

## FREQUENCY OF ATRIAL FIBRILLATION IN PATIENTS WITH DILATED CARDIOMYOPATHY AT A TERTIARY CARE HOSPITAL, PESHAWAR

Taimour Khan

Department of Health and Biological Sciences, Abasyn University, Peshawar, Pakistan

Qandeel Hira

Department of Health and Biological Sciences, Abasyn University, Peshawar, Pakistan

Shafqat Hussain

Department of Health and Biological Sciences, Abasyn University, Peshawar, Pakistan

Wasif Khan

Department of Health and Biological Sciences, Abasyn University, Peshawar, Pakistan

Adnan Khadim

Department of Health and Biological Sciences, Abasyn University, Peshawar, Pakistan

Kainat

Department of Health and Biological Sciences, Abasyn University, Peshawar, Pakistan

Shah Fahad Khalid

Lecturer Cardiology, Department of Health and Biological Sciences, Abasyn University, Peshawar, Pakistan

[Fahad.khalid@abasyn.edu.pk](mailto:Fahad.khalid@abasyn.edu.pk)

### Author Details

#### Keywords:

Atrial fibrillation; Dilated cardiomyopathy; Electrocardiography; Echocardiography; Mitral regurgitation; Left ventricular ejection fraction.

Received on 24 Apr 2026

Accepted on 06 Jun 2026

Published on 21 Jun 2026

Corresponding E-mails & Authors\*:

Shah Fahad Khalid

[Fahad.khalid@abasyn.edu.pk](mailto:Fahad.khalid@abasyn.edu.pk)

### Abstract

**Background:** Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia in patients with dilated cardiomyopathy (DCM) and is associated with worsening heart failure, thromboembolic events, and increased mortality. This study aimed to determine the frequency of AF and evaluate its association with demographic and echocardiographic characteristics in patients with DCM.

**Methods:** This cross-sectional study was conducted in the Department of Cardiology, Lady Reading Hospital, Peshawar, from February to June 2026. A total of 113 patients with echocardiographically confirmed DCM were enrolled using a non-probability convenience sampling technique. Demographic and clinical data were collected using a structured questionnaire. Atrial

fibrillation was diagnosed using a standard 12-lead electrocardiogram (ECG). Data was analyzed using R software (version 4.3), and a  $p$ -value  $<0.05$  was considered statistically significant.

**Results:** Among the 113 patients, 20 (17.7%) had AF, while 93 (82.3%) were in sinus rhythm. The mean age of the participants was  $55.9 \pm 9.2$  years, and 78 (69.0%) were male. No significant association was observed between AF and age ( $p = 0.20$ ) or gender ( $p = 0.13$ ). However, AF was significantly associated with the severity of mitral regurgitation ( $p = 0.011$ ). Patients with AF also demonstrated a higher prevalence of severe left ventricular systolic dysfunction, with borderline statistical significance for left ventricular ejection fraction  $<30\%$  ( $p = 0.074$ ).

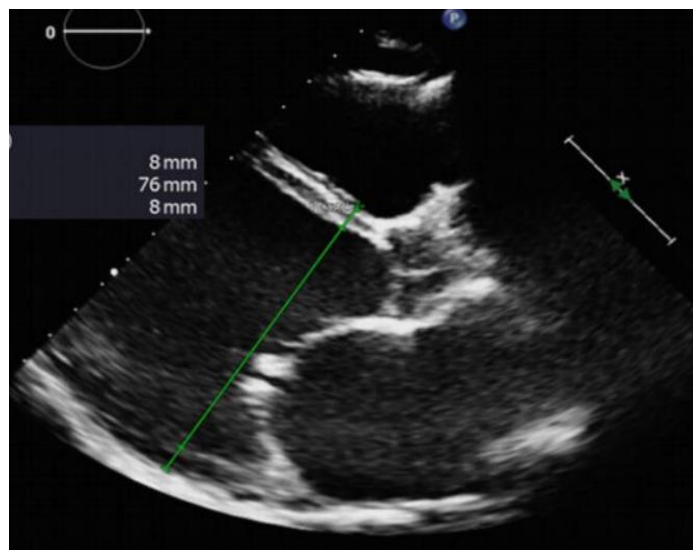
**Conclusion:** Atrial fibrillation was present in nearly one-fifth of patients with DCM and was significantly associated with mitral regurgitation and severe left ventricular systolic dysfunction. Early recognition of AF and echocardiographic abnormalities may improve risk stratification and clinical management in patients with DCM.

