

Original contribution

Multicentre prospective study of perinatal depression in Japan: incidence and correlates of antenatal and postnatal depression

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Summary

A multicentre study on the epidemiology of perinatal depression was conducted among Japanese women expecting the first baby (N = 290). The incidence rate of the onset of the DSM-III-R Major Depressive Episode during pregnancy (antenatal depression) and within 3 months after delivery (postnatal depression) were 5.6% and 5.0%, respectively. Women with antenatal depression were characterised by young age and negative attitude towards the current pregnancy, whereas women with postnatal depression were characterised by poor accommodation, dissatisfaction with sex of the newborn baby and with the emotional undermining. Antenatal depression was a major risk factor for postnatal depression.

Keywords: Antenatal depression; postnatal depression; epidemiology.

Introduction

Concerns for the mental health of women during pregnancy and after childbirth have promoted a series of investigations into perinatal depression. This is an issue concerning not only the women themselves but also children they look after (e.g., Murray & Cooper, 1997;

O'Connor et al, 2002, 2003). It has attracted attention from medical, nursing, social welfare and policy making perspectives. The incidence (O'Hara & Swain, 1996; O'Hara & Zekoski, 1988) and correlates (Austin & Lumley, 2002; Brugha et al, 2000; Buist et al, 1999; Cooper et al, 1996) of perinatal depression have been studied intensively in Western countries but very little in Asian countries. The classical study of Kumar & Robson (1984) reported about 10% of pregnant women experiencing the onset of depression during the current pregnancy. This finding was replicated in an interview study (Kitamura et al, 1993) as well as a large scale questionnaire survey (Kitamura et al, 1996b) in Japan. In contrast to the risk factor studies of postnatal depression, causes of antenatal depression have been little investigated (Kitamura et al, 1996a; Ross et al, 2004). Psychosocial correlates of antenatal depression have been reported by Kitamura et al (1993, 1996b) in Japan. However, these studies were conducted in a single hospital, and are thus

subject to selection bias. There is scarcity of reports about the incidence of postnatal depression in Japan.

This paper reports the incident and psychosocial correlates of antenatal and postnatal depressions among primiparous women in a nation-wide, multicentre, follow-up study in Japan. Like Kumar & Robson (1984), we used women who were expecting their first baby because we thought psychosocial environments would be substantially different between women who had and those who had not yet delivered babies. In addition, it would have been difficult to invite women with more than one child to visit a hospital at 3 months and 12 months after the delivery. The primary research question is the incidence of antenatal (during pregnancy) and postnatal (three months after delivery) depression in a Japanese female population. Despite many reports about the psychosocial correlates of perinatal depression in Western countries, we know little about them in Japan. Transcultural studies on perinatal depression such as the Transcultural Study of Postnatal Depression (TCS-PND; Asten et al, 2004) rarely include Japan. Thus the second aim of this study is to give a rough sketch of the psychosocial correlates of both antenatal and postnatal depressions in order to give perspectives to future studies.

Methods

Participants

Out of a total of 1159 women attending the antenatal clinics of the five university hospitals within a specified period (that differed between hospitals shown in brackets) – Saitama Medical School Comprehensive Medical Centre (June 1998 to October 1998), Mie University Hospital (May 1999 to January 2000), Okayama University Hospital (October 1997 to June 1999), Kyushu University Hospital (October 1997 to April 1999), and Ryukyu University Hospital (April 1999 to March 2000), 756 (65.2%) were expecting their first baby. Of these 756 pregnant women, 20 (2.6%) were planning to give birth in a clinic other than the university clinic they were currently attending and thus were excluded from the study. We solicited participation in the follow-up study of mental health related to pregnancy and childbirth to the remaining 736 women. Of these 433 (58.8%) declined while 303 (41.2%) agreed to do so. However, 13 of these 303 women failed to be followed up in the subsequent interviews thus leaving 290 women for examination. As compared to the other women expecting their first baby ($n = 466$), these 290 women did not differ in terms of marital status (married vs. single), education, and the time of menarche. However, the participating women were more likely to be employed (35.7% vs. 25.6%, $P < 0.01$). The majority of women (277, 96%) were married and living with their spouses, whereas seven women (2%) were married but not living with their spouses and six (2%) were single. About half of the women (42%) had a full-time job while 20% of them had a part-time job and 38% were home makers.

Antenatal depression group vs. antenatal control group: Of the above 290 women, three were excluded from the statistical analyses of identification of risk factors of antenatal depression because they had been suffering from Major Depressive Episode (MDE) when they became pregnant and one was excluded because she had a longstanding history of schizophrenia. Further analyses about antenatal depression were performed for these 286 women.

Postnatal depression group vs. postnatal control group: Of the above 290 women, nine were excluded from the statistical analyses because they were suffering from MDE when they gave birth and one was excluded because she had a longstanding history of schizophrenia. Further analyses about postnatal depression were performed for these 280 women.

Data collection

After obtaining informed consent, one midwife was dispatched to each woman as the responsible midwife. The interview was conducted by the same midwife in late pregnancy, and 1 month, 3 months and 12 months after childbirth. During each interview, a set of questionnaires was distributed to the participating women. The information regarding the husband was thus obtained from the woman.

