



ISSN (E): 2277-7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2023; 12(1): 2033-2036

© 2023 TPI

[www.thepharmajournal.com](http://www.thepharmajournal.com)

Received: 15-10-2022

Accepted: 19-11-2022

## G Tejaswi

Department of Veterinary  
Medicine, College of Veterinary  
Sciences and Animal Husbandry,  
PVNRTVU, Rajendranagar,  
Hyderabad, Telangana, India

## S Ayodhya

Department of Veterinary  
Medicine, College of Veterinary  
Sciences and Animal Husbandry,  
PVNRTVU, Rajendranagar,  
Hyderabad, Telangana, India

## G Ambica

Department of Veterinary  
Medicine, College of Veterinary  
Sciences and Animal Husbandry,  
PVNRTVU, Rajendranagar,  
Hyderabad, Telangana, India

## BDP Kala Kumar

Department of Veterinary  
Medicine, College of Veterinary  
Sciences and Animal Husbandry,  
PVNRTVU, Rajendranagar,  
Hyderabad, Telangana, India

## Corresponding Author:

### G Tejaswi

Department of Veterinary  
Medicine, College of Veterinary  
Sciences and Animal Husbandry,  
PVNRTVU, Rajendranagar,  
Hyderabad, Telangana, India

## Incidence of arrhythmias in canines

G Tejaswi, S Ayodhya, G Ambica and BDP Kala Kumar

### Abstract

A total of 158 dogs with the history of various generalized diseases presented to the Veterinary Clinical Complex, College of Veterinary Science, Rajendranagar over a period of 6 months from December 2021 to May 2022 were screened for ECG abnormalities. Among 158 dogs, 28 revealed arrhythmias with an incidence of 17.7%. The ECG Arrhythmias detected were atrial fibrillation (AF), Ventricular Premature Complex (VPC), sinus arrest or block, 2nd degree heart block, 1st degree heart block and Right Bundle Branch Block (RBB) in 9 (32.1%), 7 (25%), 5 (17.9%), 3 (10.7%), 3 (10.7%) and 2 (7.1%), respectively with highest incidence of atrial fibrillation followed by VPC. Age wise incidence of arrhythmias was highest in > 7 years age group dogs i.e., 16 (57.1%). The breed wise incidence of arrhythmias was recorded highest in Labrador retriever 7 (25%) and lowest in nondescriptive, Golden retriever and Lhasa Apso 1 (3.6%). The incidence of arrhythmias was relatively higher in male dogs i.e., 21 (75%) when compared to that of females i.e., 7 (25%).

**Keywords:** Electrocardiography, arrhythmias, atrial fibrillation, ventricular premature complex, heart block, sinus arrest

### Introduction

Electrocardiography (ECG) acts as one of non-invasive diagnostic aid in the diagnosis of cardiac illness. Heart rhythm refers to the regularity with which impulses generate and spread throughout His Purkinje system, causing the heart to contract. Electrocardiography is a relatively inexpensive and a noninvasive technique which serves as a sign of electrolyte imbalance, drug toxicity and less specifically myocardial and pericardial affection of the heart, in addition to recording of disruption in electric potential called Arrhythmia (Mattera *et al.*, 2012) <sup>[1]</sup>. Cardiac arrhythmias can be primary (or) secondary and arrhythmias in animals because of primary etiology are rare (Bolton, 1975) <sup>[2]</sup>.

### Materials and Methods

Dogs presented to Veterinary Clinical Complex, College of Veterinary Science, Rajendranagar, during a period of six months from December 2021 to May 2022 formed the basis for the study. Dogs presented to the clinic with the history of various generalized diseases such as exercise intolerance, respiratory distress, cyanosis, coughing, lethargy, weakness, anorexia, ascites, weakness, gastro enteritis etc., during preliminary screening examination were included in the study and were subjected for physical examination, auscultation by using 3M Littmann Veterinary Stethoscope, followed by Electrocardiography using BPL Cardiart 9108-D, a single channel, 12 lead ECG machine. The ECG was recorded as per the standard procedure described by Tilley 19923. The dog was placed on right lateral recumbent position, with four limbs perpendicular to the body's long axis. After a proper shaving and applying electrode jelly to the animal's skin, the RA and LA electrodes were connected to fore limbs at the point just proximal to the olecranon on the caudal aspect, whereas RL and LL electrodes to the rear limbs were connected at a point just proximal to the patellar ligament on the cranial aspect. The legs were held properly such that the electrodes did not touch each other. If in case animal was stressed in this position ECG was recorded in standing position. All the dogs were subjected for evaluation of heart rate, rhythm and complex and duration abnormalities

