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ORIGINAL CONTRIBUTION

Symptoms associated with the DSM IV diagnosis of depression in pregnancy and post partum

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Abstract Pregnancy and the postpartum may affect symptoms of depression. However it has not yet been tested how the symptoms used for the DSM IV diagnosis of depression discriminate depressed from non depressed women perinatally. A modified version of the Structured Clinical Interview for DSM IV (SCID interview) was used that allowed assessment of all associated DSM IV symptoms of depression with depressed and non depressed women in pregnancy and the postpartum period. Loss of appetite was not associated with depression either ante or postnatally. The antenatal symptom pattern was different from the postnatal. The sensitivity of the symptoms ranged from 0.7% to 51.6%, and specificity from 61.3% to 99.1%. The best discriminating symptoms were motor retardation/agitation and concentration antenatally, and motor retardation/agitation, concentration and fatigue postnatally. Depression in pregnancy and postpartum depression show significantly different symptom profiles. Appetite is not suitable for the diagnosis of depression in the perinatal period.

Keywords Diagnosis · Classification · Depression · Perinatal · Pregnancy · Postpartum · DSM

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Introduction

Several studies have suggested that depression is at least as common in pregnancy as in the postnatal period (Evans et al. 2001; Heron et al. 2004; Gavin et al. 2005). However there has been little study of how the physiological and psychosocial changes around childbirth may confound the diagnosis of depression at these times (O'Hara 1994), (Whiffen and Gotlib 1993).

In both pregnancy and post partum there may be changes in the prevalence of symptoms used to diagnose depression, such as patterns of appetite, sleep and fatigue. Over pregnancy and the postnatal period there are also substantial changes in a range of psychoactive hormones, with large rises of oestrogen, progesterone and cortisol during pregnancy (Lommatzsch et al. 2006). Cortisol, at the end of a normal pregnancy, reaches levels associated with major depression or Cushing's syndrome (Magiakou et al. 1997). Blunting of reactivity to a physical stress test has been observed at the end of pregnancy (Kammerer et al. 2002). Parturition is followed by sharp falls in level of all three

hormones as the placenta is removed. One might expect that these changes would affect the symptoms, the incidence and the type of depression over the perinatal period (Kammerer et al. 2006).

There is evidence that depression and affective disorder is under diagnosed and under treated in the perinatal period (Warner et al. 1996), and that this is important both for the woman herself, and for the future development of her child. There is good evidence that antenatal anxiety and depression, and postnatal depression can affect fetal and child development (Van den Bergh et al. 2005; Murray et al. 2006; Talge et al. 2007). It is thus important to have good diagnostic tools for both pregnancy depression and postpartum depression. In order to be able to reliably measure treatment outcomes over the perinatal period we need to know more about the possible physiological fluctuation in prevalence of these symptoms.

Recently published data show that in the different stages of pregnancy different cut off points of the self rating questionnaires Edinburgh Postnatal Depression Scale (EPDS) and Beck Depression Inventory (BDI-II) are appropriate in order to detect depression (Su et al. 2007). These findings suggest a different load with the different associated symptoms of depression in both depressed and non depressed pregnant women compared with women at other times in their lives. All this raises the question as to whether the whole range of symptoms used for the diagnosis of depression is suitable in the perinatal period. To our knowledge, this has not yet been investigated although it is of importance in order to be able to reliably identify depression, as well as assess treatment outcome, during this time.

As the Structured Clinical Interview for DSM IV is the required instrument—often called the gold standard—to assess these symptoms following DSM IV, this instrument was used for the study. DSM IV uses two entry criteria for the diagnosis of depression (depressed mood and/or loss of interest) and seven associated symptoms of depression (appetite problems, sleep problems, motor problems, lack of concentration, loss of energy, poor self esteem and suicidality). We tested whether these associated symptoms of depression differed in frequency between those who met the entry criteria for depression (minor or major) in comparison to those who did not. Sufferers from minor depression present at least two but less than five symptoms, patients with major depression suffer from five or more symptoms of depression. For the research question of this study minor and major depression were combined together to compare with those who did not meet DSM IV entry criteria for depression in pregnancy and postpartum.

