

Abstract

Recent debate surrounds the potential therapeutic application of 3,4-Methylenedioxymethamphetamine (MDMA), a stimulant and hallucinogenic drug, in treating posttraumatic stress disorder (PTSD), a psychiatric disorder triggered by a traumatic event and characterized by symptoms such as anxiety, flashbacks, and anhedonia. MDMA's impact on the release of dopamine, norepinephrine, and serotonin suggests the potential to treat PTSD symptoms related to mood dysregulation. Specifically, its modulation of serotonin levels could help relieve anxiety and depression commonly experienced by PTSD patients. Brain-derived neurotrophic factor (BDNF) is a protein that plays a role in learning, memory, and synaptic plasticity and its dysfunction has been implicated in numerous psychiatric illnesses. Previous studies have shown that MDMA can alter BDNF levels in the hippocampus, although information surrounding its specific effects on the dorsal hippocampus (DH) is not well known. The impact of MDMA on BDNF levels in the amygdala, which is implicated in various anxiety disorders characterized by heightened fear responses (including PTSD), is similarly under-examined. Measuring expression of BDNF in the amygdala and DH may provide insight into how MDMA affects synaptic plasticity and neurogenesis relating to fear and memory, as well as contributes to a better understanding of its therapeutic capabilities. This study aimed to investigate the impact of MDMA on BDNF levels in the amygdalar complex (COA) and DH using a rat model. Adult male rats were administered either MDMA or saline prior to brain removal. BDNF gene expression was determined via RT-qPCR. Our findings indicated that acute MDMA exposure increased BDNF gene expression in both the COA and DH. As such, MDMA may exert its therapeutic effects on PTSD symptomology through its modulation of BDNF expression within the COA and DH. Future research projects may analyze BDNF expression after chronic MDMA exposure to establish long term biological effects prior to clinical use.