Early Human Development 109 (2017) 7–14

Contents lists available at ScienceDirect

Early Human Development

journal homepage: www.elsevier.com/locate/earlhumdev

The role of maternal anxiety and depressive disorders prior to and during pregnancy and perinatal psychopathological symptoms for early infant diseases and drug administration

Linda Krause [a,b], Franziska Einsle [a], Johanna Petzoldt [a], Hans-Ulrich Wittchen [a], Julia Martini [a,b,*]

[a] Institute of Clinical Psychology and Psychotherapy, Technical University Dresden, Germany
[b] Department of Child and Adolescent Psychiatry, Faculty of Medicine, Technische Universität Dresden, Germany

ARTICLE INFO

Article history:
Received 4 December 2016
Received in revised form 9 March 2017
Accepted 22 March 2017
Available online xxxx

Keywords:
Maternal anxiety disorders
Maternal depressive disorders
Perinatal distress
Inflammatory diseases
Gastrointestinal complaints
(anti-infective) medication

ABSTRACT

Background: Maternal mental health prior to and during pregnancy has been shown to be associated with inflammatory diseases and gastrointestinal complaints in the offspring. Unfortunately, many studies merely focused on perinatal distress without consideration of lifetime anxiety and depressive disorders.
Aims: To prospectively investigate associations of anxiety and depressive disorders prior to and during pregnancy as well as perinatal distress with infants' inflammatory diseases, gastrointestinal complaints and corresponding drug administration.
Study design: Prospective-longitudinal study initiated in 2009/2010.
Subjects: $N = 306$ (expectant) mothers with and without DSM-IV lifetime anxiety and depressive disorders (Composite International Diagnostic Interview for Women) and low vs. high severity of psychopathological symptoms during pregnancy (Brief Symptom Inventory) enrolled in early pregnancy and repeatedly assessed during peripartum period.
Outcome measures: Infant inflammatory diseases, gastrointestinal complaints and drug administration assessed via questionnaire (maternal report) at four months postpartum ($n = 279$).
Results: Severe psychopathological symptoms during pregnancy were associated with inflammatory diseases and anti-infective medication, whereas anxiety and depressive disorders prior to and during pregnancy were related to gastrointestinal complaints (diarrhea, colic complaints) and corresponding medication.
Conclusions: These results have to be discussed with caution, because information on infants' diseases were based exclusively on maternal self-reports. However, they suggest promising directions regarding our current knowledge about the relevance of maternal perinatal distress for infant inflammatory diseases (e.g. fetal programming). Moreover, the association between maternal anxiety and depressive disorders and infant gastrointestinal complaints may be explained by an anxious misinterpretation of 'normal' infant signals or a transmission of adverse gut microbiota, respectively.

1. Background

Infant inflammatory diseases and gastrointestinal complaints are very common during early infancy, rank among the most frequent reasons to consult a pediatrician or for hospitalization [1] and are associated with (chronic) morbidity of the offspring in later life [2] as well as disadvantageous economic and social development [3].

Previous studies revealed evidence for a relation between prenatal maternal distress and anxiety or depressive symptoms with infant inflammatory diseases such as infectious [4–9], skin diseases [5,10,11] and digestive illnesses [5,7,12]. Regarding gastrointestinal complaints, a link between maternal depression and infant diarrhea was recently discussed [12] and a number of studies have shown that infants' colic complaints are associated with maternal distress [13], anxiety [14,15] and depression [16].

Unfortunately, many studies merely focused on perinatal distress without consideration of lifetime anxiety and depressive disorders. Studies that considered anxiety and depression assessments were

Abbreviations: no AD, no anxiety nor depressive disorder; pure D, pure depressive disorder; pure A, pure anxiety disorder; comorbid AD, comorbid anxiety and depressive disorders; CIDI-V, Composite International Diagnostic Interview for Women; BSI, Brief Symptom Inventory; GSI, Global Severity Index.

* Corresponding author at: Department of Child and Adolescent Psychiatry, Technische Universität Dresden, Schubertstraße 42, 01307 Dresden, Germany.
E-mail addresses: Linda.Krause@mailbox.tu-dresden.de (L. Krause), franziska.einsle@srh-gesundheitshochschule.de (F. Einsle), johanna.petzoldt@tu-dresden.de (J. Petzoldt), hans-ulrich.wittchen@tu-dresden.de (H.-U. Wittchen), julia.martini@tu-dresden.de (J. Martini).

http://dx.doi.org/10.1016/j.earlhumdev.2017.03.009
0378-3782/

executed mostly via dimensional questionnaires [4–10,13,15,16] rather than ICD or DSM criteria [12,14]. Moreover, no study considered maternal anxiety and depressive disorders prior to pregnancy so far. Overall, the results remain conflicting with some studies finding no relation between maternal prenatal distress, anxiety and depression with infant infectious diseases [12] and digestive illnesses [4].

