

A Controlled Study of the Onset, Duration and Prevalence of Postnatal Depression

JOHN L. COX, DECLAN MURRAY and GAIL CHAPMAN

In a two-stage screening procedure using the Edinburgh Postnatal Depression Scale and Goldberg's Standardised Psychiatric Interview, 232 women six months after delivery were compared with control women individually matched for age, marital status and number of children, obtained from general practitioner lists, who were not pregnant nor had had a baby in the previous 12 months. No significant difference in the point prevalence of depression at six months was found between the postnatal (9.1%) and control women (8.2%) nor in the six-month period prevalence (13.8% postnatal, 13.4% controls), but a threefold higher rate of onset of depression was found within five weeks of childbirth. The possible explanations relate to the long duration of depression in women with young children, and the stressful effect of childbirth and its psychosocial sequelae.

Although the frequency, severity and family consequences of a non-psychotic depression occurring shortly after childbirth have been extensively investigated (Pitt, 1968; Paykel *et al.*, 1980; Cox *et al.*, 1982; Kumar & Robson, 1984; Watson *et al.*, 1984; Wrate *et al.*, 1985; Cogill *et al.*, 1986; Stein *et al.*, 1991; Murray, 1992), the question of whether there is a higher frequency of postnatal depression compared with that found in non-postnatal women has remained unanswered. Thus no controlled study has been carried out in the UK, although the frequency of depression after childbirth was found to be similar in non-pregnant, non-puerperal Ugandan women (Cox, 1979), and in a study by O'Hara *et al.* (1990) in the US, 10.4% of women were depressed nine weeks after delivery compared with 7.8% of controls – a non-significant difference.

There were, however, methodological limitations to these studies, such as the difficulty in obtaining a satisfactory control group, allowing for an effect of drop-out rates on depression, and for a possible therapeutic effect of conducting serial interviews. Nevertheless, uncontrolled prospective studies which compared the frequency of depression in postnatal women with that in general population studies also found that the rates were similar. Thus, Kumar & Robson (1984) compared the 12-month period prevalence of psychiatric disorder (24%) after delivery with that reported by Brown & Harris (1978) in their Camberwell community study (17%), and Watson *et al.* (1984) compared the frequency of postnatal depression (12%) with 14.9% found by Bebbington *et al.* (1981). In the study reported by Cooper *et al.* (1988), the prevalence of depression six months after childbirth (8.8%) was similar to that in a comparison group (9.9%) from a community

study in Edinburgh (Surtees *et al.*, 1983), but a higher incidence of depression was found within three months of delivery.

We recognised, therefore, that there was a need for a carefully controlled study of postnatal depression in mothers living in the UK, and that this research could influence both the direction of future aetiological studies and also assist a more cogent theoretical underpinning to the community services for mothers with infants. This paper describes such a study.

Method

The study was carried out within the North Staffordshire Health District, which has a population of 460 000 and is mainly lower social class. The principal employers are the pottery and coal-mining industries. There are about 6000 births per annum, most of which take place in the North Staffordshire Maternity Hospital, Stoke-on-Trent.

The index group comprised women recruited from the North Staffordshire Hospital. Using random numbers, women were selected from the antenatal clinic lists (all consultant clinics were used in rotation) and then contacted by the research midwife (GC). The sole purpose of this initial contact was to obtain their cooperation, consent and confirmation of the address to which the postal questionnaire could be sent five months after delivery. To avoid delay in commencing data collection, women were also recruited from the birth register and included in the study without having been seen in the antenatal clinic.

The women included in the control group were aged between 16 and 45 years, were not presently pregnant, nor had given birth in the previous 12 months. These subjects were recruited from four general practice age/sex registers by the research midwife (GC). From these registers a list of all women aged between 16 and 45 was made and their age, marital status, number and ages of children, as well as

their address and telephone number recorded. This information was used to select a woman who could be matched as closely as possible with a 'postnatal' woman for marital status, number of children, and age (within five years). Fourteen selected control women could not be traced by the research team, and another control was therefore selected. Control women who were subsequently found to be pregnant, but had not contacted their general practitioner, were also replaced. The eight control women who did not wish to take part in the study were not replaced.