Instruments

Psychiatric diagnoses: The midwives conducted an *ad hoc* structured diagnostic interview to compile a manual like the Diagnostic and Statistical Manual for Psychiatric Disorders (3rd ed. revised) (DSM-III-R; American Psychiatric Association, 1994). This interview guide was developed as a short structured interview for psychiatric disorders often observed during pregnancy and after childbirth – Major Depressive Episode, Dysthymic Disorder, Manic Episode, Hypomanic Episode, Panic Disorder, Generalized Anxiety Disorder, Agoraphobia, Social Phobia, Specific Phobia, and Obsessive Compulsive Disorder, and suicidal behaviour. Some of the wordings of questions used followed a Japanese draft of the Composite International Diagnostic Interview (World Health Organization, 1990) and the Schedule for Affective Disorders and Schizophrenia (SADS; Endicott & Spitzer, 1978). Although Agoraphobia is not a codable disorder of the DSM-III-R, this interview enables diagnosable Panic Disorder with Agoraphobia and Agoraphobia without history of Panic Disorder by combining the chronological data. It covers not only present but also past episodes when used in late pregnancy. In the subsequent interviews, the questions cover the time frame since the previous interview. When an interview was missed (e.g., the one three months after the delivery), its subsequent interview (e.g., the one 12 months after the delivery) covers the time frame since the last interview but one (e.g., the duration since one month postnatally to the time of the 12-month interview). When a psychiatric episode was identified, the interviewer questioned the onset of each episode. The interviewing midwives were lectured and trained by one of us (T.K.) in a series of lectures and by role playing. Using 29 case vignettes of different types of psychiatric disorders, we examined the midwives' agreement (kappa coefficient, Cohen,

1960) with the diagnoses made by the expert as moderate to almost perfect (0.64 to 0.83).

Demographic variables: We examined the ages of the women and their husbands, their education (1, elementary; 2, junior high school; 3, high school; 4, college; 5, university; 6, Master degree or over), and their annual income.

Marital condition: In the late pregnancy questionnaire we measured the women's marital status (single, married but living separately, and married and living together), the age when married, and single question items tapping marital satisfaction (1, very dissatisfied; to 5, very satisfied) and marital agreement (1, rarely; to 5, almost always). In addition, we included the Intimate Bond Measure (IBM, Wilhelm & Parker, 1988), a self-report measure assessing the current intimate relationship with the spouse in terms of two subscales – care and control. Each subscale consists of 12 items. The care and control correspond to the care and overprotection of perceived rearing respectively measured by the Parental Bonding Instrument (PBI; Parker et al, 1979). Psychometric properties of the IBM (Wilhelm & Parker, 1988) and its Japanese version (Inomata, 1994) were reported.

Accommodational condition: In the late pregnancy questionnaire the woman was asked whether she lived in rented accommodation (rented house or flat), the degree of satisfaction with her accommodation (1, very satisfied; to 5, very dissatisfied), whether she felt that the accommodation would be crowded after the birth of the child (1, never; to 3, very much so), and whether she planned to go back to the home of origin after childbirth (*Satogaeri*). Because the first three variables were substantially correlated with each other, we added the Z-score transformed scores of them as a new variable Poor Accommodation. We treated *Satogaeri* separately because it reflects the Japanese cultural characteristic of baby rearing.

Occupational condition: The woman was also asked in the late pregnancy questionnaire about her current job (home maker vs. part-time worker vs. full-time worker) and, if working, her plan for employment after childbirth (continue working vs. return to work when the child had grown up vs. relinquish the job for good). In the questionnaire 3 months after the delivery, we asked how many days a week the women and husbands respectively spent on home making and, separately, the time spent on home making before and after the birth of the child.

Obstetric variables: The numbers of past pregnancies, abortions, still births, and termination of pregnancies and the menarche age were enquired about in the late pregnancy questionnaire. A single item (Sugawara et al, 1997) examined the presence and degree of premenstrual tension with a 4-point scale (1, always; to 4, never). Psychological response to the current pregnancy was examined for the woman and husband separately. The woman was asked if the sex of the baby was important (definite sex vs. "either will do"). The woman was also asked whether she had desired the pregnancy. In the late pregnancy questionnaire, the preparedness and readiness to be a mother was measured in terms of participation in a maternity class (group), taking maternity lessons (individual), use of telephone consultation, maternity-bics/maternity swimming, conversation with other pregnant women, books about pregnancy/child rearing, having heard about maternity blues and postnatal depression, confidence in pregnancy (1, very weak; to 4, strong), and past experience of holding a baby of another woman (1, never; to 4, many times). Healthy living during pregnancy was also

asked about in the questionnaire and dealt with drinking (number of times per week) and smoking (number of cigarettes per day).

Social support, coping, and life events after the delivery: Barrera (1986) distinguished between the functional aspects of social relationships and divided them into (1) perceived support (i.e., the perception that social support would be available should an individual desire it) and (2) received support (i.e. actual enactment of social support). Perceived social support includes both availability and satisfaction. In the late pregnancy questionnaire, the number (total number of people available and, if so, who they are) and satisfaction (1, dissatisfied; to 4, satisfied) of perceived social support were measured in terms of the three domains – emotional, informational and instrumental supports. In the questionnaire three months after the delivery we asked about the amount and satisfaction (dissatisfaction) of enacted social support, social undermining, and disappointment about support (absence of expected support when it was needed) in three domains – emotional, informational and instrumental.

The coping style was measured by 14 items from the Ways of Coping Check List (WCCL; Folkman & Lazarus, 1980) selected according to Kendler et al (1991). The WCCL has three subscales – turning to others, problem solving and denial.