In this study we aimed to determine whether the symptoms used for the diagnosis of depression, following DSM IV, are appropriate in pregnancy and the postpartum period, and which are the most useful. Our hypotheses were that not all the symptoms associated with depression in DSM IV would be appropriate in the perinatal period, and that the symptom profile would differ between pregnancy and postpartum.

Methods

The protocol was approved by the ethics committee of the Canton of Zurich, Switzerland, and written informed consent was obtained from all participants.

Data collection took place in five obstetric departments in the canton of Zurich, Switzerland. They serve city, suburban and rural catchment areas and are responsible for the management of about half of the annual birth rate of the canton. Consecutive women were recruited postnatally to take part in a Structured Clinical Interview for DSM IV diagnoses (SCID) (Spitzer et al. 1992; APA 1994) on day 4. These were carried out by telephone in week 6 postnatally. For a diagnosis of depression (major or minor) following DSM IV women had to meet one of the entry criteria (depressed mood or loss of interest over a period of at least 2 weeks) and have at least one other symptom.

Among the consecutive 1,356 eligible women approached there was a participation rate of 66% (n=892). With the first 195 cases only those women who met entry criteria, i.e. depressed mood or loss of interest for 14 consecutive days, were asked about the presence of the remaining seven symptoms. This is the usual SCID procedure. From then on all participants were asked about all nine symptoms. Thus the depressed cases from the whole sample (n=892) and the non depressed cases from the sample excluding the first 195, were included in the study.

The SCID interview is specifically designed to assess diagnoses of DSM IV. Usually the SCID interview finishes if the interviewee does not qualify for the entry criteria of a depressive episode, i.e. if the interviewee has not suffered continuously for 14 days from depressed mood and/or loss of interest in the time period under study. Subjects who do not meet these criteria for either the symptom of depressed mood or the symptom of loss of interest are excluded from the diagnosis of a depressive episode following DSM IV. For this study, all nine SCID symptoms of depression—the entry criteria and the seven associated symptoms of depression—were assessed in all subjects. This procedure, i.e. an adaptation of the usual SCID procedure, allows comparison of participants who met the entry criteria (of depressed mood and/or loss of interest) with women who did not meet these entry criteria.

By definition, in order to ascertain information necessary for the diagnosis of a depressive episode, the SCID

interview explores symptoms experienced by the proband in the past. However, for these interviews only the worst four weeks in the postpartum period (following the definition of DSM IV) and the worst four weeks in pregnancy were assessed. DSM IV provides the definition that "postpartum depression" is "depression with onset within the first four weeks after childbirth". The term depression in pregnancy means depression that occurs throughout the whole time period of pregnancy. In order to be able to compare time intervals of the same length when carrying out the SCID interview the worst continuous four weeks period within the two time periods under study were assessed. Other episodes of depression that the participating woman may had experienced earlier in life were not assessed.

Women with a current condition with psychotic features, based on the interviewing psychiatrist's judgement, were excluded. Current drug or alcohol dependency, and a general medical condition, using the participant's own judgement, were also exclusion criteria. Two women with a postpartum psychosis and one woman with a current alcohol dependency were excluded from the study.

Previous pregnancy loss, occasional use of alcohol and nicotine, medication, occasional use of either non-prescribed or illegal drugs, psychological dependence on medication both from the life time perspective and with respect to the pregnancy and the postnatal period under study were assessed, and the groups under study were compared for differences in distribution of these characteristics.

Interrater reliability was assessed with 50 interviews selected at random using tape recorded interviews and repeated interviews. The interviewers' judgement (students of psychology, midwives and psychiatric nurses) and the training psychiatrist's judgements were correlated 0.68 to 0.82, kappa coefficient (Cohen 1960). The interviewers' ratings were kept in the database for analysis.

The statistical analysis was carried out using SPSS 12.0. Chi Square analysis was used to compare differences in distribution of ordinal data between the groups under study. ANOVA was used to compare differences in distributions of interval scaled characteristics in the groups under study. Kappa coefficient was used to compute the inter-rater reliability.

