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Vertebral heart score in indigenous dog breed of Tamil Nadu

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Abstract

Chippiparai dog which is a unique medium-sized, sight hound breed of Tirunelveli district of southern Tamil Nadu. In the present study, Vertebral heart score (VHS) was measured by thoracic radiographs of left and right lateral recumbency. A total of 12 dogs (young -6 and adult-6) were used for the study. The mean VHS on right lateral radiographs was found to be 8.63 ± 0.23 and 8.95 ± 0.13 in young and adult dogs respectively. Whereas, the mean VHS on left lateral radiographs was found to be 8.67 ± 0.33 and 8.97 ± 0.1 in young and adult dogs respectively. No significant differences could be found between the VHS of both young and adult Chippiparai dogs.

Keywords: Vertebral heart score, Indigenous dog, Chippiparai

1. Introduction

The vertebral heart score (VHS) is used to objectively assess cardiac dimensions on thoracic radiographs. A high VHS suggest the presence of cardiac pathology, such as dilated cardiomyopathy, degenerative atrioventricular valvular disease, pericardial effusion, pericardioperitoneal diaphragmatic hernia, tricuspid dysplasia, ventricular septal defect, or patent ductus arteriosus, among others. However, breed or body conformation can influence the VHS ^[1].

There are variations exist between the different breeds of dogs. VHS reference ranges for different exotic dog breeds such as German Shepherd, Labrador Retriever, Grey Hound, Whippet, Beagle, Pug, Pomeranian, Yorkshire Terrier, Dachshund, Bull dog, Shih Tzu, Lhasa Apso and Boston Terrierr have already been documented ^[2].

India had a rich canine genetic resource, besides the vast wealth of livestock germ plasm. Indigenous canine breeds like Rajapalayam, Chippiparai, Mudhol hound, Rampur hound, Caravan hound, Banjara hound and Jonangi were well known. Of which, Chippiparai dog, a unique medium-sized, sight hound breed. The breeding tract of this dog was reported to be Tirunelveli district of southern Tamil Nadu ^[3].

Hence, the present study was designed to develop the basic data on cardiac size in Chippiparai breed using Digital Radiography.

2. Materials and Methods

The study was carried out on 12 clinically healthy Chippiparai breeds of dogs brought to Madras Veterinary College teaching hospital with the consent of the owner. The dogs were divided into two groups based on age as young / puppy (from 1 to 6 months) and adult (6 months and above). Each group consisted of six animals. The radiographic examination included right-to-left and left-to-right lateral thoracic radiographs from non-sedated animals.

While radiography, care was taken to avoid movement of the animal so that the shape and size of the cardiac silhouette was not deviated from normal ^[4]. Radiographic images were obtained by using Siemens 500 mA, 3 phase, 6 pulse X-ray generator. Digital processing of the images was carried out using Computerised radiography AGFA 30-X using the standard exposure technique based on the chest depth of the animal.

Measurement of the Vertebral Heart Score (VHS) was done as per Buchanan and Bucheler ^[5] in right and left lateral views of thoracic radiographs in dogs.

Vertebral Heart Score = Short axis dimension + Long axis dimension

It was expressed as the total units of vertebral length to the nearest 0.1 vertebra.

The long axis (LA) and short axis (SA) were measured in right-to-left and left-to-right lateral radiographs beginning from the cranial edge of T4. Statistical analysis was performed using

SPSS software (SPSS® 20.0 for Windows). Results were expressed as a mean ± standard error. T- test for equality of means was used to compare the differences between young and adult age groups and left lateral versus right lateral VHS respectively.

3. Results and Discussion

3.1 Left VHS

Mean ± SE for left long axis of heart were 4.78 ± 0.12 and 5.15 ± 0.03 in young and adult age groups respectively (Table 1 and Figure 1). Significant difference was observed between the age groups. This could be explained by significant increase in LAD measured by 2D echocardiography between the age groups studied. Whereas, higher values of left LA was reported for Spitz (5.59 ± 0.27), Labrador Retriever (5.55 ± 0.16) and Mongrel dogs (5.34 ± 0.18) by Bodh *et al.* [6]. Also, a positive correlation was reported in relation to body weight. In young and adult age groups, mean ± SE for left short axis were found to be 3.88 ± 0.04 and 3.83 ± 0.11 respectively. Analysis revealed no significant difference between the age groups studied. However, higher values of SA (4.4 and 4.5) was reported by Ghadiri *et al.* [7] in common large breed dogs of Iran.

