



**EFFICACY OF IVERMECTIN TO CONTROL
LEISHMANIA MAJOR IN SAND FLY VECTOR
PHLEBOTOMUS PAPATASI
AND THE MAMMALIAN HOST**

**A Thesis
Submitted in Fulfillment
of
The Requirement for the Degree
of
Doctor of Philosophy
in Zoology**

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2005**

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ACKNOWLEDGEMENT

Thanks for the Merciful and Compassionate God who helped me with the capability for carrying out this work.

Words fail to express my deepest gratitude and special thanks to ***Dr. Erian George Kamel*** Professor of Invertebrates and Parasitology, Girls college for Arts, Science and Education, Ain Shams University for his precious assistance, valuable helps and critical reading of the manuscript, sharing his expertise with me during the research. Such unlimited assistance will never be forgotten and I shall always remain indebted to him.

I would like to express my sincere gratitude to ***Dr. Bahira El Sawaf*** Professor of Medical Entomology, Faculty of Science, Ain Shams University, for her advice, interest, utmost patience, fruitful advice, helpful discussion, revising the manuscript and continuous guidance throughout the course of this work. I am also greatly indebted to her continuous support.

Deeply indebted to ***Dr. Magdi Gebril Shehata*** Professor of Medical Entomology, Faculty of Science, Ain Shams University, for his sincere help, continuous guidance, offering all the required facilities, encouragement and direct and active supervision throughout the present study.

I would like to express my deepest thanks and greatly appreciation to ***Dr. Hala Kassem*** Associate professor, Department of Environmental Basic Sciences, Institute of Environmental Studies and Research, Ain Shams University, for suggesting and planning the present investigation, energetic help and illuminating advice, and follow up during different stages of constructive criticisms, revision of the manuscript.

I would like to thank all the staff member of the Vector Biology Program, **NAMRU-3 Cairo**, for their encouragement and supporting me to continue the Abamectin bioassays, providing me with *Leishmania* parasites and offering all the required facilities. Sincere thanks are specially due to **Dr. Hanafi Ahmed Hanafi**, Medical Entomologist at the department, for his collaboration and valuable helps during study course.

Great thanks are due to **Dr. Maha Kamal Tewfick** , Lecturer, Faculty of Education, Suez Canal University, for her valuable help with the Probit analysis of the data.

I would like to express my deepest thanks to Tharwat Saman, Computer Engineer, for his great effort to finish thesis writing with me.

My gratitude and thanks are dedicated to my colleagues in insectory, institute of Environmental Studies & Research, Ain Shams University, for the valuable assistance in maintaining the sand fly colony during the research.

Finally, I would like to acknowledge all staff members of the Research and Training Center on Vector of Diseases, Ain Shams University, for their friendly help and support.

Last but not least, my deepest appreciation is rightfully given to all my colleagues and the staff members, at Department of Zoology, Girls college for Arts, Science and Education, Ain Shams University, for their friendly help and cooperation throughout the present work.

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ABSTRACT

EFFICACY OF IVERMECTIN TO CONTROL *LEISHMANIA MAJOR* IN SAND FLY VECTOR *PHLEBOTOMUS PAPATASI* AND THE MAMMALIAN HOST.

BY : JANETTE MOUSSA KAMEL GEORGY

The present study investigated the effect of two avermectins (ivermectin and abamectin) as environmentally safe biocides agents to control *Leishmania* parasites and *P. papatasi* sand flies. Treatment of *P. papatasi* adults with abamectin showed that abamectin has a high efficacy against sand flies at very low concentrations. The calculated LC₃₀, LC₅₀ and LC₉₀ values 48h post-treatment were 2.75ng, 4.35 ng and 13.28 ng respectively. Abamectin showed no effect on the mortality percentages of *L. major* parasites neither in culture nor in sand flies. Ivermectin revealed a great systemic activity on sandfly at extremely low dosage. . The values of LD₃₀, LD₅₀ and LD₉₀ values 48h post-treatment were 2.62 µl, 3.65 µl and 8.22 µl respectively. The highest mortality was achieved at 24 h of the treatment. No fly mortality was observed after 72 h till the 9th day post injection at all doses. Survival of *P. papatasi* females that tolerated 2.6 µl, 3 µl and 7 µl of ivermectin was 11, 6, 12 days versus 15 days for the control. Flies fed on 2.6 µl and 7µl lived significantly shorter than those did in control group. Sublethal dose (LD₃₀) of Ivermectin also produced significant reduction in the fecundity but lower effect on fertility. Ivermectin significantly reduced the longevity of treated females and decreased the number of emerging flies. Sex ratio distortion (male biased) was observed. Ivermectin showed high activity against *Leishmania* parasites in culture. The corresponding LC₃₀, LC₅₀ and LC₉₀ values were 0.25 µg, 1.45 µg and 107.1 µg. Histopathological studies revealed that abamectin displayed a great efficacy on the gut of sandfly *P. papatasi* when treated with LC₃₀. This efficacy appeared from the third day post feeding. No apparent histological changes in the treated gut with LD₃₀ of ivermectin was observed. Histopathologic effect on the ovaries on the sixth and seventh

days post-feeding was noticed. The oocytes were few in numbers and the nuclei of nurse cells were extremely distorted and showed pycnosis. The effect of ivermectin on the liver of treated hamster with 2.6 μ l displayed pathologic alteration in the hepatocytes enlargement and disarrangement of hepatic sinusoids were also observed. The liver tissues with the lethal dose (16 μ l) of ivermectin showed that the hepatic tissue has completely lost their characteristic features. The treated splenic tissue with sublethal dose of ivermectin suffered minimal dose dependent pathological alterations. With the lethal (16 μ l) dose applied to hamster, spleen tissue showed progressive ulceration.

Key words: Ivermectin – Abamectin – *Leishmania major* – *Phlebotomus papatasi* - Hamster.

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