

Echocardiographic Evaluation of Malabari Goats with Haemoparasitic Diseases

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Abstract

The study was carried out to assess the echocardiographic changes in Malabari goats with haemoparasitic diseases. Twelve female Malabari goats presented to the University Veterinary Hospital which were positive for blood parasites were taken up for the study. Out of twelve animals, nine were positive for Anaplasma spp, two were positive for Theileria spp and one animal was positive for both Anaplasma and Theileria infection. Pericardial effusion was recorded in one goat. Hyperechoic spots were recorded in the left ventricle in two goats. The values of the parameters studied are reported.

Keywords: Echocardiography, Haemoparasites, Malabari Goat

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Introduction

Haemoparasitic diseases of ruminants can have a deleterious effect on the life and production capacity of ruminants (Ademola and Onyiche, 2013). Diagnosing heart diseases in ruminants are challenging as the clinical signs are hidden until signs of congestive heart failure occur often resulting in sudden death (Buczinski, 2009). An early diagnosis of cardiac diseases in ruminants are of utmost importance as the prognosis of the most common heart disorders ranges from guarded to poor (Bexiga *et al.*, 2008). Other ancillary tests routinely employed like complete cell blood count, blood culture, electrocardiography and serum biochemistry panel, may lack the sensitivity or specificity to detect heart diseases (Buczinski, 2007). Echocardiography is an important non-invasive diagnostic technique for assessing the cardiac chambers, valves and cardiac function through visualisation and by using several indices. Echocardiography has been extensively employed for clinical studies in small animals and horses. Sheep and goats are also affected with several diseases affecting the heart (Hallowell *et al.*, 2012). It has been observed that echocardiography, like in any other species, is a safe and suited method to assess the heart of goats (Szaluś-Jordanow *et al.*, 2017). A recent study in Saanen goats used two-dimensional speckle tracking echocardiography to assess the changes in myocardial function (Leroux *et al.*, 2020). The use of echocardiography in goats to assess the cardiac variations in haemoparasitic diseases are scarce and are lacking in India. A study has been conducted earlier on Black Bengal goats to evaluate the normal left ventricular function (Sankariah and Kumar, 2017).

Materials and Methods

Twelve adult Malabari goats in the age group of 1-2 years and body weight of 20-25 kg brought to the University Veterinary Hospital which were found to be positive for haemoparasites on blood smear examination formed the diseased group. Echocardiographic indices namely Left Ventricular Internal Diameter at End Diastole and Systole, Interventricular Septum at End Diastole and Systole, Left Ventricular free wall at End Diastole and Systole, Fractional Shortening and Ejection Fraction in B-mode were assessed in the affected animals. The values of the normal animals as obtained and reported for goats of similar age and body weight were used for statistical analysis (Tejaswini *et al.*, 2018). Values for each parameter were determined by the average of three to five cardiac cycles (Boon, 2011). Data were analyzed statistically by SPSS version 24.0.

Instrumentation and Scanning Protocol

Echocardiographic examination was carried out by two-dimensional (2-D) a 3.2 - 3.5 MHz phased array transducer, Mindray Z-6 ultrasound scanner. Echocardiograms were recorded and analyzed as described (Thomas *et al.*, 1993). Based on the need, the depth and gain adjustments were made. The lower third of the 2nd to 6th right intercostal area was shaved and ultrasound gel was applied over the skin and on the transducer to allow intimate contact between the skin and the transducer head. The echocardiographic examination was performed by placing the animal on the right lateral recumbency with all the four limbs extending outward and forward on a specially designed table for echocardiographic examination, enabling all the examination to take place from below the patient (Boon, 2011). Keeping the animal calm, the transducer was placed on the animal's chest at a point where intense palpable apex beat was felt. All the examinations were made from the right parasternal window, in right lateral recumbency following the description of Allaam *et al.* (2013). Scanning positioning and measurements were carried out as described (Tejaswini *et al.*, 2018).

