Maternal psychological morbidity and low birth weight in India

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Summary Depression following childbirth is associated with poor child growth in developing countries. We describe the association between psychological morbidity during pregnancy and low birth weight (<2.5 kg). A cohort of 270 mothers was recruited from a district hospital in Goa, India; all mothers were interviewed with a screening questionnaire for psychological morbidity. Babies of 250 mothers were reviewed at birth to measure their weight. Excluding 5 premature babies, we found that maternal psychological morbidity was independently associated with low birth weight (odds ratio 1.44, 95% CI 1.00–2.07). We conclude that maternal psychological morbidity has an adverse impact on foetal growth.

Maternal psychological morbidity in the postnatal period is associated with failure to thrive and malnutrition in the first year of life in developing countries (Patel *et al*, 2004*a*). The majority of mothers who are depressed postnatally also show significant psychological morbidity in the antenatal period (Patel *et al*, 2004*a*). It is plausible that the adverse impact of maternal depression on infant growth may begin during the antenatal period, leading to low birth weight. A cohort study from Pakistan reported that babies of mothers who were depressed during the third trimester of pregnancy were 2.1 times (95% CI 1.1–3.3) more likely to have a low birth weight (<2.5 kg) than babies of other mothers (Rahman *et al*, 2004). We present an analysis of another cohort study, from India, which aimed to describe the risk factors for depression in the postnatal period (Patel *et al*, 2002). We used the data from that study to test the hypothesis that psychological morbidity in the third trimester is associated with low birth weight.

METHOD

Details of the recruitment have been reported by Patel *et al* (2002). The study took place in the antenatal clinic of the Asilo Hospital, a district hospital in the town of Mapusa, Goa, in 1999–2000. Consecutive women attending the hospital's antenatal clinic who were more than 30 weeks pregnant were eligible to participate. Women who were transient visitors to the hospital clinic or who did not speak a study language were excluded. At recruitment, participants were interviewed with the Konkani language version of the General Health Questionnaire (GHQ; Patel *et al*, 1998). This 12-item questionnaire is a measure of psychological health. The Konkani version has been developed, validated and used in Goa (Patel *et al*, 1998). An interview elicited data on other risk factors for postnatal depression: maternal age, parental education, economic deprivation (paternal income, being in debt), antenatal medical problems, whether the pregnancy was planned, and obstetric factors (number of pregnancies). The outcome was the weight of the newborn, routinely recorded immediately after birth in the labour room. The weight was recorded in kilogrammes up to two decimal places, and then categorised into a dichotomous outcome: low birth weight (<2.5 kg) or normal birth weight. Written or verbal witnessed (by a hospital nurse) informed consent was obtained from all participants.

The analysis aimed to test for a linear association between maternal psychological morbidity, categorised as quartiles of GHQ scores, and low birth weight in term babies; premature babies (<37 weeks) were therefore excluded. Unadjusted odds ratios were calculated for each risk factor and multiple logistic regression was used to adjust for potential confounding effects.

RESULTS

In total, 297 mothers were eligible to participate; 27 mothers (9.1%) refused, leaving a sample of 270 mothers with an average gestation at recruitment of 34 weeks. Their average age was 26 years (range 18–40). All but one were married; 114 (42.2%) were primigravida. Less than 10% of the mothers were in full-time employment. Fathers had marginally more years of formal education than their wives (mean 7.5 years *v.* 6.4 years). The average monthly income for fathers was Rs 2140 (US$50).

Table I Association between maternal General Health Questionnaire (GHQ) score in the last trimester of pregnancy and low birth weight

	Odds ratio for each quartile increment in GHQ OR (95% CI)	Odds ratio for top quarter *v.* lowest three-quarters[1] OR (95% CI)
Unadjusted	1.44 (1.00–2.07)	3.29 (1.44–7.56)
Adjusting incrementally for:		
Maternal education	1.43 (0.99–2.06)	3.25 (1.41–7.54)
+Age	1.45 (1.00–2.10)	3.46 (1.47–8.14)
+Income	1.42 (0.98–2.06)	3.81 (1.38–10.54)
+Paternal education	1.40 (0.97–2.04)	3.38 (1.18–9.64)
+Antenatal medical problems	1.44 (1.00–2.10)	3.26 (1.41–7.56)
+Intimate partner violence during pregnancy	1.53 (1.05–2.24)	3.49 (1.48–8.24)

1. Top quarter: GHQ score above 6.

Outcome data were available for 250 babies (92.6%). Five babies were premature and hence excluded from the analysis, leaving 245 eligible mother–baby dyads. Of these, 26 babies (10.6%) were of low birth weight.

