The influence of obstetric procedures and social and cultural factors on breast-feeding rates at discharge from hospital

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SUMMARY The influence of obstetric factors on breast-feeding rates at discharge from St. Thomas's Hospital in 1969 and 1970 has been examined in 1356 primiparous mothers delivering healthy babies. Induction of labour and assisted delivery were significantly associated with lower breast-feeding rates. The association could not be explained by differences in social class, country of origin, birthweight, anaesthesia in labour, or medical reasons for induction and assisted delivery. The most likely explanation is that induction and assisted delivery are associated with delay in starting breast-feeding. However, trends in obstetric management of labour and delivery are unlikely to have a large influence on the incidence of breast-feeding compared with the influence of social and cultural factors.

A national survey of infant feeding practices in 1975 (Martin, 1978) showed that assisted delivery and caesarean section were associated with delay in starting breast-feeding and that delay reduced the likelihood of mothers breast-feeding at two weeks after delivery. Since breast-feeding is generally beneficial to infant health, and since greater efforts are being made to encourage mothers to breast-feed, it is important to establish the relation of obstetric procedures to breast-feeding and to estimate the influence which trends in obstetric management of labour and delivery will have on breast-feeding rates.

This paper presents an analysis of the relative importance of obstetric procedures, medical care, and social and cultural factors on breast-feeding rates at discharge from the lying-in wards. The population studied includes a large mix of races, and cultural factors have been shown to be major influences on infant feeding practice (Jones and Belsey, 1977). The data source is the computerised obstetric records at St. Thomas's Hospital. To avoid the possible confounding influences of previous breast-feeding experiences and abnormalities of the infant, only primiparous mothers living in the inner London borough of Lambeth whose babies were not admitted to a special care unit have been studied.

Method

Deliveries in 1969 and 1970 were chosen to allow comparisons with the 1970 British Births Survey (Chamberlain *et al.*, 1975; 1978).

Of the 4715 Lambeth mothers delivering in 1969 and 1970, 1398 were included in the study group. Completed records were available for 1356 (97%) of these mothers. The variables examined were maternal age at delivery; parents' country of origin (Africa, West Indies, India or Pakistan, England, Wales, and Scotland, Northern Ireland, Eire, mixed, other); social class (I and II, III, IV and V, other) based on the Registrar General's classification of husband's occupation; antenatal admissions to hospital; gestational age at booking clinic; number of antenatal visits; gestational age at delivery; spontaneous or induced labour; type of delivery (normal unassisted, breech, forceps or ventouse extraction, caesarean section); type of anaesthesia (general anaesthetic, epidural block, local infiltration, pudendal block); episiotomy or tears; birthweight; and complications of the puerperium.

The measure of infant feeding available was the type of feeding on discharge from the lying-in wards. The possibility was considered that feeding on

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discharge might be associated with length of stay in hospital and that if associations were found between type of feeding and obstetric procedures they might be due to a common link with length of stay. However, a preliminary analysis of our population showed that 91% of the mothers remained in hospital after delivery for six to 12 days and there was no evidence for a downward trend in breast-feeding rates with increasing length of stay (Table 1). There were no differences in the mean length of stay between mothers who breast-fed (8.1 days) and those who bottle-fed (8.0 days), nor were there associations between mean length of stay and country of origin of the infant's parents, social class, birthweight, induction of labour, type of delivery, or gestational age at booking clinic.

Analysis of the data was carried out firstly by means of cross-tabulations and secondly by using a model-fitting procedure which enabled an estimate to be made of the individual contributions of variables while allowing for associations between variables (see Appendix). The Genstat computer program package was used (Rothamstead Experimental Station, 1977).

Results

The breast-feeding rate on discharge from hospital was 44.0%. The associations between breast-feeding on discharge and a range of social, medical, and obstetric factors were examined by looking at two-way cross-tabulations and differences in means (Table 2).

Mothers who breast-fed were on average older, attended prenatal clinics earlier in pregnancy, and made more visits. However, their babies were similar in birthweight and maturity to bottle-fed babies. Breast-feeding was more common in Social Classes I and II and in African and West Indian mothers. Induction of labour, general anaesthetic, breech delivery and caesarean section and complications of the puerperium were associated with lower breast-feeding rates.

There were no differences between the proportion of mothers breast-feeding who had epidural or local infiltration anaesthesia and unanaesthetised mothers, nor were there differences between

mothers delivered by forceps or ventouse and those having normal unassisted deliveries.

Many of the variables which were significantly associated individually with breast-feeding were inter-related. For example, primigravidae in Social Classes IV and V were on average younger and attended for antenatal care later in pregnancy. Mothers who had labour induced were more likely to have assisted deliveries. By analysing one variable at a time we cannot decide whether the relationships between, for example, breast-feeding and attendance at antenatal clinic or induction are due to a common link with social class and type of delivery respectively. Furthermore, true associations may be obscured because of the confounding influence of associations with other variables. For example, African mothers tended to have lighter babies than British mothers but they also had higher breast-feeding rates. A negative association of breast-feeding and birthweight may be present, but masked by the influence of country of origin.

