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**Arun Mourya**  
Department of Veterinary  
Medicine, College of Veterinary  
Science & AH NDVSU,  
Jabalpur, Madhya Pradesh,  
India

**HK Mehta**  
Department of Veterinary  
Medicine, College of Veterinary  
Science & AH NDVSU,  
Jabalpur, Madhya Pradesh,  
India

**Rekha Mourya**  
Department of Veterinary  
Medicine, College of Veterinary  
Science & AH NDVSU,  
Jabalpur, Madhya Pradesh,  
India

**DK Gupta**  
Department of Veterinary  
Medicine, College of Veterinary  
Science & AH NDVSU,  
Jabalpur, Madhya Pradesh,  
India

**Amita Tiwari**  
Department of Veterinary  
Medicine, College of Veterinary  
Science & AH NDVSU,  
Jabalpur, Madhya Pradesh,  
India

**Brejesh Singh**  
Department of Veterinary  
Medicine, College of Veterinary  
Science & AH NDVSU,  
Jabalpur, Madhya Pradesh,  
India

**PC Shukla**  
Department of Veterinary  
Medicine, College of Veterinary  
Science & AH NDVSU,  
Jabalpur, Madhya Pradesh,  
India

#### Correspondence

**Arun Mourya**  
Department of Veterinary  
Medicine, College of Veterinary  
Science & AH NDVSU,  
Jabalpur, Madhya Pradesh,  
India

## Vertebral heart scale: A diagnostic tool for cardiomegaly in dogs

**Arun Mourya, HK Mehta, Rekha Mourya, DK Gupta, Amita Tiwari, Brejesh Singh and PC Shukla**

#### Abstract

Dogs admitted to Teaching Veterinary Clinical Complex (T.V.C.C), College of Veterinary Science and A.H, MHOW, (M.P), with a history of persistent dry coughing, increases on exercise and were not responding to therapy. On clinical examination there were no changes observed in clinical signs. The radiological examination of the thoracic cavity was performed to observe the size and shape heart in the dogs. Vertebral heart scale (V.H.S) method was used for the measurement of heart size. Out of nine dogs used for study two dogs Labrador and Mongrel considered as cardiomegaly. The sizes of the hearts were 13 v and 12 v respectively as compare to normal V.H.S 9.7 v (8.5 – 10.5 v). On radiological examination pressing of trachea by enlarge heart was clearly visible.

**Keywords:** VSH, cardiomegaly, cardiac disease

#### Introduction

Cardiac diseases are the second most prevalent cause of death in the dogs accounting for a percentage of 16.3<sup>[1]</sup>. Cardiac diseases are often a diagnostic problem and determination of the heart size is important for evaluation the patient with cardiac disease. Cardiomegaly is one of them and often seen in older dogs as compare to younger one. Giant breed dogs often develop dilated cardiomyopathy. Pericardial effusion, aortic effusion and endocarditic seem to be more frequently in large breed dogs.

Thoracic radiograph are very helpful in the diagnosis of heart disease and it provides immediate information about the size, shape and position of the heart and its relation to adjacent structures and is therefore of paramount importance for understanding of the heart diseases. Studies using planimetry and various cardio thoracic ratios have been reported, but these methods have not been proved suitable for general clinical use. A guideline of 2.5 to 3.5 intercostal spaces for dogs was introduced in 1968 and is still used in veterinary medicine. Limitations of this method include variations of the cardiac size and shape, confirmation of the thorax, phase of respiration, superimposition of ribs, and imprecise measurement point<sup>[2,3,4]</sup>.

To overcome these limitations, particularly for inexperienced observer who may be especially prone to false positive interpretation when examining radiograph of puppies, brachycephalic breeds or obese dogs because these animals usually have a relatively broad, rounded cardiac silhouette that resembles the enlarged heart seen in many metacephalic or dolicephalic dogs<sup>[5]</sup>. Therefore to overcome misdiagnosed cardiomegaly various alternative heart skeletal ratio have been explored and emphasis was placed on comparison of heart size and vertebral length, because both are measurable in thoracic radiographs and good correlation are exist between heart weight and body length<sup>[2]</sup>.

