study population.

Shortness of breath (42.1%) and basal crepitation (41.4%) were the most common presenting features with other clinical signs and symptoms such as cough (17.8%), swelling of limb (19.1%), palpitations (11.2%) and only 5.3% of patients reported chest pain in our study which is similar to other studies.[1,5,6,10]

Diabetes mellitus was the most common risk factor in our study which is similar to the study by Kothalkar AD and Mishra S et al [4,5] while the other studies [6,8] have identified hypertension as a cause of DCM. These differences may be due to the small sample size and the hypertensive patients were excluded from our study.

Chest X-ray showed cardiomegaly in 70.4% of patients, with bilateral pulmonary infiltrates in 19.1%.that is similar to study conducted by Kothalkar AD et al.[4] This high prevalence of cardiomegaly is helpful as a bedside tool for suspicion of dilated cardiomyopathy in the setting of echocardiography is unavailable. However, the low rate of radiographic findings of pulmonary edema suggests that many patients present at an earlier congestive stage or that subclinical pulmonary congestion is under-recognized.

Electrocardiographic abnormalities were yet various findings. The single most common ECG pattern was RS pattern with Left Bundle Branch Block (LBBB) (15.8%), followed by ST depression/ T-wave inversion (12.5%) and isolated LBBB (11.1%) while in a study by Kothalkar AD [4] and Mishra S[5] et al, it was LBBB. These differences may be due to the stage at which the disease is presented to the cardiologists. These conduction and repolarization abnormalities likely reflect diffuse myocardial remodeling

and conduction system involvement.

Echocardiography confirmed global hypokinesia in 48.0% of patients, with ejection fraction (EF) between 21-30% in nearly 10%. Only 1.97% had EF above 50%, that implies most patients in our study presented with moderate to severe systolic dysfunction which is similar to the study by Thapa R et al [3] while in a study by Kothalkar AD [4] and Behera BK et al [9] it was 35-40%. These differences may be due to variability in echocardiographic findings among different cardiologists, different treatment protocols they have received, and differences in the study population.

This study has shown that 34.2%, of patients expired which is higher than 18% reported by Mishra S et al.[5] but lower than the 55% observed by Behera et al.[9] The difference may be due to factors like delayed presentation, limited access to advanced mechanical circulatory support, stage at which the disease is presented, compliance with medication, and the presence of teamwork in the treatment of DCM.

This study has shown that the use of mechanical ventilation, inotropes, and cardiomegaly was associated with an increase in mortality in DCM while in the study by Pereira Nunes Mdo C et al[13] Chagas disease was associated with an increase in mortality. These differences may be because Chagas disease is not common in our country.

This study has shown several implications like clinical suspicion for dilated cardiomyopathy in patients presenting with dyspnea and basal crackles, even in the absence of chest pain, should be referred earlier for echocardiography and confirmatory the diagnosis.

Patients with DCM have high mortality. It helps to identify high-risk patients' need for inotropes or ventilation and evidence of cardiomegaly may help earlier transfer to higher-level care prevent mortality rate and increase knowledge among primary care providers to differentiate DCM from other respiratory and cardiac diseases in Nepal's resource-limited regions.

This study has limitations it was a single-center study, regional, a small sample size and we did not follow patients after discharge from the hospital so long-term outcomes, readmission, and quality of life remain unknown.

CONCLUSIONS

The most common presentation was cough and basal crackles. Cardiomegaly, RS pattern with Left

Bundle Branch Block, and global hypokinesia were the most common radiological presentations. The In-hospital mortality rate was 34.2% and the use of inotropes, mechanical ventilation, and cardiomegaly on chest X-rays were significantly associated with an increased risk of death. These results provide valuable insights into the clinical profile and short- term outcomes of DCM in a tertiary care setting in Nepal. The study is limited by its single-center design, relatively small sample size, and lack of long-term follow-up. The result of the study will help to assess the patients of dilated cardiomyopathy in cardiac centers. Multicentre studies with larger population and longitudinal tracking to better understand the progression of DCM and to evaluate the effectiveness of interventions should be conducted to verify the findings of this study. Public awareness about cardiac disease like dilated cardiomyopathy and complications should be raised by cardiologist and government to prevent heart failure and death..

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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