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UMBILICAL CORD SEPARATION TIME AMONG INFANTS SEEN AT THE IMMUNISATION CLINIC OF THE UNIVERSITY OF BENIN TEACHING HOSPITAL, NIGERIA

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ABSTRACT

Objective: To document the umbilical cord separation time and factors which may influence this among a cohort of infants.

Design: Descriptive cross sectional study.

Setting: Well Baby/Immunisation clinic in University of Benin teaching hospital, Benin city, Edo state, Nigeria.

Subjects: Four hundred and ninety seven consecutive mothers with their healthy infants were documented for age, parity, place of delivery of infant, mode of delivery, gender of infants, cord care and the time it took for the umbilical stump of their infants to separate after birth or drop.

Results: The time taken after birth for the cord stump to drop or to separate from its attachment ranged from two to 28 days with a mean of 6.34 ± 3.67 days. There was a significant relationship between umbilical stump separation time on one hand and place of delivery ($p < 0.001$), gender of infants ($p < 0.001$) and cord care practice ($p < 0.001$) on the other hand. A significantly shorter cord stump separation time was found among babies delivered at non-orthodox centres, male infants and those who had inadequate cord care. There was no relationship between cord stump separation time and maternal parity, mode of delivery and materials used in tying the cord.

Conclusion: Cord stump separation time may be as long as 28 days and factors which may influence this include place of delivery, gender of infants and cord care practice. Knowledge of the normal range of time it takes for separation of the cord after birth is important to prevent unnecessary and maybe harmful interventions.

INTRODUCTION

When the umbilical cord is cut, the cord stump is suddenly deprived of its blood supply. The stump soon starts to dry up or lose its vitality though still linked to the baby. While it remains attached, it could serve as conduit for infection as the non-viable tissue could harbor micro-organisms unless it is hygienically handled. It normally separates between five and 15 days after birth; (1) although, some authors have recorded intervals as long as 21 days (2).

Separation of the umbilical cord stump is mediated through inflammation at the junction of the cord and the skin of the abdomen with leucocyte infiltration and subsequent digestion of the cord (3). During the normal process of separation, small amounts of cloudy mucoid material may collect at this junction;

this may be misinterpreted as pus. Acknowledged factors that delay the process of cord separation are the application of antimicrobials to the stump, (3-7) Caesarean section, (2,3,8-10) infection and defective neutrophil mobility in the neonate (11). Drying and separation of the stump is facilitated by exposure to air.

After the cord stump has separated, the umbilicus continues to elaborate small amounts of mucoid material until complete healing takes place, usually a few days after separation. During this interval the umbilicus is still susceptible to infections which may cause a delay in healing. Delay in cord stump separation may increase the risk of infection, cause maternal anxiety and entails more home visits by midwives (in areas where this facility is available), thus increasing the workload of health care professionals

and the cost of postnatal care (12). The knowledge of the normal range of time it takes for the umbilical cord to separate after birth is important to prevent unnecessary and perhaps harmful interventions.

MATERIALS AND METHODS

The study was conducted at the Well Baby/ Immunisation Clinic of the University of Benin Teaching Hospital (UBTH), Benin City, Edo State; between July and August 2009. Consecutive mother/ baby pairs attending the clinic were recruited. Questionnaires were administered to 497 mothers to document mother's age, parity, place of delivery of infant, mode of delivery, gender of infants, cord care and the time it took for the umbilical cord stump of their babies to drop after birth.

Only the sole use of methylated spirit for cord care by the mother was considered as adequate. Other forms of treatment or intervention used on the umbilical cord stump were considered non-beneficial or inadequate. Approval for the study was obtained from the Ethics Committee of UBTH and informed consent obtained from each adult participant.

Data collected were entered into the Statistical Package for Scientific Solutions (SPSS) version 16. The results were cross tabulated as frequency tables and contingency tables. Means, standard deviations and ranges were used as appropriate to describe continuous variables. Fisher's exact test and Chi-square were used to test the strength of association where appropriate, while significance of each test was presumed for p -value < 0.05 .

RESULTS

The mothers' ages ranged between 17 and 42 years (mean of 29.10 ± 4.91 years) with the mode of maternal parity being 1.0 (range 1–8) (Table 1). The mean cord stump separation or detachment time was 6.34 ± 3.67 days with a range of two to 28 days. Cord separation occurred in most (83.1%) of the infants in the first week of life while 97.8% of all the infants had their cord stump separated by two weeks of life (Table 1). The proportion of infants whose cord separation time occurred in the first week of life increased with maternal parity while the proportion of those whose cord separation time occurred in the second week of life declined with maternal parity. This relationship was, however, not significant.

