

Antibodies to *Anopheles culicifacies* salivary glands encumber vector competence to *Plasmodium vivax*

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Anopheles culicifacies A and C are responsible for 65-70% of malaria cases in India. Species B is least susceptible to parasite and plays very little role, if at all, in the malaria transmission. Three sets of rabbits were immunized with the salivary gland proteins from these three members (A, B and C). High titer antibodies were detected in the sera when characterized by *in vitro* ELISA. Western blotting and *in vivo* ELISA were conducted to gauge the cross reactivity of these antibodies with other tissues as well as salivary glands from other sibling species. Salivary glands and midgut exhibited highest cross reactivity. 97 kDa polypeptide was recognized exclusively by antibodies against salivary glands of species-A and C (primary vectors). Similarly, two immunogenic polypeptides (29 and 21 kDa) were present only in species-B. Fecundity was reduced significantly (37%) and number of oocysts per infected mosquito was reduced by 69% in the group of mosquitoes that ingested anti-salivary gland antibodies along with infected blood meal. Proportion of infected mosquitoes was significantly low as compared to control.

Key words : *An. culicifacies*, Salivary glands, *P. vivax*.

INTRODUCTION

Mosquitoes are unquestionably the most medically important arthropod vectors of diseases. Mosquito-borne diseases like malaria are responsible for significant human morbidity and mortality through out the world. Mosquito control through environmental perturbation and pesticide application, used to be primary strategy for controlling mosquito-borne diseases, but environmental and human health concerns, as well as development of pesticide resistance, limit the usefulness of these traditional approaches in our modern day world. Genetic plasticity of pathogen and drug resistant strains of parasites has significantly contributed to the present situation. No promising strategies have been designed on the horizon for the control of malaria. Most anti-malarial strategies have primarily targeted the infection in humans, whereas we know plasmodium development in mosquitoes is more elaborate than in the vertebrate host (Shahabuddin and Costero, 2001). Development of malaria vaccines that block transmission of parasites by mosquito vectors remains one such pragmatic approach that can complement or replace existing control methods.

Transmission blocking vaccines have long been the subject of intensive research, and although they have yet to be realized clinically, they are at least now becoming a technical possibility. Various vector incrimination studies have unequivocally established that *An. culicifacies*

contributes to about 70% of malaria cases in India, but is still ignored in this context.

An. culicifacies exists as a complex of five sibling species provisionally designated as A, B (Green and Miles, 1980), C (Subbarao *et al.*, 1983), D (Vasantha *et al.*, 1991) and E (Kar *et al.*, 1999). These species are reported to have various biological differences *viz.* their distribution, response to insecticides (Raghvendra *et al.*, 1992) host preferences (Joshi *et al.*, 1988) and vectorial capacity (Subbarao *et al.*, 1988). Some of the mosquitoes are immunologically superior to others. *An. culicifacies* A and C are primary vectors whereas, species B has very little role if at all, in the transmission of malaria (Kaur *et al.*, 2000).

Salivary glands and midgut are the two different epithelial barrier that the parasite has to overcome for successful completion of sporogony. Since long the role of mosquito salivary gland for the expression of the genes specifically connected to the blood feeding has been recognized but in addition to that, the mosquito salivary glands are also the final destinations of the insect inhabiting stages of many parasites before transmission to a new vertebrate host, playing a critical role in parasite transmission. It itself indicates prime importance of this organ to contribute towards the development of parasite and antibodies directed towards it, might adversely effect parasite transmission and also reproductive performance

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