Results and Discussion

Nine of the animals were positive for *Anaplasma* spp. Two were positive to *Theileria* spp. and one animal was positive for both *Theileria* and *Anaplasma* species. In the right parasternal long axis view, all the four chambers right atrium (RA), right ventricle (RV), left atrium (LA) and left ventricle (LV), mitral, tricuspid and aortic valves were visualised. No apparent abnormalities were recorded in the diseased group on B-mode examination. However, hyperechoic spots were visualised inside the left ventricle of two goats affected with anaplasmosis. Pericardial effusion characterised by anechoic area in pericardial space was recorded in one goat of the study group affected with anaplasmosis (Fig.1). The mean echocardiographic parameters are presented in Table 1.

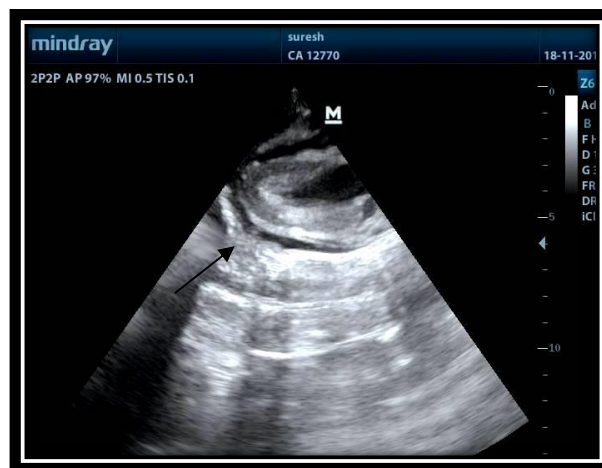


Figure 1: Pericardial effusion in a goat with anaplasmosis- represented by anechoic area in the pericardial sac (Right parasternal long axis view)

Table 1: Mean echocardiographic parameters of animals with haemoparasitic infection (Mean $\pm$ SE)

Parameters	Echocardiographic values
	(Mean $\pm$ SE)
LVIDd (cm)	2.77 $\pm$ 0.08
LVIDs (cm)	1.74 $\pm$ 0.09
IVSd (cm)	0.86 $\pm$ 0.02
IVSs (cm)	1.06 $\pm$ 0.02
LVFWd (cm)	0.78 $\pm$ 0.03
LVFWs (cm)	1.41 $\pm$ 0.04
FS (%)	37.74 $\pm$ 1.64
EF (%)	68.96 $\pm$ 2.11

Perusal of literature did not reveal any studies with respect to use of echocardiography in haemoparasitic diseases in goats. Detection of pericardial effusion was noted by French *et al.* (2014) in cattle affected with *A. marginale* characterized by large volume of hypoechoic fluid within the pericardial sac. Restifo *et al.* (2015) observed moderate pericardial effusion in an equine affected with *A. phagocytophilum* with normal cardiac measurements. These findings are in concurrence with the finding of pericardial effusion in one goat in the present study. Hyperchoic foci present in the ventricle could be associated with thrombus (Madron *et al.*, 2015). No conclusive opinion regarding hyperechoic spots in the ventricle could be formed in the present study. The echocardiographic values reported in the present study did not vary significantly when compared to the normal values established in a concurrent study with healthy goats (Tejaswini *et al.*, 2018).

The results of echocardiography in small ruminants have indicated its importance for use as animal model for studying human cardiovascular diseases (Locatelli *et al.*, 2011). The present study indicates the use of echocardiography to assess the cardiac effects in haemoparasitic diseases. The presence of hyperechoic spots and pericardial effusion suggests that cardiac involvement may be present in haemoparasitic diseases. The indices in the present study did not show a significant variation, possibly because of the variation in the severity of infection and the etiology. Further studies are warranted with a large population and based on specific haemoparasitic disease to reach conclusive inferences with regard to the parameters of importance and also use of tissue Doppler and speckle tracking in further assessing the cardiac pathology.

Conclusion

The echocardiographic changes recorded associated with haemoparasitic infection in goats is reported. This study underscores the relevance of use of echocardiography in assessing cardiac function in goats with haemoparasitic diseases.

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Conflict of Interests

There is no conflict of interest.

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