In the questionnaire three months after delivery the woman was asked as to whether she had experienced each of 45 different events for the one-month period after delivery. These include somatic conditions (e.g., insomnia and pain), changes of life pattern (e.g., relocation and *Satogaeri*), physical changes (e.g., obesity), financial difficulties (e.g., excessive expenses), families and in-laws (e.g., attitudes of in-laws), extra-familial relationships (e.g., hobbies), occupation (e.g., change of job content), child-rearing (e.g., difficulty in feeding), baby (e.g., infection), and others. If they reported having experienced any of them, they were further asked to rate the impact of each event either in positive (desirable) or negative (undesirable) deprecation from 0 to 100. The positive and negative event scores were calculated by adding all the positive and negative scores respectively.

Early parental loss, perceived rearing, and child abuse: Early parental loss was defined as either death of or separation from a parent for 12 months or longer before the subject was 16 years of age (Brown et al, 1987).

Perceived parenting was measured by the Parental Bonding Instrument (PBI; Parker et al, 1979). This is to assess retrospectively the perceived parental rearing before the subject was 16 years of age. The PBI is a self-report of 25 items with a 4-point scale anchored from 1: very likely to 4: very unlikely. The PBI consists of two subscales – care and overprotection. The care score indicates how affectionate the parent was towards the child whereas the overprotection score indicates what control the parent exercised over the child's activities and decisions. The reliability and validity was reported for both English (Parker, 1981, 1983) and Japanese versions (Kitamura & Suzuki, 1993). The participants who had reported parental loss before 16 years of age were excluded from the analyses using the PBI because they might have found it difficult to describe parental behaviour for such a short period.

In the late pregnancy questionnaire the woman was asked whether she had experienced any of eight categories of abusive behaviour on the part of the father or the mother before the age of 16: They include (a) emotional neglect; e.g., saying "you are

not my child"; (b) threat; e.g. of not giving meals and destroying cherished pets or toys; (c) shamed; e.g. scolding cruelly and making fun of the child in front of others; (d) slapping; (e) punching with a fist; (f) hitting with an object; e.g. a club; (g) kicking; and (h) burning; e.g. with a cigarette. Each category of abusive behaviour was rated for its frequency (when it was most frequent) from both parents separately with a 6-point scale; 1: never, 2: once or twice in the lifetime, 3: several times a year, 4: several times a month, 5: several times a week, and 6: almost everyday. The father's and mother's abuse scores were calculated by adding the scores of these eight abuse categories.

Past life events: The woman was questioned as to whether she had experienced each of the 28 different events during her lifetime. The list of life events includes 12 items that Brugha et al (1985) recognized as most likely to precede depression as well as other items we thought appropriate in the Japanese cultural setting. If a woman reported having experienced any of them, she was further asked how many times they occurred as well as how old she was when the event occurred.

Social desirability: Because the recall of past experiences may be subject to the response style of the subject towards socially acceptable bias, the Social Desirability Scale (SDS; Crowne & Marlowe, 1960; Kitamura & Suzuki, 1986) was administered as part of the questionnaire. We selected ten items appropriate for a Japanese population (Kitamura & Suzuki, 1986).

Statistical analysis

In order to identify risk variables of antenatal and postnatal depression, we compared those women who developed DSM-III-R MDE during the current pregnancy (antenatal depression

group, $n = 16$) and within three months after the delivery (postnatal depression group, $n = 14$) with those who did not (control groups, $n = 270$ antenatally and $n = 266$ postnatally) in terms of the demographic, marital, accommodational, occupational, obstetric, social support, coping and early life experiences. Because of the multiple comparisons we performed, we set the statistical significance level at the alpha value of 0.05 divided by the number of items of each domain. For example, because we studied a total of 28 types of past life events, we set the significance level of this domain at $P < 0.002$ ($0.05/28$). Only a few women had missing values for several variables (the number of the participants is noted in Tables where there are missing data). The mean SDS score did not differ between antenatal depression (16.9 SD = 4.0) and its control groups (16.2 SD = 3.1) nor between postnatal (16.0 SD = 4.4) and its control groups (16.2 SD = 3.1).

Results

Antenatal and postnatal depression

During the present pregnancy period, 16 (5.5%) women had an onset of MDE, 12 (4.1%) of Depressive Disorder Not Otherwise Specified, 0 (0%) of Manic Episode, 8 (2.8%) of Generalized Anxiety Disorder, 0 (0%) of Panic Disorder, 1 (0.3%) of Social Phobia, and 2 (0.7%) of Specific Phobia, and 2 (0.7%) of Obsessive Compulsive Disorder. A total of 35 (12.1%) women reported having an onset of any of the above disorders. The incidence of antenatal depression was 5.6% (16/286).

Table 1. Demographic variables, accommodational conditions, and response to the current pregnancy in the antenatal and postnatal depression groups and their control groups

