



**UNIVERSITI PUTRA MALAYSIA**

***PREVALENCE OF PANCREATITIS IN CATS PRESENTED TO  
UNIVERSITY VETERINARY HOSPITAL UPM FROM 2013-2014***

**LIM MAY LYN**

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**UPM**  
UNIVERSITI PUTRA MALAYSIA  
BERSILU BERCASA

**PREVALENCE OF PANCREATITIS IN CATS PRESENTED TO  
UNIVERSITY VETERINARY HOSPITAL UPM FROM 2013-2014**

By

**LIM MAY LYN**

Thesis Submitted to the School of Graduate Studies, Universiti Putra  
Malaysia, in Fulfilment of the Requirements for the Degree of Master of  
Veterinary Medicine

2014

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in  
fulfilment of the requirement for the degree of master of veterinary  
medicine

**Prevalence of Pancreatitis in Cats Presented to University Veterinary  
Hospital UPM from 2013-2014**

By

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2014

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Pancreatitis is a common disease in cats and clinically important as it can lead to significant morbidity and mortality if not properly managed. However, its clinical signs are often vague and diagnosis remains challenging. In Malaysia, there are limited tests for feline pancreatitis resulting in possible underdiagnosed cases. Therefore the objectives of this study were to determine the prevalence of feline pancreatitis in cats presented to University Veterinary Hospital, UPM as well as the prevalence of concurrent pancreatitis with inflammatory bowel disease and hepatitis. Additional objective was to determine the clinical pattern of pancreatitis in cats if any. Two populations of cats were included in this study. The first population of cats included 50 clinically ill cats presented with the complaint of vomiting, diarrhea, jaundice or increased liver enzymes. The second population included 30 cats that had died or that were humanely euthanized. The pancreas, liver and small intestines were sampled for postmortem examination. The prevalence of pancreatitis in clinically ill cats was 32% (n=16) based on abnormal fPLI test results and typical ultrasonographic findings. 44% (n=7) of cats with pancreatitis had concurrent liver disease, 12% (n=2) had gastrointestinal disease and 19% (n=3) had both. There was no observable clinical pattern seen in cats diagnosed with pancreatitis. For the necropsy cases, the prevalence rate of pancreatitis was 84% (n=25) with acute pancreatitis accounting for 17% and chronic pancreatitis 67% of cases. The diagnosis of pancreatitis is difficult and should be based on a combination of compatible clinical and laboratory findings, abdominal ultrasonography, specific immunoassays for pancreatitis and histopathology.

Keywords: pancreatitis, cats, feline pancreatic lipase, vomiting, diarrhea

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia  
sebagai memenuhi keperluan untuk ijazah Master Perubatan Veterinar

**Prevalens Pankreatitis Pada Kucing yang Menerima Rawatan di  
Hospital Veterinar Universiti UPM dari tahun 2013-2014**

Oleh

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Pankreatitis merupakan sejenis penyakit yang penting pada kucing, ia boleh menyebabkan kematian jika rawatan yang sewajarnya ditangguhkan. Diagnosis untuk pankreatitis agak rumit petanda klinikal yang tidak jelas dan kekurangan jenis ujian di Malaysia. Oleh itu, objektif pertama adalah mengkaji prevalens pankreatitis pada kucing yang menerima rawatan di Hospital Veterinar Universiti, UPM. Objektif berikutnya adalah menentukan gejala klinikal penyakit pankreatitis dan kebarangkalian serempak penyakit kolangiohepatitis dan penyakit usus inflamatori. Kajian ini melibatkan dua kumpulan kucing, kumpulan pertama merupakan kumpulan yang dieuthanisekan atau mati dengan jumlah 30 dan kumpulan kedua melibatkan kucing yang diwadkan dengan gejala cirit, jaundice dan muntah. Untuk kucing yang mati, sampel diambil dari hati, usus kecil dan pankreas untuk histopathologi. Prevalens penyakit pankreatitis di kalangan kucing yang sakit adalah 32% (n=16) berdasarkan fPLI dan ultrasound. 44% kucing yang berpenyakit pankreatitis mempunyai inflamatori di hati; 12% (n=2) mempunyai penyakit usus inflamasi 19% (n=3) mempunyai kedua-dua. Diagnosis untuk pankreatitis pada kucing adalah sangat komplikasi, ia mesti melibatkan petanda klinikal, keputusan ujian makmal, ultrasound, imunoasai dan histopatologi.

Kata kunci: pankreatitis, kucing, feline pancreatic lipase, muntah, cirit

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## List of abbreviations

AAFP	American association of feline practitioners
ALT	Alanine transferase
AP	Alkaline phosphatase
BID	Twice a day
CT	Computed tomography
DGGR	1,2-o-dilauryl-rac-glycero-3-glutaric acid-(6-methylresorufin) ester
DIC	Disseminated intravascular coagulation
EDTA	Ethylenediaminetetraacetic acid
FelV	Feline leukemia virus
FIP	Feline infectious peritonitis
FIV	Feline immunodeficiency virus
fPLI	Feline pancreatic lipase immunoreactivity
fTLI	Feline trypsin-like immunoreactivity
GGT	Gamma-glutamyl transpeptidase
GIT	Gastrointestinal tract
IBD	Inflammatory bowel disease
IM	Intramuscular
IV	Intravenous
KCl	Potassium chloride
MRCP	Magnetic resonance cholangiopancreatography
MRI	Magnetic resonance imaging
NaCl	Sodium chloride
PCV	Packed cell volume
PO	Per os
PSTI	Pancreatic secretory trypsin inhibitor
QID	Four times a day
SAMe	S-adenosylmethionine