Those who qualified DSM IV criteria for a depressive episode were compared with those who did not, on the proportions of those who fulfilled criteria for scoring on each of the individual SCID items. Two x two chi squares, or Fishers Exact test when cell sizes were below 6, were used to test for the significance of differences in proportions. By definition women categorised as DSM IV cases of depression had to have scored on one of the two entry criteria symptoms, depressed mood or loss of interest, and so these two symptoms have been excluded from our analyses.

Results

Table 1 shows the demographic characteristics of the subjects, and compares those who met DSM IV criteria for depression (major plus minor) in pregnancy and the postpartum period with those who did not. It can be seen that in general the groups were similar, although postnatally de novo depressed participants were somewhat younger than continuously depressed and well participants.

132/892 (14.8%) women were categorized as a DSM IV case of major or minor depression during the 9 month pregnancy period, and 38/892 (4.3%) in the 6 week postnatal assessment period. These numbers reflect the prevalence of cases that were identified in the time periods under study. As these time periods are different in length, they clearly cannot be directly compared with each other. Of the women who were categorized as cases, 115 (12.9%) reported a depressive episode in pregnancy only, 17 (1.9%) were cases in both the antenatal and postnatal periods, and 21 (2.4%) cases only in the postnatal period.

Table 2 shows the proportion of women scoring on each of the non entry criteria seven SCID symptoms used in the diagnosis of depression, and compares those who met criteria for major or minor depression with those who did not, in pregnancy and in the postnatal period. Antenatally, the most common symptoms in the non depressed group were increased appetite (39%), fatigue/loss of energy (28%) and insomnia or hypersomnia (26%). For each of the symptoms listed, depressed women were significantly more likely to score than non-depressed women, except for loss of appetite. Very few women scored on this latter item in either the depressed or the non depressed group antenatally (3.8% and 3% respectively). Postnatally, the most common symptoms in the non depressed group were loss of appetite (43%), diminished ability to concentrate (17%), psychomotor agitation/retardation (17%), and fatigue/loss of energy (16%). Depressed women were more likely to score on these symptoms than non-depressed women, except for loss of appetite. Loss of appetite was very common postnatally with nearly half of the non depressed (43%) and of the depressed sample (42.1%) scoring on loss of appetite postnatally.

The results were further analysed by comparing controls with women with major depression (excluding those with minor depression) and confirmed the finding that appetite did not distinguish women with major depression from controls. This difference was not significant: loss of appetite in pregnancy, pregnancy major depression, $n=37$, Fisher's Exact Test, $p=.617$; loss of appetite postpartum, post partum major depression, $n=13$, Pearson Chi Square, $p=.820$).

Table 3 compares the symptom profile of those meeting the SCID criteria for major or minor depression in

Table 1 Characteristics of women who met SCID entry criteria for depression in the perinatal period compared to women who did not ((mean (SD) or proportions (%))

	Antenatal depression only (n=115)	Postnatal depression only (n=21)	Depressed both antenatal and postnatal (n=17)	Not depressed both antenatal and postnatal (n=553)	One-way ANOVA or chi square
Age	31.2 (5.1)	29.4 (3.0)	32.8 (4.9)	32.0 (4.7)	F(3,701)=3.158, p=.02
Cohabitation status (proportion not living with baby's father)	11/106 (10%)	0/19 (0%)	0/16 (0%)	16/503 (3%)	X^2 (3)=12.908, p=.005
Socio-economic status (proportion middle class)	65/112 (58%)	12/21(57%)	10/16 (63%)	343/521 (66%)	NS
Parity (proportion primiparous)	52/115 (45%)	9/21 (43%)	10/17 (59%)	336/553 (61%)	NS
Previous pregnancy loss (proportion one or more)	30/113 (27%)	5/20 (25%)	7/17 (41%)	118/546 (22%)	NS
Smoking this pregnancy (proportion yes)	26/114 (23%)	2/21 (10%)	2/17 (12%)	80/550 (15%)	NS
Alcohol abuse this pregnancy (proportion yes)	3/115 (3%)	0/21 (0%)	0/17 (0%)	21/552 (4%)	NS
Illicit drug taking this pregnancy (proportion yes)	4/115 (3%)	0/21 (0%)	0/16 (0%)	9/553 (2%)	NS

