Archives of Disease in Childhood, 1987, **62**, 709–711

Ethnic differences in incidence of very low birthweight and neonatal deaths among normally formed infants

P B TERRY, R G CONDIE, J G BISSENDEN, AND D F KERRIDGE

Departments of Obstetrics and Paediatrics, Dudley Road Hospital, Birmingham

SUMMARY The incidence of very low birthweight babies (less than 1500 g) and neonatal mortalities in this group were analysed for the 15 608 births to mothers of various racial origins at this hospital during the years 1979–82 inclusive. Very low birth weight occurred less commonly in the European (9·1/1000) and Pakistani (10·1/1000) groups and most commonly in the West Indian group (23·2/1000). Neonatal survival in West Indians, however, was better than in any other group. Analysis of the stillbirths weighing less than 1500 g showed a lower rate in the West Indians compared with that of the European, Pakistani, and Indian groups. There was no evidence of a higher incidence of 'light for dates' in very low birthweight West Indian neonates.

Perinatal survival varies nationally and internationally. Improved neonatal care services have contributed to the declining perinatal mortality in Britain.[1] This has resulted in an increased survival of very low birthweight infants and has prompted a more careful examination of the relevant factors.[2] One factor, which has been studied in the United States of America, but which has received little attention in Britain, is the effect of the ethnic group of the mother. Comparing low birthweight blacks and whites in the United States, the survival was higher in the black population.[3 4] In this country neonatal mortality in Asians and non-Asians was examined and preterm delivery not found to be a problem in Asians, most deaths being due to lethal congenital malformation.[5]

The aim of this study was to examine the incidence of very low birthweight babies and the neonatal deaths (first 28 days) delivered at this hospital of normally formed infants born to Indian, Pakistani, West Indian, and European mothers in the area of the West Birmingham Health Authority. Particular attention was paid to possible differences between the survival of West Indian and European very low birthweight babies.

Patients and methods

The records of all booked and unbooked deliveries at this hospital between 1979–82 inclusive were examined. Of the 15 608 babies born during this time, 706 were excluded because the mother was not from Indian, Pakistani, West Indian, or European ethnic groups. Bangladeshi mothers accounted for 475 of the 706 exclusions, but the numbers were too small to justify a detailed analysis. A further 151 births with major lethal and non-lethal congenital abnormalities were excluded but are described elsewhere.[6] The incidence of very low birthweight (defined as infants weighing less than 1500 g) was calculated, together with the normally formed stillbirth and neonatal mortality in the total population and the very low birthweight groups.

The correlation between neonatal survival and birthweight was modelled to fit a sigmoid curve (a logistic regression analysis using maximum likelihood). Ordinary regression analysis would have been inappropriate as it does not deal adequately with the definitive nature of survival or mortality. The best clinical estimate of gestation was available for 299 of the 435 infants weighing less than 2000 g, and the mean birth weight for gestation groups (in weeks) up to and including 33 weeks was calculated.

Results

The neonatal mortality per thousand of normally formed infants over the four years was 6·2 for the total population. It was lowest in the European

