

الآية

بسم الله الرحمن الرحيم

قال تعالى: ﴿وَسَأَلُونَكَ عَنِ الرُّوحِ قُلِ الرُّوحُ مِنْ أَمْرِ رَبِّي وَمَا أُوتِيتُمْ مِنَ الْعِلْمِ إِلَّا قَلِيلًا﴾

صدق الله العظيم

سورة الإسراء الآية (85)

Dedication

To my Father and Mother,

To my Brothers and Sisters,

To my Supervisor and Friends,

I dedicate this humble study

Acknowledgment

First my thanks to **Allah** for the success of completing this work. I would like to express my deep appreciation and thanks to my supervisor Dr. Tayseer Elamin Mohamed Elfaki who gave me much of her time to accomplish this work through her advice, help and knowledge. Also, I am grateful for technical staff of East Nile Hospital and Bashair Hospital for their help in sampling and data collection. Gratitude is also extended to my colleagues, Mona Edris Mohammed in Western Soba Health Centre and Elsadig Omer in Bashair Hospital for their help and support. I am grateful to Mr. Ahmed Bakhit in Sudan University of Science and Technology for his support. Special thanks to my friends in Faculty of Medical Laboratory Sciences for their continuous moral support.

Abstract

The study was aimed to determine the prevalence rate of *Giardia lamblia*/*Helicobacter pylori* co-infections in Khartoum state, Sudan. A cross-sectional study was carried out during the period between May to December 2015. A total of 100 subjects were included in this study, the age was ranging between 1-80 years, the mean age was 29 ± 19 years old. Stool samples were taken from all subjects included in the study. Clinical and parasitological data were obtained and recorded.

Out of 100 subjects, 14 (14%) were positive for *G. lamblia*, by using direct wet mount, and 22 (22%) were positive by using formal ether concentration technique (FECT) ($p=0.000$), 30 (30%) were positive for *H. pylori* when detected by using *H. pylori* antigen test in stool.

The study showed that the prevalence of *G. lamblia* was higher in females (17.5%) than in males (8.1%) ($p=0.193$). In contrast *H. pylori* prevalence was higher in males (35.1%) than in females (27%) ($p=0.390$). The prevalence rate of *G. lamblia* was higher, (50%) in the age group >66 years old by using direct wet mount ($p=0.053$), also the prevalence rate of *H. pylori* was higher, (50%) in >66 years old ($p=0.424$). According to education levels, the high infection rate of *G. lamblia* was reported among those with low and high education levels (50%) ($p=0.019$), while the highest infection rate of *H. pylori* was (66.6%) among those with low education ($p=0.023$). The highest infection rate of *G. lamblia* according to occupation was found among the students (50%) ($p=0.160$), while *H. pylori* was found to be higher in house wives (36.6%). The study showed that *G. lamblia* was affected by previous infection ($p=0.019$), while *H. pylori* was not affected by previous infection ($p=0.752$).

The study revealed that the prevalence rate of *G. lamblia* and *H. pylori* co-infections were (5%), (9%) by using direct wet mount and formal ether concentration technique respectively.

This study indicated that the prevalence rate of *G. lamblia* and *H. pylori* in the study area were (14%), (30%) respectively, and co-infection was (5%), with no significant value for co-infection ($p=0.615$).

مستخلص الدراسة

هدفت الدراسة إلى تحديد معدل إنتشار الإصابات المشتركة للقارديا لامبليا وبوابيات المعدة الحلزونية في ولاية الخرطوم، السودان. الدراسة المستعرضة نفذت في الفترة مابين مايو 2015 إلى ديسمبر 2015 وكان مجموع عدد المستهدفين للدراسة 100 شخص، وكانت أعمارهم تتراوح مابين 1-80 عاماً، وكان متوسط العمر 19 ± 29 عاماً. تم أخذ عينات الفسحة من كل المشتركين في هذه الدراسة بالإضافة إلى البيانات السريرية والطيفية تم الحصول عليها وتسجيلها.

بلغت إصابات القارديا لامبليا 14 (14%) إصابة من أصل 100، تم الكشف عنها بإستخدام طريقة التحضير الرطب، وعند إستخدام تقنية ((FECT (formal ether concentration technique) كانت نسبة الإصابة 22 (22%)، وبلغت الإصابة ببوابيات المعدة الحلزونية 30 (30%) من أصل 100، بإستخدام إختبار مستضدات الجرثومة في البراز.

