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Clinico-epidemiological profile of cardiac disorders in golden retrievers and cocker spaniels in Bengaluru, India

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Abstract

Cardiac disorders are a major cause of morbidity in dogs, particularly in breed-predisposed populations. The present study aimed to determine the occurrence, distribution, and clinical manifestations of cardiac disorders in dogs presented to Teaching Veterinary Hospital, Veterinary College, Hebbal. The study evaluates the occurrence and clinical manifestations of cardiac disorders in two predisposed breeds; Golden Retrievers and Cocker Spaniels. A total of 91 dogs comprising Golden Retrievers and Cocker Spaniels were evaluated between December 2024 and June 2025 using clinical examination, electrocardiography, radiography, echocardiography, and biochemical analysis. Out of 91 dogs examined, 34 were diagnosed with cardiac disorders, indicating an overall occurrence of 37.36%. Breed-wise occurrence was higher in Cocker Spaniels (42.8%) compared to Golden Retrievers (33.92%). Dilated cardiomyopathy (DCM) was the most prevalent condition (79.41%), followed by pericardial effusion (8.82%), hypertrophic cardiomyopathy (5.88%), and mitral valve insufficiency (5.88%). Age-wise analysis revealed a significantly higher occurrence in dogs above 6 years (44.11%) ($p < 0.001$). Male dogs (58.82%) were more affected than females (41.17%), though not statistically significant. Clinical signs such as exercise intolerance (94.11%), lethargy (82.35%), and ascites (70.58%) were commonly observed. Diagnostic findings revealed cardiomegaly in 82.35% of cases and significant echocardiographic changes consistent with DCM.

The study highlights a considerable occurrence of cardiac disorders in dogs in Bengaluru, with strong associations to breed and age, emphasizing the need for early screening strategies and breed-specific preventive management.

Keywords: Cardiac disorders, dogs, breed predisposition, golden retrievers, cocker spaniels, teaching veterinary hospital hebbal

Introduction

Cardiac disorders are a significant concern in canine medicine, posing challenges for veterinarians and dog owners. Their prevalence has increased due to breed predispositions, along with changes in nutrition, lifestyle, and genetic selection. Golden Retrievers and Cocker Spaniels are particularly affected breeds, each showing distinct disease patterns and clinical manifestations. Approximately 10% of dogs in veterinary practice are diagnosed with cardiac disease, with prevalence increasing with age. Smaller breeds are more commonly affected by myxomatous mitral valve disease (MMVD), while larger breeds are predisposed to dilated cardiomyopathy (DCM) (Brambilla *et al.*, 2020) ^[1]. Golden Retrievers and Cocker Spaniels are among the breeds predisposed to cardiac disorders, exhibiting distinct disease patterns. Large breeds such as Golden Retrievers are more prone to dilated cardiomyopathy (DCM), whereas smaller and medium-sized breeds like Cocker Spaniels commonly develop myxomatous mitral valve disease (MMVD).

MMVD accounts for nearly 70–75% of acquired cardiac diseases and is prevalent in small and medium-sized breeds such as Cocker Spaniels. It involves progressive degeneration of the mitral valve, leading to regurgitation and valvular insufficiency. In contrast, DCM mainly

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affects large breeds like Golden Retrievers and is characterized by ventricular dilation and reduced myocardial contractility. Both conditions impair cardiovascular efficiency and can lead to congestive heart failure, arrhythmias, and premature death if not properly managed (Hoque *et al.*, 2019) [4].

Vishnurahav *et al.* (2017) [8] documented that the most frequently observed congenital cardiac disorders in dogs include patent ductus arteriosus, subaortic stenosis, pulmonic stenosis, and tetralogy of Fallot, with less common anomalies comprising atrial septal defect, ventricular septal defect, atrioventricular valve dysplasia, and persistent right aortic arch. The majority of these congenital conditions tend to progress toward cardiac failure, which may be managed either pharmacologically or through corrective interventional procedures.

