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Short Communication

ELECTROCARDIOGRAPHIC STUDIES IN HALLIKAR BULLOCK IN PUDUCHERRY REGION, INDIA

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Hallikar breed is recognized cattle breed in India (Nivsakar *et al.* 2000) and it is found in southern states like Andhra Pradesh, Karnataka and Tamil Nadu. Electrocardiography is a simplest form of recording the changing potential difference in heart. Electrocardiography is primarily a valuable aid for assessing the cardiac functions, diagnosis of various cardiac diseases and to determine the prognosis and therapeutic considerations (Radostits *et al.* 2010). Studies of Ayala *et al.* (1998) showed that age in horses was factors that play important role in affecting electrocardiography parameters. Reddy and Sivajothi (2016) recorded electrocardiograms in clinically apparently healthy cross bred cattle in Andhra Pradesh of India. Devadevi *et al*. (2018) reported electrocardiography changes in cattle with Bovine Benign theileriosis. Electrocardiographic study was done in theileriosis infected buffaloes by Hasanpour *et al*. (2008). Standardized values and numerous researches were done in canine and equine electrocardiography compared to that of cattle and small ruminants (Reddy *et al.* 2014). So, the aim of the study was to standardize the electrocardiographic values and changes noticed in healthy Hallikar bullocks of Puducherry region.

The study

The study was carried out in the Large Animal Medicine Unit, TVCC, RIVER, Puducherry. The Hallikar bullocks of age group between eight to ten years were taken for the study. After arrival of the animals, it was allowed to take rest for 15 minutes. Then the animals were allowed to stand inside the Travis without any sedation. Then the sites were cleaned and electrocardiographic gel was applied adequately. The skin was lifted and the alligator clips were applied firmly. The ECG was taken using bipolar base apex mode using limb lead II (Fig. 1 and Fig. 2). At the fifth inter-costal space just caudal to the olecranon process the positive electrode I (left arm) was attached, on the jugular furrow about lower 1/3 of the left side of the neck the negative electrode (right arm) was attached and the earth (neutral) was attached away from these two electrodes (wither). All ECGs were recorded on a single channel ECG machine (Electrocardiograph, Concept Bio Medical, India. Type-ECG 300G) with paper speed 25mm/second and calibration of 10mm equal to 1mV and 5 mm equal to 2 mV. For measuring ECG parameters, the traces were analyzed using a magnifying lens. Parameters recorded in electrocardiography were P wave amplitude and duration, QR and RS amplitude and QRS duration, T wave amplitude and duration, P-R duration and Q-T interval. By this method of measuring the precision of duration was expressed in 0.04 second and amplitude was calculated as 1.0 mV. Heart rate was calculated by measuring the average of last six R-R intervals of each trace as the animals were more relaxed at the end of the recording (Rezakhani *et al*. 2004).

Observation and analysis

In Table 1, Mean ECG values of fifteen apparently healthy Hallikar bullocks were given. In ECG, alteration in the heart rate was recorded in eight bullocks showed pause between each beat suggestive of bradycardia (Fig. 6) and seven bullocks showed tachycardia (Fig. 4). The

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Fig. 1 and Fig. 2. Electrocardiogram using base apex mode limb lead II method. Three sites of electrodes attached in the Hallikar bullock.

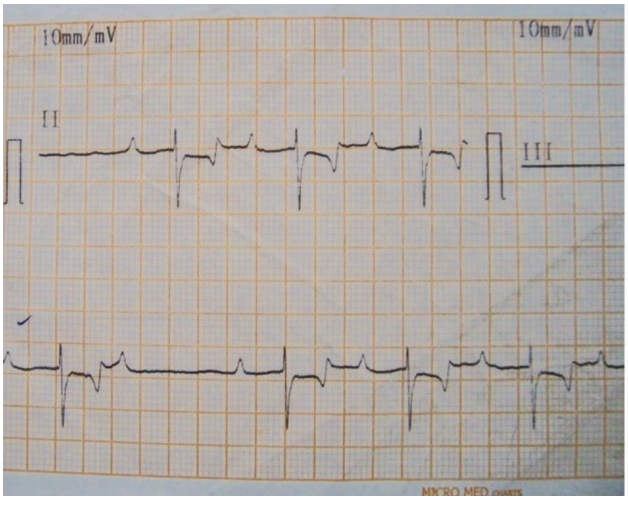

Fig. 3. Bradycardia and increased P-R duration.

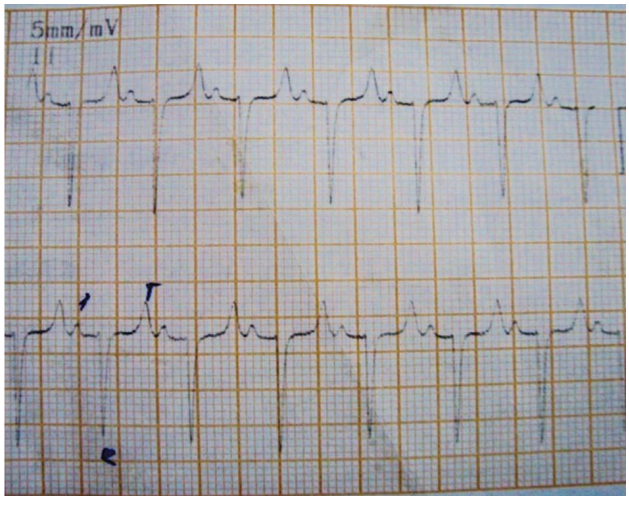

Fig. 4. Tachycardia and increased QR and RS amplitude.

