Current insecticide susceptibility status of Malaysian Anopheles maculatus Theobald to malathion, permethrin, DDT and deltamethrin

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Abstract. Chemical insecticides are still considered as important control agents for malaria vector control. However, prolonged use of these chemicals may select mosquito vectors for resistance. In this study, susceptibility status of adult Anopheles maculatus collected from 9 localities in peninsular Malaysia, viz. Jel, Temerloh, Pos Banun, Snderut, Jeram Kedah, Segamat, Kota Tinggi, Kuang and Pos Lenjang were determined using the standard WHO bioassay method in which the adult mosquitoes were exposed to standard insecticide impregnated papers malathion, permethrin, DDT and deltamethrin – at pre-determined diagnostic dosage. Deltamethrin was most effective insecticide among the four insecticides tested, with the LT50 of 29.53 min, compared to malathion (31.67 min), DDT (47.76 min) and permethrin (48.01 min). The effect of all insecticides on the laboratory strain was greater (with all insecticides demonstrated LT50 < 1 hour) than the field strains (deltamethrin 32.7, malathion 53.0, permethrin 62.0, DDT 67.4 min). An. maculatus exhibited low degree of resistance to all test insecticides, indicating that these chemical insecticides are still effective in the control of malaria vector.

INTRODUCTION

Human malaria is truly a disease of global proportions and is one of the most broadly distributed vector-borne infections. Although malaria in Malaysia is already under control, malaria persists in a number of problematic foci, such as aboriginal areas, tribal villages found in cleared hilly jungles, and in communities working in agricultural and land development (Rohani et al., 1994). Ministry of Health Malaysia reported that in 2012, 4726 malaria cases occurred in Malaysia with 16 deaths (VBDCP, 2012). Anopheles maculatus Theobald is the principal vector of human malaria in peninsular Malaysia (Rcld, 1968; Loong et al., 1988; Vythingam et al., 1995). The other malaria vectors are Anopheles sundaicus, Anopheles campestris, Anopheles donaldi and Anopheles cracens especially along the Malaysia-Thailand border (VBDCP, 1988).

At present, chemical control of malaria in Malaysia is carried out using deltamethrin for indoor residual spraying, temephos as a larvicde and permethrin to impregnate bed nets (VBDCP, 2012). During the Malaria Eradication Programme, indoor residual spraying of DDT emulsifiable concentrate (EC) at 2g/m² has been extensively used since 1967. Extensive use of residual insecticide spraying for malaria vector control has selected anopheline mosquitoes resistant to insecticides. Due to the removal of DDT from public health usage worldwide, except in designated countries, the Vector Borne Disease Control Programme has switched to the usage of pyrethroids in 1998 till today.