Table 1 *Births and deaths (Rate per 1000)*

	Indian	*Pakistani*	*West Indian*	*European*
Total births	4185	2193	1859	6514
Stillbirths	31 (7·4)	20 (9·1)	9 (4·8)	42 (6·4)
Livebirths	4154	2173	1850	6472
Neonatal deaths	26 (6·3)	17 (7·8)	14 (7·6)	31 (4·8)
Early neonatal deaths	26 (6·3)	16 (7·4)	14 (7·6)	21 (3·2)
Late neonatal deaths	0	1 (0·4)	0	10 (1·5)
Births <1500 g	68	26	46	72
Stillbirths	14 (206)	4 (154)	3 (65)	13 (181)
Livebirths	54 (13·0)**	22 (10·1)**	43 (23·2)$^{+++}$	59 (9·1)***
Neonatal deaths	22 (407)	12 (545)	12 (279)	25 (424)
Early neonatal deaths	22 (407)	11 (500)	12 (279)	19 (322)
Late neonatal deaths	0	1 (45)	0	6 (102)
Births 1000–1499 g	44	15	31	55
Stillbirths	12	2	1	11
Livebirths	32 (7·7)**	13 (6·0)**	30 (16·2)$^{+++}$	44 (6·8)***
Neonatal deaths	5 (156)	4 (308)	2 (67)	11 (250)
Early neonatal deaths	5 (156)	3 (231)	2 (67)	7 (159)
Late neonatal deaths	0	1 (77)	0	4 (91)
Births <1000 g	24	11	15	17
Stillbirths	2	2	2	2
Livebirths	22 (5·3)$^{+}$	9 (4·1)	13 (7·0)$^{++}$	15 (2·3)**
Neonatal deaths	17 (773)	8 (889)	10 (769)	14 (933)
Early neonatal deaths	17 (773)	8 (889)	10 (769)	12 (800)
Late neonatal deaths	0	0	0	2 (133)

Difference from the West Indian group: *p<0·05, **p<0·01, ***p<0·001; difference from the European group: $^{+}$p<0·05, $^{++}$p<0·01, $^{+++}$p<0·001; statistical analysis using χ^2 with Yates' correction.

population at 4·8 but higher in the other ethnic groups (Indian 6·3; Pakistani 7·8; and West Indian 7·6, Table 1).

Of the four ethnic groups, the lowest incidence of very low birthweight occurred in the European and Pakistani groups at 9·1/1000 and 10·1/1000, respectively, and the highest incidence in the West Indian group at 23·2/1000 (Table 1). This pattern was repeated in both the very low birthweight subdivisions—that is, less than 1000 g and 1000–1499 g inclusive (Table 1).

The very low birthweight specific neonatal mortalities were highest in the Europeans and Pakistanis at 424/1000 and 545/1000, respectively, and lowest in the West Indians at 279/1000 (Table 1). There was no suggestion that low birthweight West Indian perinatal losses occurred as stillbirths (Table 1).

The logistic regression analysis for the probability of survival against birthweight seemed to show the improved survival of West Indians, compared with that of other ethnic groups at all birthweights, in the very low birthweight range (Table 2). The Indian babies survived better than their Pakistani and European counterparts. The probability of survival of neonates weighing 1000 g may be taken as an example when a value of 0·75 was obtained for West Indians, 0·52 for Indians, 0·39 for Europeans, and 0·32 for Pakistanis.

There was no evidence of a higher incidence of light-for-dates or growth retarded neonates in the West Indian group (Table 3).

Table 2 *The probability of neonatal survival against birthweight (in 100 g increments) for each ethnic group*

Birthweight g	*Probability*			
	Indian	*Pakistani*	*West Indian*	*European*
500	0·06	0·04	0·10	0·04
600	0·11	0·07	0·18	0·07
700	0·17	0·10	0·30	0·11
800	0·26	0·18	0·45	0·18
900	0·38	0·23	0·61	0·27
1000	0·52	0·32	0·75	0·39
1100	0·65	0·43	0·85	0·52
1200	0·76	0·54	0·92	0·64
1300	0·85	0·65	0·95	0·75
1400	0·91	0·75	0·98	0·84
1500	0·94	0·83	0·99	0·90
Total No	139	49	87	160

Derived using a logistic regression analysis: the upper limit of the sample was 2000 g.