A method was described for measuring the cardiac size in dogs by measuring the long and short axes in radiograph and comparing the sum of these measurement to the midthoracic vertebral bodies, to produce a unit less index called the vertebral heart score (VHS). VHS has been proposed as a potential means of increasing the accuracy of radiographic diagnosis of cardiac disease, particularly for inexperienced observers<sup>[2]</sup>. According to same researchers most normal dog have a VSH of 8.5 – 10.5 v. The objective of this study was to use the VHS for diagnose of cardiomegaly in dogs which is very simple technique and can be used in field condition, where modern diagnostic facilities are not available.

#### Materials and Methods

Dogs admitted to Teaching Veterinary Clinical Service Complex (T.V.C.S.C), College of Veterinary Science and A.H, MHOW, (M.P), with a history of persistent dry coughing, increases on exercise and were not responding to therapy are used for this study. The radiographical examination in lateral and dorsoventral recumbency was performed. On lateral

radiographic view, the long axis of the heart was measured from the ventral border of the left main stem bronchus (the most distant point on the ventral contour of the cardiac radiographic image). This dimension reflects the combined size of the left atrium and the left ventricle. The short axis was measured at the widest point of the cardiac image on a line perpendicular to the long axis at the level of the caudal vena cava. The measurement were made using a metric ruler and recorded in millimeter. The two measurements (long and short axis) were then compared to the vertebrae starting at the cranial edge of the thoracic 4 (T<sub>4</sub>), and a result, expressed in units of vertebral lengths, was obtained for each axis [6].

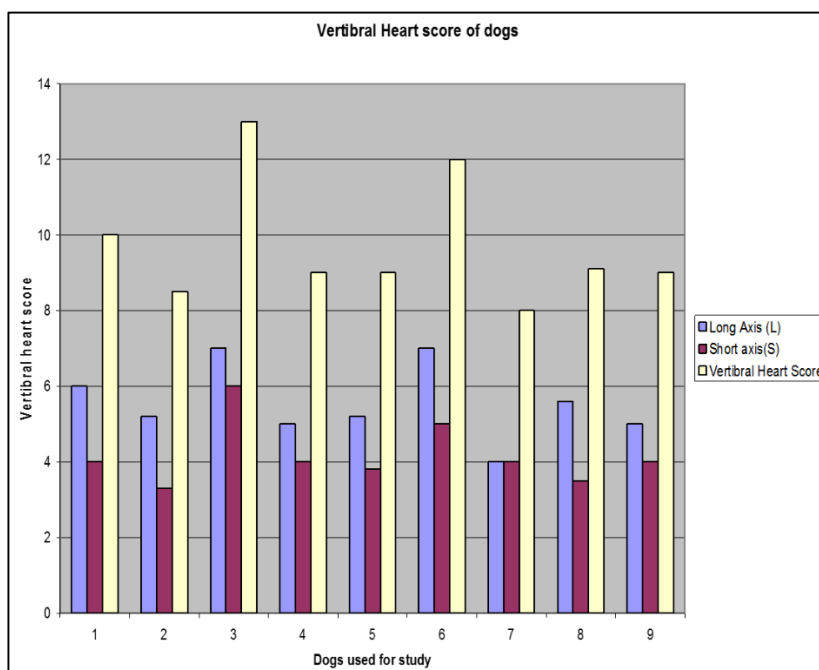
**Results and Discussion**

After the radiography the long axis and short axis was measured and those dogs that having VHS of  $> 9.7 \pm 0.5$  were considered as cardiomegaly. Out of nine dogs (Table 1) one Labrador and Mongrel suffer from cardiomegaly. The long

