



بسم الله الرحمن الرحيم

∞∞∞∞

تم رفع هذه الرسالة بواسطة / حسام الدين محمد مغربي

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى

مسئولية عن محتوى هذه الرسالة.

ملاحظات : لا يوجد





**Cairo University**  
**Faculty of Veterinary Medicine**  
**Department of Medicine and Infectious Diseases**



# **Epidemiological Studies of Feline Corona Virus Infection with Special Reference of Feline Infectious Peritonitis in Cats in Egypt**

**A Thesis Presented by**

**Ahmed Zaki Anwer**

**(B.V.Sc., Cairo University, 2012, M.V.Sc., Cairo University, 2016)**

**Faculty of Veterinary Medicine, Cairo University**

**To**

**Cairo University**

**Faculty of Veterinary Medicine**

**For the Degree of Ph.D. in Veterinary Medical Sciences  
(Infectious Diseases)**

**Under the Supervision of**

**Prof. Dr. Mounir Abdel-Halim**

Professor of Infectious Diseases  
Faculty of Veterinary Medicine  
Cairo University

**Prof. Dr. Hassan M. El-Said**

Professor of Infectious Diseases  
Faculty of Veterinary Medicine  
Cairo University

**2022**





### APPROVAL SHEET

This is to approve that, the dissertation presented by **Ahmed Zaki Anwer**

Submitted to **Cairo University**

Entitled: **Epidemiological Studies of Feline Corona Virus Infection with Special Reference of Feline Infectious Peritonitis in Cats in Egypt**

For the degree of **Ph.D. (Infectious Diseases)**

Has been **Approved by the examining committee:**

**Prof. AbdelKarim Abdel-Tawab**

Professor of Infectious Diseases and head of Animal Medicine Department

Department of Animal Medicine

Faculty of Veterinary Medicine, Alex University

**Prof. Prof. Adel Abdel-Azim Fayed**

Professor of Infectious Diseases

Department of Medicine and Infectious Diseases

Faculty of Veterinary Medicine, Cairo University

**Prof. Hassan M. Elsaid**

Professor of Infectious Diseases

Department of Medicine and Infectious Diseases

Faculty of Veterinary Medicine, Cairo University

**Prof. Mounir Abdel-Halim**

Professor of Infectious Diseases

Department of Medicine and Infectious Diseases

Faculty of Veterinary Medicine, Cairo University

**Date: 27-3-2022**





**Cairo University**  
**Faculty of Veterinary Medicine**  
**Department of Medicine and Infectious Diseases**



## **SUPERVISION SHEET**

# **Epidemiological Studies of Feline Corona Virus Infection with Special Reference of Feline Infectious Peritonitis in Cats in Egypt**

**A Thesis Presented by**  
**Ahmed Zaki Anwer**  
**To**  
**Cairo University**  
**Faculty of Veterinary Medicine**  
**For the Degree of Ph.D. in Veterinary Medical Sciences**  
**(Infectious Diseases)**

**Under the Supervision of**

**Prof. Dr. Mounir Abdel-Halim**

Professor of Infectious Diseases  
Faculty of Veterinary Medicine  
Cairo University

**Prof. Dr. Hassan M. El-Said**

Professor of Infectious Diseases  
Faculty of Veterinary Medicine  
Cairo University

**2022**





**Cairo University**  
**Faculty of Veterinary Medicine**  
**Department of Medicine and Infectious Diseases**

**Name:** Ahmed Zaki Anwer Mohamed

**Nationality:** Egyptian

**Place of birth:** Arab Republic of Egypt

**Degree:** Ph.D. degree, 2022

**Specification:** Infectious Diseases

**Thesis Title:** Epidemiological Studies of Feline Corona Virus Infection with Special Reference of Feline Infectious Peritonitis in Cats in Egypt

**Under supervision:**

**Prof. Dr. Mounir Abdelhalim**

Professor of Infectious Diseases, Faculty of Veterinary Medicine Cairo University

