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Long-term Consequences of Early Maternal Deprivation in Behavioral and Neurobiological Responses of Adult Rat

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S u m m a r y : Early maternal deprivation is considered as an animal model of early life stress and it is highly associated with a number of abnormalities in brain and behavior in adulthood. Therefore, the aim of this study was to investigate long term changes in specific behavioral and neurobiological parameters in maternal deprived (MD) rats compared to controls. Our study showed that early maternal deprivation stress may produce long term effects on various behavioral and neurobiological indices that are related to dopaminergic function.

INTRODUCTION

A single 24 hour period of MD has been associated with numerous brain and behavioral abnormalities during adulthood. The aim of this study was to investigate the MD-induced modifications of specific behavioral and dopaminergic related parameters in adult rats. The behavioral profile of MD rats was assessed using various behavioral procedures related to motor activity. In addition, the dopaminergic activity and the phosphorylation of a 32 kDa dopamine and cAMP-regulated phosphoprotein (DARPP-32) were estimated in discrete brain regions in MD and control animals.

METHODS

Wistar rat puppies were deprived from their mothers for a 24-h single period. Maternal deprived rats and controls were subjected to the following behavioral tests when aged 69-90 days. Spontaneous motor activity was recorded in an open field testing cage, using a computerized activity monitoring program. Moreover, behavioral response to d-amphetamine (d-amp) and various brain regions was estimated by High Performance Liquid Chromatography (HPLC). In these brain regions, total and phosphorylated DARPP-32 protein levels were assessed by Western blotting analysis.

RESULTS

MD rats showed an altered motor activity when compared to controls. Moreover, MD rats showed a differential response to d-amp and apo administration as compared to controls. In general, specific dopaminergic alterations were observed in the MD rats. Specific changes in total and phosphorylated DARPP-32 expression were observed along with the aforementioned behavioral and neurochemical parameters.

DISCUSSION

Present results have shown that early maternal deprivation stress may produce long term consequences in various behavioral and neurobiological indices. These effects are mainly related to motor activity and the dopaminergic function of specific brain regions involved in the pathophysiology of schizophrenia.

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