Table 3 *Mean birthweight (g) for gestation up to 33 weeks (Stillbirths have been excluded)*

Gestation (weeks)	*Indian*	*Pakistani*	*West Indian*	*European*
24	590	660		560
25	855			690
26	753	827	907	1053
27	983	1013	1020	863
28	1010	1170	1087	1115
29	1280		1144	1365
30	1291	1360	1253	1468
31	1538	1355	1470	1371
32	1481		1693	1735
33	1827	1990	1823	1733

Discussion

This study has shown a higher incidence of very low birthweight neonates in the West Indian population compared with several other ethnic groups. This finding does not seem to be due to a higher incidence of light-for-dates neonates in the West Indian group, and although gestation has not been documented as accurately as birth weight, the conclusion must be that more West Indian neonates are delivered at the shorter gestations. Without knowing the cause of preterm labour in many cases, any further conclusions must be speculative, but ethnic variation in the distribution of gestation must represent one explanation.

Survival of the very low birthweight West Indian babies was better than in any other ethnic group. If this is mainly or entirely due to ethnic considerations the finding might agree with the comparison made between blacks and whites in the United States, as might be expected, as the Dudley Road Hospital West Indian population is of similar extraction to the American black population. Caution is needed, however: the numbers are small. Although it was not possible to confirm the improved survival of small West Indian babies, these findings are consistant with those of other reports,[3 4] and the consistency of a trend over several studies, particularly those undertaken in different places, is more convincing than statistical significance in any one study. The fact that the stillbirth rate for West Indians in the very low birthweight group was low excluded the possibility of more small West Indian fetuses dying before or during labour, and therefore made the figures for the neonatal mortalities smaller.

The traditional method of analysing neonatal survival is in terms of birthweight groups. This method, although also used here, has three disadvantages. The first is that there is not agreement about limits: those used in *British Births 1970*[7] differ from those used in the *Scottish Perinatal Mortality Survey 1977–1981*.[8] The second disadvantage is that the birthweight groups are large enough for there to be a significant difference between survival at the top and bottom of the range. The third disadvantage is digit preference combined with the artificially imposed limits of the birthweight groups, especially around the important 1000 g value. This study used a binomial logistic regression analysis to examine the correlation between neonatal survival and birth weight. This is a technique that is ideally suited to, but has not been widely used in, the field of perinatal audit. Although it would have been desirable to attempt to separate the effects of birth weight and gestation by a multivariate analysis, the correlation between the two is so high that the multivariate would be unlikely to yield trustworthy results.

Finally, it must be emphasised that the ethnic group of the mother was the only factor examined in this study. Other confounding variables, such as social class, maternal age, and ultimate family size, are known to influence both preterm labour and perinatal mortality. A detailed examination of such factors, however, would require a much larger study.

We thank the West Midlands Regional Health Authority for annual support given to P B Terry.

References

1 Reynolds EOR, Stewart AL. Comparison of neonatal management methods for the very low birthweight babies. *Br Med J* 1980;**281**:1488–9.
2 Stewart AL, Reynolds EOR, Lipscomb AP. Outcome for infants of very low birthweight: survey of world literature. *Lancet* 1981;1:1038–41.
3 National Center for Health Statistics. A study of infant mortality from linked records; Vital Health Statistics. Series 20, No. 12. US Public Health Services, Rockwell Maryland, 1972.
4 North AF, MacDonald HM. Why are neonatal mortality rates lower in small black infants than in white infants of similar birthweight? *J Pediatr* 1977;**90**:809–10.
5 Jivani SK. Asian neonatal mortality in Blackburn. *Arch Dis Child* 1986;**61**:510–12.
6 Terry PB, Bissenden JG, Condie RG, Mathew PM. Ethnic differences in congenital malformations. *Arch Dis Child* 1985;**60**:866–8.
7 Chamberlain R, Chamberlain G, Howlett B, Claireaux A. *British Births 1970*. Vol 1. London: Heinemann, 1975.
8 McIlwaine GM, Howat RCL, Dunn F, MacNaughton MC. The Scottish Perinatal Mortality Survey. *Br Med J* 1979;**2**:1103–6.

Correspondence to Dr P B Terry, Departments of Obstetrics and Paediatrics, Aberdeen Maternity Hospital, Foresterhill, Aberdeen AB9 2ZD, Scotland.

Received 9 March 1987