Measures

The Edinburgh Postnatal Depression Scale (EPDS) is a ten-item self-report scale specifically validated for use with child-bearing women (Cox *et al*, 1987). Each item is scored on a four-point scale (0–3), the minimum and maximum total scores being 0 and 30 respectively. The scale takes less than five minutes to complete and is well received by child-bearing women; it rates the intensity of depressive symptoms present within the previous seven days. A cut-off score 12/13 was found to identify most seriously depressed women, but a score of nine or more recommended screening for major and minor depression diagnosed according to Research Diagnostic Criteria (RDC; Spitzer *et al*, 1978).

The 28-item General Health Questionnaire (GHQ-28; Goldberg & Hillier, 1979) was also used. Each item has four possible responses and the 'GHQ scoring method' (0–0–1–1) was used. The GHQ-28 has four subscales of seven items each: somatic symptoms, anxiety and insomnia, social dysfunction, and severe depression.

The Standardised Psychiatric Interview (SPI; Goldberg *et al*, 1970) is a semistructured interview designed for use in the community, and takes 15–40 minutes to administer. Two items assessing anhedonia and appetite were added to the SPI to facilitate a diagnosis according to RDC.

The Social Maladjustment Schedule (SMS; Clare & Cairns, 1978) was modified for use in this study to measure social adaptation to parenting. These data, together with the clinical characteristics of depressive disorder will be described in a later paper.

Procedure

The same procedure for data collection was used in both the index and control groups. The EPDS was sent by post with a letter which described the aims of the study (a covering letter from their general practitioner was included for controls), and the women were asked to complete the scale without consulting relatives. A stamped addressed envelope was enclosed; if there was no reply within two weeks a second letter was sent, then if necessary a third. If no reply was received we called to the home address and asked the mother to complete the EPDS questionnaire. All high scores (EPDS score 9–30) and a sample of low scorers (EPDS score 0–8) were selected for a subsequent home interview.

To arrange these interviews, a further letter was sent which gave a time and a date when the interviewer would call. At this visit the two self-report scales were completed – the GHQ-28 and a repeat EPDS. The SPI and the modified SMS were also administered. All interviews were carried

out by DM or GC, who were both fully trained in London in their use. DM and JC had used the SPI in previous research (Murray & Cox, 1990). In addition to establishing the presence of defined psychiatric symptoms and manifest abnormalities within the previous seven days, any symptoms occurring within the previous six months were also assessed. A careful enquiry was also made as to the duration and intensity of any depression identified and in particular to the time of onset of depression.

To ensure comparability of SPI ratings between interviewers, 20 interviews carried out by GC were audiotaped and later discussed with DM, when the RDC diagnoses were made. In addition, some of the more difficult ratings were discussed with JC, who had also accompanied GC on several home visits towards the end of the study.

Results

Of the 251 postnatal women sent the EPDS, 243 (97%) returned the completed questionnaire; two women could not be traced and six declined to take part in the research. Of the 251 control women required, two were redundant as their postnatal matches were untraced, and three were excluded owing to pregnancy near the end of the study. Of the remaining 246, 238 returned completed questionnaires, and eight did not wish to take part in the study. Those women in either the index or control group whose identified 'partner' in the other group did not return the EPDS were excluded, to leave a sample of 232 matched pairs for the analysis reported in this paper.

Of the 147 postnatal women selected for interview (96 high scorers and 51 low scorers on the EPDS), 137 interviews were successfully completed; seven women refused and three had moved away. Of the 156 control women selected for interview (106 high scorers and 50 low scorers), 140 interviews were completed; 13 women refused and three had moved away. Eight of the 137 index and four of the 140 controls interviewed were excluded in the process of pairing described above, leaving 129 postnatal women and 136 controls interviewed in the 232 matched pairs.

The demographic characteristics of the index and control women, and the success of matching, are shown in Table 1. The two groups were satisfactorily matched for marital status, number of children and social class, but the postnatal women were slightly younger than controls. No significant difference was found between the mean EPDS scores of the postnatal (7.6, s.d. 5.6) and control women (8.3, s.d. 5.3) ($t = 1.45$, $P = 0.15$, $n = 232$).

During the home interview the EPDS was again administered, as well as the GHQ-28. The mean EPDS score for the index group was then 7.7 (s.d. 5.6) and 8.3 (s.d. 5.3) for controls, a non-significant difference ($t = -0.69$, $P = 0.5$). The mean total GHQ-28 score for the index and control groups were 4.5 and 3.4 respectively ($t = 1.3$, $P = 0.18$, $n = 79$); the subscale scores showed a similar trend but no significant differences.

