



اُنِيْوَرْسِيْ تِكْنُوْلُوْجِيْ مَارَا
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**SCREENING OF TRANSOVARIAL DENV TRANSMISSION IN
FIELD-COLLECTED *Aedes albopictus* IN PANGSAPURI DAMAI AND
SUBANG BESTARI, SELANGOR**

By


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DECLARATION

I hereby declare that this thesis is my original work and has not been submitted previously or currently for any other degree at UiTM or any other institutions.

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ABSTRACT

SCREENING OF TRANSOVARIAL DENV TRANSMISSION IN FIELD-COLLECTED *Aedes Albopictus* IN PANGSAPURI DAMAI AND SUBANG BESTARI, SELANGOR

Dengue is currently the most significant arboviral infection afflicting communities in Malaysia. Recent multiple outbreak cycles of dengue cases with expansion of hotspot areas has raised public concerns. These incidences may be due to inherent maintenance of DENV harboured by an invasive vector, *Aedes albopictus* through transovarial transmission in nature. Despite of this etiological phenomenon, less attention has been paid on virological surveillance by detecting DENV from mosquito vectors population as an early warning surveillance system for forestalling of impending outbreak. Hence, the present study was conducted to detect the natural transovarial DENV transmission in *Aedes albopictus* population during outbreak seasons. Two dengue infested areas in the Shah Alam Municipality have been chosen in this study. Field-collected eggs were trapped in Pangsapuri Damai (U4) and Subang Bestari (U5), Shah Alam and reared until adulthood under insectary conditions. Prior to obtain substantial detection of pure DENV RNA template from pooled *Aedes albopictus*, optimization of viral extraction method using various kits and protocols was performed use USM laboratory strain, *Aedes albopictus* F1611. The most optimal viral extraction method was selected and homogenates of 10 female adults *Aedes albopictus* were used to screen transovarial transmission of DENV using multiplex qRT-PCR. Despite the high sensitivity and specificity of real-time assay, no DENV was detected in all samples that entailed no maintenance of DENV among *Aedes albopictus* populations in nature of epidemic areas in this research. This finding probably owes to the abundance of blood meal sources that are insensible for DENV persistence in nature, sample size population, shorter sampling time frame, unsuitable period of vector surveillance and misconception of dominant vectors in collection locality. Thus, the current findings could be improvised in the future to detect transovarial transmission of DENV in nature during inter-epidemic period of re-epidemic areas as a reliable sentinel tool for dengue outbreak.

Keywords : *Aedes albopictus*; dengue; DENV; qRT-PCR; transovarial transmission

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Dengue is one of the most prevalent vector-borne viral diseases infects humans. There has been an increasing frequency and reports of epidemics spread geographically over the years. Dengue fever (DF) was one considered as a benign sporadic infection during the 19th century; the first clinical case reported in Penang Island in Malaysia in 1967 (Rudnick, 1967). Dengue is now endemic in many tropical and subtropical countries infects 2.5 billion living people with millions of clinical dengue cases annually (Bhattacharya *et al.*, 2015). In Malaysia, the Ministry of Health, Datuk Seri Dr. S. Subramaniam declared that dengue cases has shot to 30, 890 cases with 98 deaths from January till March 21 of 2015. This represents an incremental trend from the 21, 967 cases and 54 deaths reported during the same period last year (The Sun Daily, 2015).

DF is caused by any of four distinct dengue virus (DENV) serotypes, DENV1 to DENV4, which are closely related but antigenically different (Rohani *et al.*, 2007). DENV belongs to the Flaviviridae family and is vectored by two nuisance biters from the genus *Aedes*, namely *Aedes aegypti* and *Aedes albopictus* (Satoto *et al.*, 2014 ; Thongrunkiat *et al.*, 2010). Malaysia as a tropical country with temperate and humid climates throughout the year, favours an adaptation for this *Stegomyia* species to breed and concomitantly transmits the DENV. *Aedes aegypti* (Linn.) is considered as a principal vector, while *Aedes albopictus* (Skuse) commonly serves as secondary vectors. Nonetheless, an invasive species, *Aedes albopictus* is an important vector in Southeast Asia as it can transmit DENV that causes Dengue Haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) (Yaacob, 2006).