Journal of Affective Disorders 188 (2015) 252–256

Contents lists available at ScienceDirect

Journal of Affective Disorders

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

Short Communication

Infant outcomes following treatment of antenatal depression: Findings from a pilot randomized controlled trial

Elena Netsi [a,e], Jonathan Evans [b,e], Katharina Wulff [c,e], Heather O'Mahen [d,e], Paul G. Ramchandani [d,e,*]

[a] Department of Psychiatry, University of Oxford, Oxford, UK
[b] School of Social and Community Medicine, University of Bristol, UK
[c] Nuffield Laboratory of Ophthalmology, Nuffield Department of Clinical Neurosciences, University of Oxford, Oxford, UK
[d] Mood Disorders Centre, University of Exeter, Washington Singer Building, Exeter, UK
[e] The Centre for Mental Health, Imperial College London, UK

ARTICLE INFO

Article history:
Received 6 March 2015
Received in revised form
21 July 2015
Accepted 27 August 2015
Available online 29 August 2015

Keywords:
Perinatal mood disorders
Psychological therapies
Infant bio-behavioural organisation
Infant sleep
Infant temperament
RCT

ABSTRACT

Introduction: Maternal antenatal depression is associated with an increased risk of emotional and behavioural problems in children. More recently antenatal depression has been associated with shorter sleep duration, higher number of awakenings and sleep problems in infants. Examining the effect of treatment of depression on child development is the next step in unravelling the complex association between antenatal depression and offspring development.

Methods: We used data from a pilot RCT of women with antenatal depression who received either Cognitive Behavioural Therapy (CBT) or Treatment as Usual (TAU), to examine infant sleep duration and temperament two months postpartum. Data was available for $n=14$ in the CBT group and $n=11$ in the TAU group.

Results: No differences by treatment arm were evident. Improvement in depression scores during pregnancy was associated with easier temperament ($\beta=-.45$, $p=.024$) and shorter nocturnal sleep duration ($\beta=-.58$, $p=.003$). The findings were more pronounced in the CBT group compared to the TAU group.

Limitations: This was a pilot RCT and as such the sample size was small and there was some loss to follow up between the baseline and postnatal assessment.

Conclusion: Improvement in antenatal depressive symptoms may have beneficial effects for the infant; whether these are directly through effects on foetal development or indirectly through changes in the postnatal mother–infant relationship remains to be determined.

1. Introduction

There is accumulating evidence suggesting that children exposed to antenatal anxiety or depression are at higher risk of emotional and behavioural problems at 4 and 7½ years of age and antisocial behaviour at 16 years of age (Bergman et al., 2007; Hay et al., 2010; O'Connor et al., 2003; Stein et al., 2014). More recently, antenatal depression has been associated with earlier markers of disturbed development including infant sleep, measured as shorter sleep duration, more night awakenings and sleep problems (Armitage et al., 2009; O'Connor et al., 2007). Early disturbances in sleep, may place infants at increased risk of emotional and behavioural problems (Sivertsen et al., 2015) and delayed language development (Dionne et al., 2011) as well as persistent sleep disturbances. A recent longitudinal study reported that infants with 3–4 awakenings at 6 months were at 6 times higher risk for awakenings at 18 months, and infants sleeping ≤ 10 h at 6 months were at 14 times higher risk of sleeping ≤ 10 h at 18 months (Hysing et al., 2014). The effects of antenatal depression on child development are complex particularly due to the interacting genetic, epigenetic and environmental mechanisms that are in play, and have been attributed in part to the "programming effects" of antenatal depression on the developing foetus.

To date, all published studies examining the association between antenatal depression and infant sleep and behaviour have been observational in nature and to a certain extent have informed us on the temporal order of risk (antenatal depression) and outcome (infant sleep and behaviour). Examining the effect of treatment of depression on child development is the next step in

* Corresponding author at: The Centre for Mental Health, Imperial College London, 7th Floor Commonwealth Building, London W12 0NN, UK.
E-mail address: p.ramchandani@imperial.ac.uk (P.G. Ramchandani).

http://dx.doi.org/10.1016/j.jad.2015.08.055
0165-0327/

unravelling the complex association between antenatal depression and offspring development and establishing whether the association is causal. Research in animals has already demonstrated the potential reversibility of stress effects through careful manipulation of stress levels during pregnancy and cross-fostering of offspring (Weaver et al., 2004).

One treatment trial has examined infant development following treatment of depression in the ante- and post-natal periods using an adapted CBT model (Rahman et al., 2008). Significant differences were evident in parenting practices. This trial, however, incorporated the intervention in both the ante- and postnatal periods and so it is difficult to delineate specific effects of treatment of depression during pregnancy alone (Rahman et al., 2008). Addressing antenatal depression may prevent the development of later interruptions to mother–infant interaction, attachment, and maternal responsiveness in the postnatal period, all of which have been shown to affect later development (Murray et al., 2009; Pearson et al., 2012; Stein et al., 2012). Due to the currently limited knowledge of the effect of antidepressants on the developing fetus (El Marroun et al., 2012; Fenger-Grøn et al., 2011; Hendrick et al., 2003) and to the lower acceptability of pharmacological treatment (Freeman, 2007) understanding the effects of psychological treatment on child development are critical.