Materials used in tying the cord were mainly thread (65.6%) and clamp (22.7%) (Table 1). Most of the infants whose umbilical cords were tied with

thread (85.9%) and plastic clamp (85.8%) had their cord stump detached in the first week of life. No significant relationship exist between cord separation time and materials used in tying the cord (Table 1). Majority of the mothers (44.3%) delivered in private hospitals, followed by proportion that delivered in teaching hospitals (34.4%). The places of deliveries were grouped into orthodox (teaching hospitals, State hospitals, private hospitals and maternity homes) and non-orthodox (traditional birth attendant's (TBA) place, at home, church, chemist, primary health centre and "on the road" proceeding to a hospital) centres (Table 2). Cord stump separation time was shorter among babies delivered at the non-orthodox centres than at the orthodox centres (Table 2). The relationship between cord separation time and place of delivery was statistically significant ($p < 0.001$).

A higher proportion (83.6%) of infants delivered by spontaneous vaginal delivery (SVD) had a shorter cord stump separation time than those delivered by Caesarean section (CS). However, no significant association was found between the time of cord stump separation and the mode of delivery (Table 2).

Of the 497 infants recruited, 238 (47.9%) were males while 259 (52.1%) were females, giving a male to female (M: F) ratio of 1: 1.1 (Table 2). Their ages ranged between one and 51 weeks (mean 15.6 ± 12.14 weeks). Cord stump detachment in the first week of life occurred in a higher proportion of male infants (84.9%) in comparison to female infants (81.5%). A significant relationship exist between cord stump separation time and gender of infants ($p < 0.001$) (Table 2).

The majority (79.5%) of the respondents embarked on inadequate cord care practices in caring for their baby's cord rather than adequate (20.5%) care (Table 2). The inadequate cord care practices included the use of various combinations of alcohol (methylated spirit), hot compress, menthol-containing balm, sand, toothpaste, palm oil, salt and saliva. They however, were associated with a shorter cord detachment time (86.1% of cord stump so treated getting detached in the first week of life as opposed to 71.6% among those who used methylated spirit). A significant relationship exist between cord separation time and cord care practice ($p < 0.001$) (Table 2).

No significant association was found between time of cord stump separation on one hand and maternal parity, mode of delivery and materials used in tying the cord on the other. However, significant relationships exist between cord stump separation time on one hand and place of delivery, gender of infants and cord care practice on the other.

Table 1
Relationship between Cord Separation Time, Parity of Mothers and Materials used in tying cord

	Cord Separation Time (Days)				OR	p
	1 – 7	8 – 14	15 – 21	22 – 28		
Maternal Parity						
1 (n=173)	138 (79.8)	30 (17.3)	3 (1.7)	2 (1.2)	3.0	0.2307
2 (n=117)	96 (82.1)	18 (15.4)	2 (1.7)	1 (8.5)	2.7	0.415
3 (n=98)	83 (84.7)	14 (14.3)	1 (1.0)	0 (0.0)	2.0	1.000
4 (n=70)	59 (84.3)	10 (14.3)	1 (1.4)	0 (0.0)	2.0	1.000
≥5 (n=39)	37 (94.9)	1 (2.6)	0 (0.0)	1 (2.6)	∞	0.051
Total	413 (83.1)	73 (14.7)	7 (1.4)	4 (0.8)	3.0	0.0745
Materials used in tying cord						
Thread (n=326)	280 (85.9)	39 (12.0)	5 (1.5)	2 (0.6)	3.0	0.216
Plastic clamp (n=113)	97 (85.8)	14 (12.4)	1 (0.9)	1 (0.9)	2.0	0.497
Suture (n=45)	25 (55.6)	18 (40.0)	1 (2.2)	1 (2.2)	1.0	1.000
Others (n=13)	11 (84.6)	2 (15.4)	0 (0.0)	0 (0.0)	5.5	0.371

Figures in parenthesis represent percentages.

Table 2
Relationship between Cord Separation Time and Place of Delivery, Mode of Delivery, Gender of Infants and Cord Care Practice

Parameters	Cord Separation Time (Days)				Total	p-value
	1 – 7	8 – 14	15 – 21	22 – 28		
Place of Delivery						
Orthodox	338 (80.9)	69 (16.5)	7 (1.7)	4 (0.9)	418 (100.0)	< 0.001*
Non-orthodox	75 (94.9)	4 (5.1)	0 (0.0)	0 (0.0)	79 (100.0)	
Mode of Delivery						
CS	47 (79.7)	11 (18.6)	0 (0.0)	1 (1.7)	59 (100.0)	0.4917
SVD	366 (83.6)	62 (14.2)	7 (1.6)	3 (0.7)	438 (100.0)	
Gender of Infants						
Male	202 (84.9)	35 (14.7)	1 (0.4)	0 (0.0)	238 (100.0)	<0.001*
Female	211 (81.5)	38 (14.7)	6 (2.3)	4 (1.5)	259 (100.0)	
Cord Care Practice						
Adequate	73 (71.6)	24 (23.5)	3 (2.9)	2 (2.0)	102 (100.0)	<0.001*
Inadequate	340 (86.1)	49 (12.4)	4 (1.0)	2 (0.5)	395 (100.0)	