RDC depression

The frequency of diagnosed episodes of RDC depression present at interview was found to be similar in the index

Table 1
Characteristics of the index and control groups' 232 matched pairs

	Postnatal women	Control women
Mean (s.d.) age: years	25.4 (5.2)	27.2 (4.7)*
Marital status: % married/cohabiting	193 (83.2%)	191 (82.4%)
Social class (of partner) ¹		
I	5 (2.2%)	2 (0.9%)
II	19 (8.2%)	22 (9.5%)
IIIN	32 (13.8%)	34 (14.7%)
IIIM	96 (41.4%)	94 (40.5%)
IV	22 (9.5%)	25 (10.8%)
V	9 (3.9%)	6 (2.6%)
Army	1 (0.4%)	0 (0%)
unemployed	24 (10.3%)	15 (6.5%)
no partner	17 (7.3%)	26 (11.2%)
missing	7 (3.0%)	8 (3.5%)
% with > 1 child	45.7%	47.8%
Mean age of youngest child: months	5.8	44.8

*P<0.0001 (t-test).

1. Non-cohabiting partners included.

and control groups; 9.1% (n=21) of the 232 postnatal women were depressed, as were 8.2% (n=19) of the control women (Table 2). The six-month period prevalence was also similar: 13.8% for the postnatal women and 13.4% for control women (Table 2).

To allow for cases arising because of the two-stage screening procedure, a corrected point prevalence for RDC depression was calculated by applying the positive predictive value to the EPDS high scorers who could not be interviewed and the negative predictive value to the EPDS low scorers not interviewed (Table 2).

The timing of onset and the duration of depression in weeks is shown in Table 3, and illustrated in Fig. 1. In three postnatal women the depression began during pregnancy,

Table 2
Point prevalence and corrected point prevalence¹ of RDC depression 6 months after delivery and 6-month period prevalence in index and control women

	Postnatal women (n=232)	Control women (n=232)
Point prevalence at 6 months		
major depression	8 (3.5%)	8 (3.5%)
minor depression	13 (5.6%)	11 (4.7%)
total depression	21 (9.1%)	19 (8.2%)
Corrected point prevalence		
total depression	23 (9.9%)	23 (9.9%)
Six-month period prevalence		
major depression	15 (6.5%)	13 (5.6%)
minor depression	17 (7.3%)	18 (7.8%)
total depression	32 (13.8%)	31 (13.4%)

1. Making allowance for screening procedure (see text).

Table 3
Onset in relation to childbirth and length in weeks of episodes of depression in postnatal women and in corresponding period for control women, which was taken as a date 6 months before interview

		Depressed at interview		Depressed in previous 6 months but not at interview					
		Postnatal women		Control women		Postnatal women		Control women	
onset	length	onset	length	onset	length	onset	length	onset	length
21	6	-134	160	1	10	-18	42		
3	22	-234	260	20	8	18	10		
0	25	-26	52	-27	52	10	10		
0	25	-1	-1	0	8	8	14		
0	25	0	26	4	18	18	4		
11	13	23	3	0	17	-23	39		
-104	130	0	26	-26	56	0	8		
-105	130	-182	208	0	8	-78	96		
12	14	0	26	0	8	8	8		
-79	104	-39	65	1	12	18	6		
0	26	9	17	13	8	18	1		
23	4	13	13			2	13		
1	26	13	13						
-178	208	-56	82						
-26	52	-4	30						
2	24	-7	33						
0	27	-104	130						
12	17	10	16						
8	19	-70	96						
6	20								
4	23								

1. Prolonged depression; onset could not be determined accurately.

and in three control women with a prolonged depression the onset was after an earlier delivery. The mean duration of depression in the postnatal women was 36 weeks (s.d. 45) compared with 50 weeks (s.d. 64) for controls.