This is the first trial of treatment of antenatal depression to examine child outcome. This is a pilot randomised controlled trial (RCT) of cognitive behavioural therapy (CBT) for antenatal depression examining infant outcome 2 months postpartum. Although this pilot trial was not powered to provide a definitive test of the effect of treatment on child outcome, it does provide some preliminary evidence. The present report examines whether (a) there are differences in infant sleep and temperament at 2 months of age in two groups of antenatally depressed women, receiving CBT vs. TAU, and (b) whether improvement in depressive symptoms with treatment is associated with infant sleep and temperament. We hypothesised that improvement in maternal depressive symptoms would be associated with easier temperament and longer sleep duration.

2. Methods

This pilot RCT assessed the feasibility of CBT treatment of depression during pregnancy (ISRCTN44902048). The design, analysis of primary outcome, and description of the sample have been reported in detail elsewhere (Burns et al., 2013). In total, $n=154$ screened positive on the Whooley 3-question screen for depression, of which $n=101$ (65.5%) were invited to take part and $n=86$ (55.8%) gave consent for future contact. Fifty three women were not invited to take part; reasons given by the midwives included 'woman too unwell for CBT', 'misperceptions about the remit of CBT' and some midwives did not directly screen using the Whooley questions on the basis that things were going well for the woman as assessed in the booking appointment (Burns et al., 2013). Thirty six women (23.4%) were excluded (main reasons: declined participation after phone contact/before baseline, were over 18 weeks gestation and miscarriage). Fifty women (32.5%) were assessed for eligibility ($n=13$ did not meet inclusion criteria and $n=1$ declined to be randomised). Thirty six women (23.4%), meeting criteria for depression on the Clinical Interview Schedule (CIS-Revised version) (Lewis et al., 1992), were randomised to TAU or CBT plus TAU. The CBT intervention consisted of 12 individual sessions at the woman's home. Women in the Treatment as Usual arm continued to receive usual care from the GP and midwife. Allocation to treatment arm was done through a central randomisation service, accessed via the internet and using computer generated code. Research assistants conducting baseline and follow-up assessments were blind to group allocation. In the CBT group 2 were lost to follow-up and 2 did not complete postnatal questionnaires. In the TAU group 4 were lost to follow-up, 2 withdrew and 1 did not complete the postnatal questionnaires. Twenty five women completed postnatal questionnaires on their infants' sleep and temperament (CBT $n=14$ TAU $n=11$). The sample presented with similar demographic characteristics across treatment arms for age (CBT $m=28.2$ years, SD=5.0 TAU $m=30.1$ years, SD=6.2), educational qualifications ('O' level or equivalent and above CBT 83.3% and TAU 88.9%) and severity of depressive episode (CBT mild 55.5%, severe 27.8% and TAU mild 55.5%, severe 27.8%). Sample characteristics are reported in detail in Burns et al. (2013).

There were no differences in infant gender, infant age or birth weight between the two groups (male: CBT $n=8$, TAU $n=4$, $\chi^2(1)=.28$, $p=.701$; Child age-CBT M(weeks)=8.5, SD=3.5 TAU M (weeks)=9.5, SD=7.4, $t(22)=.523$, $p=.666$; birth weight-CBT M (gr)=3422.69, SD=503.33 TAU M(gr)=3180.21, SD=871.7, t (22)=−.916, $p=.371$). There were no differences in baseline depression scores and maternal age between participants with complete data and those lost to follow-up ($t(34)=.91$, $p=.369$, t (34)=−0.41, $p=.683$). There were also no differences in maternal education levels ($\chi^2(3)=3.7$, $p=.29$), or socio-economic status, ($\chi^2(7)=2.41$, $p=.934$) as assessed by maternal occupation.

The Edinburgh Postnatal Depression Scale (EPDS), is a well validated and widely used questionnaire (Cox et al., 1987). It was administered to women at baseline (Time 1), at the end of treatment (15 weeks post randomisation – Time 2) and 2 months postnatally (33 weeks post randomisation – Time 3). Change in depressive symptoms from baseline to post-treatment was calculated by subtracting the scores post-treatment from the baseline scores (Time 1–Time 2). A higher score on this variable indicates a decrease in depressive symptoms and a negative score an increase in depressive symptoms.

Maternal reports on the fussy-difficult factor from the Infant Characteristics Questionnaire were used to assess infant temperament (Bates et al., 1979) 2 months postpartum. This is a 9 item scale and a higher score on the questionnaire indicates a more difficult/demanding infant.

The Brief Infant Sleep Questionnaire (BISQ) was used to record infant sleep (Sadeh, 2004). We focused on nocturnal sleep duration (7 pm–7 am); 2) daytime sleep duration (7 am–7 pm) and 24 h period sleep duration (calculated by adding the nocturnal and daytime sleep duration and subtracting duration of wakefulness during night hours).

A 3-step analysis was undertaken: first, differences in infant sleep and temperament were examined by treatment arm (CBT vs. TAU, Table 1). Second, associations between change in antenatal depressive symptoms and infant outcomes were examined (these were also examined by treatment arm separately). Third, regression models were used to control for postnatal depression.

3. Results

Differences in infant outcome were examined by treatment arm (Table 1). In this small sample size, the differences did not reach statistical significance although they did indicate some large effect sizes for sleep duration over the day (Cohen's $d=.79$) and 24 h period ($d=.80$).

Associations between change in maternal depression scores, and infant temperament and sleep were examined using linear regression models. An improvement in depression scores was associated with lower scores on the difficult temperament scale $\beta=-.45$, $p=.024$, 95%CI[−1.18, −.09], and shorter nocturnal sleep duration $\beta=-.58$, $p=.003$, 95%CI[−.38, −.09]. There was a