

Umbilical Cord Separation Time in Healthy Nigerian Newborns

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Abstract

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Background: An umbilical cord that remains attached beyond a week is usually a matter of concern to mothers in developing countries. Furthermore, delayed cord separation may increase the risk of bacterial infection.

Objectives: To determine the average time of umbilical cord separation and evaluate the relationship between this time and gender, birth weight, gestational age, parity of the mother, mode of feeding and common cord care practices among Nigerian neonates.

Methods: Questionnaires were administered to mothers of healthy newborns seen at the Infants' Welfare Clinic of the Institute of Child Health, College of Medicine, University College Hospital (UCH), Ibadan, and the Adeoyo Hospital and Maternity, Yemetu, Ibadan. Mother's parity, place of antenatal care and birth, gestational age, time and nature of amniotic fluid, duration of labour, birth weight, time of umbilical cord separation after birth, mode of feeding and mode of cord care were recorded.

Results: Complete data were available in respect of 536 newborns. The mean cord separation time was 8.7 days (SD 3.7; range 2-21 days). Cord separation time was significantly shorter among male babies, infants fed with only breast milk, those whose mothers did not book for antenatal care and those delivered per vaginam ($p < 0.005$). Alcohol (methylated spirit) was the most common single agent used for umbilical cord treatment. Other forms of cord care consisted of alcohol and hot fomentation, alcohol and menthol containing substances, alcohol and traditional mixture. The time taken for the umbilical cord to separate varied significantly ($p < 0.05$) with different types of cord treatments.

Conclusions: We suggest an intensification of the promotion of exclusive breast feeding and clean cord care practices and recommend that the use of menthol containing substances, traditional herbal mixtures and hot fomentation be discouraged.

Introduction

PREGNANCY and the birth of a child are subject to many superstitious beliefs. Consequently, a lot of concern and anxiety surround the baby until the umbilical cord falls off.¹ Variable times for cord separation have been reported, with the commonly

reported periods being between five and fifteen days after birth.²⁻⁶ Generally, an umbilical cord that remains attached beyond one week tends to be of concern to mothers in developing countries.^{1,3,4} The normal process of cord separation is by inflammation of its junction with the abdominal skin, resulting in collection of small amounts of cloudy mucoid material at the junction. This is often misinterpreted as pus.^{1,2,5} Factors that may alter this process of cord separation include delivery by Caesarean section, antibiotic use, application of antiseptics to the cord, defective neutrophil mobility and infection in the neonate.^{5,7,8} A delayed cord separation may increase the risk of bacterial entry especially in areas where the level of hygiene is low.² The challenge for the

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caregivers is to be able to differentiate between normal and abnormal processes so that unnecessary interventions may be prevented.

Neonatal problems such as omphalitis and tetanus result from mismanaged cord treatment, due to misconceptions and unhygienic cord care practices.² These latter practices must be corrected as neonatal tetanus and cord infections continue to be important causes of morbidity and mortality in developing countries.⁹ Delays in cord separation, quite apart from worrying the mothers, may increase the workload of care givers and induce unnecessary workup for infections and treatment with expensive antibiotics. To our knowledge, the effects of factors such as maternal parity, the place and mode of delivery, gestational age, birth weight and types of cord care on umbilical cord separation time have not been extensively studied in the sub-region. The aims of the present study therefore, are to determine the average time of umbilical cord separation and evaluate the relationship between cord separation time and these factors among Nigerian neonates.

Materials and Methods

The study was carried out at the Infants' Welfare Clinic of the Institute of Child Health, College of Medicine, University College Hospital (UCH) Ibadan and the Adeoyo Hospital and Maternity, Yemetu, Ibadan over a period of five months (June - October 2002). All normal babies delivered during this period qualified for entry into the study. The only exclusion criterion was the

presence of any umbilical defect such as an omphalocele. Informed consents were obtained from 557 mothers whose infants were below the age of six weeks. Mothers who were unwilling or unsure of the required information were excluded.

Standardized questionnaires were administered at these clinics by two of the investigators. Information obtained included the maternal parity, place of antenatal booking and delivery, gestational age of the babies, mode of delivery (vaginal vs caesarean section), age and sex of the infant, birth weight (kg), mode of feeding (exclusive breast feeding, formula or mixed feeding), type of cord treatment and age (days) at which there was cord separation.