Based on LA and SA values, VHS was calculated using Buchanan’s formula in young and adult dogs. The mean ± SE or VHS were found to be 8.67 ± 0.33 and 8.97 ± 0.1 in young and adult dogs respectively (Figure 2) which was significantly lesser than the VHS reported by Buchanan and Bucheler [5]. No significant difference was observed between the age

groups. Whereas, higher values of VHS were recorded in Turkish Shepherd (9.7 ± 0.67), Whippets (10.5 ± 0.6 for show pedigree; 11.1 ± 0.4 for racing pedigree) and Beagle (10.2 ± 0.4) by Gulamber *et al.* [8], Bavegems *et al.* [4] and Kraetschmer *et al.* [9] respectively. No significant correlation in relation to body weight.

3.2 Right VHS

Mean ± SE were 4.8 ± 0.11 and 5.17 ± 0.08 for the right long axis of heart in young and adult age dogs respectively (Table 1 and Figure 1). However, higher values of Right long axis of heart was recorded by Ghadiri *et al.* [7] in Doberman (5.6), German Shepherd (5.4) and native dogs of Iran (5.3). Significant difference was found between the age groups and positive correlation with body weight was observed.

In young and adult age groups, mean ± SE for right short axis were 3.83 ± 0.15 and 3.78 ± 0.09 respectively. Whereas, higher values of VHS was reported in right SA in Spitz (4.48) and Labrador Retriever (4.71) by Bodh *et al.* [6]. There was no significant difference between the age groups.

VHS calculated using Buchanan’s formula were found to be 8.63 ± 0.23 and 8.95 ± 0.13 in young and adult dogs respectively. However, higher values were reported in German Shepherd (9.7 ± 0.8), Boxer (11.6 ± 0.8), Doberman (10 ± 0.6), Yorkshire Terrier (9.7 ± 0.5) and Cavalier king Charles spaniel (10.6 ± 0.5) by Lamb *et al.* [10]. No significant difference was observed between the age groups studied. Similar observations were made by Sleeper and Buchanan [11].