## INTRODUCTION

Dilated cardiomyopathy (DCM) is one of the most common forms of cardiomyopathy and is characterized by dilation of one or both ventricles accompanied by impaired systolic function in the absence of abnormal loading conditions or significant coronary artery disease (1). It represents a major cause of heart failure, ventricular arrhythmias, sudden cardiac death, and heart transplantation worldwide (2). The etiology of DCM is multifactorial and includes genetic mutations, viral myocarditis, autoimmune disorders, alcohol abuse, cardiotoxic drugs, metabolic abnormalities, and ischemic heart disease. Progressive ventricular remodeling results in myocardial fibrosis, neurohormonal activation, and reduced cardiac output, leading to worsening cardiac function and adverse clinical outcomes (3).

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia and frequently coexists with DCM. Progressive ventricular dysfunction and atrial enlargement promote electrical and structural remodeling, creating a substrate for the development of AF (4). The coexistence of AF and

DCM is associated with worsening heart failure symptoms, reduced exercise tolerance, increased thromboembolic risk, frequent hospitalizations, and higher mortality (5). Electrocardiography remains the gold standard for diagnosing AF, while echocardiography plays a central role in assessing ventricular dimensions, left ventricular ejection fraction, atrial enlargement, valvular abnormalities, and intracardiac thrombus (6).



*Figure 1: Echocardiographic findings of dilated cardiomyopathy.*

Several clinical factors increase the risk of AF in patients with DCM, including hypertension, diabetes mellitus, ischemic heart disease, valvular disease, advancing age, and persistent ventricular dysfunction (7). Early identification of AF is clinically important because timely initiation of anticoagulation, rate or rhythm control strategies, and optimized heart failure therapy may reduce complications such as stroke, systemic embolism, and progressive ventricular dysfunction. Standard investigations include electrocardiography, transthoracic echocardiography, and, in selected patients, cardiac magnetic resonance imaging (8).

Despite advances in the diagnosis and management of DCM, limited local data are available regarding the frequency of atrial fibrillation among patients with dilated cardiomyopathy in Pakistan, particularly in Khyber Pakhtunkhwa. Determining the burden of AF in this population is important for improving early diagnosis, risk stratification, and therapeutic decision-making. Therefore, this study aimed to determine the frequency of atrial fibrillation in patients with dilated cardiomyopathy presenting to a tertiary care hospital in Peshawar.

## MATERIALS AND METHODS

This cross-sectional observational study was conducted in the Department of Cardiology, Lady Reading Hospital (LRH), Peshawar, over a period of four months to determine the frequency of atrial fibrillation among patients with dilated cardiomyopathy. The study population comprised adult patients admitted to the Cardiac Care Unit (CCU) with a confirmed diagnosis of dilated cardiomyopathy based on echocardiographic findings. Patients aged 18 years or older of either gender were eligible for inclusion. Patients with congenital heart disease or peripartum cardiomyopathy were excluded from the study.

The sample size was calculated using OpenEpi ([www.openepi.com](http://www.openepi.com)) with a 95% confidence level, an 8% margin of error, and an anticipated frequency of 25%, yielding a final sample size of 113 participants. A non-probability convenience sampling technique was employed to recruit eligible patients during the study period. Ethical approval was obtained from the Institutional Review Board of Lady Reading Hospital, Peshawar, before the commencement of the study. Written informed consent was obtained from all participants after explaining the objectives, procedures, potential benefits, and possible risks of the study. Confidentiality and anonymity of the participants' information were maintained throughout the research process.

