

Using Association Rule Mining to Find Relations between the Neurobiology of OCD and Its Different Subtypes

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Obsessive-Compulsive Disorder (OCD) is a neuropsychiatric disorder that is characterized by recurrent and intrusive thoughts or images (obsessions) or intentional repetitive behaviors (compulsions). According to DSM-5 these obsessions and compulsions must be time-consuming and cause distress or impairment to be considered as OCD characteristics. OCD like many psychiatric disorders is a heterogeneous condition and OCD patients show different symptoms and respond differently to treatments, also OCD shares similar symptoms with other psychiatric disorders like anxiety disorder that may cause problems in diagnosis and treatment [1-3]. Studies in the recent decade have focused on the relation of phenotype-based subtypes of OCD with its neurobiology and how different subtypes respond to different treatments to resolve OCD heterogeneity [4]. For this purpose, some studies used Machine Learning and Data Mining methods to find neurobiological markers to define new subgroups for severity or treatment response prediction [4,5].

Association rule mining is a data mining method that can discover relations and correlations in large datasets in the form of if-then probabilistic statements. Association rule mining algorithms such as Apriori have been used in medical and psychiatry research. Some of these researches are: diagnosis and treatment of oral cancer in early stages [3], breast cancer detection [3], exploring associations among comorbidities of borderline personality disorder [3], explore the relationship between autism prevalence and lead mercury concentration, that provided a deeper understanding of autism pathogenesis [3]. In a recent study of OCD, the Apriori algorithm has been used to predict the response of different subgroups of OCD patients to Fluvoxamine treatment based on clinical variables [3]. The researchers chose this algorithm because it can handle OCD's vast amount of heterogeneous data and like other data mining methods can overcome some limitations of traditional data analyzing methods [3]. Data mining methods have been used for other heterogeneous disorders besides OCD. In a recent study, data mining methods were used to find strong relations of different clinical and laboratory variables with Pediatric Acute-onset Neuropsychiatric Syndrome (PANS) symptoms [6].

Based on the above-mentioned points, we hypothesize that by using association rule mining algorithms like the Apriori algorithm we can extract possible relations between the neurobiology of OCD and its different phenotype-based subtypes. For this purpose, we must have a dataset of OCD patients that includes OCD sub-type, and neurobiological data for each patient and apply algorithms on the dataset. We can use different neurobiological data that have been presumed to have a role in OCD in the form of neuroimaging, EEG, or other kinds of data. Found relations by algorithms can be investigated more by further research and can be used as features in machine learning algorithms like SVM to find possible neurobiological markers of OCD. We hope by finding different neurobiological markers by this method, we can define homogenous OCD subtypes that will help us to devise a better strategy for the treatment of OCD patients.

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OPEN ACCESS

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Received Date: 12 Dec 2020

Accepted Date: 24 Dec 2020

Published Date: 29 Dec 2020

Citation: Dadras A, Gharibzadeh S. Using Association Rule Mining to Find Relations between the Neurobiology of OCD and Its Different Subtypes. *J Neural Forecast*. 2020; 3(1): 1009.

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- Psychiatry. 2020.
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