**Introduction**

Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected female *Anopheles* mosquitoes. There are more than 400 different species of *Anopheles* mosquitoes; however only 30 are major malaria vectors. *Anopheles* vectors species bite between dusk and dawn. During blood feeding, the female mosquito injects saliva into the human skin to facilitate meal intake. The salivary proteins (mSP) stimulate immune responses that may lead to antibody production. It is hypothesized that in endemic settings, after repeated mosquito bites, human hosts develop an immune response against mSP that correlates with the level of exposure.

**Purpose**

We attempted to establish whether people residing in non-endemic areas for Malaria develop antibodies against *Anopheles* salivary gland extract (SGE) and gSG6-P1 salivary protein. These findings will help to understand host-mosquito interaction in the absence of the disease.

**Questions, Hypotheses, and Predictions**

**Question**: What are the levels of antibody response against SGE and gSG6-P1 salivary protein in healthy individuals in Kansas?

**Hypothesis**: The antibody response against *An. gambiae* saliva is directly correlated with the level of exposure to mosquito bites.

**Prediction**: People engaged in outdoor activities with no use of protective strategies such as repellent will present higher antibody levels against *An. gambiae* proteins than people using repellent or staying indoors during vacations.

**Study System**

We evaluated the whole salivary gland extract (SGE) and one salivary protein, gSG6, from *An. gambiae* mosquitoes. Those two components where used as antigen in an ELISA test to measure IgG, IgM and IgE antibodies from human blood.

**Methods and Experimental Design**

We enrolled 15 healthy volunteers (7 females and 8 men) living in Manhattan, KS, with ages between 19 and 42 years old (mean age = 24.08). The average time residing in the city was 3.3 semesters (calculated based on the number of semesters attending KSU). All participants were engaged in any type of outdoor activity (i.e. gardening, hiking, camping); however, only 7 out of 15 (54.9%) reported the use of repellent.

**Results**

We found a significant positive correlation between age and Anti-SGE (A) and Anti-gSG6-P1 (B). We found a significant positive correlation between age and Anti-SGE/gSG6, which means that the older the person the higher the level of IgE antibodies against both Anti-SGE and Anti-gSG6-P1.

**Conclusion**

Mosquito saliva plays an important role in vector-borne disease transmission and pathology. Here we show that IgG antibody levels against gSG6-P1 are higher in people that does not use repellent, which suggest that gSG6-P1 proteins might be useful markers to measure human–mosquitoes contact. We also found that males and females respond differently to mosquito salivary antigens; males showed higher levels of IgG for gSG6 and females presented higher IgM levels for SGE. Since mSP have a profound impact on pathogen transmission, additional studies characterizing factors that may influence immune response against salivary proteins are needed.

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**References**


**Future Directions**

**Low and Non-endemic**

Exposure to mosquito bites will include immunity that accumulates with time.

**Seasonal/Travelers**

High antibody levels will wane after ceasing exposure for long periods of time.

**Hyper/Endoemnic**

Children living in areas with *An. albimanus* and *Plasmodium* are infected with malaria during and protection against symptoms.