

THESIS

**ELECTROCARDIOGRAPHY EVALUATION ON
CHRONIC KIDNEY DISEASE IN CATS**



By

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**FACULTY OF VETERINARY MEDICINE
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CHRONIC KIDNEY DISEASE IN CATS**

Thesis

Submitted in partial fulfilment of the requirement for the degree of
Bachelor Veterinary Medicine

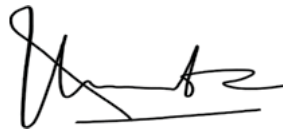
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DECLARATION

Hereby, I declare that in the thesis entitled:

**ELECTROCARDIOGRAPHY EVALUATION ON
CHRONIC KIDNEY DISEASE IN CATS**

There is no other work ever published to obtain bachelor degree in any other universities before and as I have ever known that there are no papers or opinions which have been written or published by someone else, besides the writing which is referred in this paper and mentioned in the references.

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SUMMARY

IZZATUL SHAHIRAH BINTI IDRUS. Electrocardiography (ECG) evaluation on chronic kidney disease (CKD) in cats. The objective of this study is to evaluate the ECG reading changes on cats with CKD. Nowadays, animals with kidney problem began to develop cardiac problems, especially in the advance stages of kidney disease which can leads to sudden cardiac arrest. Arrhythmias, cardiac chamber enlargement, myocardial diseases, electrolyte imbalances and drug toxicity are some of the cardiac diseases commonly seen in animals suffering CKD.

The cardiovascular and renal systems interact in a complicated way. Heart and kidneys, in which acute or chronic organ failure in one has a negative impact on the other, are brought on by a number of multifactorial causes. Cardiovascular-renal disorders (CvRD) is defined as disease, toxin or drug-induced structural and/or functional damage to the kidney and/or cardiovascular system, leading to disruption of the normal interactions between these systems, to the ongoing detriment of one or both. Renal and heart illness are well-known causes of morbidity and mortality in domestic dogs and cats

This research was a descriptive research. A number of 20 cats suffered from CKD underwent this ECG evaluation were selected randomly. A feline medical record consisting of: age, breed, sex, weight, medical history including previous medical records and complaints was filled out for each cat. A physical examination was done after which includes temperature, hydration status, auscultation for heart and respiratory rate, mucous membrane and others. Blood test was done prior to ECG

and blood pressure. The cats were positioned and restrained manually on the right lateral recumbency during ECG. A gentle handling for the cats during blood pressure was taken.

Based on this research, few cardiac abnormalities were found in 18 (90%) cats out of all examined cats via ECG. The other 2 (10%) cats showed normal ECG readings. The most seen abnormality occurred in S wave, with 15 (75%) out of 20 cats, followed by Q-T interval (60%), T wave (25%), R wave (15%), P wave (10%), P-R interval (5%) and QRS complex with no abnormality (0%). No notable correlation seen between the ECG abnormalities and CKD with sex, age, and breed of the animals. In conclusion, despite of sex, breed and age of animals, an ECG evaluation is required as part of the diagnostic works in treating CKD in order to give proper treatment and management to the animals.

**ELECTROCARDIOGRAPHY EVALUATION ON
CHRONIC KIDNEY DISEASE IN CATS**

Izzatul Shahirah binti Idrus

ABSTRACT

Electrocardiography (ECG) is a fundamental part in determining cardiac changes or abnormalities. The objective of this study was to evaluate the ECG reading changes on cats with CKD. Twenty cats suffered CKD were selected randomly underwent this ECG evaluation. Majority of examined cats were Domestic Short-hairs 12, followed by Domestic Long-hairs 6 and British Short-hair 2. Initially, a medical record was filled out to evaluate their age, sex, breed, body weight and history (previous medical record, complaint), followed by physical examination. All cats had their ECG conducted, measured and analysed descriptively. The evaluation was done in terms of the ECG waves, sex, age and breed of the cats. Out of 20 (100%) ECGs collected, 18 (90%) ECGs showed ECG wave changes while 2 (10%) ECGs showed normal reading. The most commonly changes found in the ECG wave is S wave with 75% incidence, followed by Q-T interval (60%), T wave (25%), R wave (20%), P wave (10%), P-R interval (5%) and finally, QRS complex (0%). From the evaluation of the ECG shows few cardiac abnormalities, electrolyte imbalance and drug toxicity, which indicates the cause of ECG changes. The ECG changes were commonly found in male cats and in Domestic Short-hair breed. The age of examined cats ranging from 2 years old until 22 years old with mean $\pm$ SD value of 7.53 ± 3.09 in CKD stage 4 and mean $\pm$ SD value of 6 ± 1.73 in stage 3.

Keywords: ECG, electrocardiography, CKD, chronic kidney disease, cats

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TABLE OF CONTENTS

	Page
ENDORSEMENT FORM.....	ii
DECLARATION.....	iii
IDENTITY FORM.....	iv
ASSESSMENT FORM.....	v
SUMMARY.....	vi
ABSTRACT.....	viii
ACKNOWLEDGEMENT.....	ix
TABLE OF CONTENTS.....	xi
LIST OF TABLES.....	xiv
LIST OF FIGURES.....	xv
LIST OF APPENDIX.....	xvi
LIST OF ABBREVIATION AND SYMBOLS.....	xvii
 CHAPTER 1 INTRODUCTION.....	 1
1.1 Research Background.....	1
1.2 Problem Formulation.....	4
1.3 Research Objective.....	4
1.4 Research Benefits.....	4
1.4.1 Theoretical outcome.....	4
1.4.2 Practical outcome.....	5
1.5 Theoretical Basis.....	5