The data were analyzed using *Systat* software package for data entries, frequencies and cross tabulations. The analysis of variance (ANOVA) was used to test the significance of the differences in means and the Chi-square test for test of proportions, where appropriate. The level of significance was taken as $p < 0.05$.

Results

Complete data was obtained for 536 infants (96.2 percent) of the 557 mothers who gave their consent to participate in the study. They consisted of 273 (50.9 percent) males and 263 (49.1 percent) females. The interval from birth until cord separation in the study population ranged from two to 21 days, with a mean of 8.7 days (\pm S.D, 3.7). Umbilical cord separation occurred within the first week of life in 50.7 percent of the infants, while 91.8 percent of all the infants had their cord

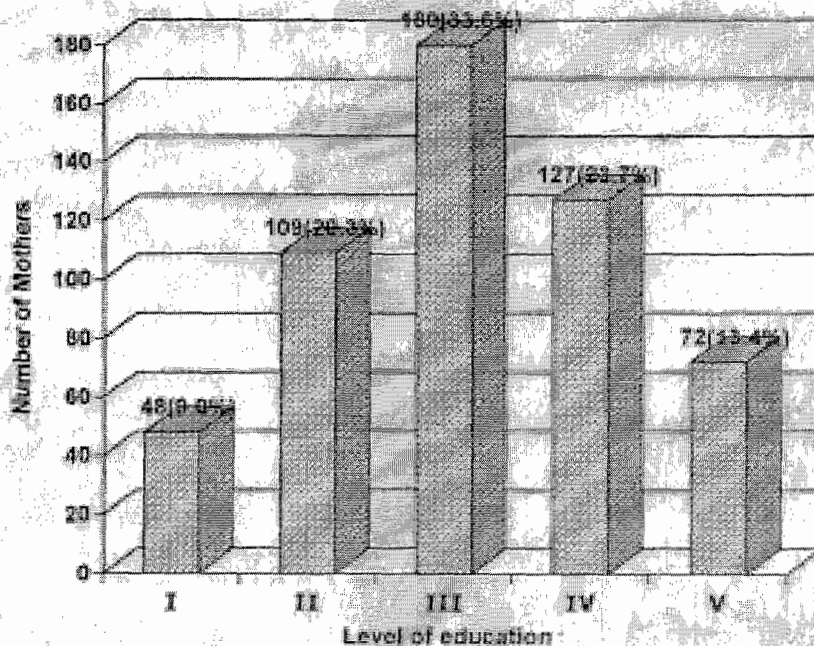


Figure 1: Educational Status of the Mothers

Table I

Time of Cord Separation and Gender

Time of Cord Separation (days)	Male (M)		Female (F)		M+F	
	N	%	N	%	N	%
<7	139	25.9	133	24.8	272	50.7
8-14	113	21.1	107	20.0	220	41.1
15-21	21	3.9	23	4.3	44	8.2
Total	273	50.9	263	49.1	536	100

*Mean \pm SD8.1 \pm 3.68.7 \pm 3.98.7 \pm 3.7

*F = 4.140; df = 1, P=0.04

Table II

Maternal and Infant Characteristics and Time of Cord Separation

Characteristics	Cord separation time (days)					
	N	%	Mean \pm SD	F value	df	P value
Antenatal Care	471	87.9	9.8 \pm 3.8	6.973	1	0.009*
Booked	65	12.1	8.3 \pm 3.6			
Unbooked						
Gestational Age (wks)						
<32	12	2.2	8.0 \pm 2.9			
32- <37	44	8.2	8.5 \pm 4.2	0.087	3	0.967
\leq 37- <42	447	83.4	8.4 \pm 3.8			
\leq 42	33	6.2	8.2 \pm 2.9			
Birth Weight (kg)						
<1.5	13	2.4	8.5 \pm 3.1			
1.5-2.499	118	22.0	8.3 \pm 2.9	0.241	3	0.867
2.5-4.0	230	42.9	8.1 \pm 2.8			
>4.0	67	12.5	8.0 \pm 3.5			
*Unknown	108	20.2	8.4 \pm 3.1			
Maternal Parity						
One	180	33.6	8.5 \pm 4.1			
Two	130	24.3	8.5 \pm 3.5			
Three	141	26.3	8.2 \pm 3.3	0.804	4	0.523
Four	79	14.7	8.7 \pm 4.2			
>Four	6	1.1	6.3 \pm 1.0			
Mode of Feeding						
Breast milk only	339	63.2	7.8 \pm 3.6			
Formula only	6	1.1	9.7 \pm 5.9	12.329	2	0.000*
Mixed feeding	191	35.7	9.5 \pm 3.8			

