

**RESISTANCE TO PYRETHROIDS IN MOSQUITOES IN ADO-ODO OTA,
OGUN STATE.**

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AUGUST, 2024

**RESISTANCE TO PYRETHROIDS IN MOSQUITOES IN ADO-ODO OTA,
OGUN STATE**

BY

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**A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE
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THE AWARD OF THE MASTER OF SCIENCE (M.Sc) DEGREE IN
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COLLEGE OF SCIENCE AND TECHNOLOGY, COVENANT
UNIVERSITY, OTA, OGUN STATE, NIGERIA**

AUGUST, 2024

ACCEPTANCE

This is to attest that this dissertation is accepted in partial fulfilment of the requirements for the award of the degree of Master of Science (M.Sc) in Microbiology in the Department of Biological Sciences, College of Science and Technology, Covenant University, Ota, Nigeria.

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DECLARATION

I, BALOGUN, DANIEL OLUWATOBILOBA (22PCQ02457), declare that this research was carried out by me under the supervision of Professor Obinna C. Nwinyi of the Department of Biological Sciences, College of Science and Technology, Covenant University, Ota, Nigeria. I attest that this dissertation has not been presented either wholly or partially for the award of any degree elsewhere. All sources of data and scholarly information used in this dissertation are duly acknowledged.

BALOGUN DANIEL OLUWATOBILOBA

Signature and Date

CERTIFICATION

We certify that this dissertation titled **“RESISTANCE TO PYRETHROIDS IN MOSQUITOES IN ADO-ODO OTA, OGUN STATE”** is an original research work carried out by **BALOGUN, DANIEL OLUWATOBILOBA** in the Department of Biological Sciences, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria under the supervision of Prof. Obinna C. Nwinyi. We have examined and found this work acceptable as part of the requirements for the award of Master of Science in Microbiology.

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DEDICATION

This research work is dedicated to God ALMIGHTY for His grace and favour throughout the duration of carrying out this research.

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LIST OF ABBREVIATIONS

AChE	Acetylcholinesterase
BHC	Benzene hexachloride
DDT	Dichlorodiphenyltrichloroethane
ELISA	Enzyme-linked immunosorbent assay
GSTs	Glutathione S-transferases
IRS	Indoor residual spraying
ITNs	Insecticide-treated nets
IVM	Ivermectin
KDR	Knockdown resistance
LLIN	Long-lasting insecticidal nets
VGSC	Voltage-gated sodium channel gene
WHO	World Health Organization

ABSTRACT

The spread of malaria can be controlled through long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS) using pyrethroids. However, the increasing resistance to pyrethroids poses a significant challenge to effective vector control in Africa. This study assessed mosquito species composition in Ado Odo Ota, Ogun state, and evaluated the resistance levels to pyrethroids. A 6-month longitudinal entomological survey was carried out using light trap and larval sampling. Mosquitoes were collected from various selected towns in Ado Odo Ota, and *Anopheles* species were identified through morphological and molecular analyses. The susceptibility status of *Anopheles gambiae sensu lato* to permethrin (0.75%) and deltamethrin (0.05%) was assessed using the World Health Organization insecticide susceptibility test. Additionally, the species were screened for knockdown (kdr) target site resistance alleles. Five hundred seventy-nine (579) adult mosquitoes were collected and morphologically identified using Coetzee's taxonomic keys. Two-thirds (376/579) of the mosquitoes were identified as *Culex spp.*, constituting the most abundant species in Ado Ota local government. Molecular identification using intentional mismatch primers confirmed *Anopheles coluzzi*'s presence as the communities' main species. Thirty percent 30% (22.5 – 37.5) of the *Anopheles gambiae* mosquitoes were susceptible to permethrin after 24 hours, while 98% (95.7 -100) of the vectors were susceptible to deltamethrin. Sporozoite detection using circumsporozoite ELISA showed none (0/40) of the tested blood-fed female *Anopheles gambiae* were positive for sporozoites, and the West African and East African knockdown resistance genes were detected in very high frequencies among the sampled population (L1014F – 64% [0.36 – 0.83], L1014S – 60% [0.30 – 0.77]). This study revealed that *Anopheles coluzzi* (99%) is the predominant species in Ado Odo Ota local government area. Deltamethrin is still effective in several communities; however, the high knockdown resistance of both the east and west alleles calls for urgent implementation of integrated vector control in Ogun state.

Keywords: *Insecticide testing, Malaria, Mosquitoes, Pyrethroids, Species composition.*