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Antenatal depression and hematocrit levels as predictors of postpartum depression and anxiety symptoms

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ABSTRACT

The aim of this study is to delineate the risk factors of antenatal depression and its consequences, including postnatal depression, and to examine whether the hematocrit (Hct) is associated with maternal depression. The Edinburgh Postnatal Depression Scale (EPDS), Spielberger's State Anxiety Inventory (STAI), Kennerley and Gath Maternity Blues Assessment Scale (KGB), Beck Depression Inventory (BDI) and Hamilton Depression Rating Scale (HAMD) were assessed at the end of term (T1) and 2–3 days (T2) and 4–6 weeks (T3) after delivery in 126 women with and without antenatal depression. The Hct was measured at T1. Antenatal depression was significantly predicted by lifetime depression and premenstrual syndrome and less education. Antenatal depression was not associated with obstetric or neonatal outcomes. Antenatal depression symptoms strongly predict depression and anxiety symptoms at T2 and T3. The EPDS, KGB, STAI and BDI, but not the HAMD, scores, were significantly lower at T3 than before. The incidence of depression significantly decreased from T1 (23.8%) to T2 (7.8%) and T3 (5.3%). T1 Hct values significantly predicted the T3 postnatal EPDS, STAI, KGB and BDI scores. Delivery significantly improves depression and anxiety symptoms. Increased Hct in the third trimester is a biomarker of postpartum depression and anxiety symptoms.

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1. Introduction

Maternal depression, a type of depression that occurs from conception to 6 months after delivery, is one of the leading causes of morbidity with respect to maternal functioning and neonatal outcomes. These conclusions are drawn from reviews (British Psychological Society, 2014; Gentile, 2015; Khalifeh et al., 2015; Rai et al., 2015), a National US survey on 14,549 mixed-race women in the USA (Vesga-López et al., 2008), and studies on the impact on child's development (Parsons et al., 2012; Stein et al., 2014) and marital relationship (Beestin et al., 2014; Khan, 2011; Khan et al., 2009). Postpartum depression is a subtype of maternal depression, which shows a clinical picture that is quite similar to that of non-puerperal major depression (Burns, 2003; Nonacs and Cohen, 1998). Postpartum depression occurs in 10–28% of women within

3 months after delivery as described in different studies including a systematic review (Brockington, 2004), a study that delineated the point prevalence rate during pregnancy and the postnatal period using the adapted Structured Clinical Interview for DSM Disorders (DSM) and the Edinburgh Postnatal Depression Scale (EPDS) in 296 women from 10 sites in 8 countries (Gorman et al., 2004), and recent cross-sectional studies (Evagorou et al., 2015; Falah-Hassani et al., 2015; Gavin et al., 2005; Rai et al., 2015; Roomruangwong and Epperson, 2011; Stuart-Parrigon and Stuart, 2014).

While the phenomenology and risk factors of postpartum depression are quite well-established, relatively less research has focused on antenatal depression. The incidence rate of antenatal depression is very broad and depending on the studies is estimated to be between 10% and 66% (Cankorur et al., 2015; Srinivasan et al., 2015; Yusuff et al., 2015; Zeng et al., 2015). To the best of our knowledge, no specific instrument was developed to assess prenatal depression. Many authors, however, use the EPDS, which was primarily developed to assess postnatal depression, to score

severity of antenatal depression and to make the diagnosis of antenatal depression with good sensitivity and specificity for major depression (Ji et al., 2011; Martins et al., 2015; Pearlstein, 2015). Also, the Beck Depression Inventory (BDI) and the Hamilton Depression Rating Scale (HAMD) scores are useful instruments to make the diagnosis of prenatal depression (Ji et al., 2011).

Some studies have described socio-demographic and clinical risk factors for antenatal depression (Biaggi et al., 2015). For example, the risk toward antenatal depression is increased in women with a precarious legal or economic status, including financial worries, lack of social support, a history of abortion and an irregular menstrual cycle (Yusuff et al., 2015; Zeng et al., 2015). Protective factors are younger age, good partner relationship and wanted delivery (Zeng et al., 2015).

Recent studies, reviews and meta-analyses show that antenatal depression together with previous depressive episodes strongly predict the occurrence of postpartum depression (Beck, 1996; Field et al., 2010; Nonacs and Cohen, 2003; Stewart et al., 2003). Cankorur et al. (2015) reported that antenatal depression persisted after delivery in 49.7% of the women, while new onset postpartum depression developed in 13.9% of the parturients (Cankorur et al., 2015). Antenatal depression may additionally be associated with an increased risk of an operative delivery although this association becomes less significant after controlling for body mass index (BMI) (Hu et al., 2015). There is a significant association between antenatal depression symptoms and emergency Cesarean delivery even after controlling for smoking, BMI and other variables (Bayrampour et al., 2015). Antenatal depression symptoms may also interfere with fetal growth trajectories and contribute to a worse neonatal outcome, including lower baby birth weight (Henrichs et al., 2010). On the other hand, no significant associations were observed between antenatal depressive symptoms and Apgar scores 1 and 5 min after delivery (Grigoriadis et al., 2013).