Given the evidence that infants of anxious mothers are more likely to receive medication [4] and the fact that an uncritical or even unnecessary prescription of antibiotics might be attended by an increase of bacterial resistances/reduced bacterial diversity [17], infants' medication should also be considered in research studies.

Thus, this prospective-longitudinal study aims to examine the relations between maternal anxiety and depressive disorders prior to and during pregnancy and severe perinatal psychopathological symptoms with infants' inflammatory diseases, gastrointestinal complaints and drug administration four months postpartum. Given the evidence that infants' diseases can also be associated with other factors such as maternal age [15,18], socioeconomic status [15,19], parity [15,20], infant sex [18], birth weight [18], gestational age [18], mode of delivery [21] and breast-/formula feeding [22], these variables are considered as control variables in this study. Since maternal report of infant diseases and drug administration may be biased by current maternal psychopathological burden, analyses are furthermore controlled for current anxiety and depressive disorders and severe psychopathological symptoms four months postpartum.

2. Methods

2.1. Study design

In the prospective-longitudinal Maternal Anxiety in Relation to Infant Development Study (MARI-Study) [23] $N = 306$ (expectant) mothers were recruited during the first trimester of pregnancy in the area of Dresden from January 2009 until June 2010. Assessments were conducted in approximately two-month intervals (T1: week 10 to 12 of gestation, T2: week 22 to 24 of gestation, T3: week 35 to 37 of gestation, T4: 10 days after delivery, T5: 2 months after delivery, T6: 4 months after delivery) and additionally one year later (T7: 16 months after delivery). All mothers (and other legal guardians) provided written informed consent after the study aims and procedures were fully explained. Further information about design, aims, methods and assessments of the study can be found elsewhere [23].

2.2. Participants

A total of $N = 533$ pregnant women were approached and screened for inclusion (gestational age < 12 weeks, age: 18–40 years) and exclusion criteria (multiple pregnancy, history of >3 spontaneous abortions/(induced) terminations of pregnancy/still births or infant impairment, invasive fertility treatment, severe physical disease of the expectant mother, substance abuse or heroin substitution, severe psychiatric

Table 1
Sample characteristics of women with ($n = 279$) and without ($n = 27$) information on infants' inflammatory diseases, gastrointestinal complaints and drug administration.

	Reached after delivery, infant health information available ($n = 279$)		Not reached after delivery a/o infant health information not available ($n = 27$)		Group differences[#]
Maternal Age (years) (M, SD)	28.2	4.4	26.6	4.0	$t = 1.77$ $p = 0.077$
Education (n, %)					
No degree or 9th grade	17	6.1	4	14.8	$Chi^2 = 3.84$
10th grade	69	24.7	8	29.6	$p = 0.279$
High school	103	36.9	7	25.9	
University	90	32.3	8	29.6	
Marital status (n, %)					
Married	102	36.6	11	40.7	$Chi^2 = 1.09$
Not married	167	59.9	16	59.3	$p = 0.581$
Separated/widowed/divorced	10	3.6	0	0.0	
Current occupation (n, %)					
Employed	162	58.3	11	40.7	$Chi^2 = 7.77$
Unemployed	24	8.6	6	22.2	$p = 0.100$
Housewife	14	5.0	3	11.1	
Student	61	21.6	5	18.5	
Other	18	6.5	2	7.4	
Monthly household income after taxes (n, %) <500 €	19	6.8	4	14.8	$Chi^2 = 3.07$[a]
500 to 1500 €	98	35.1	9	33.3	$p = 0.689$[a]
1500 to 2500 €	85	30.5	8	29.6	
2500 to 3500 €	52	18.6	3	11.1	
3500 to 4500 €	18	6.5	2	7.4	
>4500 €	7	2.5	1	3.7	
Parity (n, %)					
Primiparous	165	59.1	13	48.1	$Chi^2 = 1.22$
Multiparous	114	40.9	14	51.9	$p = 0.269$
Infant birth weight (grams) (M, SD)	3445.4	446.9	n.a.	n.a.	n.e.
Gestational age (weeks) (M, SD)	39.5	1.3	n.a.	n.a.	n.e.
Mode of delivery (n, %)					
Spontaneous vaginal delivery	221	79.2	n.a.	n.a.	n.e.
Assisted delivery/C-section	58	20.8	n.a.	n.a.	
Infant sex (n, %)					
Female	135	48.4	n.a.	n.a.	n.e.
Male	144	51.6	n.a.	n.a.	
Exclusive Breastfeeding until 4 months (n, %)					
Yes	215	77.1	n.a.	n.a.	n.e.
No	64	22.9	n.a.	n.a.	

(n) number, (%) percentage, (M) mean, (SD) standard deviation, (n.a.) not available, (n.e.) not estimated.
[#] Pearson's chi-squared test or two-sample mean-comparison test.