

Abstract

SARS-CoV-2 is a virus whose spread needs to be urgently curtailed. Spike proteins were analysed for epitopes as they have been found to be the immunogens used in many new releases COVID-19 vaccine. With an Indonesian vaccine – “vaccine merah putih”-still in development, it remains essential to conduct immunoinformatics research on the Indonesian virus isolate to support vaccine research, especially when the vaccine developed solely contain spike protein of SARS-CoV-2 to ensure good population coverage in terms of epitope recognition. MHC class II and MHC class I Epitopes from the spike proteins of four Indonesian isolates of SARS-CoV-2 in addition to OC43 and HKU1 hCoV were identified. These were compared for any similarity, of which none was found between the SARS-CoV-2 isolates and the hCoV samples, indicating that spike protein is highly diverse across coronaviruses. B cell epitopes were also identified, with even less similarity between all coronaviruses, suggesting that antibody generated from common cold human coronaviruses (hCov) infection will not cross react with the SARS-CoV-2 spike protein. This study identified 56 CD8+ T cell epitopes and 41 CD4+ T cell epitopes from the spike protein of SARS-CoV-2. The MHC class I and II epitopes derived from the spike protein of SARS-CoV-2 Indonesian isolates were found to have a 99.38% population coverage among the Indonesian Austronesian population, seven epitopes are identified as vaccine candidates because they are promiscuous with high binding affinities toward both HLA-Class I and HLA-Class II alleles. The epitopes with significant level of similarity to human self-peptides, originated from IgG, was identified within the spike protein of SARS-CoV-2. The presence of epitopes similar to human peptides in the vaccine might reduce vaccine immunogenicity or induce autoimmune, therefore it needs to be removed or modified in the vaccine. The epitopes identified in this study could be used as a starting point to investigate immune response toward SARS-CoV2 or COVID-19 vaccine in Indonesian population. The usage of these epitopes in vaccine formulation would firstly require further confirmation *in vitro*.