Data were collected using a structured questionnaire that recorded demographic characteristics, clinical history, and electrocardiographic findings. Only patients with echocardiographically confirmed dilated cardiomyopathy were enrolled. The presence of atrial fibrillation was determined

based on electrocardiographic evaluation by the treating cardiologist. Data were entered and analyzed using R software (version 4.3). Categorical variables were summarized as frequencies and percentages, while continuous variables were presented as mean  $\pm$  standard deviation or median with interquartile range, depending on data distribution. Associations between atrial fibrillation and selected demographic or clinical variables were assessed using the Chi-square test or Fisher's exact test where appropriate. A *p*-value of  $<0.05$  was considered statistically significant.

## RESULTS

This study was conducted at Lady Reading Hospital (LRH), a tertiary care hospital in Peshawar, with the aim of determining the frequency of atrial fibrillation in patients diagnosed with dilated cardiomyopathy using 12 leads ECG and Transthoracic Echocardiography. A total of 113 patients with dilated cardiomyopathy were included in this cross-sectional study. The mean age of the participants was  $55.9 \pm 9.2$  years. The patients were male and female both. Atrial Fibrillation (AF) was present in 20 patients (17.7%), while 93 patients (82.3%) did not have AF.

**Table 4.1: Age and Gender by Atrial fibrillation status**

Characteristics	Overall (N = 113)	No AF (N = 93)	AF Present (N = 20)	P-value
Age (years), Mean $\pm$ SD	$55.9 \pm 9.2$	$55.4 \pm 9.2$	$58.0 \pm 9.6$	0.20
Gender, n (%)				0.13
Male	78 (69.0)	67 (72.0)	11 (55.0)	
Female	35 (31.0)	26 (28.0)	9 (45.0)	

This table shows that the mean age was  $55.9 \pm 9.2$  years, although patients with AF were older than those without AF and the difference was not statistically significant ( $p = 0.20$ ). The study consisted mainly of males (69%) and there was no statistically significant difference between AF and non-AF groups when it comes to gender distribution ( $p = 0.13$ ).

Table 4.2: Clinical History by Atrial Fibrillation Status

Characteristic	Overall(N=113)	No AF(N=93)	AF Present(N=20)	P-value
Hypertension	74(65%)	58(62%)	16(80%)	0.13
Diabetes Mellitus	70(62%)	60(65%)	10(50%)	0.20
Ischemic Heart Disease	5(4.4%)	5(5.4%)	0(0%)	0.60
History of stroke	4(3.5%)	4(4.3%)	0(0%)	>0.90
Family history of cardiomyopathy	25(22%)	19(20%)	6(30%)	0.40

Table 4.2 compares the clinical history of patients with and without atrial fibrillation (AF). The highest prevalence of comorbid conditions was that of hypertension (65%), which was higher among those with AF than those without AF. Diabetes mellitus was higher in patients without AF. There were no differences in prevalence of ischemic heart disease, prior history of stroke and family history of cardiomyopathy between the two groups.

Table 4.3: Diagnostic and Echocardiographic Finding by Atrial Fibrillation

Characteristics	Overall(N=113)	No AF(N=93)	AF Present(N=20)	P-value
LVEF Category				0.074
<30%	53(47%)	40(43%)	13(65%)	
30-40%	60(53%)	53(57%)	7(35%)	
Left Atrial enlargement	113(100%)	93(100%)	20(100%)	>0.90

LVEDD enlarged	113(100%)	93(100%)	20(100%)	>0.90
Mitral regurgitation				0.011
Mild	65(58%)	58(62%)	7(35%)	
Moderate	35(31%)	23(25%)	12(60%)	
Severe	13(12%)	12(13%)	1(5.0%)	

This table presents the diagnostic and echocardiographic findings of patients according to atrial fibrillation (AF) status. Patients having AF more often showed reduce LVEF (<30%). There was no statistically significant difference observed (p-value = 0.074). Presence of enlarged left atria and LVEDD were found in both cases without any statistical significance. The severity of mitral regurgitation showed a strong relationship with AF patients (p-value = 0.011).

