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ORIGINAL PAPER

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Depressive symptomatology in pregnancy

A Singaporean perspective

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Abstract This is a two-part study looking at depressive symptomatology in pregnancy in Singaporean women, and the associated demographic, and bio-psychosocial characteristics of women at risk of depressive illness. We validated the 10-item Centre for Epidemiological Studies-Depression scale amongst pregnant women, and then used this tool to identify depressive states in an antenatal cohort from the national maternity hospital. Amongst the sample population, the rate of depressive disorders is as high as one in five in the antepartum. The risk factors in the antepartum include being young, history of smoking, having past and current obstetric complications, frequent alcohol use and having medical problems.

Key words depression – depressive symptomatology – pregnancy – antepartum

Introduction

Pregnancy is one of the important periods in a woman's life, as it brings along numerous changes, not just in the physical aspects, but also socially and psychologically. However, for some, it may also be a period fraught with emotional and psychological disturbances. The incidence of depressive states in pregnancy has been reported to be between 10 % and 40 % of all pregnant women [1, 2], and, amongst Chinese obstetrical patients in New York, psychiatric morbidity was reported to be as high as 23 % [3]. In the postpartum, depressive disorders have similarly been found to occur at a notable rate worldwide [4, 5]. However, comparing rates across different studies can be suspect due to differences in diagnostic criteria, different population characteristics and varying methodologies.

As some symptoms of depression, e. g. fatigue, poor sleep and change of appetite, are also commonly found in pregnancy, the presence of a clinical depressive state may readily be missed during pregnancy. Depression can affect the health status of pregnant women and may lead to self-medications with drugs or alcohol, which increase the risks of complications to the pregnancy [6]. In the postpartum period, if depression persists, there can also be long-lasting adverse effects on the emotional and cognitive development of the children. It has been found that depressed mothers are less sensitively attuned to their infants, and less affirming [7].

The implication of not diagnosing depression early may, therefore, result in increased morbidity, both for the mother and baby, and even mortality, from maternal suicide with infanticide [8], if the depression remains unabated.

This present study sets out to establish the prevalence of depressive symptomatology among Asian women in the antenatal and postnatal period. We used the CES-D [9, 10] after first validating its use in the local antenatal population. We chose this instrument over the more commonly used Edinburgh Postnatal Depression Scale [11] as we wanted an instrument for both the antenatal and postnatal periods. The CES-D is also less time-consuming and a secondary aim of this study is to find a scale that can be used to aid clinical assessment in a busy obstetric setting. We also examined some of the putative sociodemographic risk factors for depression in these women. We hypothesise that antenatal depression predicts postnatal depression.

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Subjects and methods

The study was conducted in the antenatal clinics of Kandang Kerbau Women and Children Hospital, which is the major maternity hospital in Singapore with well over 15,000 deliveries per year. Subjects were patients attending the obstetric clinic. Informed written consent was obtained and the study was approved by the Hospital's Ethics Committee.

For the first part of the study, a clinical interview was conducted for 32 patients in addition to the CES-D being administered. Two experienced psychiatrists conducted the clinical assessment. Joint assessments were carried out at the start of the study in order to establish an acceptable inter-rater reliability and both researchers were blinded to the CES-D score. The interview was conducted with the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders (SCID). Patients were selected based on their CES-D scores that were ascertained beforehand by a research assistant.

The second part of the study was to administer the validated CES-D (Chinese, English and Malay versions) on a sample of pregnant patients. Drawing from figures established from findings elsewhere [2, 12], we estimated that 20–40 % of the pregnant women in Singapore may have depressive symptomatology. To detect a 3 % interval from 30 % with a 95 % confidence interval at a significance level of 5 %, a sample of about 500 was recruited, taking into account a 10 % attrition rate [13]. The patients also answered a questionnaire to furnish demographic data and any past medical, psychiatric history or depressive episodes or suicide. Information on the parity of the subjects, their present and past obstetric history, and any complications of their pregnancy were obtained, and, where necessary, interviews with the obstetric staff were conducted. Patients were randomly sampled from the various antenatal clinics on different days over a 6-month period. Sampling was done for one antenatal clinic on different days, with consecutive patients selected at the registration counter of the clinic. About 10 % of those approached declined to participate.