Golden Retrievers are widely popular for their temperament and adaptability, but selective breeding has increased their susceptibility to inherited and acquired diseases, including cardiac disorders. Taurine-deficient DCM has gained attention in this breed (Guo *et al.*, 2024) [3]. This condition is marked by ventricular dilation, thinning of walls, and reduced cardiac output, increasing the risk of arrhythmias and sudden death. Taurine is essential for myocardial health, and Golden Retrievers appear particularly prone to deficiency despite adequate diets, possibly due to metabolic or bioavailability factors (Kaplan *et al.*, 2018) [5].

Kaplan *et al.* (2018) [5] documented DCM cases associated with taurine deficiency in Golden Retrievers fed commercially adequate diets. Affected dogs showed reduced exercise tolerance, coughing, dyspnea, and syncope. Clinical improvement following taurine supplementation and dietary changes indicated the condition's reversibility if detected early. These findings highlight the importance of routine cardiac screening, nutritional evaluation, and breed-specific management.

Cocker Spaniels are predisposed to MMVD, a condition involving thickening and deformation of mitral valve leaflets, leading to regurgitation. This results in left atrial enlargement, pulmonary congestion, and eventual congestive heart failure (Larsson *et al.*, 1996) [6].

The occurrence of cardiac disorders in dogs is influenced by age, breed, sex, and environmental factors. Age is a major risk factor, with older dogs showing higher prevalence due to degenerative changes. Breed-specific predispositions further influence disease patterns, as seen in Golden Retrievers (myocardial disease) and Cocker Spaniels (valvular disease). Although overall prevalence is about 10%, it is significantly higher in susceptible and geriatric populations (Ferasin *et al.*, 2020) [2]. The occurrence of cardiac diseases in dogs increased with age, being highest (61.24%) in the 10–14-year age group, followed by 21.12% in dogs aged 5–9 years, 12.18% in dogs older than 14 years, and the lowest occurrence (5.46%) in dogs younger than 5 years, as reported by Satish (2009) [7].

Thus, cardiac disorders in these breeds represent both a clinical challenge and an important research area. Golden Retrievers are mainly affected by DCM, including taurine-associated forms, while Cocker Spaniels are predominantly affected by MMVD.

The present study was conducted to investigate the occurrence of cardiac disorders in dogs presented to a veterinary hospital in Bengaluru, with emphasis on breed predisposition in Golden Retrievers and Cocker Spaniels, aiming to improve clinical management and quality of life in affected animals.

Materials and Methods

This was a prospective observational clinical study conducted at the Veterinary College Hospital, Bengaluru, Karnataka, India, from December 2024 to June 2025.

The study included a total of 91 dogs comprising Golden Retrievers and Cocker Spaniels, aged above 6 months, presented to the hospital with clinical suspicion of cardiac disorders. Dogs were selected based on history, clinical signs, and preliminary examination findings suggestive of cardiovascular involvement.

All animals were subjected to a detailed clinical examination, which included recording of heart rate, respiratory rate, rectal temperature, and pulse characteristics, along with assessment of clinical signs such as exercise intolerance, coughing, dyspnea, and ascites. The diagnosis of cardiac disorders was confirmed using multiple diagnostic modalities. Electrocardiography (ECG) was performed using a standard limb lead configuration at a paper speed of 25 mm/s and sensitivity of 10 mm/mV to evaluate cardiac rhythm and conduction abnormalities. Thoracic radiography was carried out in lateral and ventrodorsal views to assess cardiac size, shape, and associated pulmonary changes. Echocardiographic examination, including two-dimensional (2D), M-mode, and Doppler techniques, was utilized to evaluate cardiac structure and function, particularly chamber dimensions and systolic performance.

Data were analyzed using appropriate statistical methods. Occurrence of cardiac disorders was calculated as percentage, and associations with breed, age, and sex were evaluated using the chi-square test. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 91 dogs comprising Golden Retrievers and Cocker Spaniels were evaluated during the study period, of which 34 dogs were diagnosed with cardiac disorders, indicating an overall occurrence of 37.36%. This relatively high occurrence may be attributed to the study being conducted in a teaching veterinary hospital, where a greater proportion of clinically suspected cases are presented.

