World Academy of Science, Engineering and Technology
International Journal of Pharmacological and Pharmaceutical Sciences
Vol:17, No:06, 2023

In silico and in vitro Investigation of the Role of Acinetobacter baumannii in the Pathogenesis of Multiple Sclerosis

Authors : Kieren Luellman, Makenzi Rockwell, Eduardo Callegari, Nichole Haag, Chun Wu

Abstract : Multiple sclerosis (MS) is an autoimmune disorder that damages the myelin sheath of neurons in the central nervous system. The presence of Acinetobacter bacteria and anti-Acinetobacter antibodies in MS patients has led to the hypothesis that the bacteria may contribute to MS pathogenesis. In this study, the protein sequences of Acinetobacter baumannii were compared to five peptides from three mammalian myelin proteins, i.e., Proteolipid Protein (PLP): PLP 139-151, PLP 178-191, Myelin Basic Protein (MBP): MBP 84-104 and Myelin Oligodendrocyte Glycoprotein (MOG): MOG 35-55 and MOG 92-106 respectively, known to induce experimental autoimmune encephalomyelitis (EAE), a condition similar to MS. We found 11 hits (i.e., with five or more amino acid sequence similarity) in Acinetobacter baumannii, which are identical or similar to PLP139-151, 32 hits to PLP178-191, 35 to MBP 84-104, 41 hits to MOG 35-55 and 26 hits to MOG92-106. In addition, Western blotting was used to assess possible interaction between the bacterial proteins and human anti-MBP, anti-MOG, and anti-PLP antibodies produced in rabbits, corresponding to MBP 84-104, MOG 35-55, and PLP 139-151, respectively. We found that both human Polyclonal anti-MOG antibody and anti-PLP antibody recognized a protein or more proteins of the same molecular mass of around 25 kDa. in Acinetobacter baumannii. The results suggested that this/these protein(s) might potentially serve as antigen(s) to induce anti-MOG antibody and anti-PLP antibody production in mammalian B cells. The proteomic study identified 433 hits, among which the sequence of Acinetobacter baumannii protein 491 subunit A matches a previously published enzyme Acinetobacter 3-Oxoadipate CoA-Transferase, in which a fragment of its peptide was observed to recognize MS patient serum via ELISA method. Our findings might pave the road to understanding one of the pathogenesis mechanisms of MS.

Keywords : multiple sclerosis, pathogenesis, Acinetobacter baumannii, antibody recognition
Conference Title : ICPP 2023 : International Conference on Pharmacy and Pharmacology
Conference Location : New York, United States
Conference Dates : June 05-06, 2023