SC	Subcutaneous
SPSS	Statistical package for the social sciences
TID	Three times a day
UPM	Universiti Putra Malaysia
UVH	University veterinary hospital
WBC	White blood cells



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## Chapter 1. Introduction

Pancreatitis is a common gastrointestinal disorder of humans and dogs. Feline pancreatitis has only recently emerged as a common yet important exocrine pancreatic disorder of cats. The true prevalence of pancreatitis in cats and dogs remains unknown. Early necropsy studies revealed 1.5% of 9342 canine pancreata and 1.3% of 6504 feline pancreata had significant pathologic lesions (Hanichen *et al.*, 1990). But recent necropsy studies reported feline pancreatitis prevalence rates as high as 67% (deCock *et al.*, 2007). In contrast, clinical evidence suggests the prevalence of pancreatitis in cats is about 0.6% (Xenoulis and Steiner, 2009). However, clinical studies might underestimate the true prevalence as ante-mortem diagnosis is often difficult because of its vague clinical signs, nonspecific hematology or biochemistry profiles, poor diagnostic value of imaging tools and frequent occurrence with other diseases (Steiner, 2003; Bazelle and Watson, 2014).

The underlying causes of pancreatitis in cats still remain unknown. However, risk factors associated with the development of pancreatitis in cats include concurrent disease, traumatic injury, organophosphate intoxication (fenthion), hypotension, viral infection and parasite infestation (Hill and Van Winkle, 1993; Xenoulis and Steiner, 2009). Several viral and parasitic agents have been shown to be associated with the occurrence of pancreatitis in cats, including *Toxoplasma gondii*, pancreatic (*Eurytrema procyonis*), and hepatic (*Amphimerus pseudofelineus*) flukes, coronavirus, parvovirus, herpesvirus, and calicivirus, but none of these agents have been reported to be an important yet common cause for feline pancreatitis, and pancreatitis is usually just a minor part of the overall condition in affected cats (Macy, 1989; Swift *et al.*, 2000; Forman *et al.*, 2004; Xenoulis and Steiner, 2008). Several studies have shown an association of pancreatitis, inflammatory bowel disease (IBD) and cholangiohepatitis in cats, which is also known as triaditis (Weiss *et al.*, 1996; Swift *et al.*, 2000; Sarah, 2013). Hence cats with cholangiohepatitis and/or IBD are considered at high risk of developing pancreatitis. In a recent study, 35% of cats with high-rise syndrome were diagnosed to have traumatic pancreatitis, however, pancreatitis is not a negative prognostic indicator for these patients (Zimmermann *et al.*, 2013).

In contrast to humans, there is no universally standard classification of pancreatitis in cats and the pathological classification of pancreatitis in cats was derived from the human classification system (Bradley, 1993). Generally, feline pancreatitis can be divided into the acute and chronic forms depending on whether permanent histological changes are present or absent. Acute pancreatitis is characterized by peripancreatic fat necrosis and neutrophilic infiltration. Acute pancreatitis can be further divided into acute necrotizing pancreatitis where there is evidence of peripancreatic fat necrosis and acute suppurative pancreatitis whereby inflammation is the most prominent feature (Hill and Van Winkle, 1993). In contrast, chronic pancreatitis is defined based on the criteria of lymphocytic inflammation, fibrosis and acinar atrophy (deCock *et al.*, 2007).

Clinical signs of pancreatitis are often nonspecific and therefore more often than not the clinical suspicion for this disease is low. Common presenting signs include anorexia, lethargy, weight loss and vomiting. Pancreatitis in cats commonly occur concurrently with gastrointestinal disease (inflammatory bowel disease), hepatic disease (hepatic lipidosis, cholangiohepatitis) and perhaps disease of other organs.

Pancreatitis can be severe and life threatening especially in acute cases and can lead to disseminated intravascular coagulation, systemic inflammatory response syndrome resulting in multi-organ failure (Son *et al.*, 2010; Xenoulis and Steiner, 2009). In addition, local complications might occur such as necrosis, abscess or pseudocyst formation, and conditions of permanently reduced pancreatic function such as diabetes mellitus and exocrine pancreatic insufficiency (Bradley, 1993; Baron and Morgan, 1999).

Pancreatitis can lead to significant morbidity and mortality, yet there are as of yet no prevalence studies of feline pancreatitis carried out in Malaysia. In addition as diagnosis of pancreatitis can be difficult, we aimed to identify clinical patterns of pancreatitis in order to help clinicians in making a diagnosis. Therefore the main objectives of the study were:

1. to determine the prevalence of pancreatitis in cats presented to University Veterinary Hospital, UPM
2. to study the clinical patterns of feline pancreatitis
3. to identify the prevalence of concurrent diseases in cats diagnosed with pancreatitis

Our hypothesis was that pancreatitis would be more common in adult cats compared to young cats and cats with pancreatitis would be at a higher risk of developing concurrent inflammatory diseases of the liver, and/or gastrointestinal tract.



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