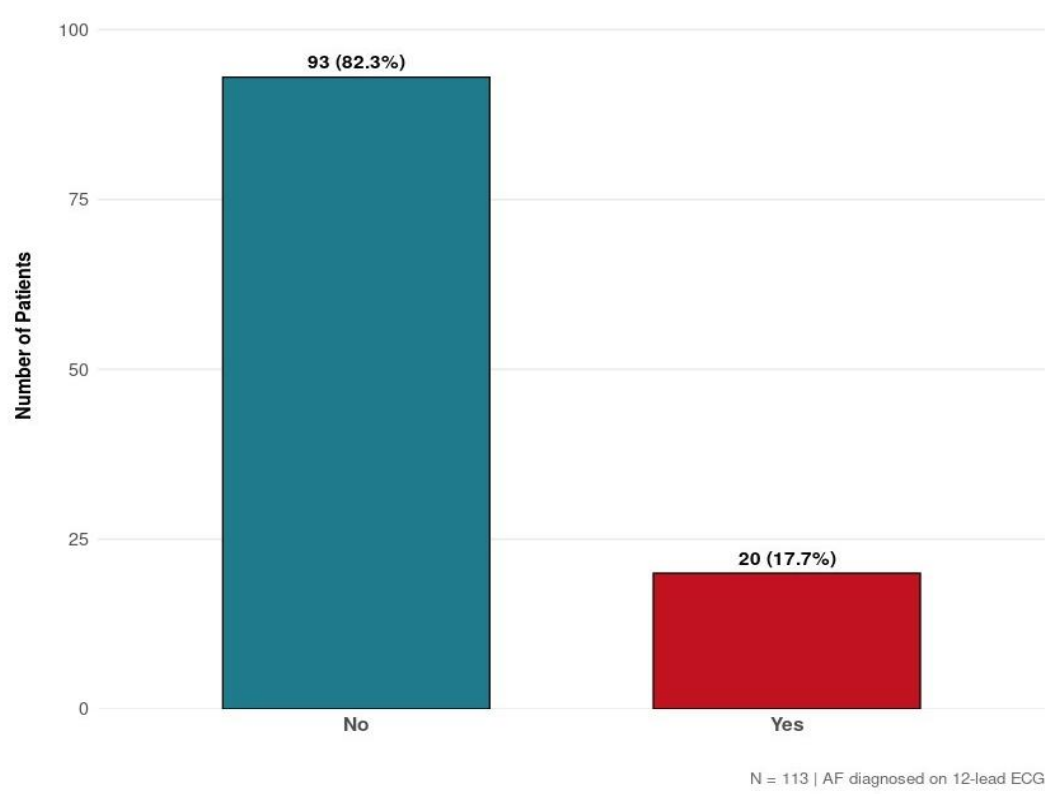


Figure 4.1: Frequency of Atrial Fibrillation in Dilated Cardiomyopathy

This bar chart shows that the majority of patients (93, 82.3%) were without AF whereas 20 patients (17.7%) had AF on 12-lead ECG.

