Immunoinformatic Approach for Epitope-Based Peptide Vaccine against Lagos Rabies Virus Glycoprotein G

Omar Hashim Ahmed[1], Arwa Abdelhalim[2], Sahar Obi[3], Khoubieb Ali Abd_elrahman[4], Ahmed Hamdi[5] and Mohammed A.Hassan[5].

1. Department of Pharmacology, University of Gazira, Faculty of Pharmacy, Medany, Sudan.
2. Sudan Medical Council, Sudan.
3. National Ribat University, Sudan.
4. University of Medical Science and Technology, Sudan.
5. Africa City of Technology, Sudan.
Correspondent Author: Omar Hashim, Ohashim221@gmail.com, 00249912683595.

Abstract

Background

Lagos rabies virus belongs to lyssavirus genus responsible for meningoencephalomyelitis in mammals that affect millions of people around the world and causes thousands of human deaths every year, to the best of our knowledge there is no peptide vaccine designed for Lagos rabies virus. The resulting peptide vaccine is expected to be more immunogenic and less allergic than conventional biochemical vaccines. The aim of this study was to design an Insilco peptide vaccine for Lagos rabies virus using Immunoinformatic tools.

Methods and Materials

Sequences of glycoprotein G of Lagos rabies virus was retrieved from NCBI, the retrieved sequences were then treated using different Immunoinformatic tools for B cell to find out the most conserved, surface and antigenic epitopes, and for T cell to find conserved peptides and to test their binding affinity to different MHC1 and MHC11 alleles. Then population coverage analysis and homology modeling was performed for most promising epitopes to show their structural positions in glycoprotein G.

Results and Conclusions

B cell tests were conducted for Bepipred with 22 conserved epitopes, Emini surface accessibility prediction with 12 conserved surface epitopes and Kolaskar and Tongaonkar antigenicity test with only three conserved epitopes being antigenic.

23 conserved epitopes were interacted with different MHC-1 alleles with (IC_{50}) ≤500 while 39 conserved epitopes interacted with MHC-II alleles with IC50≤ 1000.

Among all the tested epitopes for world population coverage the epitope **FVGYVTTTF** binding to both MHC1 and MHC11 alleles was 97.30% and it was found to bind 13 different alleles that indicate strong potential to formulate peptide vaccine for Lagos rabies virus.

Key Words

Immunoinformatic, Lagos Rabies Virus, Glycoprotein G, Lyssavirus, Peptide Vaccine, Epitope.