1. Occurrence Based on Breed

Breed-wise analysis revealed a higher occurrence of cardiac disorders in Cocker Spaniels (42.8%) compared to Golden Retrievers (33.92%). The increased occurrence in Cocker Spaniels may be associated with their well-documented predisposition to valvular heart diseases, particularly myxomatous mitral valve disease. In contrast, Golden Retrievers showed a comparatively lower occurrence but were predominantly affected by myocardial disorders such as dilated cardiomyopathy (DCM). These findings are consistent with previous reports highlighting breed-specific susceptibility to different types of cardiac diseases.

Table 1: Breed wise occurrence of cardiac disorders in the two breeds under the study

Breed	Number of animals examined	Number of animals with cardiac disorders	Percentage
Cocker Spaniel	35	15	42.8
Golden Retriever	56	19	33.92
Total	91	34	37.36

2. Types of Cardiac Disorders

Among the diagnosed cases, dilated cardiomyopathy (DCM) was the most prevalent condition, accounting for 79.41% of cases, followed by pericardial effusion (8.82%), hypertrophic cardiomyopathy (5.88%), and mitral valve insufficiency (5.88%). The predominance of DCM in the present study may be attributed to the inclusion of Golden Retrievers, a breed known for its susceptibility to myocardial dysfunction, including taurine-associated DCM. The relatively lower occurrence of mitral valve disease could be due to the limited representation of small breed dogs in the study population.

Table 2: Types of cardiac disorders observed in the two breeds of dogs under study

Diagnosed cardiac disorders	Number of dogs (n=34)	Percentage
Dilated cardiomyopathy	27	79.41
Hypertrophic cardiomyopathy	2	5.88
Mitral valve insufficiency	2	5.88
Pericardial effusion	3	8.82

3. Age-wise Occurrence

Age-wise distribution indicated that dogs above 6 years of age had the highest occurrence (44.11%), followed by dogs between 3–6 years (38.23%) and those below 3 years (17.64%). The association between age and occurrence of cardiac disorders was found to be statistically significant ($p < 0.0001$). This trend reflects the progressive and degenerative nature of most acquired cardiac diseases, which tend to manifest clinically in older animals.

Table 3: Age-wise occurrence of cardiac disorders in the two breeds of dogs under study

Age group	Number of dogs with Cardiac disorders (n =34)	Percentage	p value
Less than 3 years	6	17.64	<0.0001
3- 6 years	13	38.23	
More than 6 years	15	44.11	

4. Gender-wise Occurrence

Gender-wise analysis showed a higher occurrence in male dogs (58.82%) compared to females (41.17%); however, the difference was not statistically significant. The higher proportion of affected males observed in this study may be incidental or related to population demographics rather than a true biological predisposition.

Table 4: Gender wise occurrence of cardiac disorders in the two breeds of dogs under study

Gender	Number of dogs with cardiac disorders (n =34)	Percentage	p value
Male	20	58.82	0.304
Female	14	41.17	

5. Diet based occurrence of cardiac disorders in the two breeds of dogs under study

Among the 34 dogs diagnosed with cardiac abnormalities, 9 dogs (26.47%) were on a commercial diet, while 18 dogs (52.94%) were maintained on a home-made diet. The remaining 7 dogs (20.06%) received a mixed diet, consisting of both commercial and home-prepared food.

Table 5: Diet based occurrence of cardiac disorders in the two breeds of dogs under study

Type of diet	Number of dogs with cardiac disorders (n= 34)	Percentage	P value
Commercial diet	9	26.47	0.052
Home-made	18	52.94	
Mixed	7	20.06	

6. Clinical Findings

The most frequently observed clinical signs in affected dogs were exercise intolerance (94.11%), lethargy (82.35%), and ascites (70.58%), followed by coughing and dyspnea. These clinical manifestations are indicative of compromised cardiac output and congestive heart failure. The high prevalence of exercise intolerance and lethargy reflects reduced tissue perfusion and oxygen delivery, which are hallmark features of cardiac insufficiency.