### Results

A total of 158 dogs presented with the history of various generalized diseases presented to the Veterinary Clinical Complex, College of Veterinary Science, Rajendranagar over a period of 6 months from December 2021 to May 2022 were screened. Out of these 158 dogs, 45 dogs revealed healthy or normal ECG's, 21 dogs showed sinus rhythm arrhythmias (13 sinus

arrhythmia, 4 sinus tachycardia and 4 sinus bradycardia), 64 dogs showed wave morphology abnormalities and 28 dogs revealed arrhythmias. The incidence of arrhythmias among dogs with various generalized diseases, was found to be 17.7%. The ECG Arrhythmias detected in dogs which were screened were depicted in Table. 1. Arrhythmias recorded were atrial fibrillation, VPC, sinus arrest or block, 2nd degree Heart Block, 1st degree heart block, RBB in 9 (32.1%), 7 (25%), 5 (17.9%), 3 (10.7%), 3 (10.7%) and 2 (7.1%), respectively. Highest incidence was of Atrial Fibrillation followed by VPC.

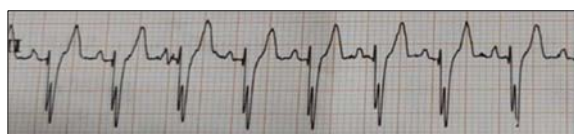
**Table 1:** Percentage of arrhythmias in dogs

Sr.no	Type of arrhythmia	No. of dogs	% (n=28)
1.	Atrial fibrillation (AF)	9	32.1
2.	Ventricular Premature Complex b(VPC)	7	25.0
3.	Sinus arrest or block	5	17.9
4.	2nd degree Heart Block (HB)	3	10.7
5.	1st degree Heart Block (HB)	3	10.7
6.	Right Bundle Branch Block (RBB)	2	7.1

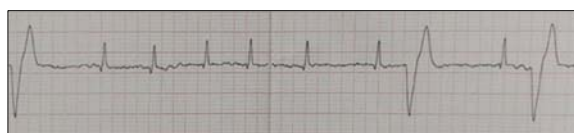
**Table 3:** Breed wise incidence of arrhythmias in dogs

Sr.no	Breed	No. of dogs affected with Arrhythmias	% Incidence (n=28)
1.	Labrador	7	25
2.	Pomeranian	5	17.86
3.	Pug	4	14.3
4.	Cocker Spaniel	3	10.7
5.	German Shepherd	2	7.14
6.	Dachshund	2	7.14
7.	Rottweiler	2	7.14
8.	Non-Descriptive	1	3.6
9.	Lhasa Apso	1	3.6
10.	Golden Retriever	1	3.6
	Total	28	100.0

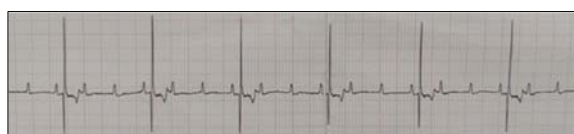
The incidence of Arrhythmias was relatively higher in male dogs 21 (75%) when compared to that of females 7 (25%). The data is presented in Table 4.



**Fig 1:** RBB in Labrador with CHF (paper speed @25mm/sec, 10mm/mv standardization)



**Fig 2:** Atrial fibrillation and VPC in a Rottweiler with DCM (paper speed @50mm/sec, 10mm/mv standardization)



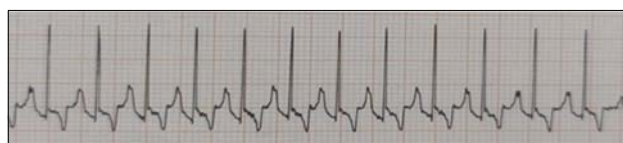
**Fig 3:** Mobitz type II 2nd degree AV block in dachshund with both left and right ventricular enlargement with DCM (paper speed @25mm/sec, 10mm/mv standardization)

Age wise incidence of arrhythmias was highest in > 7 years age group 16 (57.1%), followed by 1-7 years age group 11 (39%) and was least in 0-1 year age group 1 (3.6%). Data is presented in Table 2.