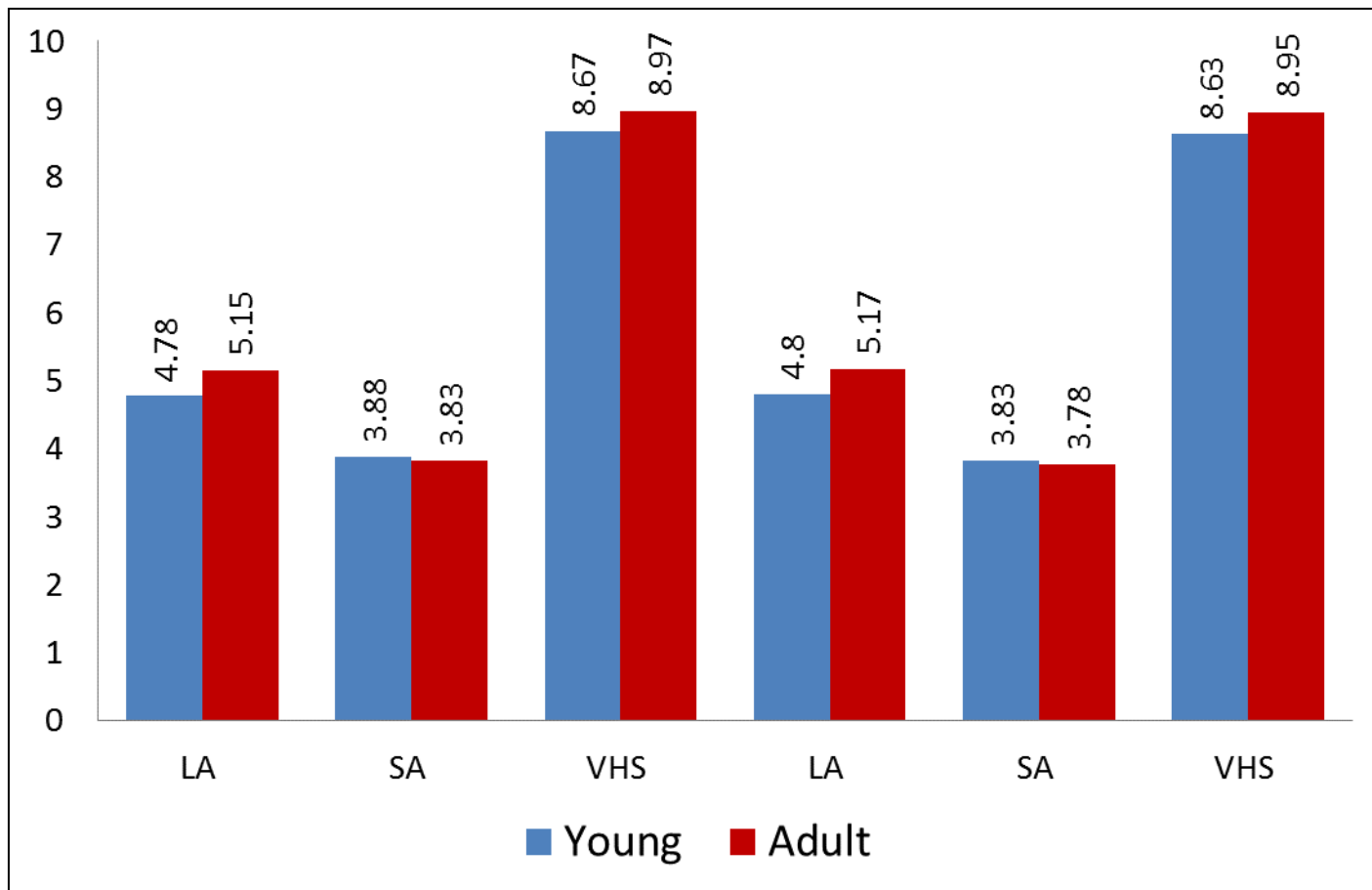


Fig 1: Graphical representation of Mean ± SE of Vertebral Heart Score in Chippiparai dogs X axis denotes Parameters, Y axis denotes VHS values

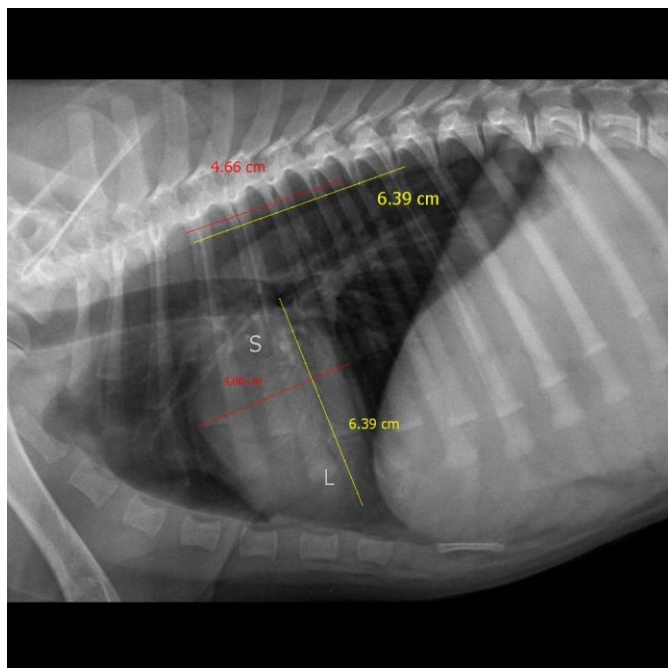


Fig 2: Left lateral Radiographs of Chippiparai dog showing VHS measurements L – Long axis of heart S – Short axis of heart

Table 1: Mean \pm SE of Vertebral heart score in Chippiparai dogs

| Parameters | | Young | Adult | t value |
|---------------|-----|-----------------|-----------------|---------------------|
| Left Lateral | LA | 4.78 \pm 0.12 | 5.15 \pm 0.03 | 2.95* |
| | SA | 3.88 \pm 0.23 | 3.83 \pm 0.11 | 0.198 ^{NS} |
| | VHS | 8.67 \pm 0.33 | 8.97 \pm 0.1 | 0.87 ^{NS} |
| Right Lateral | LA | 4.8 \pm 0.11 | 5.17 \pm 0.08 | 2.70* |
| | SA | 3.83 \pm 0.15 | 3.78 \pm 0.09 | 0.29 ^{NS} |
| | VHS | 8.63 \pm 0.23 | 8.95 \pm 0.13 | 1.12 ^{NS} |

^{NS} - No significant difference between young and adult age groups ($P > 0.05$)

*- Significant difference between young and adult age groups ($P < 0.05$)

4. Conclusion

The present study provided the basic reference data for VHS in Chippiparai, the indigenous sight hound breed of Tamil Nadu. The mean vertebral heart score in Chippiparai dogs was 8.96 vertebrae in left and right lateral radiographs with no correlation to body weight. However, the VHS value for this breed was slightly lesser than the reference range for dogs. In conclusion, VHS provided the heart size and anatomical location of heart in dogs.

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