Statistical analyses

Parametric tests (2 sample t or ANOVA) or equivalent non-parametric tests (Mann Whitney U or Kruskal Wallis) were applied as appropriate according to normality assumptions. A multiple regression analysis was performed to examine the association of the various risk factors associated with high CES-D scores. Statistical significance was set at $p < 0.05$.

Results

Validation of CES-D

Fourteen (43.8 %) of the 32 women scored 4 or more, of these 3 were diagnosed to have Adjustment Disorder with depressive features, 6 had Minor Depressive Disorder, and 5 had Major Depressive Disorder. Those who scored between 0 and 3 did not have any clinically significant syndrome or psychological symptoms. Table 1 shows the distribution of the CES-D scores.

Using logistic regression with 'depressed or not' as dependent and CES-D score as independent, an increase in 1-unit of CES-D score resulted in an increase of OR = 5.2 (95 % CI 1.5–18.2, p = 0.01) of being depressed – area under ROC = 0.953 (Fig. 1). The sensitivity was 88.9 %, specificity was 100 %, positive and negative predictive values were 100 % and 86.7 %, respectively.

Table 1 Distribution of CES-D scores amongst the 487 sample population

CES-D score	Frequency	%
0	100	20.9
1	138	28.9
2	91	19.0
3	53	11.1
4	34	7.1
5	30	6.3
6	16	3.3
7	4	0.8
8	5	1.0
9	7	1.5

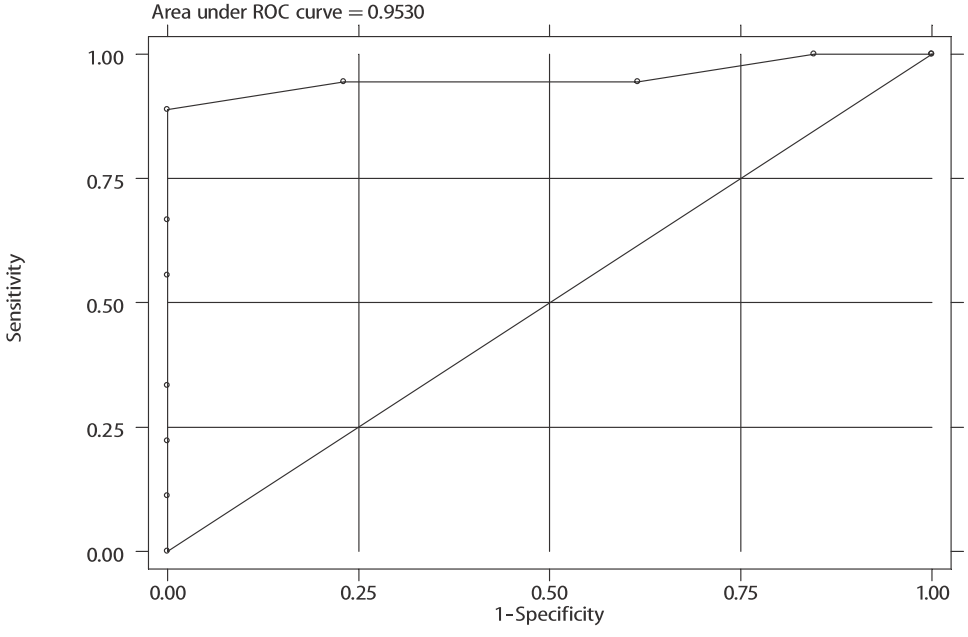

Fig. 1 Area under ROC curve – sensitivity vs specificity of the CES-D

Survey of pregnant women in an antenatal clinic

The mean age of the sample was 29.2 ± 4.9 years, with a range of 15 to 45 years.

A total of 382 (80 %) out of the cohort of 487 scored 3 or less on the CES-D, whilst 96 (20 %) of the cohort scored 4 or more on the CES-D, with no participant scoring the full score of 10 in the cohort. The mean (SD) CES-D score of the cohort was 2.1 (2), and the median was 2.