	Antenatal			Postnatal		
	Control ($n = 270$)	MDE ($n = 16$)	<i>P</i> T-test or chi-squared	Control ($n = 266$)	MDE ($n = 14$)	<i>P</i> T-test or chi-squared
Demographics						
Age	29.7 (4.7) ($n = 263$)	26.1 (4.0)	0.003	29.7 (4.8) ($n = 259$)	27.3 (4.0)	0.069
Husband's age	28.7 (5.0) ($n = 262$)	25.9 (3.4)	0.030	28.6 (4.9) ($n = 258$)	27.1 (5.0)	0.266
Age when married	26.7 (3.9) ($n = 262$)	24.5 (3.9)	0.030	26.7 (4.0) ($n = 258$)	24.7 (3.2)	0.068
Accommodational condition						
Poor accommodation	-0.05 (2.17)	0.88 (2.07)	0.096	-0.09 (2.15)	1.79 (2.13)	0.002
Response to the current pregnancy and delivery						
Own negative attitude towards the pregnancy	14/262 (5.3%)	4/15 (26.7%)	FE = 0.011	14/257 (5.4%)	3/14 (21.4%)	FE = 0.049
Husband's negative attitude towards the pregnancy	15/260 (5.7%)	2/15 (13.3%)	FE = 0.235	15/255 (5.9%)	1/14 (7.1%)	FE = 0.585
The current pregnancy not desired	63/262 (24.0%)	6/15 (40.0%)	0.279	87/260 (33.5%)	9/14 (64.3%)	0.040
Woman's dissatisfaction about the sex of baby	-	-	-	39/217 (18.0%)	6/11 (54.5%)	0.010
Husband's dissatisfaction about the sex of baby	-	-	-	174/215 (80.9%)	7/11 (63.6%)	FE = 0.236

FE, Fischer exact probability test; () percentage or S.D.

After delivery, 14 (4.8%) women had an onset of MDE, 14 (5.0%) of Depressive Disorder Not Otherwise Specified, 1 (0.3%) of Manic Episode, 2 (0.7%) of Generalized Anxiety Disorder, 3 (0.1%) of Panic Disorder, 1 (0.3%) of Social Phobia, and 2 (0.7%) of Specific Phobia, and 5 (1.7%) of Obsessive Compulsive Disorder. Thirty-four (11.7%) women reported experiencing the onset of any of the above disorders. The incidence of postnatal depression was 5.0% (14/280).

Demographics

Women in the antenatal depression group were significantly younger than those in its control group (Table 1). The husbands of the antenatal depression group were also significantly younger than those husbands in the control group. As expected, the mean age of the women when they married was younger in the antenatal depression group. The level of education of the women and their husbands did not differ between the antenatal depression group and its control group. Nor did the mean annual income differ between the two.

Unlike those women with antenatal depression, women in the postnatal depression group did not differ from those in its control group in terms of their age and that of their husband when married, the women's and their husbands' level of education, or the annual income (Table 1).

Marital condition

The antenatal depression and control groups did not differ in terms of the marital condition (married and living with spouses, married but not living with spouses, and single), two subscales of the Intimate Bond Measure, or two subscales of the marital adjustment. This was also the case for the postnatal depression.

Accommodational condition

The women in the antenatal depression group lived in poorer accommodation than the control women but this did not reach statistical significance. About half of the women (55%) of the control group planned *Satogaeri* (going to the home of origin after childbirth) and a similar proportion of women of the antenatal depression group (69%) did so.

Unlike the antenatal depression group, the mean poor accommodation score was significantly higher in the women in the postnatal depression group than its control group (Table 1). The proportion of *Satogaeri* did not differ between the two groups.

Occupational condition

The antenatal depression and control groups did not differ in terms of their occupational conditions (full-time vs. part-time workers vs. home maker). Among the full-time and part-time workers, 75 (42%) planned to continue working after childbirth; 76 (43%) planned to return to work when the child had grown up; and 27 (15%) planned to relinquish their job in order to take care of the child. The proportion of those choosing to work after childbirth did not differ between the two groups. These findings were also the case for postnatal depression.

Obstetric variables

The experiences and numbers of past pregnancies, abortions, still births, and termination of pregnancy, menarche age, or premenstrual tension did not differ between antenatal depression and control groups or between postnatal depression and control groups.

The rate of the woman's negative attitude towards the current pregnancy (i.e., perplexed vs. glad/no feeling) was significantly higher in the antenatal group than the control group (Table 1). This was not the case for postnatal depression. The rate of husbands' negative attitude towards the current pregnancy or the unwanted pregnancy did not differ either between antenatal depression and its control groups, or between postnatal depression and its control groups (Table 1).

The difference in parental education and readiness for motherhood, the rate of alcohol consumption or smoking did not differ between antenatal depression and control groups or between postnatal depression and control groups.

Regarding the current delivery, the women in the postnatal depression group were more likely to be dissatisfied with the sex of the newborn baby (Table 1). In contrast, their husbands did not differ between the two groups in terms of dissatisfaction with the sex of the newborn baby. The two groups did not differ in terms of the mode of delivery (spontaneous vs. Caesarean vs. others), the number of babies born (singleton vs. twins vs. triplet), delivery time, blood lost, or subjective severity of delivery.

Social support, coping behaviour, and life events after delivery

Antenatal depression and control groups did not differ in terms of the number of individuals who could give three

Table 2. Social support, coping behaviour, and postnatal life events in the antenatal and postnatal depression groups and their control groups

