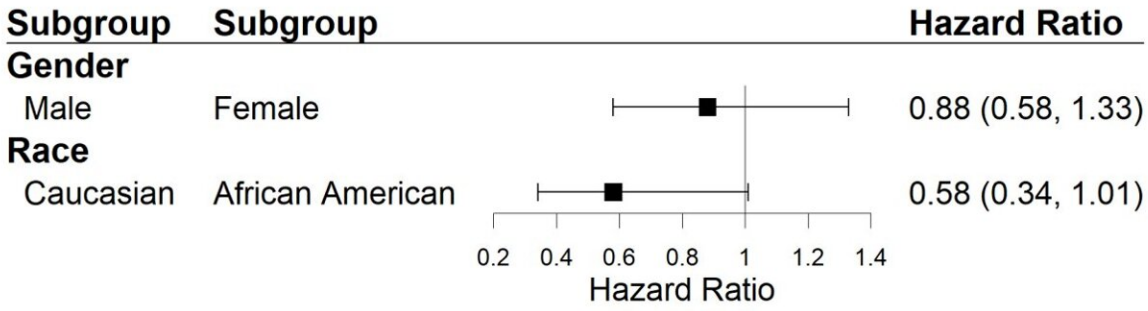
New study reveals ketamine could be effective treatment for cocaine-use disorders

February 20 2023



Comparison of gender and race in remission from CUD among patients taking ketamine as an antidepressant. Credit: *Addiction* (2023). DOI: 10.1111/add.16168

As cocaine use continues to climb across the United States, scientists have struggled to develop an effective pharmacological approach to treat the devastating disorder.

But by seamlessly combining artificial intelligence (AI), human intelligence, clinical testing and computer analysis, researchers at Case Western Reserve University have unearthed an existing option that appears to hold promise.

"Ketamine, a small synthetic organic molecule used clinically as an anesthetic and a depression treatment, was found to be associated with significant improvement in remission among people with cocaine-use disorders," said the study's corresponding author Rong Xu, professor of biomedical informatics and founding director of the Center for AI in Drug Discovery at the Case Western Reserve School of Medicine.

"This study is a great example of addressing an intractable problem by the creative use of AI using different sources of data," said study co-author Pamela Davis, the Arline and Curtis Garvin Research Professor at the School of Medicine. "It is our hope that this approach will suggest therapeutic approaches for other difficult problems."

The study was published in *Addiction*.

More than 2 million people in the U.S. regularly use cocaine, more than three times the number who take methamphetamine. Roughly one of every five drug overdose deaths in this country involves cocaine, and its consistent use contributes to an array of serious health issues—including heart attack and stroke. However, there is no U.S. Food and Drug Administration (FDA)-approved treatment for cocaine-use disorders.

Decades of research have found that existing medications such as antidepressants or stumulants have no meaningful effect, while others involve such small patient samples as to be years away from certain conclusions. Therapeutic interventions have yielded positive outcomes, but barriers such as cost, staffing and stigma significantly limit widespread adoption.

By developing novel AI-based drug discovery algorithms to identify promising candidates from all FDA-approved drugs, reviewing top drug candidates by expert panels of addiction experts such as the University of Cincinnati's T. John Winhusen, Xu and her colleagues determined

ketamine held the greatest potential to yield useful insights.

They evaluated the potential clinical effectiveness of ketamine on improving remission rates among patients with cocaine-use disorders by analyzing tens of millions of electronical health records. They found that cocaine-use disorder patients administered ketamine for pain or depression experienced two to four times higher remission rates.

While a few previous studies have found increased efficacy of ketamine in treating cocaine use disorder, the groups involved were largely homogenous. The Case Western Reserve study not only included greater diversity of participants by race and gender, but also those suffering from additional medical and psychiatric conditions.

While this study substantially strengthens the argument for the use of ketamine in treating cocaine-use disorder, the researchers emphasized that additonal clinical trials are required to assess ketamine's potential impact more thoroughly.

More information: Zhenxiang Gao et al, Repurposing ketamine to treat cocaine use disorder: Integration of artificial intelligence-based prediction, expert evaluation, clinical corroboration, and mechanism of action analyses, *Addiction* (2023). DOI: 10.1111/add.16168

Provided by Case Western Reserve University