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Demographic and Obstetric Risk Factors for Postnatal Psychiatric Morbidity

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Background. Postnatal depression follows 10% of live births but there is little consensus on the risk factors associated with its development. Previous smaller studies have been unable to quantify the impact of independent risk factors as relative and attributable risks.

Method. The Edinburgh Postnatal Depression Scale (EPDS) was used to screen a systematic sample of 2375 women, six to eight weeks after delivery. Information on socio-demographic and obstetric variables was collected at the screening interview. The risk factors associated with high EPDS scores (> 12) were determined and entered stepwise into a regression model.

Results. Four independent variables were found to be associated with an EPDS score above this threshold. These were an unplanned pregnancy (OR 1.44); not breast-feeding (OR 1.52), and unemployment in either the mother, i.e. no job to return to following maternity leave (OR 1.56), or the head of household (OR 1.50). These four variables appeared to explain the risk associated with other risk factors.

Conclusions. Although a direct aetiological role for these risk factors is not certain, they may indicate strategies for the prevention of affective morbidity in postnatal women. These may include reducing unwanted pregnancy and employment for women after childbirth.

Non-psychotic depression is found in 8–15% of women following childbirth (Pitt, 1968; Cox *et al*, 1982; Kumar & Robson, 1984; Watson *et al*, 1984; Cooper *et al*, 1988; Cox *et al*, 1993) and represents a considerable public health problem affecting women and their families. It may lead to continuing or recurrent depression (Kumar & Robson, 1984; Nott, 1987; Phillips & O'Hara, 1991) and is associated with marital difficulties (Paykel *et al*, 1980; Cox *et al*, 1982; Kumar & Robson, 1984; Watson *et al*, 1984) and disturbance in infant behaviour and development (Cogill *et al*, 1984; Wrate *et al*, 1985; Murray, 1992).

If postnatal depression is to be prevented by clinical or public health intervention, its risk factors need to be reliably identified. However, numerous studies have produced no consensus on these (Paykel *et al*, 1980; Cutrona, 1983; Kumar & Robson, 1984; O'Hara *et al*, 1984; Watson *et al*, 1984; Cooper *et al*, 1988; Hannah *et al*, 1992). Conflicting findings appear to have arisen because of relatively small subject samples, because samples are drawn from different settings, for example antenatal clinics or postnatal surveys, and because many putative risk factors are inter-related. Some reported risk factors, therefore, may not be independently associated with postnatal depression.

Others, for example subfertility, are uncommon and their impact on morbidity in the population is likely to be small. The present study reports independent risk factors from a large urban population and quantifies their effect by calculating odds ratios and population attributable fractions.

Method

Subjects

The study sample was initially recruited from postnatal wards on two maternity units in south Manchester. Women were approached prior to discharge on alternate weekdays for a 20 month period from May 1993 to February 1995 and asked to agree to a home visit 6–8 weeks after delivery. Living outside the district and speaking insufficient English to understand the screening questionnaire were the exclusion criteria. The primary purpose of the visit was to identify women with postnatal depression who were then asked to join a treatment trial.

Assessment

The screening visit consisted of a short interview collecting information about the age, occupation

and marital status of the mother and details of parity, family size and obstetric complications associated with the current pregnancy. Social class was derived from the standard occupational classification of the woman's partner or of the woman herself if she was a single parent (Elias, 1993), based on current occupation.

Subjects were asked to complete the Edinburgh Postnatal Depression Scale (EPDS; Cox *et al.*, 1987). This is a 10-item self-report questionnaire designed to screen for postnatal depression in the community which has been well validated and widely used. In itself it cannot confirm a diagnosis of depressive illness but at a threshold score of 12/13 it has been calculated to have a sensitivity of 86% and 68%, a specificity of 78% and 96%, and a positive predictive value of 73% and 67% (Cox *et al.*, 1987; Murray & Carothers, 1990 respectively).

Statistical analysis

Thirteen socio-demographic and obstetric variables on which information had been obtained at the screening interview were entered individually into a logistic regression analysis with high and low scores on the EPDS as the outcome variable using a threshold of 12/13. Those variables showing a significant association with high EPDS scores were entered into a stepwise logistic regression analysis. This analysis provides an odds ratio from which, if the proportion of the sample exposed to the risk factor is known, a population attributable fraction can be estimated. Analyses were carried out on SPSS/PC.

Results

Subjects

During the 20-month study period there were 6842 deliveries in the two maternity units. By systematic (alternate day) sampling 3463 (50.6%) were initially approached by the researchers to take part in the study, of whom 485 (14%) were ineligible. Of the 2978 eligible subjects, 603 refused to take part in the interview, resulting in a total of 2375 (79.8% of eligible subjects) complete screening interviews (no information was available on refusers). Two hundred and eighty (11.8%) subjects scored >12 on the EPDS.