Major depression is accompanied by activation of immune-inflammatory pathways as indicated by a mild chronic inflammatory state and cell-mediated immune activation (Leonard and Maes, 2012; Maes et al., 1993). These processes are frequently associated with secondary changes in the erythron and iron metabolism causing for example lowered hemoglobin, hematocrit (Hct) and iron levels (Maes et al., 1996; Rybka et al., 2013). Activated immune-inflammatory pathways are also detected in postnatal depression while immune biomarkers at the end of term may predict future postnatal depression (Anderson and Maes, 2013; Osborne and Monk, 2013). A few data showed inverse associations between lowered hemoglobin levels and postpartum depression (Corwin et al., 2003; Goshtasebi et al., 2013).

The aims of this study were to delineate the associations between 1) antenatal depression and socio-demographic (age, education, income, marital status, unwanted pregnancy) and clinical (parity, number of pregnancies, life-time history of depression, premenstrual tension syndrome (PMS) and postpartum depression) risk factors; 2) antenatal depression and obstetric (Caesarian intervention, blood loss, labor duration, delivery complications) and neonatal outcomes (Apgar score, baby length; 3) antenatal depression and mental health in the postpartum period (postpartum blues, postpartum depression and anxiety symptoms); and 4) Hct/mean corpuscular volume (MCV) at the end of term and depression and anxiety symptoms before and after delivery with the a priori hypothesis that perinatal depression is accompanied by a lowered Hct.

2. Subjects and methods

2.1. Subjects

We recruited pregnant subjects at an antenatal care clinic from September to November 2014. The pregnant women were eligible for this study if they 1) were 18 years of age or older, 2) planned to give birth and attend postpartum follow up at our hospital, and 3) were able to read and write the Thai language. Exclusion criteria included patients with urgent medical or obstetric condition (s) that impeded their ability to complete the questionnaires. Subjects with positive HIV or VDRL serology were excluded from the study. Of 200 patients screened, 126 met eligibility criteria (mean age=29.3 years, SD= ± 6.5) and were included in the analysis. Of the 74 women who were excluded, 12 were younger than 18 and 62 planned to give birth at other hospitals outside Bangkok. This study was approved by the Ethics Committee of the Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand and written informed consent was obtained from all subjects.

2.2. Measurements

The subjects were evaluated at 3 time points; i.e. 1) third trimester pregnancy (T1), 2) 2–3 days after delivery (T2), and 3) 4–6 weeks after delivery (T3) by means of clinical assessments (psychiatric and obstetric) and questionnaires. At T1, the subjects completed a questionnaire to obtain demographic information (including age, marital status, religion, education, occupation, habitat, monthly income and whether they evaluate their income as adequate). At T1, all subjects completed a questionnaire with medical and obstetrics information including age of menarche, menstrual pattern, history of dysmenorrhea, substance use, history of abortion, etc. All subjects were assessed using the Mini International Neuropsychiatric Interview (MINI)-Thai version by a psychiatrist. Using the MINI we made the diagnosis of a "lifetime" history of Axis I mood disorders, including a lifetime history of depression (which persisted longer than 2 weeks), depression after childbirth, dysthymia, anxiety disorders, hypomania and mania. We also assessed a history of premenstrual mood symptoms (PMS), defined as a recurrent pattern of mood (tension, depressive and anxiety symptoms, irritability, decreased concentration) and physio-somatic (body aches, bloating, tender breasts, fatigue) symptoms appearing in the luteal phase (after ovulation, thus 1–2 weeks before menstruation) and resolving with menstruation. The delivery records of the subjects were employed to assess delivery information such as length of labor in each stage, mode of delivery, baby's weight & length, baby's Apgar score, placenta weight and estimated blood loss.

At all 3 time points, the subjects completed the EPDS (Thai-version), which is a 10-item self-rated questionnaire for assessment of depression symptoms from during pregnancy and postpartum. The responses were graded on a 4-point Likert scale, ranging from 0 (not at all) to 3 (most of the time), so the possible range for each subscale was 0–30 with a higher score indicating a greater severity of depression symptoms. Subjects with an EPDS score ≥ 11 were categorized as "prenatal depression" subjects (Pitanupong et al., 2007; Vacharaporn et al., 2003). The BDI, a 21-item self-rated questionnaire, was rated at 3 time points. The responses were graded on a 4-point Likert scale, ranging from 0 to 3 depending on severity of the specific symptoms, so the possible range for each subscale was 0–63 with a higher score indicating a greater severity of depression; 0–9 indicating minimal depression; 10–18 mild depression, 19–29 moderate depression, and 30–63 severe depression (Beck et al., 1988). All subjects were interviewed by a psychiatrist to assess severity of depression symptoms using HAMD at all 3 time points. The HAMD is a 17-item clinician-rated