

Research Article

ALTERATIONS IN ELECTROCARDIOGRAMS OF LABRADOR RETRIEVER DOGS DURING HANDLING WITH AND WITHOUT GLOVES

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ABSTRACT: Healthy male Labrador Retriever dogs (n=8) aged between one to three years constituted the study material. The study was carried out to peruse the alterations in electrocardiograms, when the attendant restrained the dogs with bare hands and when the dogs were restrained by the attendant wearing gloves. The mean amplitude of P wave was higher in dogs handled with gloves. Similarly, the amplitudes of QRS complex and T wave were higher in the electrocardiograms of dogs handled with insulated hands. Meanwhile, the duration of T wave and Q-T interval were higher in the electrocardiograms recorded without gloves in hands. However, no alterations were perceived with respect to the duration of P wave, duration of T wave, the P-R interval, R-R interval and the heart rate. Except for the amplitude of P wave, no other differences were statistically significant. The study reported the alterations in the electrocardiogram while handling the animals with bare hands.

Key words: ECG, Labrador Retriever dogs, Gloves, Without gloves, Interference.

INTRODUCTION

An electrocardiogram is the recording of electric potentials generated by the cardiac impulse by placing electrodes on the skin on opposite sides of the heart (Guyton and Hall 2006). (Tseng *et al.* 1993) worked on body surface potential maps during ventricular

depolarization in normal adult humans.

The possibility of body surface current of the person who is handling the dog without gloves, interfering with the electrocardiogram of the dog, can never be ruled out. Researchers like (Ahmed and Sanyal 2008) suggested wearing gloves while recording ECG in goats to ensure

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least electrical interference. But there are certain emergency situations in the clinic where the electrocardiogram needs to be recorded immediately without prior preparation and the handler restrains the dog with bare hands. As per the authors' knowledge no study has been carried out so far where the electrocardiograms recorded with the person restraining the dogs with insulated hands wearing gloves and the person restraining the dogs with bare hands were compared simultaneously. Therefore, this study was carried out to give an insight into the matter and to ascertain the alterations in electrocardiograms associated with both these methods of handling dogs while recording ECG.

MATERIALS AND METHODS

Healthy male Labrador Retriever dogs (n=8) aged between one and three years having no clinical evidence of cardiac dysfunction were considered for the study. A twelve-lead standard ECG recorder, Maestros MRX-12 was used to record ECG. The electrocardiograph was set with a paper speed of 25 mm per sec and sensitivity of 1 (1 cm= 1mV). The ECG was recorded with the dog restrained in right lateral recumbency on an wooden table with electrodes attached to alligator forceps clipped over the skin of elbow joint and stifle joint (Mohapatra *et al.* 2015). Initially the ECG was recorded in the dogs with the attendant restraining the dog with insulated hands wearing gloves and then ECG was recorded in the same dogs with the attendant restraining the dogs with bare hands. The Lead II electrocardiograms were analysed and compared using student's t-test.

RESULTS AND DISCUSSION

The amplitude of P-wave of dogs which were restrained with gloves ranged between 0.1 mV

and 0.3 mV and measured significantly higher ($P<0.05$) than the mean P wave amplitude of dogs which were handled without gloves (range 0.1 mV to 0.2 mV). The mean duration of P wave was found to be equal both in dogs handled with gloved hands and the dogs handled with bare hands. However, there was no statistical significance ($P>0.05$) between the two values although the range of measured values in both the cases was between 0.04 sec and 0.08 sec (Table 1a).

The amplitude of QRS complex in insulated electrocardiogram ranged between 0.5 mV and 2 mV and recorded higher than non-insulated electrocardiogram where the amplitude ranged between 0.5 mV and 1.9 mV. But the mean QRS amplitudes of both did not differ significantly ($P>0.05$). Meanwhile, the mean duration of QRS complex of both insulated and non-insulated electrocardiogram were equal and exhibited no significant difference between them (Table 1a).

The mean amplitude of T wave was non-significantly higher ($P>0.05$) than non-gloved ECG. The T wave amplitude ranged between 0.1 and 0.4 mV in both gloved and non-gloved electrocardiograms (Table 1a). However, an inverted or negative T wave was observed in the electrocardiogram of only one dog when handled with insulated hands and also when handled with bare hands. In contrast, the mean T wave duration of dogs handled without gloves was higher than the dogs handled with gloves but statistically no significant difference ($P>0.05$) was observed between them (Table 1b).