Cs = Caesarean section, SVD = Spontaneous vaginal delivery

*Statistically significant, p < 0.05

DISCUSSION

The time taken after birth for the cord stump to detach in the present study ranged from two to twenty eight days with a mean of 6.34 ± 3.67 days. This mean cord stump detachment time is comparable to the short cord separation time earlier reported from some developing countries (2,12-14). It however, differs markedly from values obtained from developed countries (12). Novack *et al* (3) in 1988 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 affected the time of cord separation (15-21). Climatic conditions such as temperature and humidity, cord care practices and hygiene were the reasons suggested by Oladokun *et al* (2) for the comparatively short mean cord separation time found in their study done in Ibadan, Nigeria in 2002.

In the present study, there was a significant relationship between cord separation time and place of delivery, gender of infants and cord care practice. Cord stump separation time was shorter in

babies delivered outside orthodox health facilities. This may be ascribed to the fact that non-sterile materials are more likely to be used in tying the cord with its attendant consequences of bacterial colonisation and leucocyte migration. A shorter cord separation time was found among male infants. This observation affirms the findings contained in the work of Oladokun *et al* (2) who recorded a mean cord separation time of 8.1 ± 3.6 days in males as against 8.7 ± 3.9 days in females. The reason for this gender difference is uncertain. Oladokun *et al* (2) also gave no reason for their findings. Some other authors (3,21-24) did not report any gender difference in the cord stump separation time. Most of the materials used to tie the cord were not sterilised and may cause bacterial contamination of the umbilical cord resulting in increased leucocyte migration to the cord which hastens cord detachment (11). From this study, it would appear that unhygienic cord care practices favoured early separation of the cord. It is plausible that they are practiced for this reason.

There were no relationships between maternal parity, mode of delivery and the type of material used in tying the cord on one hand and cord separation time on the other in this study. Many previous studies (25-27) also reported no association between these factors. Our finding, however, differs from those of some other authors (2,3,9,10) where it was noted that umbilical cord separation occurs at a later time in infants delivered by Caesarean section in comparison to products of vaginal deliveries. They attributed this to reduced incidence of bacterial contamination of the umbilical cord among those delivered by Caesarean section with consequent reduction in leucocyte migration to the cord (10). Reports have shown that umbilical cord separation is mediated through leucocyte infiltration and digestion, (3,11,28) therefore; interventions that limit cord contamination may cause significant delays in cord separation time. It may be inferred that babies delivered by Caesarean section are less likely to have cord stumps that are contaminated because of supervised and prolonged hospital care dictated by the maternal post-operative condition.

Although a similar study (2) was conducted in Ibadan (South-West region of Nigeria), the cultural practices there differ from what obtains in Benin City (South-South region of Nigeria). The culture of a people is closely linked with the method of cord care they practice. Moreso, the more studies carried out in the country, the more likely we will get a true representation of the normal time it takes for the umbilical cord to separate in infants in the country.

In conclusion, umbilical cord stump separation time may be as long as 28 days and factors which may influence this include place of delivery, gender of

infants and cord care practice. Knowledge of the normal range of time it takes for separation of the cord after birth is important to prevent unnecessary anxiety in mothers/caregivers and thus prevent avoidable harmful interventions.