**Table 2:** Age wise Incidence of arrhythmias in dogs

Sr.no	Age group (in years)	No. of dogs affected with Arrhythmias	Age wise % incidence (n=28)
1.	0-1	1	3.6
2.	1-7	11	39
3.	Above 7	16	57.1
	Total	28	100

The breed wise incidence of arrhythmias in dogs was presented in Table 3. The highest incidence was recorded in Labrador retriever 7 (25%) followed by Pomeranian 5 (17.86%), Pug 4 (14.3%), Cocker Spaniel 3 (10.7%), German Shepherd 2 (7.4%), Dachshund 2 (7.4%), Rottweiler 2 (7.4%) with lowest in Non-descriptive 1 (3.6%), Golden Retriever 1 (3.6%) and Lhasa Apso 1 (3.6%), respectively.



**Fig 4:** Sinus tachycardia with Biatrial enlargement in a beagle with right heart failure (paper speed @25mm/sec, 10mm/mv standardization). HR = 214 bpm

**Table 4:** Gender wise incidence of arrhythmias in dogs

Sr. No	Gender	Number of dogs	% Incidence (n=28)
1.	Male	21	75
2.	Female	7	25
		28	100

**Discussion**

In the present study 158 dogs presented to VCC, C.V. Sc, Rajendranagar, Hyderabad with the history of various generalized diseases were screened, out of which the incidence of arrhythmias among dogs with generalized diseases are found to be 17.7%. This degree of incidence of arrhythmias in dogs with generalized diseases noted in the current study is higher than the observations of Shinde (2014) [4] who reported the prevalence of arrhythmias in dogs as 7.27% among dogs showing signs of cardiac illness and less than that of Kumar *et al.* (2014) [5] and Noszczyk-Nowak *et al.* (2017) [6] who recorded CA in 21.92% and 39.55%,

respectively of the dogs suspected for cardiac diseases. This difference in the prevalence rates could be due to difference in the inclusion criteria of dogs and variation in the populations being screened in each study. Present study included dogs with various generalized diseases, while most other studies included only dogs with evidence of cardiac abnormalities.

In the current study AF was of highest incidence noticed in 9 (32.1%) dogs and is in accordance with Noszczyk-Nowak *et al.* (2017) [6] who reported that AF (33.68%) as the most common form of arrhythmia recorded. This finding is also in accordance with Shinde (2014) [4], Badsar *et al.* (2018) [7] and Aravind (2021) [8] stating that AF is the most commonly encountered arrhythmia in cardiac affected dogs. Saho *et al.* (2021) [9] recorded the prevalence of AF 22.58% among supra ventricular abnormalities in dogs showing signs of cardiac diseases. Regardless of the cause of the atrial fibrillation, permanent atrial fibrillation is a common arrhythmia in dogs and is accompanied with ventricular tachycardia (Noszczyk-Nowak *et al.*, 2008 and Matli *et al.*, 2021) [10, 11]. This finding could be due to the majority of the population, included is of cardiac group which was confirmed after their echocardiographic examination.

VPC's was recorded in 7 (25%) dogs in the current study. This finding is nearer to Noszczyk-Nowak *et al.* (2017) [6] recording of VPC's in 23.37% among dogs with pathological arrhythmias and less than that of Wesselowski *et al.* (2022) [12] in 30.1% and were more according to Shinde (2014) [4] and Aravind (2021) [8] with 20% and 6.16%, respectively in cardiac affected dogs. Noszczyk-Nowak *et al.* (2017) [6] noted the prevalence of VPC's as 23.37% among dogs with pathological arrhythmias. This difference may be due to variation in the inclusion criteria of dogs, sample size and length of time period during which the study was carried out. Sinus arrest or block incidence was noted in 5 (17.5%) dogs in the present study. Saho *et al.* (2021) [9] recorded the prevalence of sinus arrest as 4.84% among supra ventricular abnormalities in dogs showing signs of cardiac diseases. Baisan *et al.* (2016) [13] recorded it as 3.7% among dogs with cardiac diseases. Noszczyk-Nowak *et al.* (2017) [6] noted the prevalence of sinus pause as 27.58% among dogs with pathological arrhythmias. This difference is may be due to variation in the inclusion criteria of dogs, sample size and length of time period during which the study was carried out. 2nd degree HB was recorded in 3 (10.7%) dogs in the current study. This finding is greater than findings of Noszczyk-Nowak *et al.* (2017) [6] who recorded it as 6.74% among dogs with pathological arrhythmias. Priyanka (2012) [14] and Aravind (2021) [8] recorded the prevalence of 2nd and 3rd degree HB as 1.4% and 1.36%, respectively in dogs with cardiac diseases. Higher incidence of 2nd degree HB could be due to majority of the population which is included is of cardiac group which was confirmed after their echocardiographic examination.