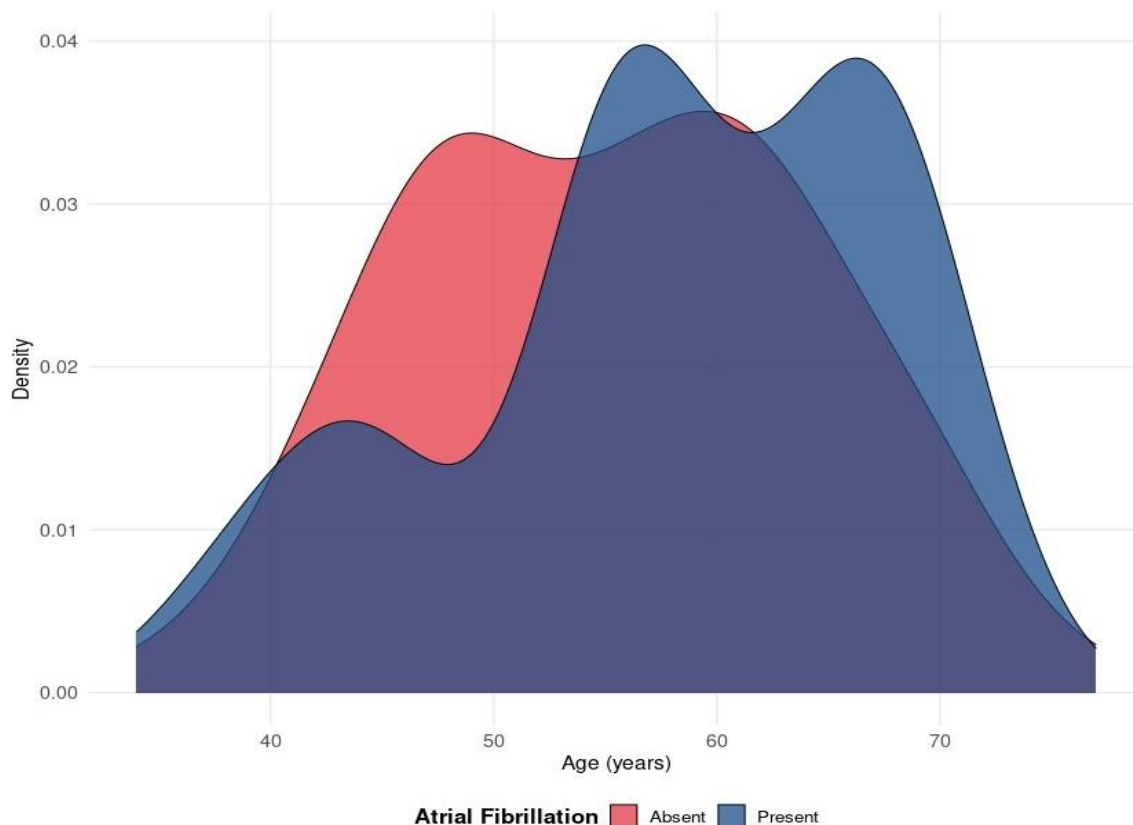


Figure 4.2: Age Distribution by Atrial Fibrillation Status in DCM

This density plot shows the age distribution of patients with and without AF. The age distribution of patients with AF (blue) appears slightly shifted toward older ages compared to those without AF (red), although there is substantial overlap between the two groups.

