CLINICAL RESEARCH

Social adversity, low birth weight, and preterm delivery

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Abstract

A prospective study of 483 pregnant women was undertaken to examine possible associations of social and psychiatric factors with both low birth weight (<2500 g) and preterm delivery (<37 weeks' gestation). As few babies were born before term (n=14) or with a low birth weight (n=14) further analyses were conducted to investigate predictors of absolute birth weight and gestational age.

Low income was found to be an independent predictor of birth weight when birth weight was treated both as a dichotomous and as a continuous variable. Unemployment was found to be associated with absolute birth weight. Although this effect was statistically accounted for by low income, a low income was frequently caused by unemployment. Smoking independently predicted absolute birth weight and tended to be associated with preterm delivery. None of the factors investigated was associated with gestational age.

In contrast with previous findings, factors such as social class, adverse life events, and psychiatric state were not associated with birth outcome. The mechanism underlying the association between low income and low birth weight requires further investigation.

Introduction

Several studies have reported a significant association between life stress and both low birth weight and preterm delivery,¹⁻⁴ but problems arise in interpreting the findings. Firstly, some of the studies were retrospective, and in these the reporting of stress before delivery may have been influenced by the occurrence of

complications at birth. Secondly, some did not distinguish between acute and chronic stress. In particular, none examined the role of long term social difficulties—for example, housing problems—which are an important source of stress.⁵ Thirdly, none comprehensively assessed psychiatric state, which may itself be related to outcome at birth.⁶⁻⁸

Despite their methodological limitations these studies suggest an important association between stress and obstetric complications that merits further investigation. We therefore conducted a study to examine the role of social adversity in birth weight and length of gestation. We attempted to overcome the methodological limitations of previous work: the study was prospective; it differentiated between the various adverse factors that might be considered to be stressful; systematic and sensitive measures of these factors were used; and an independent assessment of psychiatric state was made.

Patients and methods

Women were recruited from the antenatal clinic and the booking diary of the John Radcliffe Hospital, Oxford. Only women living in the city of Oxford were approached to take part. A series of 630 women was identified over nine months in 1982 by approaching every second expectant mother about three months before her expected date of delivery. Of these 630 women, 52 (8%) refused to take part in the study. A further 95 (15%) were excluded for various reasons, the main ones being that they were about to move out of the area or had difficulties with the English language. The final sample comprised 483 women. By using information derived from the Oxford obstetric data system we compared the index sample with all the other mothers in Oxford who delivered in the John Radcliffe Hospital in 1982 (n=979). No significant differences were found with respect to maternal age, social class, and parity, although the index sample contained slightly smaller proportions of babies with a birth weight of less than 2500 g (3% v 5.7%) and of pregnancies of less than 37 weeks' gestation (3% v 5.8%). Thus in the total group of mothers (n=1462), 4.8% delivered babies of low birth weight and 4.9% delivered before term.

The 483 women in the index sample were interviewed at home on average six weeks before their expected delivery.

Life events and social difficulties—The interview for recent life events was used to assess life stress in the 12 months preceding the interview.⁹ This interview ascertains the occurrence of potentially stressful events under six headings: work, finance, health, relationships, legal, and other. The interview was extended to make a detailed assessment of any longstanding social difficulties—for example, marital or housing problems. Discrete events and longstanding difficulties were distinguished in order to ascertain separately the impact of short term and long term stressors. Two ratings were made by the interviewers for each life event or long term difficulty (as recommended by Paykel and Mangen, 1980, unpublished manual). Firstly,

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"objective negative impact" was rated on a five point scale reflecting "the degree of unpleasant impact, stress, or threat the event would be expected to bring to bear on someone when its full nature and particular circumstances are taken into account" (Paykel and Manger). Secondly, the "degree of independence" of the event or difficulty from any possible pre-existing or concurrent psychiatric disorder was rated. Interrater reliabilities for the ratings of both negative impact and independence were found to be satisfactory, the weighted kappa range being 0.76-0.94 (percentage agreement range 88-94%).¹⁰ Those women who had experienced an independent event or difficulty of "severe" or "marked" negative impact were compared with the remainder in terms of low birth weight and preterm delivery.

