ABSTRACT

Epstein Barr virus (EBV) associated endemic Burkitt's Lymphoma (eBL), is a pediatric cancer associated with morbidity and mortality among children resident in holoendemic *Plasmodium falciparum* (*P. Falciparum*) regions, such as western Kenya. Interactions in EBV, *P. Falciparum* infections are causal links to eBL development in children resident in malaria endemic region. Additionally early ages of EBV and *P. Falciparum* infections at infancy are risk factors for eBL development. Moreover, *P. Falciparum* has exerted a strong selection pressure on hemoglobinopathies of sickle cell trait (SCT), alpha (α)-thalassemia, glucose-6-phosphate dehydrogenase (G6PD), and merozoite surface protein 2 (MSP-2) genes that confer reduced malarial disease severity. There is an overlap of eBL, *P. Falciparum* and high prevalence rates of these polymorphisms within western Kenya. The current study therefore investigated the role of these polymorphisms on acquisition of eBL associated EBV in children (aged 0-12 months, n=81) resident in western Kenya. Demographic and clinical data was abstracted from available clinical records. TaqMan and standard polymerase chain reaction (PCR) techniques was used to assay for presence or absence of the genetic polymorphisms. Chi-square ($\chi 2$) and Fisher's analysis were used to determine differences between groups while Bivariate regression model was used to determine significant associations. A comparison between two infant categories, < 6 and those ≥6-12 months of this cohort was analyzed. Analyses revealed that SCT, α-thalassemia, and G6PD mutations [Viangchan (871G>A)/Chinese (1024C>T) (p=0.999) Mahidol (487G>A)/Coimbra (592C>T) (p=0.149), Union (1360C>T)/Kaiping (1388G>A) (p=0.295), Chinese 4 (392G>T), African A-(202C>T)/(376T>A) and A (376T>A)(p=1.000 and p=0.999 respectively) variant] were not associated with the acquisition of EBV < 6 months of age. The mutations were neither protective against EBV acquisition in infants ≥ 6-12 months of age [(Viangchan (871G>A)/Chinese (1024C>T) (p=0.677)), (Mahidol (487G>A)/Coimbra (592C>T) (p=0.940)), (Union (1360C>T)/Kaiping (1388G>A) (p=0.768)), and (G6PD A-(202C>T)/(376T>) and A, (p=0.235 and p=0.257 respectively)) variant]. Additionally, *in utero* exposure to either 3D7 (p=0.921) or FC27 (p=0.914) MSP-2 alleles in infants <6 months was not protective against EBV acquisition. In children ≥6-12 months *in utero* exposure to 3D7 or FC27 also had no impact on EBV acquisition (p=0.108; p=0.754; p=0.357, respectively). In conclusion, results presented here show that variation in SCT, α-thalassemia, G6PD mutations, and *in utero* exposure to MSP-2 (FC27, 3D7) had no impact on acquisition of EBV in children from western Kenya. Therefore, children with hemoglobinopathies and those *in utero* exposed to MSP-2 genotypes (FC27, 3D7) are not significantly less susceptible to EBV acquisition.