*Excluded from test

*Statistically significant, P<0.05

Table III

Perinatal Factors by Age of Cord Separation

<i>Perinatal Factors</i>	<i>Cord Separation Time (days)</i>			<i>F</i>		<i>P</i>
	<i>N</i>	<i>%</i>	<i>Mean ±SD</i>	<i>Value</i>	<i>df</i>	<i>Values</i>
<i>Nature of Liquor</i>						
Clear	485	90.4	8.5±3.8			
Blood stained	48	9.0	8.2±3.8	0.455	2	0.635
Foul Smelling	3	0.6	6.0±0.9			
<i>*POMRBD</i>						
<24hour	32	6.0	7.3±3.3	0.006	1	0.940
≥24hours	504	94.0	8.4±2.9			
<i>Duration of Labour</i>						
<24hour	469	87.5	8.5±3.8	1.243	1	0.265
≥24hours	67	12.5	8.0±3.2			
<i>Mode of Delivery</i>						
***SVD	458	85.4	7.4±3.9	9.012	1	0.003**
Caesarean section	78	14.6	8.8±3.2			
<i>Place of Delivery</i>						
Hospital	445	83.0	8.6±3.8			
Home	39	7.3	7.1±2.9	3.400	2	0.034**
Mission house	52	9.7	8.5±4.5			

*Period of membrane rupture before delivery

**Statistically significant, P < 0.05

***Spontaneous vagina delivery

Table IV

Cord Care and Cord Separation Time

<i>Cord Care</i>	<i>Cord Separation Time</i>			<i>F</i>		<i>P</i>
	<i>N</i>	<i>%</i>	<i>Mean ±SD</i>	<i>Values</i>	<i>df</i>	<i>Values</i>
<i>Cord clamp used</i>						
Plastic	413	77.1	8.4±3.8	0.008	1	0.927
Thread/surgical sutures	123	22.9	8.2±3.7			
<i>Cord Dressing</i>						
Open	505	94.2	8.4±3.7	0.241	1	0.624
Closed	31	5.8	8.7±4.8			
<i>Cord Treatment</i>						
Alcohol (methylated spirit)	317	59.2	9.5±3.8			
Alcohol + **fomentation	119	22.2	8.5±3.3			
Alcohol + *MCS	57	10.6	9.0±4.0	3.720	5	0.003
Alcohol + traditional mixtures	26	4.9	8.5±3.4			
**Fomentation only	12	2.2	9.0±3.2			
*MCS only	5	0.9	6.6±3.3			

*MCS: Menthol containing substances (Ointments or Powder)

** Application of hot water or dry heat using a piece of cloth

separated by two weeks of life (Table I). Table I also shows the relationship between the gender and the time of cord separation. Among the infants, males had a mean cord separation time of 8.1 days (\pm S.D, 3.6) which was significantly shorter than the value of 8.7 days (\pm SD, 3.9) obtained among their female counterparts ($F = 4.140$, $df = 1$, $p=0.04$). The educational status of the mothers interviewed are shown in Fig. 1; 91 percent of the mothers had at least, some primary school education while nine percent had no formal education. The cord separation times did not differ significantly with respect to maternal educational status.

