

## ORIGINAL ARTICLE

**Umbilical Cord : Factors which Influence  
the Separation Time**

by

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**Abstract**

The separation time of the umbilical cord was studied in 98 healthy Indonesian newborns with the aim of determining the normal time of separation and to evaluate factors which may influence it. The authors looked for a relationship between cord separation and sex, birthweight, gestational age, parity of the mother and nutrition of the newborn. Mean separation time was 10.9 days (S.D. 3 : range 5-23 days). None of the factors analysed had a statistically significant influence. Cord care consisted of triple dye; no umbilical infections were found.

### Introduction

The separation time of the umbilical cord has been a subject of interest since a delay in separation time was thought to be related to a defect in neutrophil function (Hayward et al., 1979). In several reports mean separation time in normal infants was observed to lie within a narrow range (Totterman and Autio, 1970; Bhalla et al., 1975; Arad et al., 1981; Oudesluys - Murphy et al., 1987). However, some other studies reported a mean separation time which was considerably later (Wilson et al., 1985; Novack et al., 1988). Differences in mean separation time were explained by some authors as a result

### Materials and methods

During a two-month-period data were registered from 228 of the 305 live - born Indonesian infants nursed in the Department of Obstetrics and Neonatology, Dr. Soetomo General Hospital Surabaya, Indonesia. Infants of non Javanese parents were included as well as those of Javanese origin. Apart from the requirement that all mothers should live in Surabaya (in order to increase the follow-up rate for the separation time) selection was done at random and depended on the work - load of the ward. Because of the small number involved, infants delivered by Caesarian section, prematurely delivered infants and infants who needed admission in a special care unit were all excluded. Finally 211 physiologically delivered newborns were studied. The gestational age ranged from 37-43 weeks. For every infants the following factors were registered as completely as possible: sex, birthweight, gestational age, APGAR - Scores (1' and 5'), intra partum complications, use of antibiotics, parity of the mother and the nutrition of the baby. Follow up consisted of control visits in the

of different types of cord-care; climate or race did not seem to be of influence (Oudesluys-Murphy et al., 1987). Nothing was known about the normal separation time and factors influencing this in Indonesia. The purpose of this study was to determine the separation time under usual circumstances in the Indonesian newborns and to compare the influence of various factors on the time of cord separation with previous reports. We looked for a relation between separation time and birthweight, gestational age, sex, nutrition of the infant and parity of the mother.

hospital or visiting the infants at home when an infant did not show up. The infant was examined, particular details and separation time were registered. When mother and child were discharged from the hospital the mother was asked to observe the time of cord separation carefully. The date of separation was registered at the first control visit. If the cord had not separated yet the mother was asked to come for a second check up. In this way 114 separation times were collected (54%). However, the use of antibiotics and the occurrence of complications which might be of influence on the separation time were too infrequent to be used in the analysis. The APGAR - scores ranged within a very small interval. Therefore these factors were not evaluated separately. A stepwise multiple regression analysis was done to evaluate the influence of birthweight, gestational age, sex, nutrition and parity of the mother on the separation time. Only completely registered infants could be analysed in this way, and this therefore reduced the number of cases available for analysis to 98. Of 97

registered infants (46%), the data of separation time was not collected. There is no indication that this group differed from the collected group, and a comparison was made on the deviation of the factors studied. Cord care consisted of application of triple dye (brilliant green, 2.29 g, proclavine hemisulphate, 1.14 g, crystal violet, 2.29 g, water up to 1000 ml) done immediately after birth, and once again at the time of the discharge from the hospital or more often when the umbilical stump was not properly painted with the triple dye. The

after care consisted of cleaning the stump with 70% alcohol twice daily after each bath. It is a common practice to use *gurita* during the first months of life. Birthweight was measured directly after birth. Gestational age was determined from the first day of the last menstruation and in cases of uncertainty the infants were evaluated using the Dubowitz score (8). The nutrition was divided into breast-feeding and both breastfeeding and formula, Parity of the mother was noted from her medical record.

### Results

Separation time varied from 5-23 days, with a mean of 10.9 days and a S.D. of  $\pm 3.5$  (Figure 1). Each of the factors used for the statistical analysis was compared between the group with collected separation times and the group from which the separation time was not collected (Table 1). There were no important differences in the deviation of sex, birthweight, gestational age, parity and nutrition between both groups.

Stepwise multiple regression analysis was done on 98 cases to evaluate the influence on the separation time of sex, birthweight, gestational age, parity of the mother and nutrition (Table 2). Mean values and ranges of these factors are shown in Table 1. None of the factors had a statistically significant influence on the separation time. It was very striking to note that a single umbilical infection was found.

