Sex-Based Variations and Metabolic Patterns in Mental Health Disorders: Findings from MIMIC-IV

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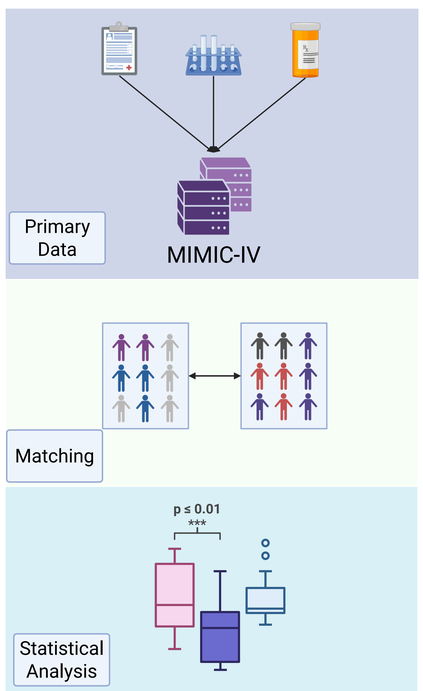
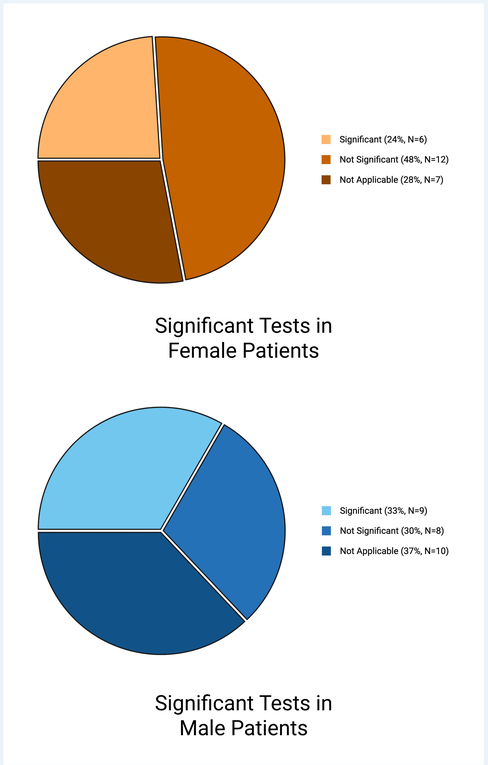
ABSTRACT

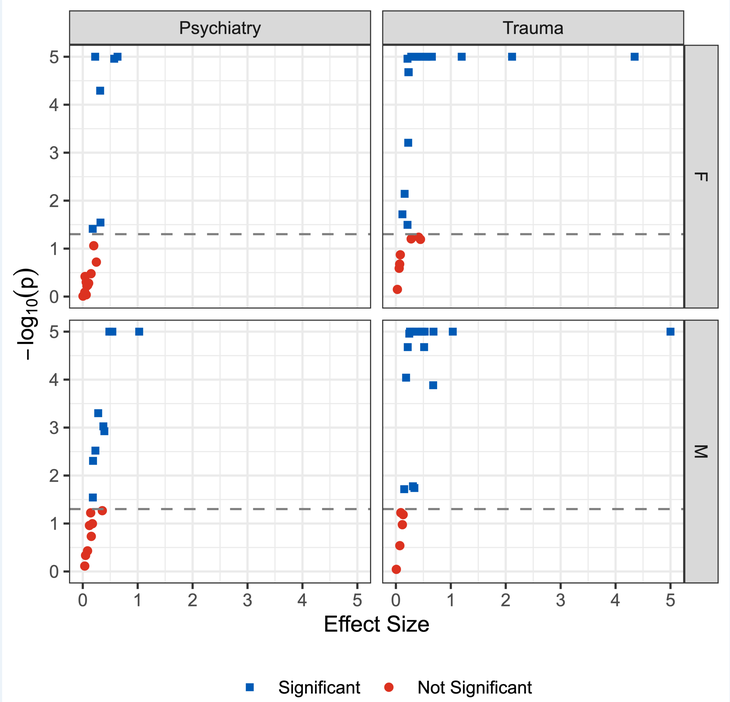
Introduction: Mental health disorders, including schizophrenia, major depressive disorder, and bipolar affective disorder, are significant contributors to global disability, collectively resulting in substantial reductions in quality-adjusted life years. While advancements in pharmacological treatments have improved symptom management, many of these therapies are associated with severe metabolic side effects, complicating long-term treatment and care. Understanding the metabolic disturbances shared across these conditions and their unique characteristics is crucial for improving patient outcomes.
Objectives: This study seeks to systematically evaluate the metabolic profiles of individuals with schizophrenia, major depressive disorder, and bipolar affective disorder compared to matched controls. Additionally, it aims to investigate sex-based differences in these profiles, providing insights into the interplay between sex, metabolic dysregulation, and mental health disorders.
Methods: Using the Medical Information Mart for Intensive Care (MIMIC-IV) dataset, this epidemiological study identifies cases based on ICD-10 diagnoses for schizophrenia, major depressive disorder, and bipolar affective disorder. Age- and sex-matched controls were selected from the database. Laboratory biomarkers were extracted, and their distributions were analyzed to characterize metabolic differences across conditions and between sexes.