Table II shows the relationship between certain characteristics of the mothers and infants and time of cord separation. Four hundred and seventy-one (87.9 percent) mothers booked for antenatal care; the mean cord separation time was significantly shorter in the 65 infants whose mothers did not book for antenatal care ($F = 6.973$, $df = 1$, $p = 0.009$). Four hundred and forty-seven (83.4 percent) of the infants were term, 56 (10.4 percent) preterm and 33 (6.2 percent) were post-term. There was no significant difference in the time of cord separation with respect to the gestational ages ($F=0.087$, $df=3$, $p=0.967$). Two hundred and thirty (42.9 percent) of the infants had normal birth weights of between 2.5kg and 4.0kg; the low birth weight infants formed 24.4 percent of the cohort, while those infants whose birth weights were not documented constituted 20.2 percent. These infants were excluded from test of statistical difference. There was no significant difference in their cord separation times ($F=0.241$, $df=3$, $P=0.861$). Also, no significant difference was found in the mean cord separation time among neonates with respect to mothers' parity ($F=0.804$, $df=4$, $p = 0.523$). Babies fed only breast milk had significantly shorter mean cord separation time of 7.8 days (\pm SD, 3.6) in comparison with those fed on mixed feeds (9.5 days \pm SD, 3.8) and formula fed infants (9.7 days \pm SD, 5.9) [$F = 12.329$, $df=2$, $p=0.000$].

The effects of certain perinatal factors on the mean cord separation time are shown in Table III. Ruptured amniotic membrane occurred less than 24 hours before delivery in 504 (94.0 percent) infants and clear amniotic fluid at delivery was reported by mothers of 485 (90.4 percent). Four hundred and forty-five (83.0 percent) infants were delivered in the hospital; labour period of less than 24 hours was reported in 469 (87.5 percent) and spontaneous vaginal delivery (SVD) was the mode in 458 (89.9 percent) infants. The mean cord separation times were significantly shorter among infants delivered by SVD than by caesarean section ($F=9.012$, $df=1$, 0.003) and at home ($F=3.400$, $df=2$, $p=0.034$).

The time of cord separation with regard to the materials used to ligate the umbilical cord stump, types

of cord dressing and cord treatments are shown in Table IV. Plastic clamps were used in 78.5 percent of the babies and 94.2 percent of mothers practised open dressing. The major forms of cord treatment were with alcohol (methylated spirit) only (59.1 percent), methylated spirit with hot fomentation (22.2 percent) and methylated spirit with traditional mixtures (4.9 percent). The mean cord separation time was significantly different with respect to the cord treatment ($F=3.720$, $df=5$, $p=0.003$). No significant difference was found in the time of cord separation in relation to the material used to clamp the cord ($F=0.008$, $df=1$, $p=0.927$) and whether open or closed dressing was employed ($F=0.241$, $df=1$, $p=0.624$).

Discussion

The time taken after birth for the cord to separate in the present study ranged from two to twenty-one days with a mean of 8.7 days (\pm SD, 3.7); this is similar to the short cord separation time earlier reported from developing countries.^{2,4} It however, differs significantly from reported values from developed countries.² Novack *et al*⁵ reported a mean cord separation time of 13.9 days in the United States of America. Many workers have reported that agents used for cord care significantly affect the time of cord separation.^{8,10-17} The comparatively short mean cord separation time found in this study may be due to climatic conditions such as temperature and humidity, cord care practices and hygiene.

We found a significantly shorter cord separation time among male infants although many of the earlier published studies^{5,6,18-20} did not report such gender difference. The contribution of other confounding factors such as the nature of cord treatment remains undetermined. It was not particularly clear from this study why male umbilical cord stump dropped faster than in female. The study also suggests that umbilical cord separation occurs at a later time in infants delivered by Caesarean section compared with products of vaginal deliveries. Similar findings were earlier reported by Oudesluis-Murphy *et al*,³ Novack *et al*⁵ and Arad *et al*.¹⁷ This may be a reflection of decreased bacterial contamination of the umbilical cord among those delivered by Caesarean section with consequent decreased leukocyte migration to the cord.³ Since the information on the events around deliveries of the babies studied were obtained retrospectively, it was difficult to establish the exact sequence, details of aseptic technique and cord treatment in all babies delivered by caesarean section during the period of admission. However, reports have shown that umbilical cord separation is mediated through leukocyte infiltration and digestion,^{5,7,13} therefore, interventions that limit cord