Table 6: Clinical signs observed in the two breeds of dogs under study with cardiac disorders during the study

Clinical signs	Number of dogs(n=34)	Percentage
Exercise intolerance	32	94.11
Dyspnea	16	47.05
Cough	13	38.23
Ascites	24	70.58
Lateral recumbency	5	14.70
Sternal recumbency	8	23.52
Congested CMM	16	47.05
Jugular vein distension	2	5.88
Heart murmurs	13	38.23
Limb edema	8	23.52
Lethargy	28	82.35
Syncope	5	14.70
Anorexia	13	38.23

7. Electrocardiographic Findings

Electrocardiographic evaluation revealed abnormalities such as tall QRS complexes (73.52%), tall P waves (61.67%), and arrhythmias (20.58%). These findings are suggestive of cardiac chamber enlargement and conduction disturbances, commonly associated with conditions like DCM. The presence of arrhythmias further indicates electrical instability of the myocardium, which may predispose affected animals to sudden cardiac events.

Table 7: Distribution of ECG abnormalities in the two breeds dogs with cardiac disorders

ECG Abnormalities	Number of animals n= 34	Percentage
Tall P wave	21	61.67
Wide P wave	14	41.18
Arrhythmia	7	20.58
Tall QRS	25	73.52
Short QRS	9	26.47
Increased QRS duration	12	35.29
Wandering baseline	6	17.64
Depression of ST segment	7	20.58
ST segment elevation	5	14.70
VPCs	2	5.8

8. Radiographic Findings

Thoracic radiography demonstrated cardiomegaly in 82.35% of affected dogs, along with features such as tracheal elevation and increased pulmonary opacity in some cases. These findings are consistent with cardiac enlargement and pulmonary congestion associated with advanced cardiac disease. Radiographic assessment proved to be a valuable tool in evaluating the severity of cardiac involvement.

Table 8: Radiographic abnormalities observed in the two breeds of dogs under the study

Radiographic findings	Number of dogs (n= 34)	Percentage
Cardiomegaly	28	82.35
Pulmonary Edema	15	44.11
Pleural Effusion	4	11.76
Pericardial effusion	2	5.88
Tracheal elevation	28	82.35

9. Echocardiographic Findings

Echocardiography revealed significant structural and functional alterations, including increased left ventricular internal diameter (LVIDd), reduced fractional shortening, and left atrial enlargement. These findings are characteristic of dilated cardiomyopathy and confirm its predominance in the study population. Echocardiography remains the most reliable diagnostic modality for differentiating various cardiac disorders and assessing disease severity.

Table 9: Echocardiographic findings in Golden Retrievers with cardiac disorders compared to the healthy dogs

Echocardiographic findings	Mean $\pm$ SE (Dogs with cardiac disorder) (n=19)	Mean $\pm$ SE (Healthy dogs) (n=6)	P value
IVSd	0.786 $\pm$ 0.043	1.113 $\pm$ 0.020	<0.0001
IVSs	0.919 $\pm$ 0.070	1.513 $\pm$ 0.020	<0.0001
LVIDd	4.025 $\pm$ 0.409	4.300 $\pm$ 0.064	0.51
LVIDs	3.479 $\pm$ 0.392	2.842 $\pm$ 0.050	0.12
LVPWd	0.847 $\pm$ 0.074	1.062 $\pm$ 0.018	0.0105
LVPWs	0.964 $\pm$ 0.078	1.450 $\pm$ 0.022	~0.06
La/Ao ratio	1.643 $\pm$ 0.038	1.30 $\pm$ 0.03	<0.001
EPSS	0.844 $\pm$ 0.059	0.442 $\pm$ 0.012	<0.001
EF	35.406 $\pm$ 2.322	59.97 $\pm$ 0.33	<0.0001
FS	16.700 $\pm$ 1.033	33.77 $\pm$ 0.38	<0.0001
Stroke volume	38.153 $\pm$ 7.665	40.17 $\pm$ 0.10	>0.1