In order to overcome these difficulties in interpretation a model-fitting statistical technique was used. The variables which were found to be significantly ($P < 0.05$) related to breast-feeding, independently of associations with other variables, were social class, country of origin, gestational age at booking clinic, birthweight, and abnormalities in the puerperium. Induction of labour and assisted deliveries were significant at the 10% level in the main effects model but when the interaction between induction and assisted delivery was taken into account both factors were found to be significant at the 5% level. Once the association of anaesthesia in labour and assisted delivery was allowed for in the analysis, type of anaesthesia was no longer a significant factor. Similarly, the relation of the number of antenatal visits to breast-feeding seems to be explained by a common association with late attendance for the first antenatal visit. When the relation of low birthweight to country of origin and social class was allowed for, lower birthweight was found to be significantly associated with lower breast-feeding rates.

By means of the statistical technique used, the relative risks of breast-feeding associated with each variable could be calculated. For example, British

Table 1 *Breast-feeding rates by length of stay in lying-in wards*

	<i>Length of stay in lying-in wards (days)</i>								
	<6	6	7	8	9	10	11	12	12+
% population (n = 1356)	5.0	7.5	24.3	30.2	20.8	4.4	3.2	1.3	3.3
% breast-feeding on discharge	33.3	42.9	43.2	45.7	43.2	53.3	46.7	45.0	38.5

Table 2 *Single variable analysis of breast- and bottle-fed infants*

Characteristic	Breast-fed (n = 602)	Bottle-fed (n = 754)	Comparison of breast- and bottle-fed
Country of origin of parents			
England/Wales/Scotland	296	509	$\chi^2 = 144.4$ P<0.001
Northern Ireland	11	44	
Eire	4	43	
Africa	59	15	
West Indies	100	51	
Indo-Asia	11	4	
Mixed	57	46	
Other	64	42	
Social Class			
I and II	73	38	$\chi^2 = 29.7$ P<0.001
III	240	310	
IV and V	114	201	
Other	175	205	
Maternal age			
Mean + SD	23.4 years (4.5)	22.5 years (5.1)	t = 3.5 P < 0.001
Type of antenatal care			
Hospital only	523	658	$\chi^2 = 2.4$ NS
Shared care	55	56	
Other	24	40	
Gestational age at booking			
Mean + SD	17.2 weeks (6.1)	18.9 weeks (7.1)	t = 4.7 P < 0.001
Antenatal admissions			
None	528	641	$\chi^2 = 1.8$ NS
One or more	74	113	
Antenatal clinic visits			
Mean + SD	10.5 (3.5)	10.0 (3.9)	t = 2.5 P < 0.02
Type of anaesthesia in labour			
None	342	411	$\chi^2 = 8.6$ P<0.025
Epidural and local infiltration	233	279	
General anaesthetic	27	64	
Labour			
Spontaneous	500	581	$\chi^2 = 7.1$ P<0.01
Induced	102	173	
Delivery			
Normal unassisted	487	572	$\chi^2 = 13.7$ P<0.005
Forceps/ventouse	102	138	
Breech	3	20	
Caesarean section	10	24	
Perineum			
Intact	126	147	$\chi^2 = 0.3$ NS
Episiotomy + tears	476	607	
Puerperium before discharge			
Normal	539	644	$\chi^2 = 4.8$ P<0.05
Complications	63	110	
Birthweight			
Mean + SD	3.30 kg (0.4)	3.27 kg (0.4)	NS
Gestational age at birth			
Mean + SD	40.3 weeks (2.1)	40.4 weeks (2.3)	NS

mothers in Social Classes I and II were 2.6 times as likely to breast-feed as mothers in Social Class III and 4.7 times as likely as those in Social Class V, even after allowing for social class differences in birthweight, induction, etc. Similarly, West Indian mothers in Social Class III were four times as likely to breast-feed as British mothers in Social Class III. Mothers delivering normally after spontaneous labour were 1.6 times as likely to breast-feed as mothers who were induced and delivered normally. Mothers delivering normally after spontaneous labour were 1.9 times as likely to breast-feed as mothers who had forceps or ventouse-assisted deliveries. Mothers who did not have medical complications following delivery were 1.6 times as likely to breast-feed as mothers with complications.

Discussion

The obstetric experience of the study mothers is broadly similar to that of the primiparous mothers in the 1970 national survey although induction rates were lower (Table 3).

Table 3 *Obstetric experience of study mothers compared with that of primiparous mothers in the national survey*

	Study group	1970 British cohort (primips)
Induction rate	20%	28.8%
Forceps/ventouse	18%	18.8%
Breech	2%	3.1%
Caesarean section	3%	4.6%

The lower rates for caesarean sections and breech deliveries are probably the result of excluding babies admitted to special care units.

The overall breast-feeding rate on discharge in the study group (44%) is similar to the proportion of 'fit' babies of primiparous mothers who had breast milk in the first week in the national survey (47%).