Characteristics of total sample

The mean age of the subjects was 28 years (range 15 to 46 years). Current employment placed 767 (32.3% of those screened) in social classes I & II,

651 (27.4%) in social class III and 306 (12.8%) in social classes IV & V. Six hundred and fifty-one (27.4%) subjects were unclassified for social class because heads of household were either currently unemployed (25.1%), students (2.2%) or in the armed forces (0.1%). Three hundred and fifty-two (14.8%) subjects were single parents, i.e. not living with a partner, 304 (12.8%) lived with partners who were unemployed. One thousand and sixty-three (44.8%) women were in employment themselves and planned to return to work after a period of maternity leave. Those without a post to resume after maternity leave were regarded as unemployed in the subsequent analysis.

Forty-six per cent (1092) of the women were primiparous, 1478 (62%) had planned to become pregnant and 198 (8.3%) had taken more than 12 months to conceive and were regarded as 'sub-fertile' for the purpose of the study. Thirty-seven per cent (872) were still breast feeding at the time of the screening interview.

Obstetric and neonatal complications were more common than would be expected in a random sample of mothers, as the alternate day sampling led to over-representation of women who remained in hospital for more than one day after delivery. Twenty-one per cent (499) experienced complications during pregnancy sufficient to result in hospital admission or investigation. Caesarian sections accounted for 573 (24%) of the deliveries. Two hundred and seventeen babies were placed in the special-care baby unit in the week following delivery.

Associations of high EPDS scores

Table 1 shows the frequency of EPDS scores >12, odds ratios and 95% confidence intervals for each of these demographic and obstetric variables. There was a significant association with high EPDS scores for eight variables, the highest risk being associated with unemployment in both the woman and the head of household, and single status. Following forward stepwise entry of the eight significant variables into the regression analysis, four variables remained significantly associated with high EPDS scores. These were having an unplanned pregnancy, no longer breast feeding at six weeks, and unemployment in either partner. A mother not planning to work outside the home following maternity leave was an independent risk factor, as was unemployment in the head of the household. Table 2 shows the odds ratios for these four variables, and the attributable fractions calculated

Table 1
Logistic regression analysis of association between individual demographic and obstetric variables and scores >12 on the EPDS at six weeks postpartum ($n=2375$)

Risk factor	Number of subjects with factor	Number (%) scoring >12 on EPDS	Odds ratio (95% CI)
Obstetric			
Unplanned pregnancy	897	146 (16.3)	1.79 (1.39–2.30)
Subfertility	198	25 (12.6)	1.48 (0.93–2.35)
Primiparity	1092	122 (11.2)	0.89 (0.70–1.16)
Complicated pregnancy	499	65 (13.0)	1.16 (0.86–1.56)
Caesarian section	573	63 (11.0)	0.90 (0.67–1.22)
Mean birthweight (lb)	7.1	6.9	0.89 (0.81–0.97)
Baby on Special-care baby unit	217	34 (15.7)	1.44 (0.98–2.13)
Not breast feeding (6 weeks)	1503	208 (13.8)	1.85 (1.39–2.46)
Demographic			
Increasing maternal age (mean in years)	27.6	26.8	0.94 (0.92–0.96)
Single status	352	70 (19.9)	2.14 (1.59–2.89)
Maternal unemployment (no job to return to following maternity leave)	1312	195 (14.9)	2.08 (1.59–2.73)
Median number of children <12 years at home	2.0	2.0	1.18 (1.06–1.30)
Head of household unemployed	651	120 (18.4)	2.80 (2.02–3.92)
Social class (risk relative to risk in class I & II):			
III	651	67 (10.3)	1.38 (0.95–1.99)
IV & V	306	34 (11.1)	1.50 (0.96–2.34)

Table 2
Stepwise logistic regression analysis of variables significantly associated with a score >12 on the EPDS

Risk factor	Odds ratio (95% CI)	Prevalence of risk factor (%)	Attributable fraction
Unplanned pregnancy	1.44 (1.10–1.89)	38.0	0.14
Not breast feeding	1.52 (1.12–2.06)	63.1	0.25
Maternal unemployment	1.56 (1.14–2.12)	55.2	0.24
Head of household unemployed	1.50 (1.10–2.04)	25.1	0.12

from the above data on the frequency of each variable in the study sample.