In bivariate analyses there were non-significant trends for low birth weight to be associated with older maternal age, lower paternal income and lower levels of maternal and paternal education. The only significant association was that between GHQ score and low birth weight (Table 1), with an odds ratio (OR) of 1.44 (95% CI 1.00–2.07) for each quartile increase in GHQ score. Exploratory analysis revealed that the association was non-linear, with the excess risk concentrated in the highest quarter of the GHQ distribution: first quarter, OR=1; second quarter, OR=0.43 (95% CI 0.09–2.16); third quarter, OR=0.74, (95% CI 0.21–2.67); fourth quarter, OR=2.51 (95% CI 0.94–6.74). In subsequent multivariate analyses the effect of adjusting incrementally for the possible confounders was observed for its impact on the linear association with GHQ score (Table 1). There was little evidence of confounding.

DISCUSSION

Babies of mothers who had high scores on the GHQ, indicating probable psychological morbidity, were significantly more likely to be of low birth weight, even after adjustment for maternal age, maternal and paternal education and paternal income. We acknowledge the limitations of this study: this is a secondary analysis of a data-set and we do not have information on all possible confounders and mediating variables, notably maternal nutritional status, maternal stature and the actual gestational period. In addition, maternal substance misuse such as smoking may be an important confounder (Nordentoft *et al*, 1996); however, smoking is very uncommon among women in our study population. Our exposure data were based on a screening questionnaire rather than a diagnostic interview, and there might be

a differential effect of maternal anxiety and depression on foetal growth. Further systematic, longitudinal, hypothesis-driven research, with *a priori* measures of potential confounders and of plausible factors that lie on the causal pathway between psychological morbidity and low birth weight, are needed to confirm our findings. However, the associations we have reported replicate those of the recent study from Pakistan, and suggest that psychological morbidity in the antenatal period has a role in the causation of low birth weight (Rahman *et al*, 2004). Evidence from the developed world has been more mixed, with some negative reports (Andersson *et al*, 2004) and some evidence that the association may only be apparent under circumstances of socio-economic adversity (Orr *et al*, 2002). The exact mechanisms are unclear, but may relate to poor self-care in women who are psychologically unwell (for example poor appetite), lesser access to antenatal services, or failure to obtain treatment for anaemia (endemic in the region).

The findings of our analysis, combined with the compelling evidence linking postnatal depression and infant malnutrition (Patel *et al*, 2004a), indicate the significance of psychological morbidity in mothers as a common, treatable – and almost entirely ignored – risk factor for impaired foetal and infant growth. This evidence has been generated from a region with half the world's malnourished children. Several recent trials (for review see Patel *et al*, 2004b) have shown that common mental disorders can be treated in developing countries using locally available and affordable interventions. We recommend that the detection and effective

management of psychological disorders in pregnancy and the postnatal period should be considered as one of the most important maternal and child health priorities in the region.

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REFERENCES

Andersson, L., Sundstrom-Poromaa, I., Wulff, M., et al (2004) Neonatal outcome following maternal antenatal depression and anxiety: a population-based study. *American Journal of Epidemiology*, **159**, 872–881.

Nordentoft, M., Lou, H. C., Hansen, D., et al (1996) Intrauterine growth retardation and premature delivery: the influence of maternal smoking and psychosocial factors. *American Journal of Public Health*, **86**, 347–354.

Orr, S. T., James, S. A. & Blackmore Prince, C. (2002) Maternal prenatal depressive symptoms and spontaneous preterm births among African-American women in Baltimore, Maryland. *American Journal of Epidemiology*, **156**, 797–802.

Patel, V., Pereira, J. & Mann, A. (1998) Somatic and psychological models of common mental disorders in India. *Psychological Medicine*, **28**, 135–143.

Patel, V., Rodrigues, M. & De Souza, N. (2002) Gender, poverty and post-natal depression: a cohort study from Goa, India. *American Journal of Psychiatry*, **159**, 43–47.

Patel, V., Rahman, A., Jacob, K. S., et al (2004a) Effect of maternal mental health on infant growth in low income countries: new evidence from South Asia. *BMJ*, **328**, 820–823.

Patel, V., Araya, R. & Bolton, P. (2004b) Treating depression in developing countries. *Tropical Medicine & International Health*, **9**, 1–3.

Rahman, A., Iqbal, Z., Bunn, J., et al (2004) Impact of maternal depression on infant nutritional status and illness: a cohort study. *Archives of General Psychiatry*, **61**, 946–952.

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