The P-Q interval indicates the time taken by cardiac impulse to travel from atria to ventricles. The P-Q interval of electrocardiograms recorded with both insulated hands and bare

Table 1a. Values of some ECG parameters (Mean \pm SE).

	P wave amplitude (mV)	P wave duration (sec)	QRS complex amplitude (mV)	QRS complex duration (sec)	T wave amplitude (mV)
With Gloves	0.14 \pm 0.03 ^a	0.04 \pm 0.005 ^a	1.07 \pm 0.19 ^a	0.04 \pm 0.002 ^a	0.23 \pm 0.03 ^a
Without Gloves	0.12 \pm 0.02 ^b	0.04 \pm 0.005 ^a	1.04 \pm 0.18 ^a	0.04 \pm 0.002 ^a	0.20 \pm 0.04 ^a

Different superscript in a row are significantly different from each other ($P < 0.05$).

Table 1b. Values of some ECG parameters (Mean \pm SE).

	T wave duration (sec)	PR interval (sec)	QT interval (sec)	RR interval (sec)	Heart Rate (bpm)
With Gloves	0.06 \pm 0.01 ^a	0.1 \pm 0.007 ^a	0.16 \pm 0.02 ^a	0.55 \pm 0.05 ^a	115.84 \pm 10.60 ^a
Without Gloves	0.07 \pm 0.09 ^a	0.1 \pm 0.014 ^a	0.18 \pm 0.02 ^a	0.55 \pm 0.05 ^a	116.06 \pm 11.71 ^a

Different superscript in a row are significantly different from each other ($P < 0.05$).

hands ranged from 0.08 to 0.12 seconds with no significant difference ($P > 0.05$) between them (Table 1b). A non-significantly higher mean Q-T interval was measured in the electrocardiogram recorded with bare hands (range 0.12 sec to 0.24 sec) than the mean Q-T interval ranging from 0.08 to 0.24 sec recorded with insulated hands (Table 1b).

The mean R-R interval was found to be ranging widely from 0.36 to 0.76 sec (table 1b) in both methods of recording electrocardiogram with no significant difference ($P > 0.05$). Similarly, the mean heart rate in dogs restrained with insulated hands and the dogs restrained with bare hands recorded similar values of having no significant difference among each other (Table 1b).

The higher P wave measured when the dogs were restrained using insulation might be due to lesser electrical interference (Table 1a). But, the mean P amplitude in both the cases measured lower than the values recorded by (Sonia *et al.* 2014) in healthy Labrador dogs. We selected dogs between a particular age group *i.e.* within one to three years for this study and Mohapatra *et al.* (2015) had reported variation in electrocardiographic parameters in Labrador Retriever dogs with respect to age. That might be the reason behind the variation in our recording in comparison to the other studies.

The measured value of QRS amplitude (Table 1a) indicated no significant difference between the two methods of handling but recorded lower values than Mohapatra *et al.*

(2012) in apparently healthy dogs. The reason might be attributed to the difference in breeds which is in agreement to the findings of Mukherjee *et al.* (2015) who reported variation in electrocardiogram is three different exotic breeds of dogs.

Martin (2007) reported that the amplitude of T wave should be around 25 % of the measured QRS complex amplitude and our findings are in agreement to it. The recording of a negative T wave corroborates the finding of Venkateshwarlu *et al.* (1997) who also recorded inverted T wave in normal healthy dogs. The variation in T wave configuration might be due to difference in anatomical distribution of Purkinje fibres resulting in variable repolarization of the ventricles.

The PR interval did not vary within groups (Table 1b). Mohapatra *et al.* (2013) also recorded almost equal value of mean PQ interval in German Shepherd dogs aged between 1 and 3 years. The QT interval represents electrical depolarisation and repolarisation of the ventricles. There was no variation in QT interval within groups (Table 1b) although wide range of values was recorded. Rezakhani *et al.* (1990) also reported a wide range of Q-T interval in normal dogs. The RR interval which represents the time period between two cardiac cycles also did not show any alteration within groups (Table 1b).

But, the heart rates recorded were lower than the heart rates recorded by Gonul and Kaymaz (2002) who measured heart rates in healthy Karabash dogs. The reason might be again attributed to the difference in breed as Karabash dog is a much heavier breed in comparison to Labrador.

CONCLUSION

The study concluded that there were certain variations in the electrocardiograms recorded while handling the animals in the two different methods which might be due to the electrical interference. Therefore, it is advisable for the attendant to wear gloves while restraining dogs during ECG recording to avoid any electrical interference. The data obtained from the study can also be used as reference values by clinicians while interpreting the ECG of Labrador dogs.

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