### Discussion

Large differences are reported in the normal time of separation of the umbilical cord. Oudesluys - Murphy et al., (1987) reported a mean separation time of 7.4 days (S.D. 3.3) in 911 Dutch neonates; Totterman et al., (1970) 6.3 days in 600 Finnish neonates; Bhalla et al., (1975) 5.8 days in 840 Indian infants; Novack et al., (1988) (S.D. 4.7) in 363 American neonates. In some reports differences in separation time are related to the type of cord - care (Arad et al., 1981; Wilson et al., 1985; Novack et al., 1988). Others mentioned that different cord - care regimens do not influence the separation (Oudesluys -

Murphy et al., 1987) Climate and race are mentioned not to be of influence. In our study, the separation time in normal Indonesian newborns with a mean of 10.9 days (S.D.3.5) was longer than that reported in most other studies. Cord care consisted of application of triple dye. However the use of triple dye cannot explain this delay completely, as in other studies, where triple dye is applied, the mean separation time ranges from 6.4 days (Arad et al., 1981) to 15 days (Wilson et al., 1985). We think that the later separation in our study could be the result

of the *gurita*. The *gurita* prevents manipulation of the stump and can thus prolong separation in this way. We did not study the influence of socio - economic status and race on the time of separation. Factors leading to a delay in separation time, mentioned in other reports are : delivery by Caesarian section, premature delivery, the use of antibiotics, low birthweight and infant being male (Oudesluys - Murphy et al., 1987). Our Study was restricted to physiologically delivered infants, with a gestational age ranging from 37-43 weeks. The use of antibiotics and the

occurrence of complications were too small to be of relevant influence. Therefore we could not confirm these findings. Sex, birthweight, parity of the mother and the nutrition of the baby did not have a significant relationship with the time of separation in our study. This means that if gestational age, sex and birthweight have an influence on separation time, as was reported by others (Oudesluys - Murphy et al., 1987), the influence is small, and is to be found only when a much larger group of newborns is studied.

Table 1 : Comparison of factors analysed between the group of infants with collected separation time data and the group of infants of which the data of separation time was not collected

Factors	Sep. time collected	n	Sep. time not collected	n
Sex : % male n = 211	50.8%	58	51.5%	50
Birthweight (g) : mean 50 n = 204	3059 348 range	111	3085 423 range	93
Gestational age (wk) mean n = 192	39.6 range	109	39.6 range	83
Parity : : % primiparae n = 211	57.9%	48	51.5%	51
Nutrition : % Breast feeding n = 211	84.2%	96	73.2%	71

Table 2 Stepwise multiple regression analysis of factors influencing separation time of the umbilical cord (n = 98)

Factor	Sep. time (days)	Coefficient/SE	Z	P
m.10.9 SD 3.6				
Sex Male		+ 0.3/0.74	-0.10	0.69
Birthweight* (kg)		- 0.017/1.18	-0.01	0.99
Gestational age** (wk)		+ 0.34/0.31	1.11	0.27
Parity Primipara		+ 0.31/0.78	0.40	0.69
Nutrition Breast bottle		- 0.60/1.38	-0.43	0.67

\* birthweight = (birthweight-3)

\*\* gestational age = (gestational age-40)

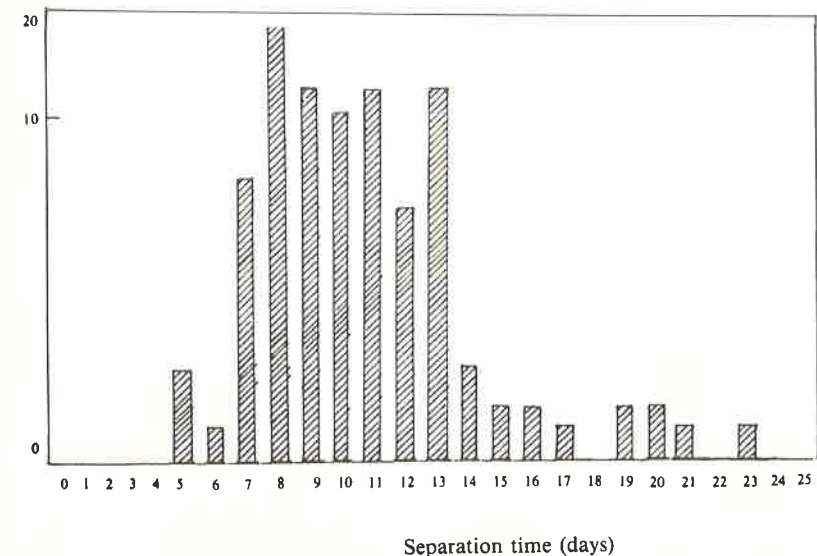


Figure 1 : Separation time umbilical cord in the normal Indonesian newborn n = 98

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