GENETIC PROFILING OF K13 ARTEMISININ-RESISTANT *Plasmodium falciparum* AMONG PATIENTS ATTENDING HEALTHCARE FACILITIES IN OTA, NIGERIA

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AUGUST, 2024

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BY

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE (M.Sc) DEGREE IN MICROBIOLOGY IN THE DEPARTMENT OF BIOLOGICAL SCIENCES, 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 Sciences in Microbiology in the Department of Biological Sciences, College of Science and Technology, Covenant University, Ota, Nigeria.

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(Secretary, School of Postgraduate Studies) **Signature and Date**

Prof. Akan B. Williams
(Dean, School of Postgraduate Studies) **Signature and Date**

DECLARATION

I, OYEGBADE, SAMUEL ADENIYI (22PCQ02462) declare that this research was carried out by me under the supervision of Dr Paul A. Akinduti of the Department of Biological Sciences, College of Science and Technology, Covenant University, Ota, Nigeria. I attest that the 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.

OYEGBADE, SAMUEL ADENIYI

Signature and Date

CERTIFICATION

We certify that this dissertation titled **GENETIC PROFILING OF K13 ARTEMISININ-RESISTANT *Plasmodium falciparum* AMONG PATIENTS ATTENDING HEALTHCARE FACILITIES IN OTA NIGERIA"** is an original research work carried out by **OYEGBADE, SAMUEL ADENIYI (22PCQ02462)** in the Department of Biological Sciences, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria under the supervision of Dr. Paul A. Akinduti. We have examined and found this work acceptable as part of the requirements for the award of Master of Science in Microbiology.

Dr. Paul A. Akinduti
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Dr. Isaac O. Ayanda
(Head of Department) **Signature and Date**

Prof. Segun I. Oyedeji
(External Examiner) **Signature and Date**

Prof. Akan B. Williams
(Dean, School of Postgraduate Studies) **Signature and Date**

DEDICATION

Dedicated to the Almighty God for His grace, wisdom, and sufficient strength

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ABSTRACT

Malaria stands out incessantly as a potential concern to public health systems in Africa, particularly with the prevalence of *Plasmodium falciparum* characterized with resistance to artemisinin alongside kelch13 (*Pf*kelch13) gene alterations. This study aimed to evaluate the prevalence of *Plasmodium falciparum* infection, genomic profiling and clonal diversity of *Pf*Kelch13 among patients attending selected health facilities in Ota**,** Nigeria. 479 patients with severe *P. falciparum* infection were engaged and their demographic status were collected. The blood samples from the patients were examined for *P. falciparum* infective stages and enumerated for parasitemia using Microscopy. DNA was isolated from high parasitemia *P. falciparum* samples and genotyped for *Pf*kelch13 using Primary and Nested PCR assays and examined with 1% agarose gel electrophoresis. Identified *PfK13* samples were sequenced using Sanger sequencing method and further analyzed for clonal diversity. Overall, *P. falciparum* malaria identified by microscopy was 265 (55.33%). Significant prevalence of 33.61% was observed among 11-20 years age group, and 29.44% rates among male based on gender demography ($p<0.05$). Parasitemia levels (>200 parasites per 100uL) were higher among male than female populations and increases among age groups (0-10 and 11-20 years). Of 10.57% *Pf*Kelch13 genotypes, higher rates of 5.66% were observed among the male compared to female. Pf strains encoded with K13 from Nigerian population clustered with other global strains identified in UK, France, China and Kuwait. *PfK13* strains obtained from this study clustered separately with strains previously reported in African countries including Ghana, Kenya and Nigeria. There is evidence of *Pf*kelch13 strains in Ota Southwest Nigeria having clonal relatedness with *P. falciparum* K13 markers Y494H and C580Y (Ghana), A578S (Kenya) and A675V (Nigeria). There is need for urgent geno-surveillance and public oriented preventive strategies to curb possible spread of *PfK13* strains and identification of *PfK13* markers for diagnosis and drug target.

Keywords: Artemisinin-resistant *Plasmodium falciparum*, *pf*kelch 13, mutation, resistance, *parasitemia*