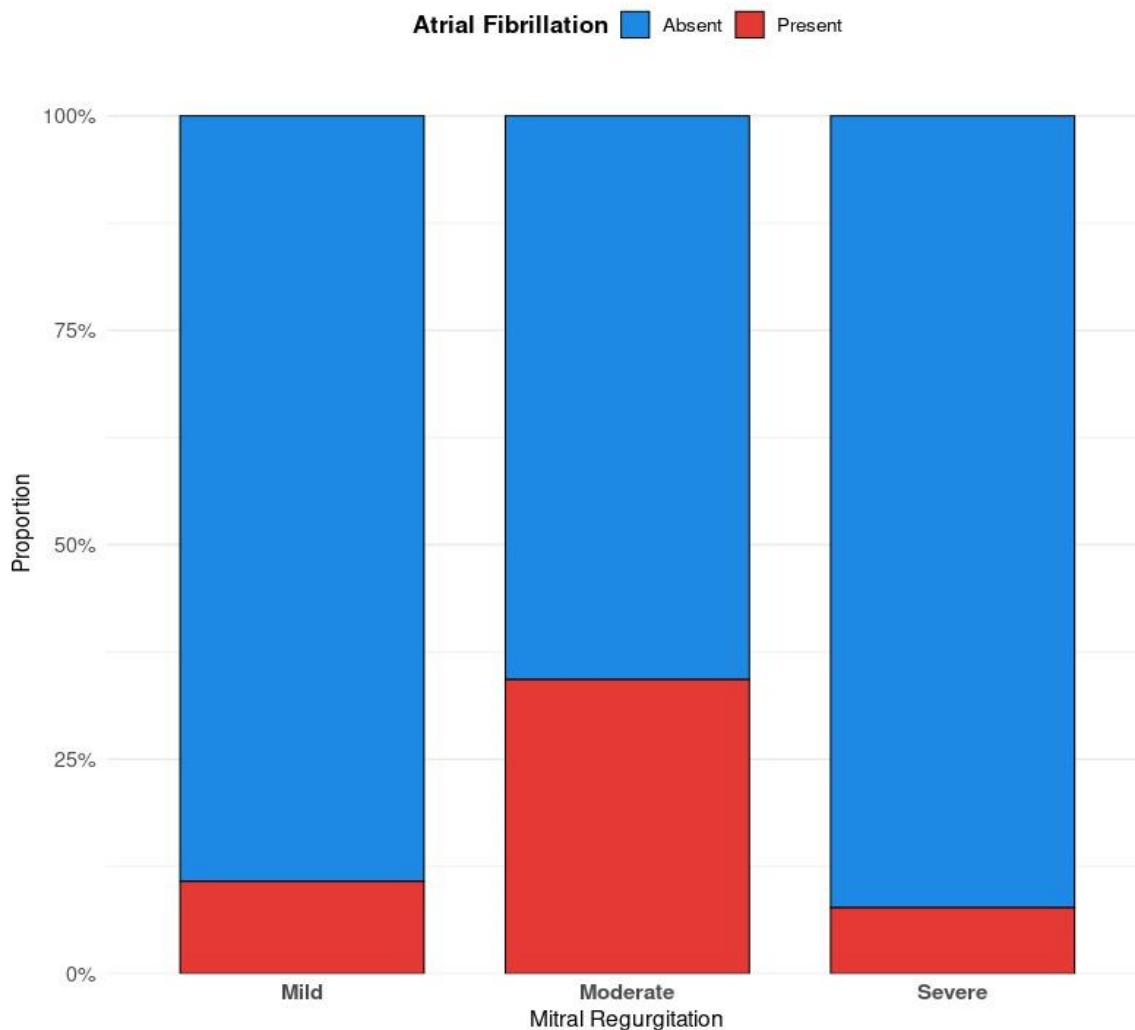


Figure 4.3: Severity of Mitral Regurgitation in Atrial Fibrillation Status

This stacked bar chart illustrates the distribution of mitral regurgitation severity according to AF status. Patients with AF had a noticeably higher proportion of moderate mitral regurgitation and a lower proportion of mild MR compared to patients without AF.

Statistical analysis was performed using R software (version 4.3). Continuous variables were expressed as mean ± standard deviation and compared using the Wilcoxon rank-sum test.

Categorical variables were presented as frequencies and percentages and compared using Pearson's Chi-squared test or Fisher's exact test, as appropriate. A two-tailed p-value < 0.05 was considered statistically significant. The 95% confidence interval for the proportion of atrial fibrillation was calculated using the Wilson score method.

## DISCUSSION

In this study, the prevalence of AF in DCM patients has been assessed. The results show that there is a significant prevalence of AF in DCM patients, where AF was seen in 17.7% of cases. The prevalence in this study is comparable to previous studies that have shown that there is a high prevalence of AF in patients with structural heart disease with a decline in their ventricular function. There was no statistically significant difference in the age of the AF group compared with the non-AF group; however, both groups had comparable numbers of men and women. This means that age and gender cannot possibly predict AF presence in these patients.

A strong association existed between AF and the degree of mitral regurgitation. Those with AF had a higher prevalence of moderate MR than those without AF. The association might be attributed to left ventricular dilatation and remodeling that result in mitral dysfunction and atrial enlargement and increase the risk of developing AF.

There was also a marginal statistical association between AF and impaired LVEF. More patients with AF suffered from severe left ventricular systolic dysfunction (LVEF <30%). Thus, declining ventricular function may promote atrial remodeling and predispose the development of atrial arrhythmias. Even though the difference did not reach statistical significance, the clinical implications are quite essential and consistent with previous data.

The results suggest that the examination of mitral regurgitation and ventricular function in DCM is crucial for AF risk stratification.