Discussion

Methodological issues

This is the largest reported screening of postnatal women for evidence of depression. Its sample is not derived from clinic attenders but from all women giving birth in hospital and should include those women who are poor users of medical services and who may be at most risk. Because initial screening took place on alternate days, a high proportion of women who remained in hospital for more than 24 hours following complicated delivery or neonatal illness are included. Our results may therefore inflate any risk that differentially affects these women. The same may be true of women with poor social

support, although there is no evidence in our data that socially vulnerable women are over-represented. For example, the rate of single mothers in our sample and the proportion of births in social classes IV and V are close to national figures (Office of Population Censuses and Surveys, 1994).

The dependent variable in this study was a score of more than 12 on the EPDS. This is a screening instrument and high scores do not in themselves confirm depressive illness. Nevertheless evaluation of the EPDS (see above) shows that it provides a valid measurement of affective morbidity and it has previously been used alone in assessing maternal mood (Hannah *et al.*, 1992). It is therefore reasonable to assume that the risk factors reported here are important in the development of postnatal depression, although it is more accurate to say that they are predictive of depressive symptoms. In addition, any preventative strategy in postnatal

depression is likely to use the EPDS for initial screening and these results are an indication of the number and characteristics of women likely to require further assessment.

Independent risk factors

Our initial analysis found significant associations between high EPDS scores and a number of variables reported as risk factors in previous studies. These were younger age (Paykel *et al.*, 1980), being single (O'Hara *et al.*, 1984), and having older children (Brown & Harris, 1978). We found no association with operative delivery (Hannah *et al.*, 1992). Previous studies have been divided on whether depression and obstetric complications are related (Cutrona, 1983; O'Hara *et al.*, 1984; Kumar & Robson, 1984) or unrelated (Paykel *et al.*, 1980; Cox *et al.*, 1982; Stein *et al.*, 1989). In our study there was no association with complications of pregnancy as reported by subjects. The increased risk in subfertility (Kumar & Robson, 1984) and after neonatal illness did not reach significance.

However, once all risk factors for high EPDS scores were entered stepwise into a regression model, none of the above variables remained significantly associated with scores above the threshold of 12. Four significant risk factors remained: unplanned pregnancy, not breast feeding, maternal unemployment (no job to return to following maternity leave) and unemployment in the head of household. In each case the odds ratio was around 1.5.

An unplanned pregnancy may result in ambivalence towards the child antenatally or lack of commitment to the infant, both of which have previously been associated with depression (Kumar & Robson, 1984; Murray, 1989). Difficulties in adjusting to parenthood and feelings of entrapment are prominent in postnatal depression and are likely to be greater if the baby is not planned.

A link between depression and bottle-feeding has been reported by Hannah *et al.* (1992); conversely, an increased risk has also been described in breast-feeding mothers and attributed to endocrine changes (Alder & Cox, 1983). Our study found depression to be more common in women who were bottle-feeding and the effect was not explained by social class. However, the nature of the causal relationship is uncertain. Breast-feeding may enhance self-esteem and so make depression less likely; alternatively, women who are depressed or discontented with their maternal role may give up breast feeding more readily.

Similarly, it is unclear in what way the relationship between maternal unemployment and depression is aetiological. It may reflect the isolation and low self-esteem of non-working mothers, equivalent to that described in other depressed women (Brown & Harris, 1978), or the substantial role change for women who were previously employed but who following childbirth have no future employment planned. Alternatively, women who are vulnerable to depression may not seek work postnatally. Depression was independently associated with unemployment in the head of the household (the male partner in 85.2% of subjects), presumably reflecting the psychological impact of socio-economic adversity.

The odds ratios associated with the four independent factors identified are modest in size, but because each risk factor is common in our sample the associated attributable risks are substantial. Population attributable fraction can be defined as the maximum change in the rate of a disorder achievable through eliminating a risk factor, but this maximum is possible only if the factor is directly aetiological. This is not the case in studies of this kind, although the causal role of some factors, for example unplanned pregnancy, is likely to be greater than others. Our results suggest that reducing unwanted pregnancies and, perhaps, better opportunities to return to employment postnatally would have a substantial effect on the rate of postnatal depression.

Clinical implications

- Risk of postnatal depression is indicated by psychosocial factors, many of them evident antenatally, but not obstetric factors.
- Reducing unplanned pregnancy as a matter of public health policy may reduce the rate of depression in postnatal women.
- The prospect of returning to work following maternity leave may reduce the risk of depression in postnatal women.

Limitations of study

- Psychiatric morbidity is indicated by scores on the Edinburgh Postnatal Depression Scale – this is primarily a screening instrument, although its relationship to depression is well established.
- The four variables independently linked to postnatal depression in this study may not be aetiological.
- No information was collected on biological risk factors.

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