ABSTRACT

Mosquito-borne diseases such as dengue are responsible for number of human deaths in the world including Pakistan every year. A sustainable and cost-effective strategy to control vector mosquitoes includes the use of vertically transmitted novel bacterium *Wolbachia pipientis* which once transfected in *Aedes aegypti* host mosquitoes spread vertically by maternal transmission to next generations, and can strongly block replication of key human pathogens including the dengue and Zika viruses. The current vector control programs are aimed to rear *Wolbachia*-infected mosquitoes to a mass number and release them to control the vector population and subsequent transmission of diseases. The target mosquito vector species *Ae. aegypti* require vertebrate blood for their reproduction. The mosquito rearing strategies at laboratory level use sedated or restrained live animals such as mice, rats or chickens as blood source. However, the use of animals for production of large number of mosquitoes constitutes ethical, logistical and regulatory issues associated with requirement of specialized animal care facility, qualified personnel, and an efficient feeding system. Purchasing of stored blood is also not of interest because it is expensive and has very short shelf-life. These limitations together are prompting research directed towards the development of artificial diets that would be capable of mimicking human blood in terms of nutrients to support the reproduction of mosquitoes. Therefore, the current study was focused to develop an artificial blood meal replacement diet (iABG diet) for rearing of the mosquito *Ae. aegypti*, the vector of dengue, Zika and chikungunya virus. The iABG diet contains bovine serum, glucose, iron chloride and ATP which can be prepared at laboratory within short time and requires no expensive equipment's. Feeding with iABG diets lead to high levels of viable egg production 84±3 as compared to human 84±2 and mice blood 74±4. No significant difference was found in the key fitness parameters of iABG fed mosquitoes including, mosquito longevity, wing length, cytoplasmic incompatibility with human blood control mosquitoes. Moreover, iABG diet significantly increased the *Wolbachia* density in the whole body of *Ae. aegypti* mosquitoes. By rearing *Wolbachia* infected *Ae. aegypti* mosquitoes exclusively on iABG diet for more than six generations, it was proved that iABG diet could successfully be used for mass rearing of *Wolbachia* infected *Ae. aegypti* mosquitoes for their field releases to control the transmission of dengue in Pakistan.