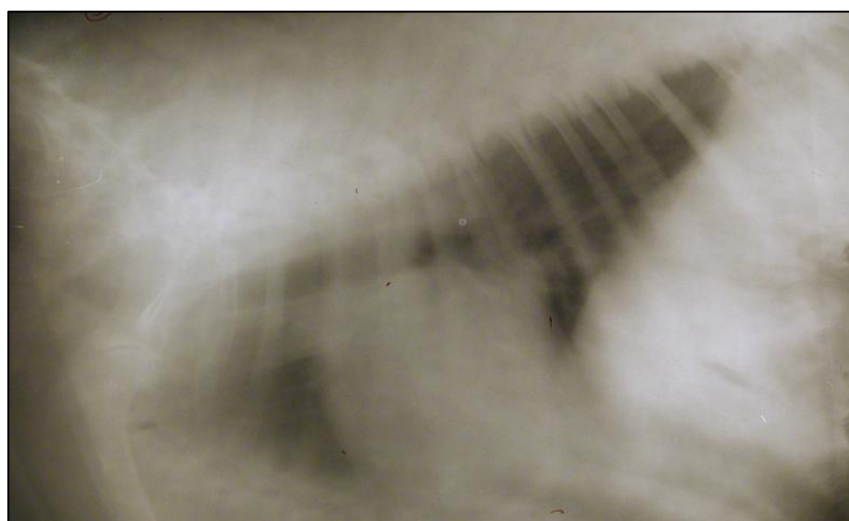
(L) and short (S) axis for Labrador L = 7 and S = 6 and for Mongrel L = 7 and S = 5 and sum of the long and short axis of the heart was 13 v and 12 v respectively as compare to normal V.H.S 9.7 v (8.5 – 10.5 v). Pressing of trachea by enlarged heart was clearly visible.

**Table 1:** Showing VHS of the dogs

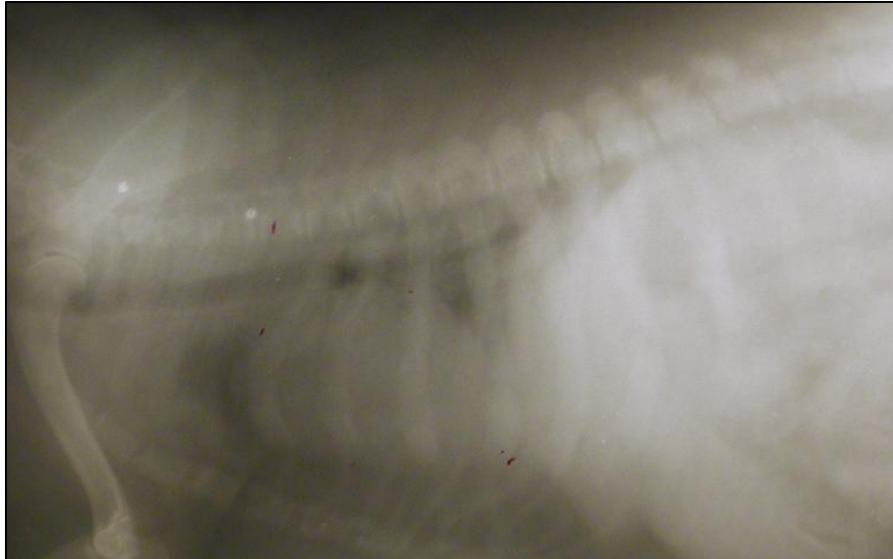
S. No	Long Axis (L)	Short Axis (S)	VHS= L+S
1	6	4	10
2	5.2	3.3	8.5
3	7	6	13
4	5	4	9
5	5.2	3.8	9
6	7	5	12
7	4	4	8
8	5.6	3.5	9.1
9	5	4	9



**Fig 1:** VHS of the dogs



**Fig 2:** Lateral radiographic view of the Labrador VHS= 13



**Fig 3:** Lateral radiographic view of the Mongrel VHS=12

### Conclusion

Cardiomegaly is a reliable sign of heart disease and it is seen in case of hypertrophic or dilated cardiomyopathy and it can be easily determined in thoracic radiograph and can be objectively measured with VHS application. In clinical practice the lateral radiographic position may be preferred to ventrodorsal position, because the lateral radiographic position is more comfortable and causes less stress for the patient with suspected cardiac disease. Therefore, it could be concluded that cardiac illness causing cardiomegaly can be diagnosed using lateral thorax radiography and VHS in case with insufficient diagnostic tools.

We conclude that VHS is easy to apply in clinical practice for determining the heart size particularly for inexperienced observers.

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