Identifying protein markers in urine samples of malaria patients for non-invasive diagnosis of malaria

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The Global Health Network

Published on: Jun 15, 2023

URL: https://tghncollections.pubpub.org/pub/k46a0dpu

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Malaria is an infectious disease caused by the protozoan parasite, Plasmodium. According to WHO, in 2020, around 241 million cases of malaria were reported across the world. It is a curable disease if diagnosed early but in recent years, drug resistance has increased drastically, especially in *P. falciparum* infections. When the parasite infects the host, there is a continuous reciprocation of metabolites between the two which may disturb the biochemical profiles of both of them. Hence, detection of the metabolites whose levels are altered in the infected patients in comparison to healthy individuals may be a sign of parasite activity or the host’s response to the infection. PCR methods are currently contributing towards improvement of the diagnosis of malaria as it has enabled the detection of Plasmodium DNA. Despite microscopic method being the gold standard, recently there has been a great interest in the research of non-invasive methods for the diagnosis of malaria and the Plasmodium DNA has been reported to be present in saliva and urine samples of the patients. These trace amounts of plasmodial DNA were detected in urine using methods like nested PCR where the target was mitochondrial cytochrome b gene of Plasmodium. The methods used for malaria diagnosis include microscopy of Giemsa-stained blood smears, polymerase chain reaction (PCR) based tests, rapid diagnostic tests (RDTs), automated blood cell analysers. So, several diagnostic methods are available for malaria but most of them are based on invasive methods and have certain limitations such as the risk of transmitting blood-borne pathogens, pain associated with invasive methods and poor compliance in case of repeated sampling. Therefore, there is a need for a novel and effective non-invasive method for malaria diagnosis. The methodology will be sample collection, proteomics analysis by LC-MS/MS, cloning of selected proteins by PCR, purification and characterization of proteins, and ELISA based quantitative detection of proteins. The expected outcome of this project is the identification of diagnostic biomarker proteins in the urine of patients infected with *P. falciparum* and/or *P. vivax*. The outcome will further aid in developing a novel, non-invasive diagnostic technique for malaria detection.