

الآية

بسم الله الرحمن الرحيم

قال تعالى:

﴿ يَرْفَعُ اللَّهُ الَّذِينَ ءَامَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا
الْعِلْمَ دَرَجَاتٍ ۗ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ ﴾ (١١)

صدق الله العظيم

سورة المجادلة

الآية (11)

Dedication

To the soul of my father

To my dear mother

To my lovely husband

To my daughters (Retal and Gofran)

To my brother and sisters

To all my friends

I dedicate this work

Acknowledgement

The deepest thanks to my God Allah, the lord of the word.

I am grateful to my supervisor Dr. Tayseer Elamin Mohamed Elfaki for guidance, help and support.

All thanks to the staff of parasitology department, Sudan University of Science and Technology.

I am also, thankful to senior technician laboratory of obstetrical department of Medical Military Hospital.

Special thanks to members of parasitology department, The National Ribat University and my gratitude is extended to Mr. Mohamed Elfateh for appreciable help.

My thanks are also for the pregnant women for their acceptance to be involved in this study.

My thanks are also extended to my colleagues for their help and support.

Abstract

This study aimed to determine the prevalence rate of *Cryptosporidium* in pregnant women in Medical Military Hospital-Khartoum State. A cross-sectional study was conducted in the period between May-December 2016. The study was conducted on 150 stool samples collected from all the study subjects. The age ranged between 16-45 years old. The mean age was 26 ± 6 years old.

Stool samples were taken from all subjects included in the study, in addition to the clinical and parasitological data were obtained and recorded. The results showed that prevalence of cryptosporidiosis among pregnant women was 23(15.3%) when using Modified Ziehl-Neelsen (M-ZN) stain for deposit obtained by Formal-ether concentration technique (F.E.C.T) while 1 sample (0.66%) was detected by using stained direct smear. The results demonstrated that the prevalence of infection was higher (10%) in the age group 21-29 years. Also the prevalence rate of *Cryptosporidium* was high (8.0%) in the third trimester according to different gestational age, while in first and second trimester, the prevalence was 2.7% and 4.6% respectively. The results were showed that prevalence of cryptosporidiosis according to drinking water source was (14.1%) from tap water while from other sources was 33.3%. The difference in rates was found to be statistically insignificant with p value=0.122. The study revealed that the prevalence of cryptosporidiosis according to diarrheal sign was 22.6% with p value=0.039.

The study indicated that the prevalence rate of *Cryptosporidium* among pregnant women was higher (15.3%).

الخلاصة

هدفت هذه الدراسة لتحديد إنتشار عدوى الكريبتوسبورديديم في النساء الحوامل في المستشفى العسكري الطبي-ولاية الخرطوم. الدراسة المستعرضة نفذت في الفترة ما بين مايو-ديسمبر 2016. شملت الدراسة 150 عينة براز والتي جمعت من جميع النساء موضوع الدراسة . تراوحت اعمارهم ما بين 45-16 سنة، وكان متوسط العمر 26 ± 6 سنة.

عينات البراز تم أخذها من جميع الأشخاص موضوع الدراسة بالإضافة للبيانات السريرية والطفيلية تم أخذها وتسجيلها.

أظهرت الدراسة أن إنتشار الكريبتوسبورديديوسيس كان 23 (15.3%) بإستخدام صبغة Modified Ziehl-Neelsen (M-ZN) للراسب الذي تم الحصول عليه بتقنية -Formal ether concentration technique (F.E.C.T) في حين أن عينة واحدة (0.66%) تم التعرف عليها بإستخدام المسحة المباشرة .

أظهرت النتائج أن معدل إنتشار الكريبتوسبورديديم مرتفع (10%) في الفئة العمرية 21-29 سنة . كما أن معدل الإنتشار أعلى (8%) في الثلث الثالث من الحمل في حين أنه في الثلث الأول والثاني من الحمل كان (4.6%) (2.7%) على التوالي.

أظهرت النتائج أن إنتشار الكريبتوسبورديديوسيس وفقاً لمصدر مياه الشرب كان (14.1%) من ماء الصنبور بينما كانت النتيجة (33.3%) من مصادر أخرى . إحصائياً وجد أن الفرق في المعدلات ضئيل بقيمة معنوية = 0.122.