Table 10: Echocardiographic findings in Cocker Spaniel with cardiac disorders compared to the healthy dogs

Echocardiographic findings	Mean $\pm$ SE (Dogs with cardiac disorder) (n=16)	Mean $\pm$ SE (Healthy dogs) (n=6)	P value
IVSd	0.658 $\pm$ 0.016	0.705 $\pm$ 0.007	0.013
IVSs	0.780 $\pm$ 0.029	1.005 $\pm$ 0.007	<0.001
LVIDd	3.598 $\pm$ 0.238	2.313 $\pm$ 0.019	<0.001
LVIDs	2.778 $\pm$ 0.280	1.605 $\pm$ 0.008	<0.001
LVPWd	0.747 $\pm$ 0.019	0.705 $\pm$ 0.007	0.050
LVPWs	0.891 $\pm$ 0.024	1.005 $\pm$ 0.007	0.091
La/Ao ratio	1.681 $\pm$ 0.059	1.305 $\pm$ 0.007	<0.001
EPSS	0.788 $\pm$ 0.063	0.400 $\pm$ 0.006 cm	<0.001
EF	35.693 $\pm$ 1.527	60.25 $\pm$ 0.40	<0.001
FS	16.609 $\pm$ 0.627	30.50 $\pm$ 0.22	<0.001
Stroke volume	16.224 $\pm$ 2.305	11.17 $\pm$ 0.29 mL	<0.001

Table 11: Occurrence of valvular regurgitation in the two breeds of dogs with cardiac disorders

	No. of dogs with valvular regurgitation (n=34)	Percentage
Mitral valve	15	44.11
Tricuspid	5	14.70
Aortic	3	8.82
Pulmonary	2	5.88



Fig 1: Golden Retriever with ascites due to CHF

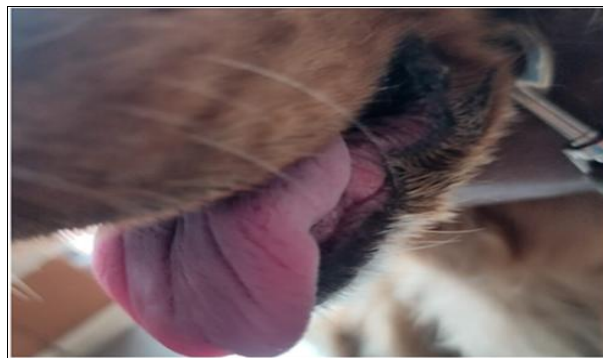


Fig 2: Cocker Spaniel showing cyanotic tongue diagnosed with CHF

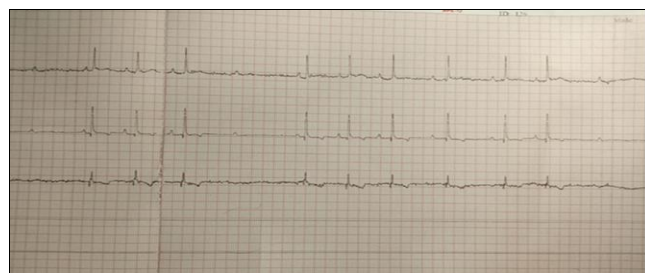


Fig 3: ECG showing arrhythmia in a Golden Retriever diagnosed with CHF

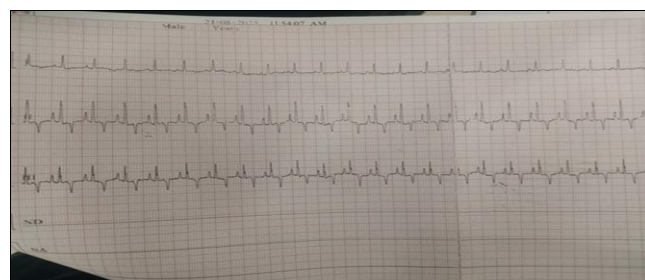


Fig 4: ECG showing Tall P wave and depressed ST segment in a Golden Retriever with CHF