1. Depressed PN only were significantly younger than never depressed (p=.01) and depressed both an and pn (p=.03, post hoc tests (LSD, least significant difference)), 2. Depressed AN only were more likely not to be living with the baby's father

pregnancy and in the postpartum period. The pattern of the associated symptoms was significantly different in the two periods. The difference in appetite was the most marked, with an increased appetite antenatally (52% antenatal vs. 8% postnatal) and a decreased appetite postnatally (42% postnatal vs. 3.8% antenatal). Fatigue/loss of energy, feelings of worthlessness and self esteem, diminished ability to concentrate, and thoughts of death and suicide all occurred at a significantly higher rate in the postnatal depressed group compared to the antenatal group, whereas sleep problems were significantly more frequent in the antenatal depressed group. The rates of psychomotor retardation/agitation were similar in the two groups.

Comparison of the postnatal symptom profile of those meeting the SCID criteria for major or minor depression in only the postnatal period (de novo depression (n=21)) with

Table 2 Proportion (%) of depressed and non-depressed women meeting criterion of individual SCID symptoms in pregnant and postnatal women

SCID Symptom	Depressed (i.e. fulfilling SCID criteria for a DSM diagnosis of depression)	Non-depressed (i.e. not fulfilling SCID criteria for a DSM diagnosis of depression)	2×2 Chi-square or Fisher's exact test
PREGNANCY			
Increased appetite	68/132 (52%)	221/565 (39%)	p=0.009
Loss of appetite	5/132 (3.8%)	16/565 (3%)	p=.573 NS
Insomnia/hypersomnia	49/132 (37.1%)	145/565 (26%)	p=.008
Psychomotor agitation/retardation	38/132 (28.8%)	48/565 (8%)	p<0.0001
Fatigue/loss of energy	67/132 (50.8%)	156/565 (28%)	p<0.0001
Feelings of worthlessness/lack of self esteem	9/132 (6.8%)	5/565 (1%)	p=0.0002
Diminished ability to think/concentrate	42/132 (31.8%)	65/565 (12%)	p<0.0001
Thoughts of death/suicide	6/132 (4.5%)	2/565 (1%)	p=0.0008
POSTPARTUM			
Increased appetite	3/38 (7.9%)	8/606 (1.4%)	p=0.0225
Loss of appetite	16/38 (42.1%)	258/606 (43%)	p=.96 NS
Insomnia/hypersomnia	6/38 (15.8%)	20/606 (3 %)	p=0.0001
Psychomotor agitation/retardation	12/38 (31.6%)	51/606 (17%)	p<0.0001
Fatigue/loss of energy	27/38 (71.1%)	99/606 (16%)	p<0.0001
Feelings of worthlessness/lack of self esteem	10/38 (26.3%)	5/606 (1%)	p<0.0001
Diminished ability to think/concentrate	19/38 (50%)	103/606 (17%)	p<0.0001
Thoughts of death/suicide	6/38 (15.8%)	5/606 (1%)	p<0.0001

Table 3 Proportion (%) of women categorised as depressed (i.e. fulfilling SCID criteria of DSM diagnosis of depression) meeting criterion on individual SCID symptoms in pregnancy compared to the postpartum period

SCID symptom	Pregnancy depression	Postpartum depression	2×2 Chi-square or Fisher's exact test
Increased appetite	68/132 (52%)	3/38 (7.9%)	$p<0.0001$
Loss of appetite	5/132 (3.8%)	16/38 (42.1%)	$p<0.0001$
Insomnia/hypersomnia	49/132 (37.1%)	6/38 (15.8%)	$p=0.01$
Psychomotor agitation/retardation	38/132 (28.8%)	12/38 (31.6%)	$p=0.74$ NS
Fatigue/loss of energy	67/132 (50.8%)	27/38 (71.1%)	$p=0.03$
Feelings of worthlessness/lack of self esteem	9/132 (6.8%)	10/38 (26.3%)	$p=0.0008$
Diminished ability to think/concentrate	42/132 (31.8%)	19/38 (50%)	$p=0.04$
Thoughts of death/suicide	6/132 (4.5%)	6/38 (15.8%)	$p=0.0171$

those who had both antenatal and postnatal depression (continuous depression ($n=17$)) showed no significant differences in the proportions scoring for any of the symptoms.

