



# Effect of ABO and Rh blood groups on host preference, oviposition success, and development of laboratory-reared *Aedes aegypti*

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## Abstract

*Aedes aegypti* is the primary dengue vector in Sri Lanka that causes the massive public health problem of Dengue Fever (DF) and Dengue Hemorrhagic Fever (DHF) on the island. It is an anthropophilic mosquito that shows preferential feeding depending on the host blood type. Hence, the study was conducted to investigate the effects of human ABO and Rh blood groups on host attractiveness, feeding, oviposition and other life-history traits of *Aedes aegypti*. Data of DF and DHF patients were collected from some selected hospitals in the Western province. Subsequently, mated female *Ae. aegypti* mosquitoes were exposed to eight blood groups (A<sup>-</sup>, A<sup>+</sup>, B<sup>-</sup>, B<sup>+</sup>, AB<sup>-</sup>, AB<sup>+</sup>, O<sup>-</sup>, O<sup>+</sup>) using human volunteers to investigate the landing and feeding preferences. Furthermore, oviposition success, adult longevity, progeny longevity, larval duration, larval mortality, pupal duration, and adult fecundity were examined. Accordingly, people with the O<sup>+</sup> blood group were the most typical group infected with DF and DHF in 2017 and 2018. However, the peak landing and feeding preferences were observed for O<sup>-</sup>. Besides, the current findings indicated that human ABO and Rh blood types did not significantly affect life-history parameters including oviposition success, larval duration, pupal duration, larval mortality, adult longevity, progeny longevity, and fecundity of *Ae. aegypti*. Eventually, it can be concluded that dengue infection risk varies with the ABO and Rh blood groups depending on their unequal prevalence in the community as well as their association with mosquito performance.

**Keywords** *Aedes aegypti* · Blood groups · Feeding · Landing · Life-history

## Introduction

Currently, Dengue Fever (DF) and Dengue hemorrhagic Fever (DHF) have become critical health problems in Sri Lanka. It is a viral infection caused by four different serotypes, namely DENV-1, DENV-2, DENV-3, and DENV-4 (Sirisena and Noordeen 2016). The two major mosquito vectors transmitting the dengue viruses in Sri Lanka are *Aedes aegypti* and *Aedes albopictus* (Noordeen et al. 2018) where *Ae. aegypti* is the primary vector and *Ae. albopictus* is the secondary vector (Vitarana et al. 1997; Crawford et al. 2017).

Plant sap serves as the energy source, whereas vertebrate blood is the amino acid source that helps the performance of mosquitoes (Greenberg 1951; Foster 1995). Generally, mosquitoes have a preferential selection of host species for

blood meals (Tandon and Ray 2000). The host preference is affected by various intrinsic and extrinsic factors. Genetic selection being the basis of these inherent factors, is controlled by adaptive advantages, which result in feeding on a specific host species (Kaipainen and Vuorinen 1960). In addition to the genetic basis of the host preference, the density of host species and accessibility to the blood source also affect the host preference. The host selection behaviour correlates with most vectors of vector-borne diseases (Takken and Verhulst 2013).

The odours released by human skin vary from person to person depending on the blood type, and mosquitoes can perceive these slight variations (Qui et al. 2006). Consequently, the variation in odours plays a significant role in the anthropophilic nature of mosquitoes. Several studies have shown that mosquitoes prefer certain blood groups over others. Accordingly, *Anopheles gambiae* feeds preferentially on blood group O under laboratory conditions (Wood and Harrison 1972). The basis for this preference is unknown. It may be related to the availability of ABO substances on skin cells and secretions in sweat (Gupta and Chowdhuri 1980). Furthermore, Gupta and Chowdhuri (1980) stated

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