Psychiatric state—The present state examination was used to assess the presence and severity of psychiatric symptoms.¹¹ This is a widely used standardised interview of established reliability. The PSE-ID-CATEGO computer program provided an index of severity of psychiatric state.¹²

Social class—The occupational classification scheme of Goldthorpe and Hope was used to assign a ranking of social class.¹³ Occupational state was determined by the occupation of the woman's partner; for those women who were not living with a partner their own current or last occupation was used.

six women full obstetric data were unavailable. Fourteen of the remaining 471 women delivered babies weighing less than 2500 g, and 14 delivered before 37 weeks' gestation. Of these, only five babies were both preterm and of low birth weight.

Twenty nine of the women were found to have a psychiatric disorder of clinical severity (that is, an index of definition of five or more on the present state examination). Two thirds of these women were suffering from neurotic depression and the remainder from anxiety states.

PREDICTORS OF BIRTH OUTCOME

In the first set of analyses, treating the outcome variables as dichotomous, low income was the only factor significantly associated with low birth weight. A trend for smoking to be associated with both low birth weight and preterm delivery was found (see table). When the factors were entered into the linear model together low income emerged as the only significant predictor of low birth weight and smoking was not a significant predictor.

*Relation between each independent factor and birth weight and gestational age (dichotomous variables) using χ^2 or Fisher's exact probability test. Values are proportions (%) of women**

Independent factor	Birth weight			Gestational age		
	<2500 g	≥2500 g	p Value	<37 Weeks	≥37 Weeks	p Value
Adverse life events	3/14 (21)	71/457 (16)	NS	0/14	76/463 (16)	NS
Chronic difficulties	1/14 (7)	25/457 (5)	NS	1/14 (7)	25/463 (5)	NS
Smoking	7/14 (50)	115/457 (25)	<0.08	7/14 (50)	115/463 (25)	<0.07
Working class	6/14 (43)	176/448 (39)	NS	8/14 (57)	175/454 (39)	NS
Low income	7/14 (50)	89/455 (20)	<0.02	3/14 (21)	93/461 (20)	NS
Unemployment (both partners)†	5/14 (36)	60/457 (13)	NS	2/14 (14)	63/463 (14)	NS
Psychiatric disorder	0/14	29/456 (6)	NS	2/13 (15)	27/463 (6)	NS

*Sample size varies slightly because of missing values.

†Unemployed single mothers classified as unemployed.

A ranking of 1-22 was used to define middle class and 23 or more to define working class.

Smoking and income—Women were asked whether they were currently smoking and were simply classified as smokers or non-smokers. They were also classified in terms of income. Low income was defined as a total family income of £4000 or less a year (1982 figures).

STATISTICAL ANALYSES

The relation of birth outcome to measures of social adversity and psychiatric state was examined in two ways. The first set of analyses treated the birth outcome variables as dichotomous. Low birth weight was defined as a weight of less than 2500 g and preterm delivery as a pregnancy of less than 37 weeks' gestation. Analyses (χ^2 or Fisher's exact probability tests) were performed to determine whether any of the independent variables measured was associated with low birth weight or preterm delivery. The independent variables examined were adverse life events, long term social difficulties, social class, smoking, low income, unemployment, and psychiatric disorder. General linear interactive modelling was used to establish whether there was any relation between these independent variables when predicting each dichotomous outcome variable.¹⁴

Although low birth weight and preterm delivery are clinically important categories, the fairly small numbers of women in these groups in this study limited the interpretation of the first set of analyses. To overcome this a second set of analyses was carried out by general linear interactive modelling, which treated birth weight and length of gestation as continuous dependent variables. All the general linear interactive modelling analyses controlled for parity.

The first set of analyses (dichotomous outcome variables) used logit transformation of a binomial dependent variable, the analyses of the continuous dependent variables used a suitable normalising transformation.

Results

The mean age of the sample was 27.3 years (range 16-41). Altogether 288 women were middle class and 186 working class; 452 were married or cohabiting; and 209 were primiparous. All women delivered live babies. Six women delivered twins and were excluded from the analyses. For a further

There was a trend for smoking to be predictive of preterm delivery but no other factors emerged as important predictors.