Figure 1a and b show the specificity and sensitivity for each symptom, in both pregnancy (1a) and in the postpartum period. The pattern changed between the two time period (1b). Antenatally, increased appetite, fatigue and sleep problems have high sensitivity but low specificity. Self esteem, sleep problems, and suicidality were very specific but had low sensitivity. Motor retardation and problems with concentration had a moderate combination of both sensitivity and specificity. Postnatally, fatigue showed the highest sensitivity and moderate specificity. Problems with concentration was the next most sensitive and also reasonably specific. Self esteem, suicidality and sleep problems were the most specific but are low on sensitivity, being relatively rare. Loss of appetite was fairly sensitive but not specific at all.

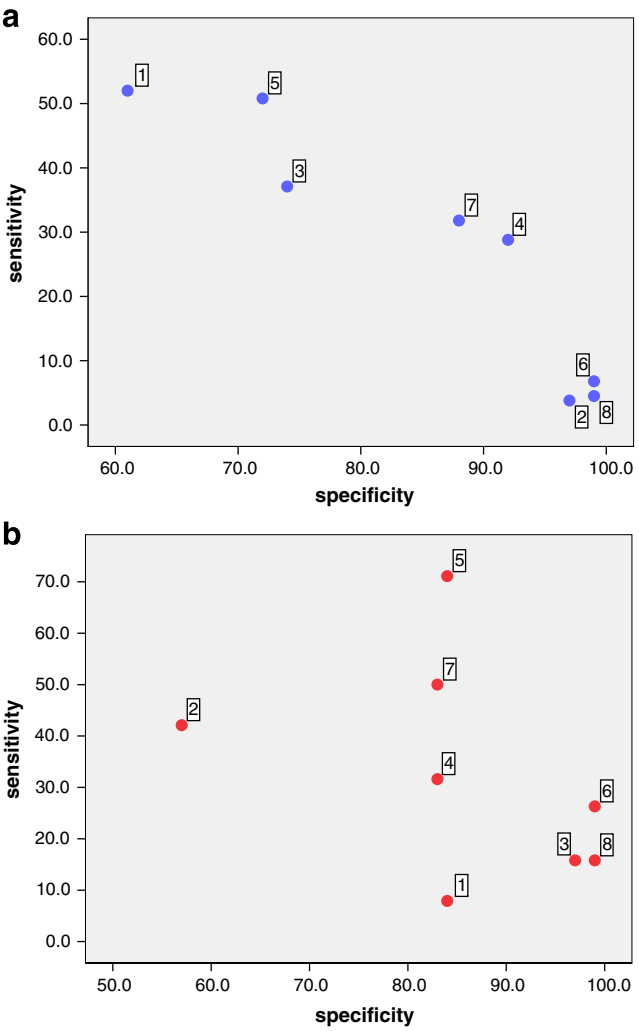

Fig. 1 **a** and **b** Sensitivity and specificity of SCID symptoms for depression in women in pregnancy (1a) and in the postpartum period (1b). 1 Increased appetite, 2 Loss of appetite, 3 Insomnia/hypersomnia, 4 Psychomotor agitation/retardation, 5 Fatigue/loss of energy, 6 Feelings of worthlessness/lack of self esteem, 7 Diminished ability to think/concentrate, 8 Thoughts of death/suicide

Discussion

In this study we have used the Structured Clinical Interview for DSM IV (SCID) (Spitzer et al. 1992) a commonly used diagnostic tool, often called the gold standard, which has been widely used for the diagnosis of depression in the perinatal period (e.g. (Klier et al. 2000; Lee et al. 2001a, b; Tam et al. 2002; Ascaso et al. 2003; Aydin et al. 2004; Gorman et al. 2004; Lee et al. 2004; Kitamura et al. 2006)). The results show that loss of appetite is not a valid symptom of depression in either pregnancy or the postnatal period, in contrast to the assumptions of DSM IV. Secondly this study shows that the symptom profile of depression in pregnancy is different from the symptom profile of post partum depression. Postpartum de novo depression and postpartum depression with preceding pregnancy depression did not differ from each other in symptom profile. Furthermore, the motor symptoms of depression and the symptom of attention deficit, or lack of concentration,

remained core symptoms of depression in these time periods.

