

**ASSESSMENT OF MOLECULAR MARKERS ASSOCIATED WITH  
ARTEMISININ RESISTANCE IN *Plasmodium falciparum* ISOLATES FROM  
OTA, SOUTHWEST NIGERIA**

**BY**

**OLADEJO, DAVID OLADOKE**

**16PCP01320**

**A DISSERTATION SUBMITTED TO THE  
DEPARTMENT OF BIOCHEMISTRY  
COLLEGE OF SCIENCE AND TECHNOLOGY  
COVENANT UNIVERSITY  
OTA, NIGERIA**

**May 2018**



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**IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF  
MASTERS OF SCIENCE (M.Sc.) IN BIOCHEMISTRY AND MOLECULAR BIOLOGY**

**May 2018**

## ACCEPTANCE

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

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## **CERTIFICATION**

This is to certify that **OLADEJO, DAVID OLADOKE** (Matric No: **16PCP01320**) carried out this research work in partial fulfilment of the requirements for the award of Master of Science (M.Sc.) degree in Biochemistry of Covenant University, Ota, under my supervision.

**Dr. T.M Dokunmu**  
(Supervisor)

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**Signature and Date**

**Dr. S.O Rotimi**  
(Head of Department)

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**Signature and Date**

**Prof. Akintola**  
(External Supervisor)

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**Signature and Date**

## DECLARATION

It is hereby declared that this research work titled “**ASSESSMENT OF MOLECULAR MARKERS ASSOCIATED WITH ARTEMISININ RESISTANCE IN *Plasmodium falciparum* ISOLATES FROM OTA, SOUTHWEST NIGERIA**” was undertaken by **Oladejo David Oladoke**. It is based on my original study in the Department of Biochemistry, College of Science and Technology, Covenant University, Ota, under the supervision of Dr. T.M Dokunmu and the ideas and the views of other researchers have been dully expressed and acknowledged.

Oladejo David Oladoke

(Student)

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Signature and Date

## **DEDICATION**

I would like to dedicate this report to the Almighty God for his grace, strength and power to carry out this research work. May His name be praised forever and ever, Amen

## **ACKNOWLEDGEMENT**

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### LIST OF ABBREVIATIONS

bp	base pairs
DNA	Deoxyribonucleic Acid
dNTP	deoxyribonucleotide triphosphate
PCR	Polymerase Chain Reaction
μL	microlitre
mL	millilitre
ng	nanogram
SNP	Single Nucleotide Polymorphism
RFLP	Restriction Fragment Length Polymorphism

## ABSTRACT

Antimalarial drug resistance means delayed malaria parasites clearance from the peripheral blood of a patient treated with the drug. Artemisinin resistance (AR) has developed in Southeast Asia owing to mutations in parasite genes. From historical spread of drug resistance across Asia to Africa, the spread of resistance to artemisinin combination therapy across Asia to Africa is imminent. This study evaluates molecular markers associated with artemisinin derivatives and partner drugs commonly used in Africa and provides data on the *Plasmodium falciparum* multidrug resistant 1 (*Pfmdr1*) and the Kelch propeller (K13) gene mutation profile of few parasite isolates from Ota, Southwest Nigeria. Parasites from a total of 210 of 360 blood samples diagnosed with malaria were studied; DNA was extracted and amplified in nested Polymerase Chain Reaction (PCR) with primers specific for *Plasmodium falciparum* multidrug resistant (*Pfmdr1*) and the Kelch propeller (K13) genes. Amplicons were resolved on a 2% agarose gel and 5µl secondary amplicon were digested using restriction enzymes *AfIII* to detect polymorphism on codon 86 in the *Pfmdr1* gene or sequenced to detect SNPs in the genes from few isolates (10%). The result of this study showed high prevalence (100%) of *Pfmdr1* 86Tyr mutant allele observed in all of the 4 isolates sequenced. For K13 gene, 13 unique mutations that have not been previously reported to be associated with artemisinin resistance were observed from one of the isolates but no marker of AR was observed. In conclusion, parasite isolates from this endemic area harbor high *Pfmdr1* mutations and other mutations on K13 with unknown consequences, which may influence clinical responses to artemisinin and its partner drug.