## CONCLUSION

Atrial fibrillation was found in 17.7% of patients suffering from DCM. The incidence of atrial fibrillation had no statistically significant correlations with age or gender. But there was a statistically significant correlation between the presence of AF and the presence of moderate-to-severe MR. Furthermore, there was a tendency towards the presence of a statistical correlation between severe left ventricular systolic dysfunction and the occurrence of atrial fibrillation. The results of the research clearly indicate that the screening of AF is necessary in DCM patients and echocardiographic parameters may be helpful in its identification.

## REFERENCES

- Ortega-Pérez, R., Ibañez, B., Sánchez-Quintana, D., & Cabrera, J. Á. (2025). Fundamental Anatomy and Its Impact on Clinical Practice: Myocardial Bridging. *JACC. Case reports*, 30(32), 105096. <https://doi.org/10.1016/j.jaccas.2025.105096>.
- Yeshwant, S., & Upadhyay, G. A. (2025). The evolution of conduction system pacing and gaps in understanding. *Progress in cardiovascular diseases*, 91, 113–120. <https://doi.org/10.1016/j.pcad.2025.06.006>
- Ortega-Pérez, R., Ibañez, B., Sánchez-Quintana, D., & Cabrera, J. Á. (2025). Fundamental Anatomy and Its Impact on Clinical Practice: Myocardial Bridging. *JACC. Case reports*, 30(32), 105096. <https://doi.org/10.1016/j.jaccas.2025.105096>
- Jin, Y., Che, W., Yang, J., Chang, S., Bao, W., Ren, X., Yu, P., & Hou, A. (2025). Classification, Diagnosis, and Prognosis of Cardiomyopathy: A Comprehensive Narrative Review. *Reviews in cardiovascular medicine*, 26(6), 36280. <https://doi.org/10.31083/RCM36280>
- McNally, E. M., Mestroni, L., & Hershberger, R. E. (2023). Dilated cardiomyopathy: Genetic determinants and clinical spectrum. *Circulation Research*, 132(9), 1145–1162.

- Gigli, M., Stolfo, D., Merlo, M., Sinagra, G., Taylor, M. R. G., & Mestroni, L. (2025). Pathophysiology of dilated cardiomyopathy: from mechanisms to precision medicine. *Nature reviews. Cardiology*, 22(3), 183–198. <https://doi.org/10.1038/s41569-024-01074-2>
- Amaral Marques, C., Laura Costa, A., & Martins, E. (2024). Left bundle branch block-induced dilated cardiomyopathy: Definitions, pathophysiology, and therapy. *Revista portuguesa de cardiologia : orgao oficial da Sociedade Portuguesa de Cardiologia = Portuguese journal of cardiology : an official journal of the Portuguese Society of Cardiology*, 43(11), 623–632. <https://doi.org/10.1016/j.repc.2024.02.004>
- Sorella, A., Galanti, K., Iezzi, L., Gallina, S., Mohammed, S. F., Sekhri, N., Akhtar, M. M., Prasad, S. K., Chahal, C. A. A., Ricci, F., & Khanji, M. Y. (2025). *Diagnosis and management of dilated cardiomyopathy: A systematic review of clinical practice guidelines and recommendations. European Heart Journal – Quality of Care and Clinical Outcomes*, 11(2), 206–222. <https://doi.org/10.1093/ehjqcco/qcae109>
- Arbelo, E., Protonotarios, A., Gimeno, J. R., Arbustini, E., Barriales-Villa, R., Basso, C., Bezzina, C. R., Biagini, E., Blom, N. A., de Boer, R. A., De Winter, T., Elliott, P. M., Flather, M., Garcia-Pavia, P., Haugaa, K. H., Ingles, J., Jurcut, R. O., Klaassen, S., Limongelli, G., Loeys, B., ... ESC Scientific Document Group (2023). 2023 ESC Guidelines for the management of cardiomyopathies. *European heart journal*, 44(37), 3503–3626. <https://doi.org/10.1093/eurheartj/ehad194>
- Bizhanov, K. A., Abzaliyev, K. B., Baimbetov, A. K., Sarsenbayeva, A. B., & Lyan, E. (2023). Atrial fibrillation: Epidemiology, pathophysiology, and clinical complications (literature review). *Journal of cardiovascular electrophysiology*, 34(1), 153–165. <https://doi.org/10.1111/jce.15759>
- Heymans, S., Lakdawala, N. K., Tschöpe, C., & Klingel, K. (2023). Dilated cardiomyopathy: causes, mechanisms, and current and future treatment approaches. *Lancet (London, England)*, 402(10406), 998–1011. [https://doi.org/10.1016/S0140-6736\(23\)01241-2](https://doi.org/10.1016/S0140-6736(23)01241-2)

