SHORT REPORT

MDMA decreases sociability and aggression and increases anxiety in mouse model of agonistic behaviour

Karel Slais, Leos Landa, Alexandra Sulcova

Masaryk University Brno, Faculty of Medicine, Department of Pharmacology, Tomesova 12, 66243 Brno, Czech Republic.

Submitted: 2009-04-01 Accepted: 2009-04-21

Key words: **MDMA; sociability; aggression; anxiety; agonistic behaviour**

Act Nerv Super Rediviva 2009; **51**(1-2): 79–80 **PII:** ANSR51129S02

There are data available showing antiaggressive and anxiogenic-like effects of 3,4-methylen-dioxy-methamphetamine (MDMA; "ecstasy") in various animal models including the agonistic behaviour in mice (Maldonado & Navarro 2000; 2001; Navarro & Maldonado 1999; 2002; Fone 2005). We evaluated its acute effects on agonistic behaviour in singly-housed mice on paired conflict interactions with group-housed partners separately in those exhibiting at least one attack (aggressive mice) and those showing a lot of defensive/escape behaviour but no attack (timid mice). The latter animals are of retentive value in prediction of either anxiolytic or anxiogenic drug activity.

The model of agonistic behaviour used consists of dyadic social interactions of adult singly-housed male mice with non-aggressive group-housed partners in neutral observational cages. Analyzed are behavioural changes in 11 acts of 4 categories: sociable, timid, aggressive and locomotor. Behavioural elements recorded: sociable – social sniffing (Ss), following the partner (Fo), climbing over the partner (Cl); timid – defensive posture (De), escape (Es), alert posture (Al); aggressive – attack (At), aggressive unrest (threat) (Ur), tail rattling (Tr); locomotor – walk (Wa), rear (Re). As aggressive mice are considered animals exhibiting at least one attack and as timid mice exhibiting defensive-escape acts, but no attack in control interactions (vehicle treatment). In the present study, singly-housed mice were administered MDMA at the doses of 2.5 or 10 or 30 mg/kg or saline in the equal amount of 10 ml/kg, orally, 30 min prior to interactions provided one week apart. Paired interactions were videotaped and ethological analysis was performed by the observer using the system Observer 3.1 (Noldus Technology, Holland). For statistical evaluation Kolmogorov-Smirnov test of normality and Wilcoxon signed rank test, two-tailed were used.

In aggressive mice (n=29), MDMA in all tested doses caused significant inhibition of all aggressive activities with the significant decrease of sociability and increase of defensive-escape behaviour; the highest dose increased walking (***Table 1***). In timid mice

Table 1. Mean values for frequency (f) of behavioural acts (see the text). Differs from controls on Wilcoxon signed rank test, *P<0.05

Group	Treatment	Sociability (fSs+fCl+fFo)	Timidity (fDe+fEs+fAl)	Aggression (fTr+fUr+fAt)	Walking	Rearing
Aggressive mice	Saline	9.6	0.3	81.4	24.3	4
	MDMA 2.5 mg/kg	9.7	2.2*	20.3*	26.3	7.5
	MDMA 10 mg/kg	7.7	3.5*	1.8*	29.1	6.5
	MDMA 30 mg/kg	4.9*	5.1*	0.5*	42.7*	7.3
Timid mice	Saline	11.1	3.7	1.0	22.6	11.4
	MDMA 2.5 mg/kg	7.8*	5.2	0.1	23	14.6
	MDMA 10 mg/kg	4.1*	7.0*	0.1	23.8	6.3
	MDMA 30 mg/kg	2.5*	7.6*	0.1	35.3*	10.5

(n=20), the most significant changes were registered in increase of defensive-escape behaviour and decrease of sociable activities; just the highest dose stimulated significantly walking.

Our study confirmed suggestion of the Spanish group (Navarro & Maldonado 1999; 2002; Maldonado & Navarro 2000; 2001) about anxiogenic effects of MDMA in the model of agonistic behaviour but provided more precise evaluation, which revealed some differences in effects, elicited in categories of aggressive and timid singly-housed mice. We fully confirmed the antiaggressive effects and increase of defensive-escape behaviour in aggressive mice. The analysis of timid mice, which were not analysed previously, brought a more convincing evidence of anxiogenic effect of MDMA: an increase of defensive-escape behaviour and at the same time inhibition of sociability.

Acknowledgment: The work was supported by Czech Ministry of Education (MSM0021622404)

REFERENCES

1 Fone KCF, Bull, EJ, Porkess MV, Rigby M, Hutson PH (2005). S34 Long-Term Changes in Serotonergic Function Following Mdma Administration To Adolescent Rats. *Behav Pharmacol*. **16**(Suppl. 1): S11–S12.

2 Maldonado E, Navarro JF (2001). MDMA ("ecstasy") exhibits an anxiogenic-like activity in social encounters between male mice. *Pharmacol Res*. **44**(1): 27–31.

3 Maldonado E, Navarro JF (2000). Effects of 3,4-methylenedioxy-methamphetamine (MDMA) on anxiety in mice tested in the light-dark box. *Prog Neuropsychopharmacol Biol Psychiatry*. **24**(3): 463–72.

4 Navarro JF, Maldonado E (1999). Behavioral profile of 3,4-methylenedioxy-methamphetamine (MDMA) in agonistic encounters between male mice**.** *Prog Neuropsychopharmacol Biol Psychiatry*. **23**(2): 327–34.

5 Navarro JF, Maldonado E (2002). Acute and subchronic effects of MDMA ("ecstasy") on anxiety in male mice tested in the elevated plus-maze. *Prog Neuropsychopharmacol Biol Psychiatry*. **26**(6): 1151–1154.

48th Annual Psychopharmacol. Meeting, Jeseník Spa, January 2006.