Depression exacerbates overactive bladder symptoms in women via the tryptophan-serotonin pathway

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Aim of study

To explore the impact of depression/anxiety on female overactive bladder (OAB) symptoms and identify psychological disorder-OAB metabolic mechanisms in mice.

Study design, materials and method

(1)Clinical :103 female OAB patients (2024.06-12) and 47 symptom-free controls were enrolled. OAB severity (OABSS , Overactive Bladder Syndrome Score), depression/anxiety (HAMA/HAMD , Hamilton Anxiety and Depression Scales) were assessed; correlations and symptom-severity stratification were analyzed.

(2)Animal and Metabolomics: Female mice underwent 21-day restrained stress (RS; 2h/d, ZT4-ZT6). Urine was analyzed via targeted multiple reaction monitoring (MRM) metabolomics for 33 neurotransmitters/derivatives.
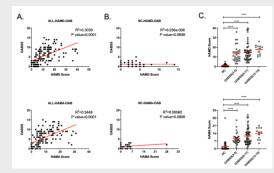
Results

(1) OAB patients showed positive correlations between depression/anxiety severity and OABSS (no correlations in controls); anxiety/depression levels increased significantly with OABSS-based severity stratification.(Figure 1)

(2) RS mice exhibited 8 altered neurotransmitters (e.g., serotonin/derivatives; fold change >1.5, p<0.05) and downregulated tryptophan metabolism (KEGG), suggesting RS may influence OAB via the tryptophan-serotonin pathway.(Figure 2)
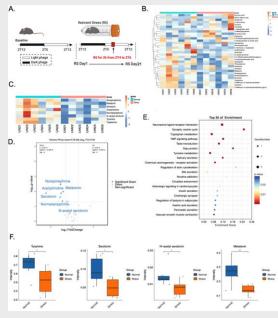
Conclusion

The presence of psychological disorders is high correlated with OAB symptom severity. The two identities shared interrelated metabolic pathways, which could be a potential therapeutic target not just for the regulation of bladder function, but also for the affective disturbance. Future studies are needed to explore the precise mechanisms between depression and OAB, with a focus on the tryptophan-serotonin pathway.

Figure 1. Correlation analysis between anxiety and depression scores and OABSS

Correlation analysis between HAMD/HAMA score and OABSS in OAB patients(A) and health controls(B). HAMD/HAMA score in grouped OAB patients(C).

Figure 2. Targeted neurotransmitter-metabolomics analysis of RS mice urine

(A) Experimental design schematic. (B) Neurotransmitter cluster analysis (NC vs. RS mice). (C) Heatmap of significantly altered neurotransmitters. (D) Volcano plot of differential neurotransmitters. (E) KEGG analysis. (F) Serotonin/derivative concentrations (NC vs. RS mice).