كشفت الدراسة أن إنتشار الكريبتوسبورديديوسيس وفقاً لعرض الإسهال كان (22.6%) ذو أهمية بقيمة معنوية = 0.039.

خلصت الدراسة أن إنتشار عدوى الكريبتوسبورديديم وسط النساء الحوامل كان عالياً بنسبة (15.3%).

Table of contents

Contents	Pages
الإية	i
Dedication	ii
Acknowledgment	iii
Abstract (English)	iv
Abstract (Arabic)	v
Table of contents	vi
List of tables	viii
List of figures	ix
Chapter one: Introduction and literature review	
1.1 Introduction	1
1.2 Literature review	2
1.2.1 Historical perspective	2
1.2.2 Taxonomy	2
1.2.3 Morphology	3
1.2.4 Life cycle	3
1.2.5 Characteristics of <i>Cryptosporidium</i>	4
1.2.6 Disease transmission	6
1.2.7 Etiology and pathology	7
1.2.9 Risk factor	8
1.2.10 Prognosis	9
1.2.11 Morbidity and mortality	9
1.2.12 Immunology of pregnancy	11
1.2.12 <i>Cryptosporidium</i> diagnosis	12
1.2.12.1 Laboratory diagnosis	13
1.2.12.2 Diagnosis of extra intestinal cryptosporidiosis	16
1.2.13 Treatment	17
1.2.14 Prevention and control	17
1.2.15 Cryptosporidiosis in Sudan	17
Rationale	19
Objectives	20
General objective	20
Specific objectives	20
Chapter two: Materials and methods	
2.1 Study design	21
2.2 Study area and study duration	21
2.3 Study population	21
2.4 Sample size	21
2.5 Sample collection	22

2.6 Data collection	22
2.7 Methods	22
2.7.1 Direct wet preparation	22
2.7.1.1 Procedure	22
2.7.2 Direct smear	22
2.7.3 Formal-ether concentration technique	22
2.7.3.1 Procedure	22
2.7.4 Modified Ziehle-Neelsen Stain	23
2.7.4.1 Reagents	23
2.7.4.2 Procedure	23
2.8 Data analysis	24
2.9 Sensitivity and specificity	24
2.10 Ethical consideration	24
Chapter three: Results	
3.1 General characteristics of studied population	25
3.2 Parasitological results	26
3.2.1 Prevalence of cryptosporidiosis by using Zn stain for direct smear and concentrated smear prepared technique	26
3.2.2 Sensitivity and specificity of technique	26
3.2.3 Prevalence of cryptosporidiosis according to age groups	26
3.2.4 Prevalence of cryptosporidiosis according to gestation age	27
3.2.5 Prevalence cryptosporidiosis according to source of drinking water	27
3.2.6 Prevalence of cryptosporidiosis according to diarrheal sign	28
3.3 Detection of other parasites using wet preparation and stained FECT smear	29
3.3.1 Prevalence of Co-infection of <i>Cryptosporidium</i> and other parasites	30
Chapter four: Discussion	
Chapter Five: Conclusion and recommendation	
5.1 Conclusion	32
5.2 Recommendations	32
References	33
Appendix: Questionnaire	41

List of Tables

Tables	Page No.
Table(2.1): Formula of sensitivity and specificity	24
Table (3.1): Frequency of study subjects according to age groups	25
Table (3.2): Frequency of study subjects according to gestation age	25
Table (3.3): Prevalence of cryptosporidiosis by using M- Zn stain for direct smear and concentrated smear prepared technique	26
Table (3.4): Sensitivity and specificity of stained direct smear	26
Table (3.5): Prevalence of cryptosporidiosis according to age groups	27
Table (3.6): Prevalence of cryptosporidiosis according to gestation age	27
Table (3.7): Prevalence of cryptosporidiosis according to source of drinking water	28
Table (3.8): Prevalence of cryptosporidiosis according to diarrheal sign	28
Table (3.9):Prevalence of cryptosporidiosis according to contact with animals	29
Table (3.10): Prevalence of others parasites among pregnant women using wet preparation and stained FECT smear	29
Table (3.11):Prevalence of Co-infection of <i>Cryptosporidium</i> and other parasites	30

List of figures

Title of figures	Page No.
Figure (1.1): <i>Cryptosporidium Sp.</i> oocysts stained with modified acid-fast stain	3
Figure (1.2): Life cycle of <i>Cryptosporidium</i>	4