Sixteen postnatal women reported that their depression began less than five weeks after delivery, compared with

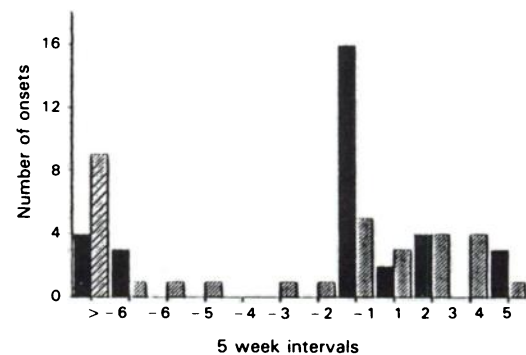


Fig. 1 Onset of depression (RDC major and minor) in 5-week intervals before and after birth or interview for controls (▨ postnatal women, ▨ control women).

only five women for the corresponding time period in the control group ($\chi^2 = 6.035$, $P = 0.014$).

Discussion

The results of this first British controlled study confirms earlier reports (Pitt, 1968; Watson *et al*, 1984; Kumar & Robson, 1984) that the prevalence of depression in postnatal women is similar to that found in the general population of women. However, like Cooper *et al* (1988), we also found an increased risk of such depression commencing shortly after delivery, a finding which suggested that childbirth and its immediate psychosocial sequelae were likely to be important causal factors for the non-psychotic depressions, as well as for the psychoses. The similar period prevalence for index and control women and yet increased rate of early-onset depression following childbirth can be partly explained by the long duration of depression in the control women who also had young children, and by the three control women in whom the onset of depression had followed a much earlier delivery.

The rates of depression reported for a predominantly working-class population are at the lower end of the range frequently quoted (see Brown & Harris, 1978), a finding which may be explained by the population and geographical characteristics of the people living in North Staffordshire. The communities of this district are traditionally parochial, stable and strongly bound together; these factors lead to a distinctive pattern of living, as well as to a strong local culture (Kivell *et al*, 1992). This stability may facilitate more access to social supports than in other urban areas. Our success in obtaining a satisfactory control group, and the low drop-out rate, suggests that the comparison of the onset rate and prevalence of depression between the index and controls is perhaps more robust than in the other studies so far reported. Our controls, however, were slightly older than the index women, as it was inevitable that women with a child over one year of age were more likely to be older than those with a baby of six months, but this age difference was unlikely to contribute to the increased incidence of depression shortly after childbirth.

What could explain this threefold increase of depression arising in the first month after delivery? While it appears likely that this increase is a direct consequence of the physical and psychological stresses of childbirth and its attendant new relationships, other explanations need to be considered. Any observer bias could influence the recorded onset of depression, although this was minimised by joint discussion of ratings, as well as by careful dating of

the onset according to the woman's own report. The mothers may have attributed (falsely) the onset of depression to the birth in a 'search after meaning', as the birth was a significant reference point for the postnatal women but not for controls. In this respect it is of interest that O'Hara *et al* (1990), whose acquaintance controls had their friend's delivery as a reference point, found that a *higher* proportion of control (9/14) than postnatal women (9/19) reported the onset of depression within the first eight days after delivery. In our study the controls were not acquaintances of the index women and so had no specific reference point to date the onset of depression.

Although these factors should be taken into account when interpreting our data, they are unlikely to account for the threefold increase in rate of onset of depression in the first month of childbirth. It is most likely that this 'life event' and the immediate impact of a new family member is a specific stress which lowers self-esteem and leads to the development of a depressive disorder; this causal effect of childbirth is of far smaller magnitude than the 22-fold increase in risk reported by Kendell *et al* (1987) for puerperal psychosis.

The category 'postnatal depression' thus remains a useful diagnostic term to direct clinicians and researchers to these possible triggering and maintaining effects for the non-psychotic depressive disorders, which affect at least one in ten postnatal women.

Acknowledgements

The study was funded by the West Midlands Regional Research Committee. We thank Dr Peter Jones of the Department of Mathematics, Keele University, for his statistical advice, and the following general practitioners for their active cooperation with this study: Dr J. Bashford, Dr Law, Dr Agarwal, Dr Manhudane, Dr D. Garvie, Dr M. Fisher, Dr M. Shapley, Dr Tucker, Dr G. Thomas, and Dr Thomas, and the staff at their respective health centres.