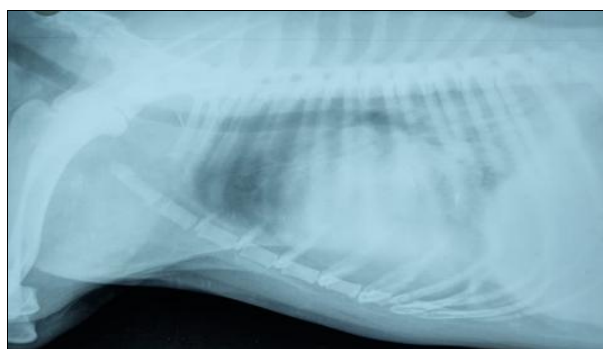


Fig 5: Thoracic radiograph showing cardiomegaly with Pulmonary edema in Golden Retriever with CHF

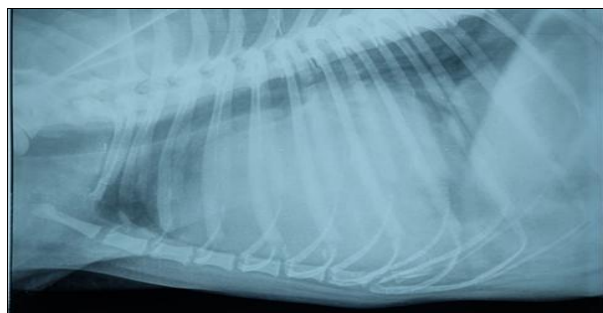


Fig 6: Thoracic radiograph showing cardiomegaly with Pericardial effusion in a Cocker Spaniel with CHF

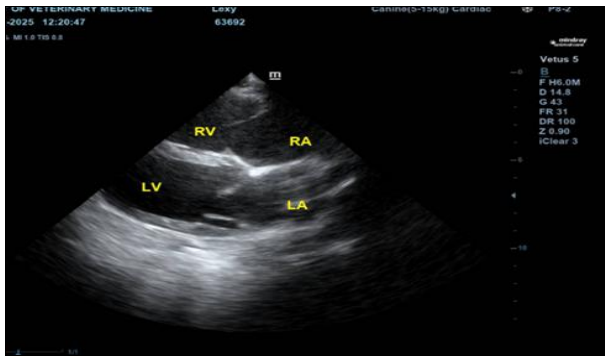


Fig 7: Echocardiography showing right-sided dilatation of heart chambers in a Cocker Spaniel with DCM

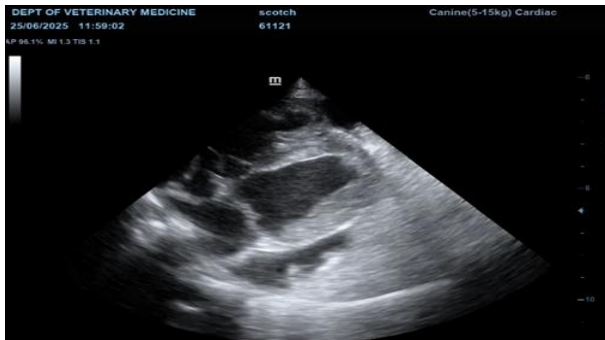


Fig 8: Echocardiography showing pericardial effusion in a Cocker Spaniel

Discussion

The present study revealed an overall occurrence of 37.36% cardiac disorders in dogs presented to a tertiary veterinary hospital in Bengaluru. This relatively higher occurrence compared to general population estimates (~10%) may be attributed to referral bias, as animals presented to specialized centers are more likely to exhibit clinical signs suggestive of cardiac disease. Similar observations have been reported by Hoque *et al.* (2018) [4], who documented a higher prevalence of cardiac disorders in clinically suspected dogs presented to veterinary teaching hospitals, thereby supporting the findings of the present study.