1st degree HB was recorded in 3 (10.7%) dogs in the current study. This finding is greater than findings of Shinde (2014) [4] and Aravind (2021) [8] where they reported the prevalence of AV blocks as 1.36% and 1.04%, respectively and is less than the findings of Shinde (2014) [4] who recorded 1st degree HB in 25% of cardiac affected dogs. Noszczyk-Nowak *et al.* (2017) [6] noted the prevalence of 1st degree HB as 12.63% among dogs with pathological arrhythmias. This difference in the prevalence rates is may be due to difference in the inclusion criteria of dogs and variation in the populations

being screened in each study and also present study included dogs with various generalized diseases, while most other studies included only dogs with evidence of cardiac abnormalities.

RBB was recorded in 2 (7.14%) dogs in the current study. Shinde (2014) [4] recorded RBB in 22.5% of the dogs which is greater than the current study and Satish (2009) [15] recorded RBB in 2.34% of the CHF dogs which is less than the current study. Wesselowski *et al.* (2022) [12] noted BBB in 1.3% of large breed canine cases evaluated for the occurrence of AHD. This difference is may be due to variation in the inclusion criteria of dogs, sample size and length of time period during which the study was carried out.

In the present study incidence of arrhythmias was highest (57.1%) in >7 years age group, followed by 1-7 and <1 year age group. This finding is in accordance with Mukherjee *et al.* (2020) [16] and Kavitha *et al.* (2022) [17] who observed that arrhythmic patterns were predominant in aged dogs and contrast to findings of Kumar *et al.* (2014) [5] and Noszczyk-Nowak *et al.* (2017) [6] who observed predominantly in young dogs. Shinde (2014) [4] noted the highest prevalence of arrhythmias was between 5-10 years age group with a median age of 7 years. This finding is because, incidence of cardiac diseases is high in aged dogs (Satish, 2009 and Aravind, 2021) [15, 8].

In the current study breed wise incidence of arrhythmias was ranging from 3.6% to 25%, the highest incidence was recorded in Labrador retriever 25% followed by Pomeranian 17.86%, Pug 14.3%, Cocker Spaniel 10.7%, German Shepherd 7.4%, Dachshund 7.4%, Rottweiler 7.4%, lowest in Non-descriptive and Golden Retriever and Lhasa Apso 3.6% respectively. These findings are similar to that of Mukherjee *et al.* (2020) [16] who recorded highest incidence of arrhythmias in Labradors and Kumar *et al.* (2014) [5] who observed that CA have the highest frequency in Pomeranian breed (30.70%). Kumar *et al.* (2014) [5] opined that the risk factor of CA for Pomeranian was comparatively 2.103 times higher than other breeds. And also, may be due to increased predisposition of these breeds to various cardiac diseases resulting in arrhythmias.

In our present study the incidence of arrhythmias was relatively higher in male dogs 75% when compared to that of females 25% and is in accordance with Manev (2021) [18], Shinde (2014) [4] and Noszczyk-Nowak *et al.* (2017) [6]. Overall cardiac rhythm abnormalities were more common in male dogs (Noszczyk-Nowak *et al.*, 2017) [6]. This finding is contrast to the findings of Gupta *et al.* (2007) [19] and Kumar *et al.* (2014) [5] who reported that it was more in females. According to Vishnurahav *et al.* (2018) [20] male dogs were found to be dominating in the occurrence of cardiac diseases than females which could be a possible reason for a high incidence of arrhythmias in males.

## Conclusion

From the above findings it can be concluded that arrhythmias are majorly noticed in geriatric dogs and among all AF is the most frequently encountered arrhythmia in dogs with generalized diseases. The breed wise and gender wise incidence of arrhythmias was highest in Labrador retriever and in male dogs, respectively. Hence, random ECG evaluation in adult dogs may help to identify the cardiac disease in early stages and also to prevent fatal outcome.

