

UNIVERSITI TEKNOLOGI MARA

**A STUDY ON *CRYPTOSPORIDIUM*
SPP. ISOLATED FROM CHILDREN
WITH DIARRHOEA ADMITTED TO
SELAYANG HOSPITAL AND
SUNGAI BULOH HOSPITAL IN
SELANGOR, MALAYSIA**

NURUL FARIZA BINTI ROSSLE

Thesis submitted in fulfilment
of the requirements for the degree of
Master of Science

Faculty of Medicine


June 2016

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student	:	Nurul Fariza binti Rossle
Student I.D. No.	:	2010800884
Programme	:	Master of Science (Medicine)
Faculty	:	Medicine
Thesis Title	:	A Study on <i>Cryptosporidium</i> spp. Isolated from Children with Diarrhoea Admitted to Selayang Hospital and Sungai Buloh Hospital in Selangor, Malaysia

Signature of Student	:	
Date	:	June 2016

ABSTRACT

This study was conducted to verify the prevalence of cryptosporidiosis among children in Selangor. Consenting children aged 12 years and below, admitted with diarrhoea to Hospital Selayang and Hospital Sungai Buloh or contracting diarrhoea in hospitalization, were included as subjects. Each stool sample was distributed into six aliquots and tested for cryptosporidiosis using direct wet mount, Sheather's sugar flotation, formalin-ether sedimentation, modified Ziehl-Neelsen staining, direct monoclonal fluorescent antibody, and polymerase chain reaction (PCR). Out of 160 stool samples, 6 (3.75%) were positive for *Cryptosporidium* spp. All children positive for cryptosporidiosis were aged <4 years. Direct wet mount, formalin-ether sedimentation concentration, modified Ziehl-Neelsen staining, and direct monoclonal fluorescent antibody testing showed the same number of positive samples (3.75%). Sheather's sugar flotation detected one less positive sample (3.13%). No noticeable DNA bands were observed on the electrophoresed gel from stool sample amplification, although there were faint bands for positive control using purified *Cryptosporidium* oocysts. The youngest child infected was 6 months old while the oldest was 3 years 4 months old. Same number of males and females were infected with four Malays and one Chinese and Indian each. There is no significant association between *Cryptosporidium* infection with gender and race. Age posed the most significant difference with all infected children being less than four years old. Further molecular epidemiological study on a larger scale incorporating humans, animals and environmental samples from the whole of Malaysia is recommended to clarify the dynamic of *Cryptosporidium* transmission in the country.

TABLE OF CONTENTS

	Page
CONFIRMATION BY PANEL OF EXAMINERS	ii
AUTHOR'S DECLARATION	iii
ABSTRACT	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF ABBREVIATIONS	xi
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the Study	1
1.2 Statement of the Problem	2
1.3 Objectives of the Study	3
1.4 Scope of the Study	3
1.5 Limitation of the Study	4
1.6 Significance of the Study	4
CHAPTER TWO: LITERATURE REVIEW	6
2.1 Introduction	6
2.2 Morphology and Life Cycle	8
2.3 Taxonomy and Species Classification	9
2.4 Transmission	16
2.4.1 Risk Factors	17
2.4.2 Oocyst Resistance	18
2.5 Outbreaks	20
2.5.1 Waterborne Outbreak	21
2.5.2 Foodborne Outbreak	22
2.6 Pathology and Clinical Manifestation	24
2.7 Detection and Diagnosis	27

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The protozoa under the genus *Cryptosporidium* are zoonotic apicomplexan obligate intracellular parasites. They invade the lining of respiratory organs and the microvilli of the gastrointestinal tract of a diverse range of hosts, including human. Cryptosporidiosis, the term used to designate infection caused by *Cryptosporidium* spp., is considered as one of the most common waterborne disease with worldwide spread, which acts as a common cause of diarrhoea in many animal species and man (Zu et al., 1994; Harp, 2003). The reported prevalence of cryptosporidiosis is 1–4% in Europe and North America and 1–37% in Africa, Asia, Australia, and South and Central America (Current & Garcia, 1991; Menon et al., 2001; Mahgoub et al., 2004; Munoz-Antoli et al., 2011). A massive clinical and epidemiological study involving 22500 children from Africa and Asia revealed that the protozoan parasite *Cryptosporidium* is one of four pathogens responsible for the majority of severe diarrhoea in infants and toddlers (Kotloff et al., 2013).

Cryptosporidium has been recognized as a cause of gastrointestinal illness in both immunocompetent (Jokipii & Jokipii, 1986; Wolfson et al., 1985; Navin & Juranek, 1984; Fayer & Ungar, 1986) and immunodeficient people (Fayer & Ungar, 1986; Current et al., 1983). In immunocompetent people, cryptosporidiosis is a self-limited illness, but in those who are immunocompromised, infection can be unrelenting and fatal (Navin & Juranek, 1984; Current & Garcia, 1991).

In Malaysia, the prevalence of cryptosporidiosis is between 0.4% and 23% (Ludin et al., 1991; Lai, 1992; Ng & Shekhar, 1993; Kamel et al., 1994a; Kamel et al., 1994b; Lim et al., 1997; Menon et al., 2001; Lim et al., 2005; Nissapatorn et al., 2005; Mohammed Mahdy et al., 2007; Rossle et al., 2012). However, few of these focus solely on paediatric cases. A study done by Ludin et al. (1991) reported relatively low prevalence of cryptosporidiosis at 4.3% in Penang. Menon et al. (2001) showed only 0.9% of positive *Cryptosporidium parvum* cases by microscopy and PCR in children hospitalized with acute diarrhoea in Kota Bharu. Rossle et al. (2012) found 4% of