	Antenatal			Postnatal		
	Control (n = 270)	MDE (n = 16)	<i>P</i> T-test or chi-squared	Control (n = 266)	MDE (n = 14)	<i>P</i> T-test or chi-squared
Satisfaction with social support during pregnancy						
Emotional support	3.5 (0.6) (n = 260)	3.6 (0.5) (n = 15)	0.245	3.5 (0.6) (n = 255)	3.6 (0.7)	0.816
Informational support	3.5 (0.6) (n = 259)	3.6 (0.5) (n = 15)	0.470	3.5 (0.6) (n = 254)	3.6 (0.6)	0.486
Instrumental support	3.4 (0.7) (n = 260)	3.4 (0.9) (n = 15)	0.982	3.4 (0.7) (n = 255)	3.4 (0.8)	0.884
Life events (LE) after childbirth						
Total positive LE score	–	–	–	346.1 (408.3)	240.4 (293.3)	0.340
Total negative LE score	–	–	–	–419.3 (402.6)	–636.5 (638.3)	0.229
Satisfaction with social support after childbirth						
Emotional support	–	–	–	3.5 (0.8) (n = 214)	3.2 (0.8) (n = 11)	0.162
Informational support	–	–	–	3.5 (0.7) (n = 212)	3.6 (0.7) (n = 11)	0.695
Instrumental support	–	–	–	3.6 (0.6) (n = 214)	3.2 (1.0) (n = 11)	0.175
Satisfaction with social undermining after childbirth						
Emotional undermining	–	–	–	3.4 (1.1)	2.4 (1.3)	0.001
Informational undermining	–	–	–	3.4 (1.2)	3.1 (1.3)	0.381
Instrumental undermining	–	–	–	3.4 (1.0)	3.3 (1.0)	0.656
Coping styles after childbirth						
Turning to others	–	–	–	6.7 (3.5) (n = 207)	7.9 (2.4) (n = 11)	0.276
Problem solving	–	–	–	6.6 (3.6) (n = 204)	6.3 (3.4) (n = 11)	0.761
Denial	–	–	–	6.7 (3.1) (n = 209)	5.9 (2.1) (n = 11)	0.385

FE, Fischer exact probability test; () percentage or S.D.

types (emotional, informational, and instrumental) of support when necessary (perceived social support) and their satisfaction.

The mean total scores of both the positive and negative life events occurring for the one month period after childbirth showed no difference between the postnatal and control groups (Table 2).

After childbirth, the women in the postnatal depression group did not differ from those in its control group in terms of the number and satisfaction of all the three types of enacted social support, social undermining, or disappointment except for the (dis)satisfaction of the emotional undermining. Thus, those women in the postnatal depression group were more likely to be dissatisfied with the emotional undermining (Table 2). Postnatal depression women did not differ from the control group women in terms of the use of any of the enacted coping behaviour categories.

Early parental loss and perceived rearing

The rate of the father's or mother's death, or separation of 1 month or longer, or one year or longer before the age of 16 did not differ between antenatal depression

and control groups. The father's or mother's PBI and abuse scores did not differ between the antenatal and control groups. This was also the case for postnatal depression.

Past life events

Among 27 life events, the rate of women who experienced a death of a sibling was 3.0% (8/270) in the control group whereas it was 18.8% (3/16) in the antenatal depression group. This, however, did not reach statistical significance.

The rates of women who had experienced peer victimization, hospitalization and death of a sibling were higher among the women with postnatal depression than among the control women, but they failed to reach statistical significance.

Past of psychiatric disorders

Because the number of some of the past episodes of DSM-III-R categories was very small in the 290 women, we combined for the purpose of comparison with the antenatal and postnatal depression the cases of Panic

Disorder (n = 7), Generalized Anxiety, Disorder (n = 19), and Obsessive Compulsive Disorder (n = 9) as Non-phobic Anxiety Disorder (n = 31), Major Depressive Disorder (n = 44) and Dysthymic Disorder (n = 3) as Depressive Disorder (n = 47), Manic Episode (n = 5) and Hypomanic Episode (n = 2) as Manic/Hypomanic Disorder (n = 7), and Agoraphobia (n = 9), Social Phobia (n = 4), and Specific Phobia (n = 32) as Phobic Disorder (n = 39). It should be noted that there are some women who experienced episodes of more than one DSM-III-R categories.

The rate of any of the past DSM-III-R groups did not differ between the antenatal depression and control groups. More women in the postnatal depression group (5/14 = 35.7%) reported having experienced an episode of Phobic Disorder than the women in the control group (33/266 = 12.4%) but this barely failed to reach statistical significance ($P = 0.028$).

The antenatal depression as a risk factor of the postnatal depression

Among the women (n = 14) who developed postnatal depression 4 (28.6%) had experienced antenatal depression during the current pregnancy while 7 of 266 (2.6%) of the women without postnatal depression did so (Fischer exact probability = 0.001).

Discussion

The incidence of antenatal depression was 6% in this study. The rate of depression during pregnancy varied in the past investigations between 2.6% and 27.6% possibly due to the differences in the definition of depression (O'Hara et al, 1988). Using the DSM-III criteria of Major Depression Cutrona (1983) reported a rate of 3.5% but this study covered only the third trimester. More data may be needed for the rate of antenatal depression and its timing during the pregnancy when considering its aetiology and treatment. The findings that approximately six percent of women expecting the first baby would have a new episode of Major Depression during the current pregnancy echoes the reports of past investigations (Kitamura et al, 1993, 1996b; Kumar & Robson, 1984). Popular belief that pregnancy represents a period of happiness and joy was not supported in Japan either. More attention should be given to mental health intervention for such women. In Japan it is still exceptional rather than routine care to dispatch a responsible midwife to a pregnant woman. Taking into account that psychological intervention can prevent the onset of post-

natal depression (Jané-Llopis et al, 2003 for review), we will have to conduct a vigorous study about whether individualised psychological care by a midwife can alleviate negative affectivity of pregnant woman.