Breed-wise analysis demonstrated a higher occurrence of cardiac disorders in Cocker Spaniels (42.8%) compared to Golden Retrievers (33.92%). This finding is in agreement with the observations of Larsson *et al.* (1997) [6], who reported a significant predisposition of Cocker Spaniels to cardiac diseases, particularly valvular disorders. Additionally, Ferasin *et al.* (2020) [2] also emphasized the role of breed predisposition in influencing the occurrence of cardiac diseases, further supporting the present findings. However, the comparatively lower occurrence observed in Golden Retrievers in the present study contrasts with reports by Kaplan *et al.* (2018) [5] and Guo *et al.* (2024) [3], who highlighted a notable prevalence of dilated cardiomyopathy (DCM) in this breed. This discrepancy may be attributed to differences in study population, dietary factors, or geographic variation.

Among the various cardiac disorders recorded, dilated cardiomyopathy (79.41%) was found to be the most prevalent condition in the present study. This observation is consistent with the findings of Hoque *et al.* (2018) [4], who also reported DCM as a predominant cardiac disorder in medium and large breed dogs. Similarly, Kaplan *et al.* (2018) [5] documented a high incidence of DCM in Golden Retrievers, particularly in association with taurine deficiency, thereby supporting the

present findings. In contrast, several epidemiological studies, including Brambilla *et al.* (2020) [1], have reported myxomatous mitral valve disease (MMVD) as the most common acquired cardiac disease in dogs overall. The lower occurrence of MMVD in the present study may be due to the limited inclusion of small breed dogs, which are typically more predisposed to valvular diseases.

Age-wise analysis in the present study revealed a significantly higher occurrence of cardiac disorders in dogs above 6 years of age, which is in strong agreement with previous reports by Ferasin *et al.* (2020) [2], who emphasized the increasing prevalence of cardiac diseases with advancing age due to progressive degenerative changes. This finding further corroborates the established understanding that acquired cardiac diseases are predominantly conditions of older animals.

The present study recorded a higher occurrence of cardiac disorders in male dogs (58.82%) compared to females, although the difference was not statistically significant. Similar trends have been reported by Hoque *et al.* (2018) [4], who also observed a higher proportion of affected males. However, other studies have reported no significant sex predisposition, indicating that gender may not be a consistent risk factor. Therefore, the findings of the present study neither strongly support nor contradict existing literature, suggesting that sex-related differences may vary depending on population demographics.

Clinical findings in the present study, including exercise intolerance, lethargy, ascites, coughing, and dyspnea, were consistent with classical manifestations of congestive heart failure. These observations are in agreement with Satish *et al.* (2009) [7], who described similar clinical signs in dogs affected with cardiac disorders. The high prevalence of exercise intolerance and lethargy observed in the present study reflects reduced cardiac output and impaired tissue perfusion, which are hallmark features of advanced cardiac disease.

Electrocardiographic findings such as tall QRS complexes, tall P waves, and arrhythmias observed in the present study are indicative of cardiac chamber enlargement and conduction abnormalities. These findings are consistent with those reported by Hoque *et al.* (2018) [4], thereby supporting the diagnostic value of ECG in detecting electrical and structural abnormalities associated with cardiac diseases.

Radiographic evidence of cardiomegaly (82.35%) observed in the present study is in agreement with standard descriptions of cardiac enlargement in dogs with chronic cardiac disorders, as reported by Satish *et al.* (2009) [7]. Similarly, echocardiographic findings, including increased ventricular dimensions and reduced systolic function, are characteristic of DCM and align with observations reported by Kaplan *et al.* (2018) [5] and other studies focusing on myocardial dysfunction.

Overall, the findings of the present study are largely in agreement with existing literature regarding breed predisposition, age-related occurrence, and clinical presentation of cardiac disorders in dogs. However, certain differences, particularly the lower occurrence of MMVD and comparatively higher predominance of DCM, may be attributed to study population characteristics, breed selection, and regional factors.

The study highlights the importance of considering breed-specific risks, particularly in Golden Retrievers and Cocker Spaniels, and emphasizes the need for early screening and comprehensive diagnostic evaluation in susceptible

populations. Further large-scale, multicentric studies are warranted to better understand regional variations and to strengthen the epidemiological data on canine cardiac disorders.

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Conflict of Interest

Not available

Financial Support

Not available

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