

**PREVALENCE OF *HISTIDINE-RICH PROTEIN II* GENE DELETION IN
Plasmodium falciparum ISOLATES FROM SUBJECTS IN ADO-OTA,
OGUN STATE**

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**PREVALENCE OF *HISTIDINE-RICH PROTEIN II* GENE DELETION IN
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STATE**

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**A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE
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THE AWARD OF 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 in Microbiology in the Department of Biological Sciences, College of Science and Technology, Covenant University, Ota, Nigeria

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Signature and Date

DECLARATIONS

It is hereby declared that this research work titled “**PREVALENCE OF HISTIDINE-RICH PROTEIN II GENE DELETION IN *Plasmodium falciparum* AMONG SUBJECTS IN ADO-OTA, OGUN STATE**” was undertaken by **KWARPO, ZEENDI SILAS**. It is based on the original study in the Department of Biological Sciences and Technology, Covenant University Ota, under Professor Olayemi O. Akinnola's supervision. The ideas and views of other researchers have been duly expressed and acknowledged.

KWARPO, ZEENDI SILAS
(Student)

Signature and Date

CERTIFICATION

We certify that this dissertation titled “**PREVALENCE OF HISTIDINE-RICH PROTEIN II GENE DELETION IN *Plasmodium falciparum* AMONG SUBJECTS IN ADO-OTA, OGUN STATE**” is an original research work carried out by **KWARPO, ZEENDI SILAS** in the Department of Biological Sciences, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria under the supervision of Professor Olayemi O. Akinnola 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 work is dedicated to the Almighty GOD, the Father of all light and giver of good and perfect gifts, who was the source of strength and inspiration for this research.

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ABSTRACT

The key to reducing malaria-related deaths in areas with high transmission rates is prompt diagnosis and appropriate treatment. Malaria Rapid diagnostic tests (RDTs or mRDT) that utilize *histidine-rich protein 2 (PfHRP2)* as a biomarker are essential for quickly and accurately diagnosing *P. falciparum* infections in endemic regions like Nigeria. However, *PfHRP2* gene deletion and the variability of amino acids threaten the mRDT test sensitivity. This study was carried out to investigate the prevalence of *HRP2* gene deletion in *Plasmodium falciparum* among symptomatic subjects in Ota. Ethical clearance from the Covenant Health Ethics Review Committee (CHREC) was obtained. Three-hundred and ninety-six samples were collected from subjects visiting four healthcare facilities in Ota, Ogun State, Nigeria and tested for malaria using HRP2-based RDT. The presence of parasites in RDT false negative cases and microscopy positive cases were validated using nested Polymerase Chain Reaction (PCR). Thereafter, exon 2 of *PfHRP2* was amplified, and Sanger sequenced. The prevalence of malaria was recorded at 57.07%, with the age group below 5 years showing the highest prevalence of 49.15%. Out of 50 samples, forty-seven were positive by 18sRNA quantitative PCR. Single-copy gene MSP1 showed an overall multiplicity of infection of 1.5. The MAD20 allele had the highest frequency (72.72%), the K1 allele (54.45%) and the RO33 allele recorded the lowest frequency (27.27%) among the samples that amplified the MSP1. The prevalence of HRP2 gene deletion was recorded at 15.4% (2/13) among samples with amplified single-copy genes using Nested PCR. More studies using larger sample sizes for genotyping and more sensitive techniques like digital droplet PCR are recommended to determine the full extent of *PfHRP2* gene deletion in Nigeria.

Keywords: *HRP2 gene, HRP2 gene deletion, RDT, Malaria diagnosis*