# مدى انتشار الميكروسبوريديا المعوية فى الانسان في القاهرة الكبرى

كجزء متمم للحصول على
درجة الماجستير فى علم الحيوان


رسالة مقدمة من
**محمود عفو جاد ابراهيم**
بكالوريوس علوم-جامعة القاهرة-2003


تحت اشراف


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# Prevalence of Human Intestinal Microsporidia in Greater Cairo

A Thesis
Submitted for Partial Fulfillment of the requirements for the degree of M.Sc. in Zoology

By
Mahmoud Afw Gad Ibrahim
B. Sc. of Science
2003

Under The Supervision of

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Student Name : Mahmoud Afw Gad Ibrahim

Thesis Title : **Prevalence of Human Intestinal Microsporidia in Greater Cairo**

Degree : Master of Science (Zoology)

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# Abstract

**Student Name: Mahmoud Afw Gad Ibrahim**
**Thesis Title : "Prevalence of Human Intestinal Microsporidia in Greater Cairo"**
**Degree : Master of Science (Zoology)**

A total of 1720 fecal samples were collected from humans (n=433), animals (n=869) and birds (n=418) for the detection of intestinal microsporidia. Microsporidial spores in the collected samples were concentrated by ethyl acetate concentration method and finally stained with acid fast trichrome (AFT) and modified trichrome (MT) stains. Positive samples for microsporidia by MT stain were confirmed by PCR and the species of microsporidia (*Enterocytozoon bieneusi* and *Encephalitozoon intestinalis*) were identified.

The results showed that intestinal microsporidia were found in percentages of 8.8, 17.0 and 10.5% in humans, animals and birds, respectively. Molecular examination of 230 microscopically positive fecal samples (38 humans, 148 animals and 44 birds) by PCR technique revealed a percentage of infection with intestinal microsporidia in 66.1% of them. The highest infection rate with *E. bieneusi* was 47.7% in birds, followed by 32.4 and 30.0% in animals and humans, respectively. Concerning the single infection with *E. intestinals*, the highest prevalence rate was 8.8% in animals, followed by 7.9 and 2.3% in humans and birds, respectively. The highest percentage of mixed infection with both *E. bieneusi* and *E. intestinals* was 36.8% in humans, followed by 16.9 and 16.0% in animals and birds, respectively. Unclassified *Encephalitozoon spp*. was only found in animal fecal samples in a percentage of 6.1%.

**Key words:** Intestinal microsporidia- humans- animals- birds- PCR

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# Contents

# List of abbreviations

| | |
|---|---|
| µg | Microgram |
| µm | Micrometer |
| AFT | Acid-fast Trichrome |
| AIDS | Acquired Immune Deficiency Syndrome |
| bp | Base pair |
| CDC | Centers for Disease Control and Prevention |
| CF | Calcofluor Stain |
| DEPC | Diethyl Pyrocarbonate |
| DNA | Deoxyribonucleic Acid |
| dNTPs | Deoxyribonucleotide Triphosphates |
| *E. bieneusi* | *Enterocytozoon bieneusi* |
| *E. cuniculi* | *Encephalitozoon cuniculi* |
| *E. hellem* | *Encephalitozoon hellem* |
| *E. intestinalis* | *Encephalitozoon intestinalis* |
| EDTA | Ethylenediamine Tetraacetic Acid |
| EIA | Enzyme Immuno Assay |
| ELISA | Enzyme Linked Immuno Sorbant Assay |
| EPA | Environmental Protection Agency |
| g | Gram |
| *g* | Gravity |
| Gel Doc. | Gel Documentation |
| HIV | Human Immunodeficiency Virus |
| IFA | indirect Immunofluorescence Assay |
| IFAT | Immunofluorescent-Antibody Test |
| ITS | Internal Transcribed Spacer |
| kGy | KiloGray |
| M | Mole |
| MAb | Monoclonal Antibody |
| MDBK | Madin Darby Bovine Kidney |
| ml | Milliliter |
| mM | Millimole |
| MT | Modified Trichrome |

| | |
|---|---|
| MTB | Modified Trichrome Blue |
| NIAID | National Institute of Allergy and Infectious Diseases |
| PBS | Phosphate Buffered Saline |
| PCR | Polymerase Chain Reaction |
| RFLP | Restriction Fragment Length Polymorphism |
| rRNA | Ribosomal Ribonucleic Acid |
| S.D. | Standard deviation |
| Sig. | Significant |
| spp. | Species |
| SSUrRNA | Sequencing Analyses of the Full Length Ribonucleic Acid |
| TAE | Tris -Acetate- EDTA |
| TB | Tuberculosis |
| TEM | Transmission Electron Microscope |
| U | Unit |
| U.S | United State |
| USA | United States of America |
| UV | Ultraviolet |
| W/V | Weight / Volume |
| WHO | World Health Organization |