Acute and Long-Term Behavioural Effects of MDMA in Adolescent Rats

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INTRODUCTION

Acute MDMA, even at low doses, increases social interaction in adult rats [1] while on the long-term its consumption produces a decrease in social interaction, an increase in anxiety and impaired object recognition memory [2, 3]. This study investigated whether MDMA has the same effects in adolescent rats. Additionally, we investigated whether the preference of adolescent rats for MDMA was mediated by social context.

METHODS

Adolescent male Wistar rats (postnatal day 36 +) were injected daily with MDMA (5 mg/kg, intraperitoneally) or saline for 2 blocks of 8 days. In block A locomotor activity and social interaction were measured using *Trackmate* software 20 minutes after injection, while in block B preference for MDMA in a social or alone context was investigated in the conditioned place preference (CPP) paradigm. Rats were placed in the CPP compartments in pairs (*social*) or with a toy rat (*alone*). The order of test paradigm was counterbalanced over rats. One month after the final drug injection, rats were tested in the social interaction, emergence and novel object recognition test.

RESULTS

MDMA did not acutely increase social interaction and rats dosed with MDMA showed increasingly less social interaction with repeated administration. MDMA caused an acute hyperactivity effect and had a sensitisation effect on activity over time. Rearing and play behaviour were decreased by the drug. MDMA did not have any long-term effects on social interaction, anxiety or object recognition memory.

Rats dosed with MDMA did not prefer the social conditioned side over the alone conditioned side in the CPP paradigm. Rats even showed a significant aversion to the social side during the second CPP period.

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DISCUSSION

Contrary to its social effects in adult rats, MDMA does not appear to increase social interaction in adolescent rats. However, the effects of MDMA on locomotor activity, rearing and social play are consistent with previously performed studies in adolescent rats [4-6].

The low dose regime used in present study did not cause long-term impairments in social behaviour, anxiety or memory performance. Past research did find a long-term decrease in social interaction in young rats [4, 7]. However, a different dose regime was applied. A comparable dose regime did lead to impairments in novel object recognition memory and increased anxiety in adult rats [3].

MDMA at a dose of 5 mg/kg is able to establish a place preference in adolescent rats [8]. Additionally, social play can create a place preference in juvenile rats [9]. However, since MDMA reduces play behaviour and because it cause hyperactivity, this might have led to the trend to an aversion of MDMA use in a social context.

CONCLUSIONS

MDMA did not cause the frequently observed acute increase in social interaction, but did lead to the typical pattern of hyperactivity, behavioural sensitisation, and decreased rearing and social play in adolescent rats. MDMA administration during adolescence had no long-term effects in adulthood. Therefore, our results might point to resilience to harmful effects of MDMA use in adolescent rats. The same might be true for use in adolescent humans.

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