The awareness of psychological state or insight was assessed with a question about whether the subject felt she was coping reasonably well or that she was ill with respect to how she had responded to the CES-D. Of the respondents, 19 (5 %) thought that they were ill, while 335 (95 %) thought they were coping reasonably well despite their feelings in the past week. Those who had scored 0–3 on the CES-D were more likely to have answered that they were coping reasonably well, as compared to those who scored 4 or more ($p < 0.001$, OR = 5.7, 95 % CI 2.2–14.8).

The characteristics found to be associated with a higher likelihood of scoring 4 or more on the CES-D are: young age, history of smoking, and having past and current obstetric complications (see Table 2). The mean CES-D score was significantly higher amongst those who had medical problems and a history of frequent

Table 2 Comparison of various factors between those who scored less than the cut-off score of 4, and those who scored 4 or more on the CES-D

Variable	CES-D < 4 n = 382 (80 %)	CES ≥ 4 n = 96 (20 %)	Mean CES-D (sd)	p
Age(years)				p = 0.049
< 21	14	8		(OR = 2.6, 95 % CI 1.04–6.3)
21–35	313	75		
> 35	44	5		
Previous smoking				p = 0.014
No	352	80		(OR = 2.3, 95 % CI 1.2–4.4)
Yes	29	15		
Current smoking				NS
No	375	92		
Yes	6	3		
Previous alcohol consumption				
No	325	74	1.99 (1.99)	
Occasional	48	19	2.46 (1.90)	p = 0.016*
Frequent	7	2	3.00 (1.87)	
Current alcohol consumption				
No	375	93		NS
Occasional	3	1		
Frequent	3	1		
Illicit substance use				NS
No	379	95		
Yes	2	0		
Psychiatric history				NS
No	378	91		
Yes	3 (0.05 %)	3 (0.05 %)		
Medical problems				
No	355	85	2.02 (1.96)	p = 0.025*
Yes	25	9	2.74 (2.15)	
Gestational age				NS
First trimester	121	37		
Second trimester	199	50		
Third trimester	52	9		
Parity				NS
Primiparous	144	37		
Multiparous	224	55		
Past obstetric complications				
Nil	281	64		p = 0.026
Abortion	29	11		(OR = 12.4, 95 % CI 1.3–120.5)
Miscarriage	55	9		
Abortion & miscarriage	1	3		
Others	15	8		
Current obstetric complications				p = 0.004
No	318	68		(OR = 2.1, 95 % CI 1.3–3.6)
Yes	59	27		

* Kruskal Wallis test

drinking before pregnancy, but not for illicit substance use, presence of psychiatric history, or parity.

Prospective postnatal follow-up

In this final part of the study, a total of 187 (38 %) participants responded to the postal survey. These patients were recruited at a mean (SD) of 7.8 (2.49) weeks postpartum. There was no significant difference between this group and the prenatal group in age, marital status, ethnicity, religion, employment, education, income, medical or psychiatric history.

In the postnatal group, 145 (79 %) of the subjects scored 3 or less on the CES-D, whilst 39 (21 %) scored 4 or more. Those who scored 0–3 antenatally were likely to score 0–3 postnatally. Likewise, those who scored ≥4 antenatally were likely to score ≥4 postnatally ($p < 0.001$, OR = 6.3, 95 % CI 2.8–14.3).

The CES-D score was not associated with the mode of delivery, or reported maternal or infant complications.

Performing univariate analysis to determine the potential risk factors to be included in the logistic regression, the predictors that determine a score of 4 or more on the CES-D include employment status, having medical problems and having domestic help. Stepwise logistic regression analysis identified that the predictors for a score ≥4 were: (i) an antenatal score of 4 or more (OR = 6.49, 95 % CI 2.56–16.41, $p < 0.001$), (ii) having a domestic maid (OR = 7.47, 95 % CI 2.12–26.30, $p = 0.002$), and (iii) history of medical problems (OR = 3.06, 95 % CI 1.03–9.11, $p = 0.04$).

