Computational Exploration of Novel Biomarkers and Therapeutic Candidates for Bipolar Disorder

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Bipolar disorder (BD) is a chronic mental health condition marked by alternating mood episodes and associated with cognitive and functional decline. The basis biological of BD is poorly understood, which limits the development of effective and personalized treatments. Furthermore, creating new medications is both expensive and time-intensive. In this sense, drug repurposing through bioinformatics offers the potential to repurpose existing drugs approved for other medical conditions. Using an in silico approach, we identified potential therapeutic candidates for BD. We employed a systematic search method to identify and collect proteins that exhibited differential expression in proteomic studies of peripheral fluids (plasma and serum) from BD patients compared to healthy controls. These proteins were subsequently mapped to their corresponding genes, which were then analyzed to uncover biological functions and potential drugs associated with BD. Protein enrichment and drug repurposing analysis were conducted using ToppFun and statistical significance was determined through Bonferroni correction. We identified 182 differentially expressed proteins across 7 included studies. Enrichment analysis revealed that the primary biological processes related to BD were complement activation and blood coagulation. Additionally, drug repurposing analysis identified several potential therapeutic candidates for BD, including fenofibrate and bezafibrate (antilipemic agents), ibuprofen (a non-steroidal anti-inflammatory drug), and rosiglitazone (an anti-diabetic drug currently being tested in BD patients). Furthermore, the antipsychotic olanzapine, which is already used for treating schizophrenia and BD type 1, was also linked to the identified genes. The combination of proteomics data analysis with an in silico drug repurposing method demonstrates significant potential for identifying novel biomarkers and therapeutic candidates for BD. This integrated strategy could enhance treatment approaches and outcomes for individuals with BD.

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