When birth weight and length of gestation were treated as continuous variables smoking, low income, and unemployment all significantly predicted birth weight when entered into the linear model alone. When these factors were entered into the model together (and preterm delivery was controlled for) smoking ($p<0.001$) and low income ($p<0.01$) were each found to be independent predictors of absolute birth weight. Unemployment was no longer significant, its effect having been largely accounted for by low income. None of the independent factors was associated with the length of gestation of the pregnancy.

There were no interactions between any of the factors in any of the analyses. None of the other independent factors was found to have much predictive value: in particular, social class, psychiatric disorder, adverse life events, and long term social difficulties were not associated with birth outcome.

Discussion

Low birth weight remains the single most important factor in infant mortality and morbidity in the Western world.¹⁵ In addition, preterm delivery is associated with a substantial perinatal mortality rate.¹⁶ It is therefore important to establish those factors associated with an increased risk of these two obstetric outcomes. This study examined the possible associations of low birth weight and preterm delivery with social adversity and psychiatric morbidity during pregnancy. Low total family income was significantly associated with a birth weight of under 2500 g. Smoking tended to be associated with such a birth weight. When the independent variables were entered into a linear model low income remained the most important predictor.

The small number of babies of low birth weight limited the interpretation of these analyses. Further analyses were therefore carried out to investigate whether the independent variables predicted birth weight when it was treated as a continuous variable. These analyses showed smoking and low income to be independent predictors of birth weight. Unemployment was also found to predict birth weight, but its effects were statistically accounted for by low

income. Unemployment, however, remained a relevant factor as it was frequently the cause of a low income. A trend was found for smoking to be associated with delivery before 37 weeks' gestation. When length of gestation was treated as a continuous variable and possible predictors were examined none was found.

Our study did not replicate previous findings of an association between low birth weight and social class, psychiatric morbidity, or adverse life events and between preterm delivery and adverse life events.¹⁻⁴ The results suggest that low income may well be an important factor underlying the association between social adversity and low birth weight. Whether low income acts as a stressor and whether its effect is mediated by factors such as inadequate maternal nutrition are issues that require further investigation.

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Lymphocyte transformation response to pokeweed mitogen as a predictive marker for development of AIDS and AIDS related symptoms in homosexual men with HIV antibodies

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Abstract

To identify factors that may predict the development of the acquired immune deficiency syndrome (AIDS) or AIDS related symptoms various immunological measurements were studied in a group of homosexual men attending screening clinics for AIDS

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in Copenhagen. Fifty seven men whose ratio of T helper lymphocytes to T suppressor lymphocytes (CD4:CD8 ratio) was less than 1.0 before the study began were included. Forty two were positive for antibody to the human immunodeficiency virus (HIV), of whom 38 were reinvestigated after a median observation period of 10 months. Among the seropositive men the transformation responses to pokeweed mitogen and cytomegalovirus and the absolute count of CD4 positive lymphocytes were the most common abnormal values. In particular, a low relative response to pokeweed mitogen on initial investigation correlated with a worsened clinical condition on reinvestigation. The risk of a worsened clinical condition was 55 times higher in seropositive men whose responses to pokeweed mitogen were low than in other seropositive men. The corresponding relative risks for low transformation responses to cytomegalovirus and for a decreased absolute count of CD4 positive lymphocytes were 18 and six.

The relative response to pokeweed mitogen is therefore a very sensitive short term predictive marker of the clinical condition of seropositive patients who have a CD4:CD8 ratio of less than 1.0.

Introduction

Though the presence of antibodies to the human immunodeficiency virus (HIV) is an important measurement in epidemiological studies of the acquired immune deficiency syndrome (AIDS), the predictive value of a positive antibody test is low as 80-95% of seropositive patients remain healthy for at least several years after they become infected.¹⁻³ Various immunological tests have been used to try to predict the prognosis of people positive for HIV antibody.^{4,5} Thus the absolute count of T helper (CD4 positive) lymphocytes and the