The results of this study show clearly that some of the associated symptoms of depression change markedly between pregnancy and the postpartum period in non depressed women. Of these appetite is the most obvious. Very few suffered from loss of appetite during pregnancy but nearly 40% of non depressed women said that they experienced an increase in appetite and put on weight "more than they would have expected". In contrast almost no non depressed women had an increase in appetite postnatally, but 43% said that they had a greater loss of appetite than they would have expected. While 26% of the non depressed women said that they suffered from sleep problems antenatally only 3% did postnatally. Symptoms of fatigue and loss of energy also diminished significantly between pregnancy and the postpartum period.

Despite this, except for loss of appetite which was in general very low antenatally and high postnatally, all the other symptoms did occur at significantly higher rates in the depressed women. However the pattern changed. It is often stated that perinatal depression is the same as that which occurs at other times (Whiffen and Gotlib 1993). These results suggest that this is not the case.

This study has certain limitations. Among the seven associated symptoms of depression, three score if there is an extreme on that symptom, either high or low (increase or loss of appetite, loss of sleep or oversleeping, motor retardation or hyperkinetic behaviour). In this study, only the separate extremes of appetite were recorded. We did not do so for sleep and motor problems.

Unfortunately, also, we have no comparable data looking at the individual symptoms of depression from outside the perinatal period. To our knowledge the only relevant study is that of Manber et al (2008). They investigated the severity of individual depressive symptoms in clinically selected groups of pregnant and non pregnant women who suffered from non-psychotic major depression and in a pregnant control group (Manber et al. 2008). They used the Beck depression inventory (Beck et al. 1979) and the Hamilton Rating Scales for Depression (Hamilton 1960) for comparison. It emerged in their groups that pregnant sufferers from non psychotic major depression scored lower on guilt, suicidality and early insomnia and higher on psychomotor retardation. It would have been of interest in this study to use a symptom rating scale with more items to compare with the SCID.

There are good studies that have looked at rates and severity of depressive episodes comparing perinatal with non perinatal samples (Cox et al. 1993; Whiffen and Gotlib 1993; O'Hara 1994), but their findings do not address the question of the sensitivity and specificity of individual symptoms and the symptom profiles of depression.

This study has shown how the symptoms used to diagnose an episode of depression may be confounded by physiological and psychosocial changes in the perinatal period. It is noteworthy that this does not appear to be the case with the motor symptoms and the concentration or attention deficit symptoms. These symptoms appear to be less confounded by pregnancy or the postnatal period. The current use of a specifier of depression with "postpartum onset" following DSM IV if onset is within four weeks after delivery of a child is supported by these data (APA 1994). It may be appropriate for the diagnostic system to introduce a similar specifier for episodes of depression occurring in pregnancy. Other modifications, giving particular emphasis to the symptoms of motor retardation/agitation and concentration may be appropriate also.

It has been suggested that some symptoms (notably loss of appetite, sleep problems and fatigue) may be less useful for the diagnosis of depression in the perinatal period because they may be confounded by physiological changes in the perinatal period. Interestingly however, our results suggest that only loss of appetite does not discriminate depressed from non depressed women whereas sleep problems and fatigue still do distinguish between the two groups (minor and major depression versus controls) when compared statistically. This study has confirmed the clinical observation that vegetative symptoms associated with depression are also found in a significant minority of normal controls across the perinatal period. It has also demonstrated how the frequency of these symptoms differs in both controls and depressed women, in pregnancy compared to postnatally.

In spite of the presence of vegetative symptoms in some controls, DSM-IV depression criteria—with the exception of appetite problems—still distinguished between the two groups of depressed and control women in the perinatal period. The much higher prevalence of psychomotor and attentional symptoms in the depressed sample may have implications for the specificity of diagnosis and treatment outcome of depression over the perinatal period.

In conclusion, this study has characterised, for the first time, how symptoms associated with depression occur and change in non depressed women in the perinatal period. It has also demonstrated how the frequency of these symptoms differs in pregnancy from postnatally. This should be taken into account in the diagnosis and in the assessment of treatment outcome of depression over this period.

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