**Prof. Dr. Hasan M. Elsaid**

Professor of Infectious Diseases, Faculty of Veterinary Medicine Cairo University

### **ABSTRACT**

Viral infections and related diseases can cause multiple devastating consequences on the health and life quality for the companion animals. There are many variable viral diseases affecting dogs and cats, some of which can cause high fatality like Feline Infectious Peritonitis in cats, others can result in self-limiting symptoms like canine corona in puppies and some of them could be transmitted to their owners and result in serious diseases like rabies. In our study, we will focus on a major infection caused by feline coronavirus (related to the novel coronavirus, which is currently attracting media attention). Feline infectious peritonitis (FIP) is a deadly pansystemic disease of wild and domesticated Felidae which is appeared as a mutant type for the less harmful feline enteric coronavirus (FeCoV). In Egypt, there is neither detailed data about diseases caused by feline infectious peritonitis nor feline enteric corona viruses till now. The study was performed to highlight on the clinical, pathological and some epidemiological findings for (FIP) diseased cats in Egypt. For this purpose, 169 cats (85 males and 84 females) of different breeds aged from 4 months to 8 years old were examined. Different technical methods were used to confirm the diagnosis of the clinically suspected cases including Rivalta's test, immunochromatographic tests, ultrasonography, radiography, hematological testing, histopathology, and RT-PCR. Rapid immunoassay SNAP Combo tests were used to exclude viral infection causing resembling symptoms like feline immune deficiency and/or feline leukemia viruses. Nearly 90% of the examined cats (152 out of 169) have been identified as carriers for feline enteric corona virus (FeCoV). Typically, (FIP) clinical signs were observed only in the multi-cat household especially in animal shelters. Nine cases out of 169 were identified with (FIP) disease; the chance to contract the disease was nearly equal for both sexes (five males and four females) and higher incidence was observed in age above two years old. Clinical signs associated with (FIP) were recorded only in cats of foreign breeds (6 Persian and 1 Himalayan and 2 mixed breed) and no (FIP) clinical cases were reported in the Egyptian Mau cats. Frequent incidence of complicating diseases like (FIP) is considered a remarkable challenge for veterinarians especially in its diagnosis. Therefore, more attention and studies are required to ease and confirm the diagnosis of such diseases with less specific symptoms.

**Keywords:** Feline Infectious Peritonitis, feline enteric coronavirus, Egypt.





## ***DEDICATION***

*I dedicate this work to my family  
especially my parents, my wife and  
my daughters for all the support  
they lovely offered and their  
continuous encouragement  
throughout this study.*



## *Acknowledgment*

*First, my sincerest thanks and gratitude should be submitted to the merciful Allah.*

*It is of my great pleasure to express my deepest thanks and gratitude to Prof. Dr. Hasan M El-said, Professor of Infectious Diseases, Department of Medicine and Infectious Diseases, Faculty of Veterinary Medicine, Cairo University, for his kind supervision, guidance, continuous support, encouragement and continuous monitoring during this work.*

*I would like to express my appreciations and gratitude to Prof. Dr. Mounir Abdelhalim, Professor of Infectious Diseases, Department of Medicine and Infectious Diseases, Faculty of Veterinary Medicine, Cairo University, for his supervision and support for this work.*

*I want to give special thanks to the staff members and colleagues in the Department of Medicine and Infectious Diseases, Faculty of Veterinary Medicine, Cairo University, for their continuous help and encouragement during my work.*



## LIST OF CONTENTS

Title	Page No.
<b>1. Chapter (1): Introduction</b>	1
<b>2. Chapter (2): Review of Literature</b>	5
<b>3. Chapter (3): Published paper</b>	
<b>3.1. Paper (1): Clinical and Pathological Studies OnFeline Infectious Peritonitis in Egypt</b>	23
<b>4. Chapter (4): Discussion</b>	52
<b>5. Chapter (5): Conclusion and recommendation</b>	56
<b>6. Chapter (6): Summary</b>	57
<b>7. Chapter (7): References</b>	60
<b>8. الملخص العربي</b>	١

