

CARDIAC ELECTROPHYSIOLOGICAL CHANGES IN PATIENTS WITH METHAMPHETAMINE AND CANNABIS USE DISORDER: A COMPARATIVE ECG STUDY

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BACKGROUND AND AIM: Methamphetamine exerts strong sympathomimetic and direct cardiotoxic effects, whereas the electrophysiological impact of cannabis remains less clearly defined. This study aimed to compare electrocardiographic markers of cardiac depolarization and repolarization among individuals with methamphetamine use disorder, cannabis use disorder, and healthy controls.

METHODS: This cross-sectional study included 53 patients with methamphetamine use disorder, 54 with cannabis use disorder, and 51 healthy controls without substance use. The study was approved by the Institutional Ethics Committee (Approval No: 2023-15142). All participants underwent standard 12-lead electrocardiography. Analyzed parameters included corrected QT interval (QTc), QT dispersion (QTd), corrected JT interval (JTc), JT dispersion (JTd), Tp-e interval, Tp-e/QTc ratio, P-wave dispersion, frontal QRS axis, heart rate, PR interval, and fragmented QRS complexes (fQRS). Continuous variables were expressed as median (interquartile range) and analyzed using the Kruskal–Wallis test with Bonferroni-adjusted post hoc comparisons. Categorical variables were compared using chi-square or Fisher's exact tests.

RESULTS: Significant intergroup differences were observed in ventricular repolarization parameters. QTc values were significantly higher in the methamphetamine group compared with both cannabis users and controls ($p=0.004$). QT dispersion was increased in methamphetamine users compared with controls ($p=0.006$). JT dispersion showed the most pronounced difference, with significantly higher values in the methamphetamine group than in the other groups ($p<0.001$). The prevalence of fragmented QRS complexes was also higher in methamphetamine users compared with controls ($p = 0.032$).

CONCLUSIONS: Methamphetamine use is associated with prolonged QTc, increased QT dispersion, elevated JT dispersion, and a higher prevalence of fragmented QRS complexes, indicating increased arrhythmogenic potential. Cannabis use was not associated with significant electrocardiographic alterations compared with controls, although a trend toward greater repolarization heterogeneity was observed.

Keywords: Methamphetamine use disorder; cannabis use disorder; electrocardiography; ventricular repolarization; QT interval; JT dispersion; arrhythmia risk