A negative attitude towards a current pregnancy is a risk factor for antenatal depression as has been ascertained in previous investigations. Obviously, an unwanted or unplanned pregnancy may represent a greater negative stressful event for women (While, 1990). Of clinical importance is that these women are shocked by the news of pregnancy and yet still plan to give birth to the baby. A very high rate of elective abortion among Japanese women suggests that they have "free hand" to do so. Thus the attitude of the women in this study may be very ambivalent. Some women may have desired a baby but the timing of the pregnancy may have been premature (for example, they might have wanted to continue their job a little longer). Alternatively, they may not have desired a baby but the unexpected news of pregnancy may have elicited subtle coercion from the people who wanted a baby (e.g., in-laws). Even women who choose abortion need mental health support (Kishida, 2001; Major et al, 1998, 2000; Soderberg et al, 1998; Turell et al, 2002). Women who did not desire pregnancy yet who are determined to give birth may need even more psychological support from perinatal health professionals.

The incidence of postnatal depression in this study was 5%. This seems to be lower than that reported in western countries (Cooper & Murray, 1998; O'Hara & Zekoski, 1988). However, another 5% of women had an episode that met the criteria of MDE partially but failed to do so. This is categorised as Depressive Disorder Not Otherwise Classified according to the DSM-III-R. Past investigations occasionally used a definition of postnatal depression that may be more over-inclusive. For example, using the Research Diagnostic Criteria (RDC: Spitzer et al, 1978), Kumar & Robson (1984) and O'Hara et al (1984) reported about 10% to 15% of incidence of both Major and Minor Depressive Disorders. The RDC Major Depressive Disorder corresponds to the DSM-III-R Major Depressive Episode and the RDC Minor Depressive Disorder (of a duration as short as a few weeks) to the DSM-III-R Depressive Disorder Not Otherwise Classified. Therefore, we consider that the incidence of postnatal depression reported in our study was compatible with that reported in the previous investigations.

Poor accommodation was found to be a risk factor for antenatal depression. This variable consists of rented accommodation, dissatisfaction about accommodation,

and feeling that the accommodation will be crowded after the birth of the child. Using Japanese pregnant women, Kitamura et al (1993, 1996b) reported that rented accommodation was linked to the onset of antenatal depression. The actual housing condition may affect mental health (Booth & Cowell, 1976; Kellet, 1989; Magaziner, 1988; Platt et al, 1989). Women expecting a baby may wish to rearrange and decorate the rooms as they desire but this can be done only when they live in their own house or flat. This interpretation may be supported by the findings of no difference between the postnatal and its control groups in terms of the number of people living together.

The association between unhappiness about the sex of the newborn and postnatal depression was a unique finding of this report. This may be an aspect of mixed feelings on the part of the women towards the pregnancy and the newborn baby. In bivariate analyses, postnatal depression was, though not reaching a statistical significance level, linked to the women's negative attitude towards current pregnancy, and undesired pregnancy (Table 1). Thus such women, though they continued their pregnancy up to childbirth, had an ambivalent feeling towards pregnancy. Kumar (1982) listed the "mixed feelings and worries about baby" as a correlate of postnatal depression. Dissatisfaction about the sex of the newborn baby may be a reflection of refusal of the baby, resulting in bonding failure. We did not measure bonding failure in these women. Future studies should focus on the relationship between the bonding failure and postnatal depression.

Although there were no differences between postnatal depression and control women in the negative life events or coping behaviour, the women with postnatal depression were more likely to be dissatisfied with the social *undermining* while the two groups did not differ in the degree of social *support*. Compared with the women without depression these women may be more sensitive to negative interpersonal approaches. The effects of social undermining has been studied less than those of social support but recent investigations have emphasized the importance of social undermining on psychological adjustment (Burg et al, 1994; Lakey et al, 1994; Lepore, 1992; Riemsma et al, 2000; Symister & Friend, 2003; Vinokur & Van Ryn, 1993).

A risk factor for postnatal depression in this study was antenatal depression. Past experiences of depression were reported as a risk factor for postnatal depression (Areias et al, 1996; Verkerk et al, 2003). Antenatal depression was also reported as a risk factor for post-

natal depression (Hobfoll et al, 1995; Verkerk et al, 2003). These and our results on the risk factor for postnatal depression are in line with the fact that past experience of the disorder is a well known risk for depression in general. Nevertheless, the risk factors related to antenatal depression (rented accommodation and negative response towards the current pregnancy) were not identical with those related to postnatal depression. Thus, though women with depression during pregnancy are more vulnerable to (re)develop depression after childbirth, there may be some other factors putting them at higher risk. Ross et al (2004) reported that the biopsychosocial model predicting the onset of antenatal depression failed to predict the onset of postnatal depression. Risks factors specific to the time of the onset of perinatal depression may be a very important topic in future studies.

Considering the prevalence of perinatal depression, health professionals caring for pregnant women should pay more attention to the mental health issues and establish a more systematic mental health support and care system. It may not be psychiatrists or obstetricians but midwives and antenatal clinic nurses that should take such responsibility. They have the advantage of easy access to pregnant women and are thus in a position to provide them with psychological support. Because their graduate and postgraduate education places greater emphasis on somatic care, there should be a shift towards providing a knowledge of perinatal mental illnesses and teaching therapeutic skills such as psychotherapy and counselling techniques (Stuart et al, 2003).