CHAPTER 2 LITERATURE REVIEW.....	11
2.1 Electrocardiography.....	11
2.2 Evaluation of ECG.....	13
2.2.1 P wave.....	14
2.2.2 P-R interval.....	15
2.2.3 QRS complex.....	15
2.2.4 T wave.....	16
2.3 Application of ECG.....	16
2.4 Normal Readings in Small Animals.....	17
2.5 Interpretation of ECG.....	17
2.6 Cardiovascular System.....	19
2.6.1 Conduction system.....	19
2.6.2 Circulatory system.....	20
2.7 Chronic Kidney Disease.....	21
2.7.1 Definition.....	21
2.7.2 Aetiology.....	22
2.7.3 Pathogenesis.....	24
2.7.4 Clinical signs.....	26
2.7.5 Diagnosis.....	26
2.7.6 Differential diagnosis.....	29
2.7.7 Therapy.....	29
2.8 Blood Pressure.....	32
2.8.1 Hypertension.....	33
CHAPTER 3 MATERIALS AND METHODS.....	35
3.1 Experimental Design.....	35
3.2 Research Time and Location.....	35
3.3 Materials and Equipment.....	35

3.3.1 Experimental animal.....	35
3.3.2 Research equipment.....	36
3.3.3 Research materials.....	36
3.4 Method of Research.....	36
3.4.1 Preparation of experimental animal.....	37
3.4.2 Blood pressure (BP) examination.....	37
3.4.3 Electrocardiography (ECG) examination.....	38
3.4.4 Staging of chronic kidney disease (CKD).....	38
3.5 Descriptive Analysis.....	39
3.6 Research Flowchart.....	40
CHAPTER 4 RESEARCH RESULTS.....	41
CHAPTER 5 DISCUSSION.....	51
CHAPTER 6 CONCLUSION.....	58
6.1 Conclusion.....	58
6.2 Suggestion.....	58
REFERENCES.....	59
APPENDIX.....	67

LIST OF TABLES

	Page
Table 1.1 CRS sub-division and its definition.....	6
Table 1.2 CvRD subgroups and its definition.....	6
Table 1.3 Electrode placements.....	10
Table 2.1 Conduction pathways of ECG waveforms.....	14
Table 2.2 ECG reference range for small animals.....	17
Table 2.3 Indications of specific cardiac abnormalities in measurement of ECG.....	18-19
Table 2.4 Renal diseases that associated with feline CKD development.....	23
Table 2.5 Treatment of CKD based on stages recommended by IRIS.....	32
Table 2.6 Normal range of BP in small animals.....	33
Table 2.7 IRIS substage of SBP in small animals based on risk of TOD.....	34
Table 3.1 IRIS staging system of CKD in cats.....	39
Table 4.1 Distribution of cats in age-related group.....	42
Table 4.2 Cases distribution of CKD stages according to sex.....	43
Table 4.3 Distribution of cats based on breed.....	44
Table 4.4 SBP stages based on CKD stages.....	46
Table 4.5 ECG abnormalities detected in 20 cats with CKD.....	48

LIST OF FIGURES

	Page
Figure 1.1 Gold standard of ECG position.....	9
Figure 1.2 Three bipolar frontal plane leads (I, II and III) and Einthoven's triangle (red).....	10
Figure 2.1 ECG waveforms.....	12
Figure 2.2 Anatomical view of normal heart and conduction system.....	19
Figure 3.1 Research flowchart.....	40
Figure 4.1 Percentage of CKD stages distribution.....	41
Figure 4.2 Cats age-related group distribution based on CKD stages.....	43
Figure 4.3 Distribution of cat's sex according to CKD stages.....	44
Figure 4.4 Breed of cat distribution based on CKD stages.....	45
Figure 4.5 ECG tracing of cats with different stages of CKD.....	49

LIST OF APPENDIX

	Page
1. Patient medical record.....	67
2. Documentation.....	70
3. Results of ECG analysis.....	72
4. Signalment of ECG findings in 20 cats with CKD.....	73
5. ECG reading of 20 cats with CKD.....	74

LIST OF ABBREVIATION AND SYMBOLS

ECG	: Electrocardiography/electrocardiogram
CKD	: Chronic Kidney Disease
GFR	: Glomerular Filtration Rate
CRS	: Cardio-Renal Syndrome
CvRD	: Cardiovascular-Renal Syndrome
CT	: Computed tomography
aVR	: augmented Vector Right
aVL	: augmented Vector Left
aVF	: augmented Vector Floor
ESRD	: End-stage Renal Disease
CHF	: Chronic Heart Failure
bpm	: beats per minute
mV	: millivolt
sec	: seconds
<i>et al.</i>	: <i>Et alli</i>
i.e.	: <i>Id est</i>
e.g.	: <i>Exempli gratia</i>
SC	: Subcutaneous
IRIS	: International Renal Interest Society
SDMA	: Symmetric Dimethylarginine
LSA	: Lymphoma/Lymphosarcoma
UTI	: Urinary Tract Infection
ml	: millimetre
kg	: kilogram
h	: hour
mmol	: millimolecular

L	: litre
mg	: milligram
mmHg	: millimeter Mercury
mEq/L	: milliequivalent per litre
dL	: decilitre
CREA	: Creatinine
BUN	: Blood urea nitrogen
SAMC	: Sabah Animal Medical Centre
CRT	: Capillary refill time
SR	: Sinus rhythm
T	: Tachycardia
B	: Bradycardia
AB	: Abnormal
DSH	: Domestic Short-hair
DLH	: Domestic Long-hair
BSH	: British Short-hair
LAE	: Left atrial enlargement
RAE	: Right atrial enlargement
LVH	: Left ventricle hypertrophy
RVH	: Right ventricle hypertrophy
%	: Percent/percentage
>	: Greater than
≥	: Equal or greater than
<	: Less than