Discussion

In the antenatal phase of the study, 20 % of the population were found to have scored 4 or more on the CES-D, which indicated significant depressive symptomatology. The cut-off score of 4 was also reported in a recent study on validation of the 10-item CES-D for use in screening for depression in a previous study [14]. In the postnatal phase, 21 % of the responders had scored 4 or more. These rates are not unlike those reported in other populations [5, 15–18].

Kessler et al. found that patients who have a "normalising" attribution, that is, the tendency to minimise the importance of symptoms, were less likely to be detected as cases by doctors, when compared to those who were more psychologically minded [19]. In this study, the majority (95 %) of the participants had thought they were not ill, but, of this group, there were actually 65 (13 %) who scored 4 or more on the CES-D. This may be a reflection of the cultural variation in the reporting of symptoms, and it has been found that depressed Chinese patients frequently reported feelings of sadness only when specifically asked about this symptom, probably due to the severe stigma associated with mental illness in the culture [22].

The only factor found to be significantly associated with a higher CES-D score in the antenatal period, inferring a risk for depressive symptomatology was age. Those younger than 21 years were more likely to score the cut-off score of 4 or more on the CES-D as well as have a higher mean CES-D score, indicating that the young mother has a higher probability of developing depressive symptoms, which is consistent with the findings of other studies [23–25].

One surprising finding was that those who had domestic help were more likely to have significant depressive symptomatology postnatally. This may be explainable by other confounding factors, for example, those who had domestic help may not have had family support to depend on, or the domestic help was obtained because the woman was depressed and, therefore, unable to cope on her own. It may also be due to the additional stress of having to manage a maid often perceived as an outsider to the family.

Alcohol intake and smoking have been reported to be detrimental to both the mother's and the infant's physical and psychological well-being, before and during pregnancy [6]. We found this to be true amongst our local pregnant women, as those who previously drank daily or once or twice a week had a higher mean score on the CES-D, and those who smoked before pregnancy were more likely to score above the cut-off score of 3 on the CES-D.

Those with medical problems had higher mean scores on the CES-D in the prenatal period, and were more likely to be depressed in the postnatal period. Those with current obstetric complications, such as diabetes and hypertension, were more likely to be depressed than those without. This finding replicates other studies in the West [26, 27].

Hughes et al. found that vulnerability to depression and anxiety in pregnancy and puerperium is related to previous stillbirth, with more recently bereaved women at significantly greater risk than controls [28]. In our study, those with past history of abortion and miscarriage were found to be at a higher risk of developing depression antenatally. A possible explanation for this observation may have been that those who had suffered loss in a previous pregnancy may be more prone to depression as the current pregnancy may reawaken feelings of grief. Mothers suffer intense mourning following an intrauterine or perinatal death, and even endorse depressive symptoms [29].

One of the significant predictors of the postnatal CES-D score was the prenatal CES-D score. Antepartum depressive symptoms have similary been found to be a predictor of postnatal depression in a number of other studies [30–32].

Some of the limitations of our study were that the findings were based largely on participants' self-report. As such, there may be an under-reporting of substance abuse and history of psychiatric illness due to the social and legal sanctions against drug-taking and given the stigma of mental illness. It is also possible that women

who refused to take part in the survey were significantly different, and these accounted for 10 % of the population approached. In the postpartum phase of the study, the response rate was only 38 %, and this may bias the sample as those who are depressed are less likely to participate in follow-ups. Furthermore, we did not look at a number of other factors that have been found to be associated with maternal depression in the antepartum and postpartum, such as marital problems, history of trauma, assault [33], or sexual abuse [34], as such information was not easily obtained in a self-report survey.

Conclusion

The use of a simple screening tool such as the CES-D, validated for use amongst our local pregnant women, can help identify those likely to have significant depressive symptomatology for a broad spectrum of disorders. In busy antenatal clinics with heavy case-load, the use of a simple, easy-to-use screening tool would provide a practical means of detecting cases with depressive symptomatology, for whom further psychiatric evaluation may be provided.

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