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REFERENCES

1. Wilson, C. B., Ochs, H. D., Almquist, J., *et al*. When is umbilical cord separation delayed? *J Pediatr* 1985; **107**: 292-294.
2. Oladokun, R. E., Orimadegun, A. E. and Olowu, J. A. Umbilical Cord Separation Time in Healthy Nigerian Newborns. *N J P* 2005; **32**: 19-25.
3. Novack, A.H., Mueller, B. and Ochs, H. Umbilical separation in the normal newborn. *Am. J. Dis. Child.* 1988; **142**: 220-223.
4. Barr, J. The umbilical cord: to treat or not to treat. *Midwives Chronicle and Nursing Notes* 1984; **97**: 224-226.
5. Salariya, E. M. and Kowbus, N. M. Variable umbilical care. *Midwifery*, 1988; **4**: 70-76.
6. Dore, S., Buchan, D., Coulas, S., *et al*. Alcohol versus natural drying for newborn cord care. *J Obstet Gynecol Neonatal Nurs* 1998; **27**: 621-627.
7. Lawrence, C. Effect of two different methods of umbilical care on its separation time. *Midwives Chronicle and Nursing Notes* 1982; **95**: 204-205.
8. Singh, N., Sharma, S. and Singh, R. Umbilical cord fall in preterm and term newborn in vaginal and caesarean deliveries. *Indian Pediatrics* 1999; **36**: 588-590.
9. Arad, I., Eyal, F. and Fainmesser, P. Umbilical care and cord separation. *Arch. Dis. Child.* 1981; **56**: 887 - 888.
10. Oudesluys-Murphy, A. M., Eilers, G. A. and de Groot. C. J. The time of separation of the umbilical cord. *Eur. J. Pediatr.* 1987; **146**: 387-389.
11. Hayward, A. R., Harvey, B. A., Leonard, J., *et al*. Delayed separation of the umbilical cord, widespread infections, and defective neutrophil mobility. *Lancet* 1979; **1**: 1009-1001.
12. World Health Organization. Care of the Umbilical Cord: A review of the evidence. WHO/RHT/MSM/98.4 ed. Geneva: WHO, 1998.
13. Lawn, J. E., Cousens, S. and Zupan, J. Four million neonatal deaths: when? Where? Why? *Lancet* 2005; **365**: 891-900.
14. Bhalla, J. N., Nafis, N., Rohatgi, P. and Singh. Some observations on separation of the umbilical cord. *Eur. J. Pediatr.* 1987; **146**: 387 - 389.
15. Zupan, J. and Garner, P. Topical umbilical cord care at birth. *Cochrane Database Syst. Rev.* 2000; **79**, **113**: 10-17.
16. Zupan, J., Garner, P. and Omari, A. A. Topical umbilical cord care at birth. *Cochrane Database Syst. Rev.* 2004: CD001057.
17. Medves, J.M. and O'Brien, B.A. Cleaning solutions and

- bacterial colonisation in promoting healing and early separation of the umbilical cord in healthy newborns. *Can. J. Public Health.* 1997; **88**: 380-382.
18. Oudesluys-Murphy, A. M. The effectiveness of single and multiple applications of triple dye on umbilical cord separation time. *Eur. J. Pediatr.* 2000; **159**: 126 – 127.
 19. Pezzati, M., Biagioli, E. C., Martelli, E., *et al.* Umbilical cord care: the effect of eight different cord-care regimes on cord separation time and other outcomes. *Biol. Neonate* 2002; **81**: 38 – 44.
 20. Golombek, S. G., Brill, P. E. and Salice, A. L. Randomised trial of alcohol versus triple dye for umbilical cord care. *Clin. Pediatr. (Phila)* 2002; **41**: 419 – 423.
 21. Sarwono, E., Disse, W. S., Oudesluys-Murphy, H. M., *et al.* Umbilical cord: factors which influence the separation time. *Paediatr. Indones.* 1991; **31**: 179 – 184.
 22. Oudesluys-Murphy, A. M., den Hollander, J. C., and Hop, W. C. Umbilical cord separation: histological findings and perinatal factors. *Biol. Neonate.* 1990; **58**: 236 – 240.
 23. Raise-Bahrami, K., Schulte, E. B. and Naqvi, M. postnatal timing of spontaneous umbilical cord separation. *Am. J. Perinatol.* 1993; **10**: 453 – 454.
 24. Abramson, J. S., Mills, E. L., Sawyer, M. K., *et al.* recurrent infections and delayed separation of the umbilical cord in an infant with abnormal phagocytic cell locomotion and oxidative response during particle phagocytosis. *J. Pediatr.* 1981; **99**: 887 – 894.
 25. Hsu, C. F., Wang, C. C., Yuh, Y. S., Chen, Y. H. and Chu, M. L. The effectiveness of single and multiple applications of triple dye on umbilical cord separation time. *Eur. J. Pediatr.* 1999; **158**: 144 – 146.
 26. Panyavudhikrai, S., Danchaivijitr, S., Vantanasiri, C., *et al.* Antiseptics for preventing omphalitis. *J. Med. Assoc. Thai.* 2002; **85**: 229 – 234.
 27. Adhikari, R. K. and Tielsch, J. M. Risk factors for umbilical cord infection among newborns of southern Nepal. *Am. J. Epidemiol.* 2007; **165**: 293 – 211.
 28. Schuman, A. J. and Oksol, B. A. The effects of isopropyl alcohol and triple dye on umbilical cord separation time. *Mil Med* 1985; **150**: 49-50.