وأظهرت الدراسة ان إنتشار القارديا لامبليا كان أعلى لدى الإناث (17.5%) منها لدى الذكور (8.1%)، وفي المقابل كان إنتشار بوابيات المعدة الحلزونية أعلى في الذكور (35.1%) من الإناث (27%). معدل إنتشار القارديا لامبليا كان أعلى (50%) في المجموعة العمرية >66 عاماً بإستخدام طريقة التحضير الرطب، كما كان إنتشار بوابيات المعدة أعلى (50%) في الفئة العمرية >66 عاماً. وفقاً للمستويات التعليمية ذكرت أن معدلات الإصابة المرتفعة للقارديا لامبليا (50%) بين ذوى المستويات التعليمية المنخفضة والعالية، بينما كان معدل الإصابة ببوابيات المعدة الحلزونية أعلى (66.6%) بين ذوى التعليم المنخفض. تم العثور على أعلى معدل للإصابة بالقارديا لامبليا وفقاً للوظيفة بين الطلاب (50%)، بينما وجد أن معدل الإصابة ببوابيات المعدة الحلزونية كان أعلى (36.6%) في ربات المنازل. الدراسة أظهرت أن القارديا لامبليا تأثرت بالإصابة السابقة، بينما بوابيات المعدة الحلزونية لم تتأثر بالإصابة السابقة.

كشفت الدراسة أن معدل إنتشار العدوى المشتركة للقارديا لامبليا وبوابيات المعدة الحلزونية كان (5%)،
(9%) بإستخدام طريقة التحضير الرطب و FECT على التوالي.
أشارت هذه الدراسة إلى أن معدل إنتشار القارديا لامبليا وبوابيات المعدة الحلزونية فى منطقة الدراسة
كان (14%)، (30%) على التوالي، وكان معدل إنتشار العدوى المشتركة بينهما (5%) مع عدم وجود
دلالة إحصائية للإصابة المشتركة بينهما.

Table of contents

Topic	Page No.
الآية	I
Dedication	II
Acknowledgment	III
Abstract in English	IV
Abstract in Arabic	VI
List of contents	VIII
List of tables	XI
List of figures	XII
Chapter one: Introduction and literature review	
1.1 Introduction	1
1.2 Literature review	1
1.2.1 <i>Giardia lamblia</i>	1
1.2.1.1 Definition	1
1.2.1.2 Classification	2
1.2.1.3 Epidemiology	2
1.2.1.4 Morphology	3
1.2.1.5 Transmission	4
1.2.1.6 Life cycle	4
1.2.1.7 Pathology	6
1.2.1.8 Immunology	7
1.2.1.8.1 Innate immunity	7
1.2.1.8.2 Acquired immunity	7
1.2.1.9 Laboratory diagnosis	8
1.2.1.10 Treatment	8
1.2.1.11 Prevention and control	9
1.2.2 <i>Helicobacter pylori</i>	9
1.2.2.1 Definition	9
1.2.2.2 Classification	9
1.2.2.3 Epidemiology	10
1.2.2.4 Morphology	10
1.2.2.5 Transmission	11
1.2.2.6 Pathology	11
1.2.2.7 Immunology	12
1.2.2.7.1 Innate immunity	12

1.2.2.7.2 Acquired immunity	13
1.2.2.8 Laboratory diagnosis	13
1.2.2.9 Treatment	14
1.2.2.10 Prevention and control	14
1.2.3 Co-infections of <i>G.lamblia</i> and <i>H.pylori</i>	15
1.2.3.1 Definition of co-infection	15
1.2.3.2 Epidemiology	15
1.2.3.3 Predisposing factors	15
1.2.3.4 Impact of co-infections	16
Rationale	18
Objectives	19
General objectives	19
Specific objectives	19
Chapter two: Materials and Methods	20
2.1 Study design	20
2.2 Study area	20
2.3 Study duration	20
2.4 Study population	20
2.5 Sample size	20
2.6 Sampling	20
2.7 Sampling methods	21
2.7.1 Collection of faecal samples	21
2.7.2 Parasitological methods	21
2.7. 2.1 Direct wet mount	21
2.7.2.2 Formal ether concentration technique (FECT)	21
2.7.2.3 Sensitivity and specificity of direct wet mount	22
2.7.3 Bacteriological method	22
2.7.3.1 <i>H.pylori</i> antigen rapid test (<i>H.pylori</i> Ag Rapid Test)	22
2.8 Data collection	22
2.9 Data analysis	22
2.10 Ethical considerations	23
Chapter three: Results	24
3.1 General characteristics of study population	24
3.2 Parasitological results	25
3.2.1 Prevalence of <i>G.lamblia</i> by using direct wet mount and FECT	25