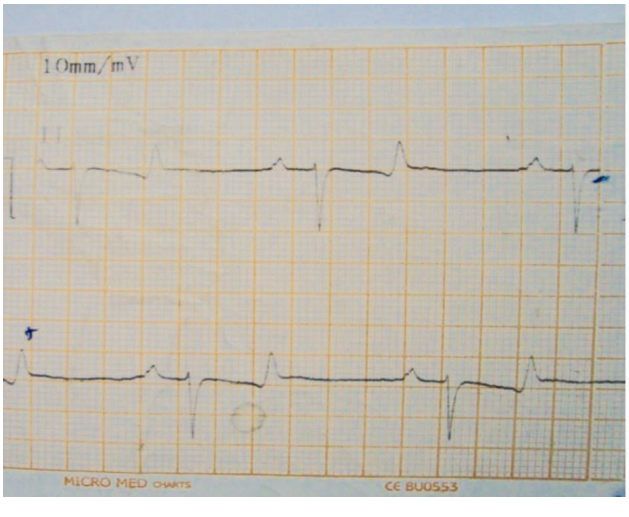

Fig. 5. Notching of P wave and Positive T wave.

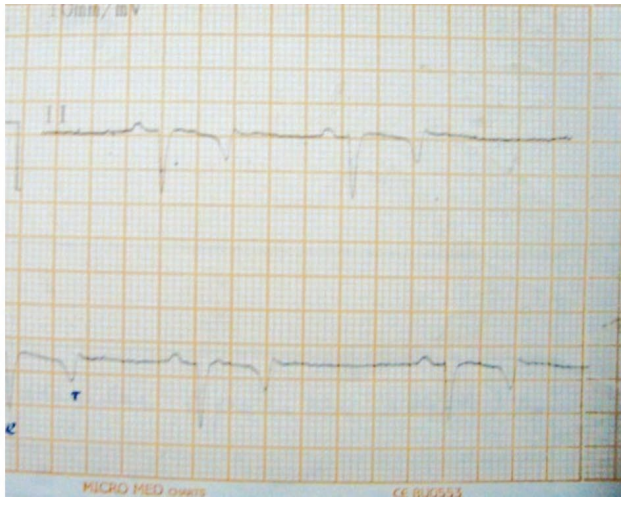

Fig. 6. Negative T wave and Bradycardia.

Table 1. Mean ECG values of fifteen apparently healthy Hallikar bullocks.

Parameters	Mean ± S.E (N=15)
P wave amplitude (mV)	0.25±0.013
P wave duration (sec)	0.10±0.005
QR amplitude (mV)	1.32±0.066
RS amplitude (mV)	1.12±0.056
QRS duration (sec)	0.083±0.0042
P-R duration (sec)	0.29±0.015
Q-T interval (sec)	0.40±0.02
T wave amplitude (mV)	0.49±0.025
T wave duration (sec)	0.11±0.006
Heart rate/ minute	64±10.45

P wave was positive in all the cases and seven bullocks showed notching of the P wave (Fig. 5) indicative of left atrial enlargement and mean P wave amplitude and duration were 0.25 mV and 0.1 sec respectively. The R wave is negative in all cases; the QRS complex indicate the ventricular depolarization, QR, RS amplitude and QRS duration were 1.32 mV, 1.12 mV and 0.083 sec respectively. T wave is positive (Fig. 5) in eight cases and negative (Fig. 6) in seven cases and its amplitude and duration were 0.49 mV and 0.11 sec. The P-R duration is the time interval between the atrial and ventricular depolarization, which is 0.29 seconds. The Q-T interval begins with onset of ventricular depolarization and ends with the completion of ventricular repolarization is 0.4 seconds in the present study. The mean heart rate for the fifteen hallikar bullocks was 64±10.45. The results of ECG revealed average increased in QR and RS amplitude (Fig. 4) and P-R duration indicative of atrial and ventricular hypertrophy, this may be due to aging and heavy work load. Reddy and Sivajothi (2016) reported there is significantly increased amplitude of the R wave and T wave and ST segment in older animals than young animals were in accordance with the present study showed increased QR and RS amplitude and P-R duration due to the larger size (hypertophy) of the heart in the older animals. Rezakhani *et al.* (2004) reported that lead base apex method is the standard method for ECG monitoring in Holstein cattle and the factors like age and pregnancy influences the ECG values. Upadhyay *et al.* (1976) studies showed the heart rate and Q-T interval were reversely related.

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