References

- BEBBINGTON, P., HURRY, J., TENNANT, C., *et al* (1981) Epidemiology of mental disorders in Camberwell. *Psychological Medicine*, **11**, 561-597.
- BROWN, G. W. & HARRIS, T. (1978) *Social Origins of Depression: A Study of Psychiatric Disorders in Women*. London: Tavistock.
- CLARE, A. W. & CAIRNS, V. E. (1978) Design development and use of a standardised interview to assess social maladjustment and dysfunction in community studies. *Psychological Medicine*, **8**, 589-604.
- COGILL, S. R., CAPLAN, H. L., ALEXANDRA, H., *et al* (1986) Impact of maternal postnatal depression on cognitive development of young children. *British Medical Journal*, **292**, 1165-1167.
- COOPER, P. J., CAMPBELL, E. A., DAY, A., *et al* (1988) Non-psychotic psychiatric disorder after childbirth. *British Journal of Psychiatry*, **152**, 799-806.

- COX, J. L. (1979) Psychiatric morbidity and pregnancy: a controlled study of 263 semi-rural Ugandan women. *British Journal of Psychiatry*, **134**, 401–405.
- , CONNOR, Y. M. & KENDELL, R. E. (1982) Prospective study of the psychiatric disorders of childbirth. *British Journal of Psychiatry*, **140**, 111–117.
- , HOLDEN, J. M. & SAGOVSKY, R. (1987) Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, **150**, 782–786.
- GOLDBERG, D. P., COOPER, B., EASTWOOD, M. R., *et al* (1970) A standardised psychiatric interview for use in community surveys. *British Journal of Preventive and Social Medicine*, **24**, 18–23.
- & HILLIER, V. F. (1979) A scaled version of the General Health Questionnaire. *Psychological Medicine*, **9**, 139–145.
- KENDELL, R. E., CHALMERS, J. C. & PLATZ, C. (1987) Epidemiology of puerperal psychoses. *British Journal of Psychiatry*, **150**, 662–673.
- KIVELL, P. T., MASON, K. T. & BENNETT, G. M. (1992) *Health Profile of North Staffordshire*. Centre for regional information and research, Geography Department, Keele University.
- KUMAR, R. & ROBSON, K. (1984) A prospective study of emotional disorders in child-bearing women. *British Journal of Psychiatry*, **144**, 35–47.
- MURRAY, D. & COX, J. L. (1990) Screening for depression during pregnancy with the Edinburgh Depression Scale (EPDS). *Journal of Reproductive and Infant Psychology*, **8**, 99–107.
- MURRAY, L. (1992) The impact of postnatal depression on infant development. *Journal of Child Psychology and Psychiatry*, **33**, 543–561.
- O'HARA, M. W., NEUNABER, D. J. & ZEKOSKI, E. M. (1990) A prospective study of postpartum depression: prevalence, course and predictive factors. *Journal of Abnormal Psychology*, **93**, 158–167.
- PAYKEL, E. S., EMMS, E. M., FLETCHER, J., *et al* (1980) Life events and social support in puerperal depression. *British Journal of Psychiatry*, **136**, 339–346.
- PITT, B. (1968) "Atypical" depression following childbirth. *British Journal of Psychiatry*, **14**, 1325–1337.
- SPITZER, R. L., ENDICOTT, J. & ROBINS, E. (1978) Research Diagnostic Criteria: rationale and reliability. *Archives of General Psychiatry*, **35**, 773–782.
- STEIN, A., GATH, D. H., BUCHER, J., *et al* (1991) The relationship between postnatal depression and mother child interaction. *British Journal of Psychiatry*, **158**, 46–52.
- SURTEES, P. G., DEAN, C., INGHAM, J. G., *et al* (1983) Psychiatric disorder in women from an Edinburgh community: associations with demographic factors. *British Journal of Psychiatry*, **142**, 238–246.
- WATSON, J. P., ELLIOTT, S. A., RUGG, A. J., *et al* (1984) Psychiatric disorder in pregnancy and the first postnatal year. *British Journal of Psychiatry*, **144**, 453–462.
- WRATE, R. M., ROONEY, A. C., THOMAS, P. F., *et al* (1985) Postnatal depression and child development: a 3-year follow-up study. *British Journal of Psychiatry*, **146**, 622–627.

*John L. COX, MA, DM, FRCPsych, FRCP(Edin), *Professor of Psychiatry, Department of Psychiatry, School of Postgraduate Medicine, Keele University, Staffordshire*; Declan Murray, MB, BCh, BAO, MRCPsych, *Consultant Psychiatrist, St Edward's Hospital, Cheddleton, Leek, Staffordshire*; Gail Chapman, RM, *Midwife, North Staffordshire Maternity Hospital, Stoke-on-Trent*

*Correspondence