



Associations between maternal and offspring hair cortisol concentrations and child behavioral symptoms in pairs of children 18-48 months old and their mothers with and without perinatal mental disorders

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Introduction

Maternal perinatal mental disorders (PMD) are associated with developmental and behavioral problems in the offspring, probably mediated by the hypothalamic-pituitary-adrenal (HPA) axis. Increased cortisol concentrations during pregnancy and the perinatal period are related to alterations in stress responses of the offspring and with child behavioral and emotional problems, though such associations are still unclear.

Methods

We compared 16 mothers with a history of PMD and their children (46.7% girls; mean age in months 31.1 ± 8) with 30 aged-matched control mothers and their children (50.0% girls; mean age in months 34.9 ± 8.8). Participants of both groups were evaluated with a clinical interview, the Depression Anxiety Stress Scale (DASS-42) and the Child Behavior Checklist 1½-5 (CBCL 1½-5) questionnaires. We measured mother and child hair cortisol concentrations. To estimate cortisol levels, we used the automatic Electrochemiluminescence immunoassay "Cortisol II" in an automatic analyzer.

Objectives

- 1 Prevalence of children's (18-48 months) behavioral and emotional problems, whose mothers were diagnosed with PMD.
- 2 Associations of hair cortisol concentrations between pairs of mothers diagnosed with PMD and their children and mothers from a community sample and their children.
- 3 Associations between children's behavioral-emotional problems and hair cortisol of both the children and their mothers.

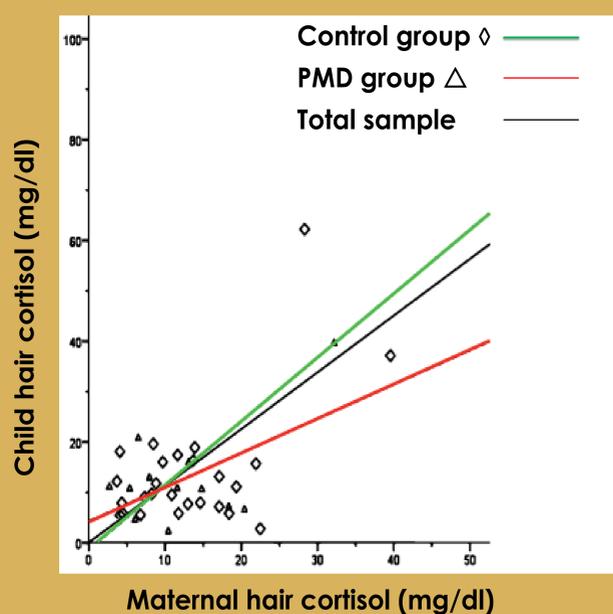
- 1 • Mothers of the PMD group scored significantly higher ADHD symptoms in their children (p=0.035) compared to the control group ones.

Comparison of CBCL dimensions between the two groups

	Control group (N=30)	PMD group (N=16)	p
	Mean (SD)		
Internalizing Problems	47.6 (11.5)	46.4 (11.6)	0,737
Externalizing Problems	46.7 (9)	49.6 (5.9)	0,256
Affective Problems	55 (6)	54.4 (5.8)	0,725
Pervasive developmental Problems	55.5 (6)	53.9 (7)	0,437
Attention Deficit/Hyperactivity Problems	52.2 (3.3)	54.8 (4.3)	0,035
Oppositional Defiant Problems	51.3 (1.9)	51.4 (3)	0,865

- 2 • A positive linear association between maternal and child hair cortisol was found in the total sample of mother-child pairs, as well as in the control group. However the association was not significant in the PMD group.

Mother-child correlation of hair cortisol levels



Results

- 3 • In the PMD group, T-scores of the "Anxiety / Depressed" scale correlated positively and significantly with child's hair cortisol concentrations whereas, T-scores of the "Aggressive Behavior" and the "Oppositional Defiant Problems" correlated positively and significantly with both maternal and child hair cortisol concentrations.

Correlation of hair cortisol levels with CBCL scale dimensions

	Maternal Cortisol		Child's Cortisol	
	r	p	r	p
Control Group				
Anxious/ Depressed	0.03	0.888	-0.14	0.501
Aggressive Behavior	-0.02	0.914	-0.12	0.571
Oppositional Defiant Problems	0.04	0.835	-0.09	0.661
PMD Group				
Anxious/ Depressed	0.29	0.328	0.57	0.042
Aggressive Behavior	0.61	0.028	0.67	0.013
Oppositional Defiant Problems	0.58	0.039	0.58	0.037

Conclusions

These findings suggest that a chronic dysregulation of maternal and child HPA axis and their associations in the PMD pairs may underlie the relations between chronic maternal stress and child behavioral and emotional problems and stress responses.

References

Karlén, J., Frostell, A., Theodorsson, E., Faresjö, T., & Ludvigsson, J. (2013). Maternal Influence on Child HPA Axis: A Prospective Study of Cortisol Levels in Hair. *Pediatrics*, 132(5), 1333-1340.
Stein, A., Pearson, R., Goodman, S., Rapa, E., Rahman, A., McCallum, M., et al. (2014). Effects of perinatal mental disorders on the fetus and child. *Lancet*, 384, 1800-1819.