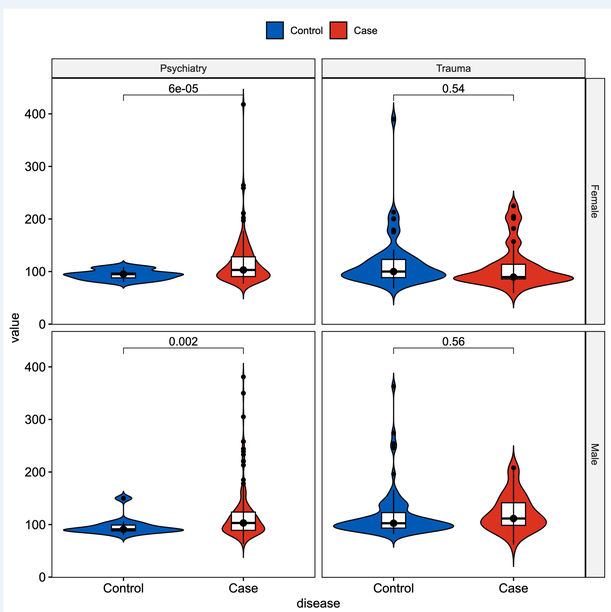
METHODS

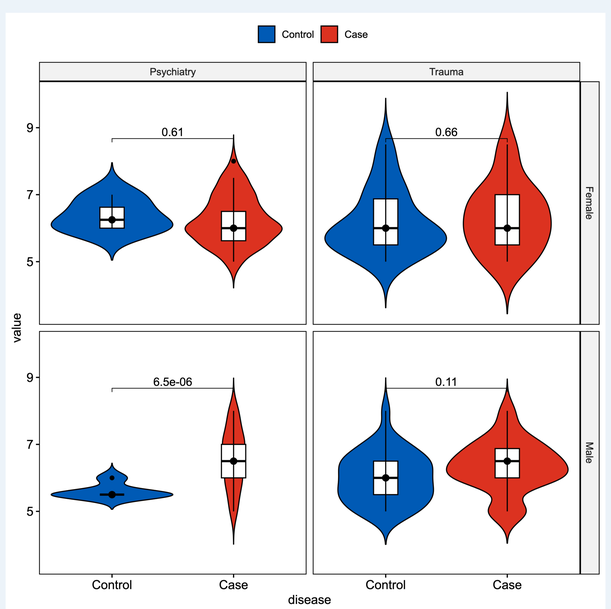


RESULTS









CONCLUSION

- We identified 7 metabolic markers that appear to be deranged in concert in Schizophrenia patients
- We found that there are considerable differences in both the quantitative values and the ranking by effect sizes between different lab measurements between males and females.
- There are distinct cluster between males and females of metabolic dysfunction.

Limitations

- A Major limitation of this study is the generalizability. The dataset comes from a single hospital and location, and which makes it difficult to generalize
- Another limitation comes from the fact that these are ER patients, where many metabolic disturbances could be explained by medication administration

Future Directions

This study has highlighted the potential of using multiple lab biomarker panels in quantifying diagnosis for schizophrenia. The next step in this study is to utilize these results to build a statistical model for prediction of disease state. This will then be followed by replication of this study in a larger cohort using one of the several Electronic Health Record databases for generalizability.
We also intend to expand this research to discover such laboratory panels for other psychiatric disorders, including Bipolar Disorder, Anxiety Disorders and Major Depressive Disorder.

ACKNOWLEDGEMENTS

- This research was made possible by the financial support of NIH under grants R01AG083628 and 5R01MH121102
- MIMIC-IV Dataset access provided by Johnson, Alistair, et al. "MIMIC-IV" on PhysioNet
- Conceptualization, data analysis and interpretation made possible with the help of everyone at the Cognitive Disorders Research lab
- Emotional Support provided by my Saadia Farooq, Romana Imami and Samara Imami
- Color Selection was done by Romana Imami