The effects of ± 3,4 methylenedioxymethamphetamine (MDMA, 'Ecstasy') on verbal and spatial memory

Kuypers KPC, Ramaekers JG
Department of Neurocognition, University of Maastricht, Maastricht

Introduction. A series of studies have shown a reduction in spatial and verbal memory of recreational and abstinent MDMA users. It is suggested that these deficits are a result of depleted 5HT levels in MDMA users. The present study aims to test this assumption by measuring memory performance of MDMA users during MDMA intoxication (5HT suppletion) and withdrawal (5HT depletion). Predicted was that MDMA would improve memory performance during intoxication and impair memory during withdrawal.
Methods. Eighteen experienced MDMA users, otherwise healthy volunteers, of both sexes (9♀; 9♂), aged 20-40 were recruited via advertisements in local newspapers. They were administered 75 mg MDMA, 20mg methylphenidate and placebo according to a double-blind, randomized design, during 3 separate periods of testing. A visual word learning task measuring immediate and delayed recall, and recognition, and a spatial memory task were conducted at 1, 5h (intoxication phase) and 25, 5h (withdrawal phase) post drug.
Results..Analysis revealed a nearly significant overall effect of drug on immediate recall score and a significant overall drug effect on delayed recall on day 1. While under influence of MDMA subjects remembered approximately 4 words less on immediate recall and 1 word less on delayed recall, compared with placebo. Analysis revealed a significant effect of drug on localisation error and reaction time on day 1. MDMA 75 mg increased the error by 1 mm and fastened reaction time by 200 ms, compared with placebo. Methylphenidate did not affect word learning or spatial memory. No treatment effects were found 25.5 h post-drug.
Conclusion. Results from the present study did not confirm the 5HT depletion hypothesis. MDMA impaired memory during intoxication but not during withdrawal. These results imply that memory performance in MDMA users is affected through other mechanism than 5HT suppletion/depletion alone. Candidate mechanisms are indirect or direct activation of post-synaptic 5HT2 and 5HT1a receptors.

Kim PC. Kuypers, Department of Neurocognition, University of Maastricht, Postbus 616, 6200 MD Maastricht, t 0031-43 388 1902; e-mail k.kuypers@psychology.unimaas.nl

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