Khan et al - 2026

3007-2387

3007-2379

DOI: <http://doi.org/10.5281/zenodo.20962328>

- Hindricks, G., Potpara, T., Dagres, N., Arbelo, E., Bax, J. J., Blomström-Lundqvist, C., Boriani, G., Castella, M., Dan, G. A., Dilaveris, P. E., Fauchier, L., Filippatos, G., Kalman, J. M., La Meir, M., Lane, D. A., Lebeau, J. P., Lettino, M., Lip, G. Y. H., Pinto, F. J., Thomas, G. N., ... ESC Scientific Document Group (2021). 2020 ESC Guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS): The Task Force for the diagnosis and management of atrial fibrillation of the European Society of Cardiology (ESC) Developed with the special contribution of the European Heart Rhythm Association (EHRA) of the ESC. *European heart journal*, 42(5), 373–498. <https://doi.org/10.1093/eurheartj/ehaa612>
- Steinberg, B. A., Piccini, J. P., Antzelevitch, C., et al. (2021). Management of atrial fibrillation in 2021: An updated comparison of the current CCS/CHRS, ESC, and AHA/ACC/HRS guidelines. *Canadian Journal of Cardiology*, 37(10), 1607–1618. <https://doi.org/10.1016/j.cjca.2021.06.011>
- Dziewięcka, E., Gliniak, M., Winiarczyk, M., Karapetyan, A., Wiśniowska-Śmiałek, S., Karabinowska, A., Holcman, K., Kostkiewicz, M., Hlawaty, M., Leśniak-Sobelga, A., Podolec, P., & Rubiś, P. (2020). *The burden of atrial fibrillation and its prognostic value in patients with dilated cardiomyopathy*. *Kardiologia Polska*, 78(1), 37–44. <https://doi.org/10.33963/KP.15046>
- Potpara, T. S., Lip, G. Y. H., Dagres, N., Crijns, H. J. M. G., Boriani, G., Kirchhof, P., Arbelo, E., Savelieva, I., Lenarczyk, R., Fauchier, L., Maggioni, A. P., Gale, C. P., & EORP-AF III Investigators Group. (2021). *Cohort profile: The ESC EURObservational Research Programme Atrial Fibrillation III (AF III) Registry*. *European Heart Journal - Quality of Care and Clinical Outcomes*, 7(3), 229–237. <https://doi.org/10.1093/ehjqcco/qcaa050>

**Khan et al - 2026**DOI: <http://doi.org/10.5281/zenodo.20962328>

- 
- Gimeno, J. R., Elliott, P. M., McKenna, W. J., et al. (2021). *Outcomes and management of cardiomyopathy patients in a European multicentre registry: 1-year follow-up results*. *European Heart Journal - Quality of Care and Clinical Outcomes*, 7(6), 567-576. <https://doi.org/10.1093/ehjqcco/qcab035>
- Aleksova, A., et al. (2010). *Atrial fibrillation in idiopathic dilated cardiomyopathy: prevalence, incidence, predictors, and prognostic significance*. *European Journal of Heart Failure*, 12(7), 748-756.
- Iovănescu, M., et al. (2023). *Atrial fibrillation in dilated cardiomyopathy: Impact on cardiac structure and function assessed by two- and three-dimensional echocardiography*. *Journal of Clinical Medicine*, 12(4), 1578. <https://doi.org/10.3390/jcm12041578>
- Almeida, A. G., et al. (2011). *Late gadolinium enhancement and atrial fibrillation in dilated cardiomyopathy: Association with atrial size and myocardial fibrosis*. *Journal of Cardiovascular Magnetic Resonance*, 13(Suppl 1), P247.