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Towards a vaccine for *Plasmodium vivax*

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INTRODUCTION

Malaria is a life-threatening disease that affected 228 million people and caused more than 0.4 million fatalities around the globe in 2018 (1). Most of these cases were caused by two Plasmodium species i.e. *Plasmodium falciparum* and *Plasmodium vivax*. . Although the cases have reduced after 2000, experts believe that eradication is not possible without new approaches and tools and one such tool considered is vaccines. The only vaccine available for malaria provides protection against *P. falciparum*, whereas the work towards a *P. vivax* vaccine has just begun.

OBJECTIVE

The aim of this study was to describe the landscape of current research in vaccine for *Plasmodium vivax*, compare it to opportunities and gaps identified in the Malaria Eradication Research Agenda (malERA) and gauge the likelihood of having vaccine for *P. vivax* by 2035.

METHODS

Data on recent and ongoing research activities/projects was systematically collected between February 2020 to May 2020 from open source databases of grants and validated with the principal investigators (PIs).

The results have been published, in a dedicated webpage with the title “Towards a vaccine for *Plasmodium vivax*”, in MESA track, an online database which captures research projects and institutions’ research portfolios in malaria elimination and eradication.

An expert opinion survey was conducted to assess the probability of having a highly efficacious and long-lasting vaccine for *P. vivax* by 2035. Questions regarding the research gaps and research opportunities for the next five years identified in malERA were also included.

RESULTS

Research project in *P. vivax* vaccine – Eligibility flow diagram

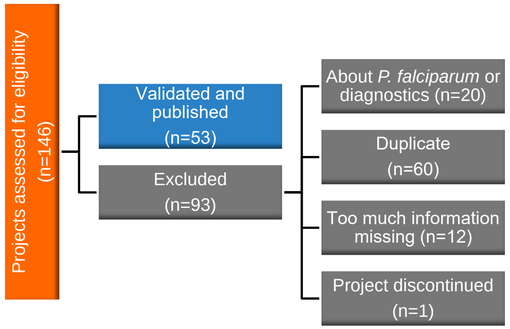

Figure 1. Eligibility flow diagram. As a result of the systematic search and consultation with experts, 146 projects were identified and assessed for eligibility. 56 projects were validated and published

Ongoing research projects towards *P. vivax* vaccine candidates

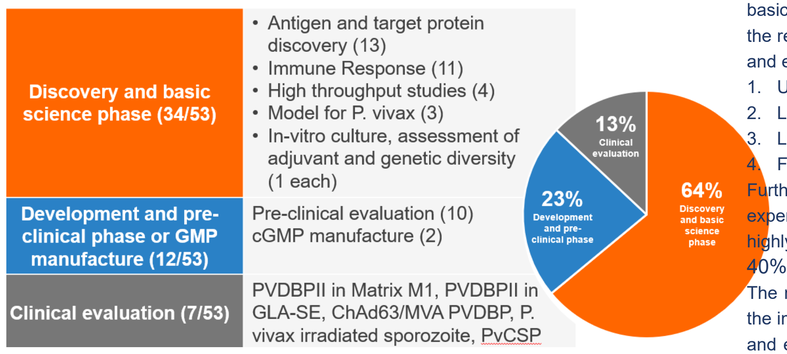

Figure 2. Research area/categorization. Projects in MESA track were categorized into three main areas of research in vaccine (3).

Progress on research gaps identified in malERA

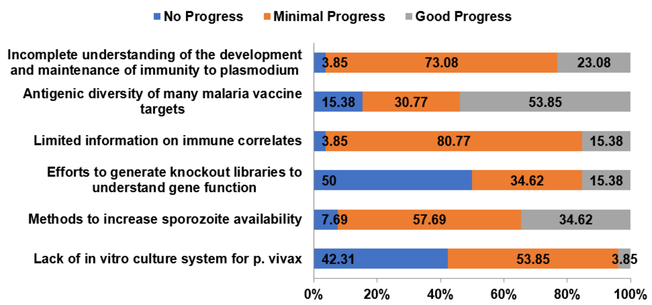

Figure 3. Progress on research gaps-result from the expert opinion survey. Responses received from 26 experts were recorded on a scale i.e. No progress, minimal progress and good progress(4).

Progress on research opportunities identified in malERA

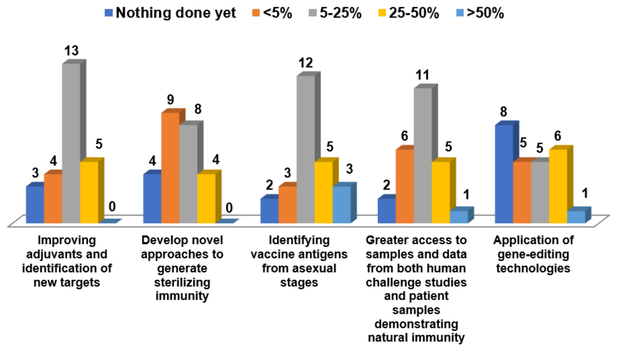

Figure 4. Progress on research opportunities for next 5 years-result from the expert opinion survey. Response received from 25 experts were recorded on a scale i.e. nothing done yet, <5% progress, 5-25% progress, 25-50% progress and >50% progress(4).

CONCLUSION/RECOMMENDATION

The main conclusion that can be drawn from this review is that we are still behind when it comes to research in *P. vivax* vaccine, starting from basic science to vaccine development. The major road blocks affecting the research in *P. vivax* vaccine identified via systematic data collection and expert opinion are:

1. Unavailability of in vitro blood-culture system
2. Lack of knowledge on immune response
3. Limited antigen discovery
4. Funding gap & lack of commitment

Furthermore, with the current available tools and gaps identified by the experts, prospects of having highly efficacious vaccine by 2035 is highly unlikely i.e. on numerical scale average came out around 40%.

The main recommendation derived from this study is the realization of the importance of a vaccine for *P. vivax* to progress towards elimination and eradication. But this requires dedication, commitment and interest from all agencies involved, from developers of policies to donors.

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Deep Dive “Towards a vaccine for Plasmodium Vivax”