**Reference**

1. Mattera G, Vanoli E, Loi FM, Martinez V, Borsini F. Borsini detecting drug induced QT interval. Prolongation in healthy dogs: A practical approach. *Webmed Central Pharmacology*. 2012;3(8):WMC003615.
2. Bolton. *Handbook of canine electrocardiography*. W. B. Saunders company, PA, U.S.A. 1975. p. 112-113.
3. Tilley LP. *Essentials of canine and feline electrocardiography*, 3<sup>rd</sup> edn. Lea and Febiger, Philadelphia; c1992.
4. Shinde Varsha Ganpat. *Studies on Cardiac Arrhythmias in dogs*. Thesis submitted to MAFSU, Bombay Veterinary College, Parel, Mumbai; c2014.
5. Kumar A, Dey S, Mahajan S. Incidence and risk assessment of cardiac arrhythmias in dogs with respect to age, breed, sex and associated biochemical changes. *Advances in Animal and Veterinary Sciences*. 2014;2(5):277-281.
6. Noszczyk-Nowak, Agnieszka, Michałek, Marcin, Kałuża, Ewelina, Cepiel, Alicja and Pasławska, Urszula. Prevalence of arrhythmias in dogs examined between 2008 and 2014. *Journal of Veterinary Research*. 2017;61(1):103-110.
7. Badsar P, Mehta HK, Nema SP, Kumbhkar Y. Cardiac abnormalities in dogs-A diagnostic study. *Intas Polivet* 2018;19(1):118-121.
8. Aravind Rao Enuganti. *Diagnosis and therapeutic management of heart failure in dogs*. Thesis submitted to PVNRTVU, C.V. Sc, Rajendranagar, Hyderabad; c2021.
9. Sahoo KK, Gupta DK, Mourya A, Shahi A, Das G, Pathak S, *et al*. Electrocardiographic Interpretations of Cardiac Disorders in Dogs. *Indian Journal of Animal Research*. 2021;55(12):1476-1483.
10. Noszczyk-Nowak AU, Pasławska D, Zysko J, Gajek J, Nicpon, Hebel M. Atrial fibrillation in dogs. *Medycyna Weterynaryjna*. 2008;64(5):686-689.
11. Matli B, Rao VV, Rani NL, Rao GS, Subramanyam KV. Prognostic findings in dogs with dilated cardiomyopathy. *The Pharma Journal*. 2021;10(5):684-687.
12. Wesselowski S, Gordon SG, Meddaugh N, Saunders AB, Haggstrom J, Cusack K, Janacek BW and Matthews DJ. Prediction of clinically important acquired cardiac disease without an echocardiogram in large breed dogs using a combination of clinical, radiographic and electrocardiographic variables. *Journal of Veterinary Cardiology*. 2022;40:126-141.
13. Baisan RA, Birsan O, Vulpe V. Electrocardiographic changes in chronic valvular disease and dilated cardiomyopathy in dog. *Human and Veterinary Medicine*. 2016;8(2):98-102.
14. Priyanka. *Clinical studies on canine arrhythmias*. Thesis submitted to Rajasthan University of Veterinary and Animal Sciences, Bikaner; 2012.
15. Satish Kumar K. *Studies on cardiac diseases and therapeutic management of congestive heart failure in dogs*. Thesis submitted to SVVU, C.V.SC, Hyderabad; c2009.
16. Mukherjee J, Mohapatra SS, Jana S, Das PK, Ghosh PR, Das K, *et al*. A study on the electrocardiography in dogs: Reference values and their comparison among breeds, sex, and age groups. *Veterinary World*. 2020;13(10):2216-2220.
17. Kavitha K, Dimri U, Mahendran K, Verma MR, Amarpal, Saxena AC, Hoque M, Madhesh E, Chaudhary AK, Kalaiselvan E and Angmo S. Electrocardiographic and radiographic changes vis-a-vis ageing in healthy Labrador Retriever dogs. *Haryana Veterinarian*. 2022;61(SI):21-25.
18. Manev. Cardiac arrhythmias in canine patients with renal insufficiency. *Tradition and Modernity in Veterinary Medicine*. 2021;6(1):21-24.
19. Gupta DK, Singh JL, Kumar M. Clinico-pathological changes in cardiac arrhythmias in dogs. *Indian Journal of Veterinary Medicine*. 2007;27(2):91-94.
20. Vishnurahav RB, Ajithkumar S, Usha Narayana Pillai MUN, John Martin KD and Aravindakshan TV. Occurrence of cardiac diseases in dogs: A retrospective study. *Journal of Entomology and Zoology Studies*. 2018;6(4):1901-1903.