Methodological drawbacks may merit consideration. Although this is a prospective follow-up study, it commenced in late pregnancy; thus, the recall of symptoms in the first trimester is a subject of recall bias. Because antenatal depression is more likely to have its onset in the first trimester (Kitamura et al, 1993), our research design was subjected to the bias of the mental condition on the response style to the questionnaire. Therefore the results related to antenatal depression call for great caution in interpretation. Secondly, we studied only women who were expecting their first baby. Therefore the findings cannot be generalised to women with children. Thirdly, the number of women studied was relatively small. A larger population should be investigated in order to confirm the present findings. Fourthly, the representativeness of the sample may be questioned because although widespread over the country, the participating antenatal clinics were all affiliated with medical schools. Future studies should include women attending non-

university antenatal clinics. Finally, our study failed to examine the interactions between variables on the onset of perinatal depression. With a larger number of participants, we will approach this issue using a multivariate analysis such as the structural equation modelling techniques (e.g., Bernazzani et al, 1997; Ross et al, 2004).

In short, this study has shown that among Japanese women, both antenatal and postnatal depression was as prevalent as reported in Western countries and that they are associated with different psychosocial correlates.

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References

- American Psychiatric Association (1994) *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed. revised), American Psychiatric Association, Washington D.C.
- Areias MEG, Kumar R, Barros H, Figueiredo E (1996) Comparative incidence of depression in women and men, during pregnancy and after childbirth: validation of the Edinburgh Postnatal Depression Scale in Portuguese mothers. *Br J Psychiatry* 169: 30–35.
- Asten P, Marks MN, Oates MR, and the TCS-PND Group (2004) Aims, measures, study sites and participant samples of the Transcultural Study of Postnatal Depression. *Br J Psychiatry* 184 (Suppl 46): 3–9.
- Austin M-P, Lumley J (2002) Antenatal screening for postnatal depression. A systematic review. *Acta Psychiatrica Scand* 107: 10–17.
- Barrera M (1986) Distinctions between social support concepts, measures, and models. *Am J Commun Psychol* 14: 413–445.
- Bernazzani O, Saucier J-F, David H, Borgeat F (1997) Psychosocial factors related to emotional disturbances during pregnancy. *J Psychosom Res* 42: 391–402.
- Booth A, Cowell J (1976) Crowding and health. *J Health Soc Behav* 17: 204–220.
- Brown GW, Harris T, Copeland JR (1987) Depression and loss. *Br J Psychiatry* 130: 1–18.
- Brugha T, Bebbington P, Tennant C, Hurry J (1985) The list of threatening experiences. A subset of 12 life event categories with considerable long-term contextual threat. *Psychol Med* 15: 189–194.
- Brugha TS, Wheatley S, Taub NA, Culverwell A, Friedman T, Kirwan P, Jones DR, Shapiro DA (2000) Pragmatic randomized trial of antenatal intervention to prevent post-natal depression by reducing psychosocial risk factors. *Psychol Med* 30: 1273–1281.
- Buist A, Westley D, Hill C (1999) Antenatal prevention of postnatal depression. *Arch Womens Ment Health* 1: 167–173.
- Burg MM, Seeman TE (1994) Families and health: the negative side of social ties. *Ann Behav Med* 16: 109–115.
- Cohen J (1960) A coefficient of agreement for nominal scales. *Educational and Psychological Assessment* 20: 37–46.
- Cooper P, Murray L (1998) Postnatal depression. *BMJ* 316: 1884–1886.
- Cooper PJ, Murray L, Hooper R, West A (1996) The development and validation of a predictive index for postpartum depression. *Psychol Med* 26: 627–634.
- Crowne DP, Marlowe D (1960) A new scale of social desirability independent of psychopathology. *J Consul Psychol* 24: 349–354.
- Cutrona CE (1983) Causal attributions and perinatal depression. *J Abnorm Psychol* 92: 161–172.
- Endicott J, Spitzer RL (1978) A diagnostic interview: the Schedule for Affective Disorders and Schizophrenia. *Arch Gen Psychiatry* 35: 837–844.
- Folkman S, Lazarus RS (1980) An analysis of coping in a middle-aged community sample. *J Health Soc Behav* 21: 219–239.
- Hobfoll SE, Ritter C, Lavin J, Hulsizer MR, Cameron RP (1995) Depression prevalence and incidence among inner-city pregnant and postpartum women. *J Consult Clin Psychol* 63: 445–453.
- Inomata T (1994) Utsubyou sei shougai no keika to haiguusha karano sapouto ni tuite [The impact of a spouse on the course of depressive disorders]. *Keio Igaku* 71: 355–371 (in Japanese).
- Jané-Llopis E, Hosman C, Jenkins R, Anderson P (2003) Predictors of efficacy in depression programmes. *Br J Psychiatry* 183: 384–397.
- Kellet J (1989) Health and housing. *J Psychosom Res* 33: 255–268.
- Kendler KS, Kessler RC, Heath AC, Neale MC, Eaves LJ (1991) Coping: a genetic epidemiological investigation. *Psychol Med* 21: 337–346.
- Kishida Y (2001) Anxiety in Japanese women after elective abortion. *J Obstet Gynecol Neonat Nurs* 30: 490–495.
- Kitamura T, Shima S, Sugawara M, Toda M (1993) Psychological and social correlates of the onset of affective disorders among pregnant women. *Psychol Med* 23: 967–975.
- Kitamura T, Shima S, Sugawara M, Toda MA (1996a) Clinical and psychosocial correlates of antenatal depression: a review. *Psychother Psychosom* 65: 117–123.
- Kitamura T, Sugawara M, Sugawara K, Toda MA, Shima S (1996b) Psychosocial study of depression in early pregnancy. *Br J Psychiatry* 168: 732–738.
- Kitamura T, Suzuki T (1986) Japanese version of Social Desirability Scale. *Jap J Soc Psychiatry* 9: 173–180 (in Japanese).
- Kitamura T, Suzuki T (1993) A validation study of the Parental Bonding Instrument in a Japanese population. *Jap J Psychiat Neurol* 47: 29–36.
- Kumar R (1982) Neurotic disorders in childbearing women. In: Brockington IF, Kumar R (eds), *Motherhood and mental illness*. Academic Press, London, pp 71–118.
- Kumar R, Robson KM (1984) A prospective study of emotional disorders in childbearing women. *Br J Psychiatry* 144: 35–47.
- Lahey B, Tardiff TA, Drew JB (1994) Negative social interactions: assessment and relations to social support, cognition, and psychological distress. *J Soc Clin Psychol* 13: 42–62.
- Lepore SJ (1992) Social conflict, social support, and psychological distress: evidence of cross-domain buffering effects. *J Person Soc Psychol* 63: 857–867.
- Magaziner J (1988) Living density and psychopathology. A reexamination of the negative model. *Psychol Med* 18: 419–431.
- Major B, Cozzarelli C, Cooper ML, Zubek J, Richards C, Wilhite M, Gramzow RH (2000) Psychological responses of women after first-trimester abortion. *Arch Gen Psychiatry* 57: 777–784.
- Major B, Richards C, Cooper ML, Cozzarelli C, Zubek J (1998) Personal resilience, cognitive appraisal, and coping: an integrative model of adjustment to abortion. *J Pers Soc Psychol* 74: 735–752.