The association of later attendance for the first visit to the booking clinic and lower breast-feeding rates at discharge is, we feel, most likely to be a reflection of an association of time of booking and behavioural attitudes related to social factors. However, we cannot exclude the possibility that the association is due to late attenders having less opportunity to receive feeding advice at antenatal clinics and mothercraft classes.

The mean birthweight of bottle-fed and breast-fed babies was similar but when the influence of country of origin, etc. was allowed for, it was found that lower-birthweight infants had lower breast-feeding rates on discharge. The explanation for this finding

might be that small babies have weaker suckling reflexes but it is also possible that mothers of these babies were encouraged to bottle-feed; or, once having started breast-feeding, the babies may have received supplementary bottle feeds which could then have interfered with breast-feeding.

Mothers whose labours were induced and who delivered either unassisted or by forceps or ventouse extraction had lower breast-feeding rates than mothers delivering after a spontaneous labour. This finding is unlikely to be explained by the medical reasons for induction inhibiting breast-feeding, because maternal problems persisting after delivery were allowed for in the analysis and major problems in the infant would have required admission to the special care unit and would therefore have excluded the infant from the study. There are two other explanations. Social reasons for induction may be more common in mothers who do not go on to breast-feed, and the experience of induction may directly inhibit breast-feeding. Our data do not allow us to distinguish between these possibilities. However, it has been shown (Martin, 1978) that induction and forceps or vacuum deliveries are associated with delay in starting breast-feeding and with higher failure rates before seven and 14 days after delivery. Our results are consistent with this finding and suggest one more reason for taking a cautious approach to induction. When induction is clinically indicated a special effort should be made to ensure that mothers who wish to breast-feed are allowed to do so as early as possible after delivery.

The preceding discussion should, however, be kept in perspective by comparing the influences of obstetric factors and sociocultural factors on breast-feeding rates. For example, the relative risks of breast-feeding associated with social class and country of origin are much larger than the relative risks associated with induction. The point can be made even clearer by considering the changes in breast-feeding rates in a standard population if the risks associated with the different variables were changed. This can be done by using the model-fitting analysis. Consider a hypothetical population which would be expected to have a low breast-feeding rate at discharge: primiparous British mothers in Social Classes IV and V delivered by forceps after an induced labour, who had complications in the puerperium. After standardising for birthweight and gestational age at booking clinic, approximately 16% would be expected to be breast-feeding at discharge. If this population were to breast-feed at the Social Class I and II rate, then approximately 33% would breast-feed. In a population similar in respect of all the variables mentioned except that of the mothers being of West Indian origin, approximately 58%

would be expected to breast-feed. In contrast, removing the influence of induction in the original hypothetical population would increase the prevalence rate to only 18%. Removing the adverse influence of complications in the puerperium would increase the rate to 24%. These figures suggest that trends in induction will have only a small influence on the prevalence of breast-feeding compared with the influence of social and cultural factors.

APPENDIX

A logit transformation ($\log p/(1-p)$) of the proportion of mothers breast-feeding was used as the dependent variable. The goodness-of-fit of the model is given by the deviance which has a distribution which is approximately χ^2 . The contribution of individual variables to the fit of the model is estimated by dropping each variable in turn from the model and calculating the differences in the deviance of the model. The difference in the deviance gives an approximate χ^2 significance test.

Country of origin, social class, induction, and type of delivery were of chief interest and these were included in all models. The first model fitted consisted of these variables plus other significant variables shown in Table 2 and birthweight, perineal tears/episiotomy, antenatal admissions, and gestational age at birth. Variables not significantly reducing the goodness-of-fit of the model when excluded were dropped. The final model, consisting of main effects only with their χ^2 and degrees of freedom, is shown in Table 4.

Table 4 Full model deviance 1619 df 1319

Variable	χ^2	df	P <
Ethnic group	139	7	0.001
Social class	32	3	0.001
Gestational age at booking	12	1	0.001
Birthweight	6	1	0.02
Abnormality of puerperium	4	1	0.05
Induction	3	1	0.1
Type of delivery	7	3	0.1

Looking at three-way cross-tabulations, it was found that the relationship between social class and breast-feeding was not the same in all ethnic groups.

In British mothers there is a clear trend of increasing breast-feeding with higher social class. In West Indian mothers the breast-feeding rate was higher in Social Classes IV and V than in Social Class III and in African mothers the rate was lower in Social Classes I and II than in IV and V. This interaction effect was taken into account by introducing the first order interactions terms into the model. The effect of the known interaction between induction of labour and assisted delivery was also examined. Addition of these factors improved the fit of the model and their removal significantly reduced the goodness-of-fit (Table 5).

Table 5 Effect of removing interaction terms from the model

	χ^2	df	P <
Ethnic group: Social class	45	21	0.01
Induction: Delivery	8	3	0.05

Removal of induction, delivery, and the interaction between them from the model give a χ^2 of 18 on 7 df (P < 0.02).

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