A STUDY ON EQUINE ELECTROCARDIOGRAPHY IN RELATION TO CHEST GIRTH

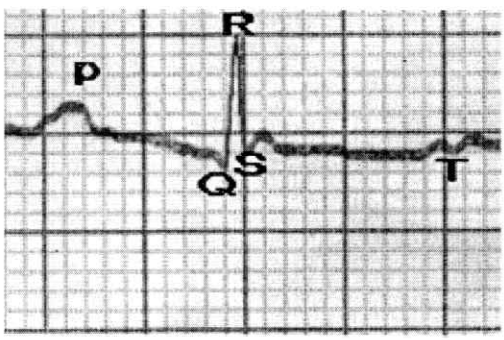
The working performance of horses depends on proper functioning of cardiovascular system. Cardiac performance in horses can be assessed by techniques like electrocardiography (ECG).This work was designed to obtain normal values of ECG in Indian racing horses and to check the correlation between ECG values and chest girth.

Elecrocardiographic values of six apparently healthy racing horses, between eight and ten years of age, maintained at Remount and Veterinary, National Cadet Corps (R&V,NCC) unit, College of Veterinary and Animal Sciences, Mannuthy were recorded in standing posture using 25 mm/second paper speed and one sensitivity. Bipolar standard limb leads (lead I, II and III) and augmented unipolar limb leads (aVR, aVL and aVF) were recorded by the procedure described by Kvart (1989). Base apex lead was recorded by attaching right arm (red) electrode cranial to right scapula and left arm electrode (yellow) over the apex beat of heart in level with olecranon on left side and running the machine in lead I settings (Alidadi *et al.*,2002).

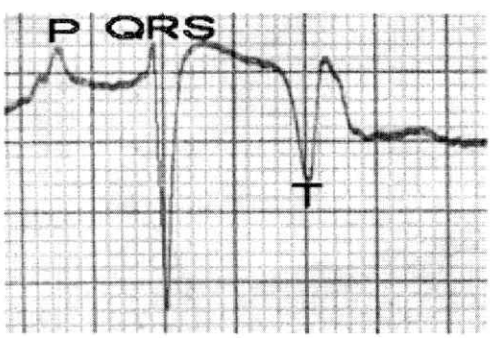
Heart rates were calculated using the formula 1500 / number of small columns between two R waves. Various ECG values like P-duration (seconds), P-amplitude (mv), P-R interval (I seconds), R amplitude (mv), QRS duration (seconds) T wave amplitude (mv), S-T segment (normally S-T segment should be on the base line with out any elevation or depression) and Q-T interval (seconds) were recorded from all the leads studied and given in Table. Chest girth of individual horses was recorded in centimeter. Electrocardiographic values of lead II and base apex lead (Fig.) were correlated with chest girth values of individual animals using standard statistical procedures.

The chest girth of adult horses ranged from 161 to 198 centimeters with an average of 179 cm. A negative correlation was found to exist between chest girth and heart rates in base apex and lead II (probability 0.001). This indicated that, as chest girth of the animal increases, heart rate tends to decrease. Also there was no correlation found between other ECG measurements and chest girth, indicating that these values were not dependant on moderate changes of chest girth in adult horses (Mamman *et al.*,1999). Base apex lead showed increased amplitudes of P, R and T waves in apparently normal horses when compared to other leads studied. Also the electrode placement and recording of base apex lead was comparatively easy. So in routine equine clinical practice, base apex lead can be used instead of lead II or other lead systems.

Fig. ECG of Normal Horse



Lead II



Base Apex Lead

Table. Values of equine Electrocardiogram (ECG)

Lead	Heart rate	P duration (Sec)	P amplitude (mv)	P-R Interval (Sec)	R amplitude (mv)	QRS duration (Sec)	T amplitude (Sec)	S-T segment	Q-Tinterval
Lead I	30.77 ± 1.54	0.09 ± 0.01	0.1 ± 0.02	0.35 ± 0.02	0.58 ± 0.11	0.07 ± 0.004	0.15 ± 0.04	Normal	0.42 ± 0.02
Lead II	38.62 ± 1.61	0.08 ± 0.008	0.16 ± 0.02	0.40 ± 0.07	0.77 ± 0.16	0.05 ± 0.001	0.22 ± 0.04	Normal	0.42 ± 0.03
Lead III	39.56 ± 2.10	0.1 ± 0.008	0.15 ± 0.1	0.33 ± 0.04	0.58 ± 0.08	0.08 ± 0.008	0.21 ± 0.04	Normal	0.35 ± 0.06
aVR	37.80 ± 1.65	0.09 ± 0.008	0.12 ± 0.01	0.34 ± 0.02	0.57 ± 0.08	0.07 ± 0.008	0.14 ± 0.02	Normal	0.40 ± 0.02
aVL	37.77 ± 1.75	0.07 ± 0.01	0.11 ± 0.02	0.35 ± 0.02	0.42 ± 0.04	0.07 ± 0.008	0.08 ± 0.01	Normal	0.37 ± 0.02
avF	39.15 ± 2.03	0.09 ± 0.008	0.13 ± 0.008	0.30 ± 0.04	0.64 ± 0.11	0.08 ± 0.008	0.17 ± 0.03	Normal	0.39 ± 0.01
Base apex	38.43 ± 2.03	0.13 ± 0.01	0.23 ± 0.02	0.37 ± 0.02	2.26 ± 0.10	0.13 ± 0.008	0.55 ± 0.007	Normal	0.40 ± 0.02

Summary

Electrocardiogram of apparently normal adult horses were recorded using bipolar limb leads, augmented unipolar limb leads and base apex lead. ECG values were correlated with chest girth. As the chest girth increased the heart rates were found to be decreased. Electrocardiographic measurements in lead II and base apex lead were not changed in relation to chest girth in adult horses.

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References

Alidadi, N., Dezfouli,M.R, Nadalian, M.G., Rezakhani,A and Nouroozian, I. 2002. The ECG of the Turkman horse using the standard lead base apex.*J.Equine.Vet.Sci.*, **22**:182-184.

Kvart.C. 1989. Electrocadiography (ECG) in hourses. *Svensk Vetrinartidning*, **41**:837-852.

Mamman, M., Kwanashe,G. and Allu,Y.O. !999. Electrocardiogram of normal Nigerian hourse.*Nigerian.Vet.J.*, **20**:40-45.

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