- Murray L, Cooper PJ (1997) Postpartum depression and child development. Guilford, New York.
- O'Connor TG, Heron J, Golding J, Beveridge M, Glover V (2002) Maternal antenatal anxiety and children's behavioural/emotional problems at 4 years. *Br J Psychiatry* 180: 502–508.
- O'Connor TG, Heron J, Golding J, Beveridge M, Glover V (2003) Maternal antenatal anxiety and behavioural/emotional problems in children: a test of a programming hypothesis. *J Child Psychol Psychiatry* 44: 1025–1036.
- O'Hara MW, Neuber DJ, Zekoski EM (1984) A prospective study of postpartum depression: prevalence, course, and predictive factors. *J Abnorm Psychol* 93: 158–171.
- O'Hara MW, Swain AM (1996) Rates and risk of postpartum depression: a meta-analysis. *Intern Review Psychiatry* 8: 37–54.
- O'Hara MW, Zekoski EM (1988) Postpartum depression. A comprehensive review. In: Kumar R, Brockington IF (eds), *Motherhood and mental illness* vol. 2, Academic Press, London.
- Parker G (1981) Parental representations of patients with anxiety neurosis. *Acta Psychiatry Scand* 63: 33–36.
- Parker G (1983) Parental 'affectionless control' as an antecedent to adult depression. A risk factor delineated. *Arch Gen Psychiatry* 40: 956–960.
- Parker G, Tupling H, Brown LB (1979) A parental bonding instrument. *Br J Med Psychology* 52: 1–10.
- Platt SD, Martin CJ, Hunt SM, Lewis CW (1989) Damp housing, mould growth, and symptomatic health state. *Br Med J* 298: 1673–1678.
- Riemsma R, Taal E, Wiegman O, Rasker JJ, Bruyn GAW, van Paasen HC (2000) Problematic and positive support in relation to depression in people with rheumatoid arthritis. *J Health Psychol* 5: 221–230.
- Ross LE, Sellers EM, Gilbert Evans SE, Romach MK (2004) Mood changes during pregnancy and the postpartum period: development of a biopsychosocial model. *Acta Psychiatry Scand* 109: 457–466.
- Soderberg H, Janzon L, Sjoberg N-O (1998) Emotional distress following induced abortion: a study of its incidence and determinants among abortees in Malmo, Sweden. *Eur J Obstet Gynecol Reprod Biol* 79: 173–178.
- Spitzer RL, Endicott J, Robins E (1978) Research diagnostic criteria: rationale and reliability. *Arch Gen Psychiatry* 36: 773–782.
- Stuart S, O'Hara MW, Gorman LL (2003) The prevention and psychotherapeutic treatment of postpartum depression. *Arch Womens Ment Health* 6 [Suppl 2]: s57–s69.
- Sugawara M, Toda MA, Shima S, Mukai T, Sakakura K, Kitamura T (1997) Premenstrual mood changes and maternal mental health in pregnancy and the postpartum period. *J Clin Psychol* 53: 225–232.
- Symister P, Friend R (2003) The influence of social support and problematic support on optimism and depression in chronic illness: a prospective study evaluating self-esteem as a mediator. *Health Psychol* 22: 123–129.
- Turell SC, Armsworth MW, Gaa JP (2002) Emotional response to abortion: a critical review of the literature. *Arch Womens Ment Health* 5: 129–149.
- Verkerk GJM, Pop VJM, Van Son MJM, Van Heck GL (2003) Prediction of depression in the postpartum period: a longitudinal follow-up study in high-risk and low-risk women. *J Affect Disord* 77: 159–166.
- Vinokur AD, Van Ryn M (1993) Social support and undermining in close relationships: Their independent effects on the mental health of unemployed persons. *J Person Soc Psychol* 65: 350–359.
- While AE (1990) The incidence of unplanned and unwanted pregnancies among live births from health visitor records. *Child Care Health Devel* 16: 219–226.
- Wilhelm K, Parker G (1988) The development of a measure of intimate bonds. *Psychol Med* 18: 225–234.
- World Health Organization (1990) Composite International Diagnostic Interview (CIDI), Version 1.0., World Health Organization, Geneva.

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