3.2.2 Prevalence of <i>G.lamblia</i> by using direct wet mount and FECT according to gender	25
3.2.3 Prevalence of <i>G.lamblia</i> by using direct wet mount according to age groups	26
3.2.4 Prevalence of <i>G.lamblia</i> by using FECT according to age groups	26
3.2.5 Prevalence of <i>G.lamblia</i> by using direct wet mount according to education levels	27
3.2.6 Prevalence of <i>G.lamblia</i> by using direct wet mount according to occupation	27
3.2.7 Prevalence of <i>G.lamblia</i> according to previous infection	28
3.3 Bacteriological results	29
3.3.1 Prevalence of <i>H.pylori</i> by using <i>H.pylori</i> Ag Rapid Test	29
3.3.2 Prevalence of <i>H.pylori</i> by using <i>H.pylori</i> Ag Rapid Test according to gender	29
3.3.3 Prevalence of <i>H.pylori</i> by using <i>H.pylori</i> Ag Rapid Test according to age groups	30
3.3.4 Prevalence of <i>H.pylori</i> by using <i>H.pylori</i> Ag Rapid Test according to education levels	30
3.3.5 Prevalence of <i>H.pylori</i> by using <i>H.pylori</i> Ag Rapid Test according to occupation	31
3.3.6 Prevalence of <i>H. pylori</i> according to previous infection	32
3.4 Co-infections of <i>G.lamblia</i> and <i>H.pylori</i>	33
3.4.1 Co-infections of <i>G.lamblia</i> and <i>H.pylori</i> by using direct wet mount and <i>H. pylori</i> Ag Rapid Test	33
3.4.2 Co-infections of <i>G.lamblia</i> and <i>H.pylori</i> by using FECT and <i>H.pylori</i> Ag Rapid Test	34
3.5 Comparison between direct wet mount and FECT	34
3.6 Sensitivity and specificity of direct wet mount	35
3.7 Detection of intensity of <i>G.lamblia</i> by using FECT	35
Chapter four : Discussion	37
Chapter five: Conclusions and Recommendations	41
5.1 Conclusions	41
5.2 Recommendations	41
References	42
Appendix	46

List of tables

Title	Page No.
Table (3.1): Frequency of study subjects according to gender	24
Table (3.2): Frequency of study subjects according to age groups	24
Table (3.3): Prevalence of <i>G.lamblia</i> by using direct wet mount and FECT	25
Table (3.4): Prevalence of <i>G.lamblia</i> by using direct wet mount according to gender	25
Table (3.5): Prevalence of <i>G.lamblia</i> by using FECT according to gender	25
Table (3.6): Prevalence of <i>G.lamblia</i> by using direct wet mount according to age groups	26
Table (3.7): Prevalence of <i>G.lamblia</i> by using FECT according to age groups	26
Table (3.8): Prevalence of <i>G.lamblia</i> by using direct wet mount according to education levels	27
Table (3.9): Prevalence of <i>G.lamblia</i> by using direct wet mount according to occupation	27
Table (3.10): Relationship between <i>G.lamblia</i> and clinical symptoms	28
Table (3.11): Prevalence of <i>H.pylori</i> by using <i>H. pylori</i> Ag Rapid Test	29
Table (3.12): Prevalence of <i>H.pylori</i> by using <i>H. pylori</i> Ag Rapid Test according to gender	30
Table (3.13): Prevalence of <i>H.pylori</i> by using <i>H.pylori</i> Ag Rapid Test according to age groups	30
Table (3.14): Prevalence of <i>H.pylori</i> by using <i>H.pylori</i> Ag Rapid Test according to education levels	31
Table (3.15): Prevalence of <i>H.pylori</i> by using <i>H. pylori</i> Ag Rapid Test according to occupation	31
Table (3.16): Relationship between <i>H.pylori</i> and clinical symptoms	32
Table (3.17): Co-infections of <i>G. lamblia</i> and <i>H.pylori</i> by using direct wet mount and <i>H. pylori</i> Ag Rapid Test	34
Table (3.18): Co-infections of <i>G. lamblia</i> and <i>H.pylori</i> by using FECT and <i>H.pylori</i> Ag Rapid Test	34
Table (3.19): Comparison between direct wet mount and FECT	34
Table (3.20): Sensitivity of direct wet mount	35
Table (3.21): specificity of direct wet mount	35

List of figures

Title	Page No.
Figure (1.1): Appearance of <i>G.lamblia</i> cyst and trophozoite	3
Figure (1.2): Life cycle of <i>G.lamblia</i>	5
Figure (1.3): Morphology of <i>H.pylori</i>	10
Figure (1.4): Pathogenesis of <i>H.pylori</i>	12
Figure (3.1): Prevalence of <i>G.lamblia</i> according to previous infection	29
Figure (3.2): Prevalence of <i>H.pylori</i> according to previous infection	33
Figure (3.3): Detection of intensity of <i>G.lamblia</i> by using FECT	36