

比較酒精擦拭與自然乾燥於新生兒臍帶護理 之照護成效

Comparison of 95% Alcohol with Natural Drying Application in Newborn Umbilical Cord Care

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摘要：本研究旨在比較使用 95%酒精及使用消毒棉花棒拭淨之兩種臍帶護理方式，對於新生兒臍帶脫落的天數、臍帶感染率與主要照顧者照護滿意度之差異。採類實驗設計法，以 2008 年 7 月至 2009 年 1 月於北市某醫學中心出生之新生兒為研究對象。其中偶數日出生者，臍帶護理是採 95%酒精進行擦拭；奇數日出生者，則無利用任何清潔液，單純以消毒棉花棒擦拭後之乾燥方式。而後以 t 檢定、卡方檢定與線性複回歸等進行資料分析。本研究共納入 127 名新生兒進行探討，酒精組 64 人，自然乾燥組有 63 人。研究期間，兩組新生兒皆無發生任何感染事件，且酒精組之平均臍帶脫落天數較自然乾燥組長 ($t=2.05$; $p=0.04$)，照顧者平均滿意度分數亦比自然乾燥組低($t=-2.82$; $p<0.01$)。此為首次台灣探討 95%酒精和消毒棉花棒擦拭之兩種不同臍帶護理方式對新生兒照護成效影響之實證研究。結果發現，對健康新生兒進行臍帶護理時，無須輔以酒精消毒，只要保持臍部乾燥即可。此結果可作為未來執行新生兒臍帶照護之實務參考。

關鍵詞：臍帶護理、感染、臍帶脫落時間、照護者滿意度

Abstract : Newborn infections at the umbilical cord area are common, often leading to omphalitis and

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septicemia. Choosing an appropriate method to clean the area is thus very important. The purpose of this study was to compare application of 95% alcohol with application of sterilized dry cotton for umbilical cord care in terms of time required for cord separation, rate of infection, and parental satisfaction. A quasi-experimental design was used. The neonates born from July 2008 to January 2009 at a medical center in Taipei participated in the study. Those who were born on even-numbered days were assigned to group A, in which 95% alcohol was applied to clean the umbilical cord. Those who were born on odd-numbered days were assigned to group B, in which sterilized dry cotton was applied to clean and render the area to air-dry. Collected data were analyzed using the Student *t* test, the chi-square test, and linear regression analysis. Of 127 health newborns participating in the study, 64 were in group A and 63 were in group B, respectively. During the study, no cases of infection of the cord area were observed. The cord separation time in group B was more quickly than in group A by nearly two days ($t=2.05$; $p=0.04$), as well as parental satisfaction was higher in group B than in group A ($t=-2.82$; $p<0.01$). To our knowledge, this is the first evidence-based study evaluating the effect with respect to application of 95% alcohol versus sterilized dry cotton in umbilical cord care among Taiwanese infants. Our results showed that swabbing with 95% alcohol may be unnecessary, and that application of sterilized cotton to keep skin dry is more effective and associated with higher parental satisfaction.

Keywords: Umbilical cord care, infection, Cord separation time, Parental satisfaction

1. Introduction

The umbilical cord connects the mother and her child for ten months. Beyond promoting a spiritual bond between them, it delivers necessary nutrients and disposes of wastes. The umbilical cord dries up and falls off naturally after it is cut to separate the newborn from the placenta at birth. Because newborns' organs are still developing, they have limited resistance to infection, and serious umbilical infection can occur if proper cord care is not performed. Growth of bacteria can cause severe inflammation, which may spread into the abdominal area and induce septicemia. McKenna and Johnson (1977) pointed out that 7 of 1,000 newborns develop omphalitis, with the number varying with the hygiene conditions of a country. Omphalitis not only necessitates prolonged hospitalization and higher medical expenses, but also increases infant's mortality by 50% to 87% (Fraser *et al.*, 2006). According to some reports, of the 1.3 billion neonates born annually in the world, 4 million die of umbilical cord infection within one month (Lawn *et al.*, 2005; World Health Organization, 1998). Therefore, umbilical cord care is a very important aspect of neonatal care and merits serious attention.

The choice of topical cleansing agents is of importance for effective umbilical cord care; however, it was mainly based on past care experiences rather than evidence-based findings (Anderson and Philip, 2004; McConnell *et al.*, 2004). Which topical cleansing agent is most effective for infants remains controversial. For example, Janssen *et al.* (2003) randomly allocated 766 newborns to either two applications to the umbilical cord stump on the day of birth with triple dye including alcohol swabbing or



dry care consisting of spot cleaning of soiled skin in the periumbilical area with water, wiping it with a dry cotton swab and allowing the area to air-dry. They found more colonization, exudates and omphalitis in the dry care group. Another randomized controlled trial by Nourian *et al.* (2009), they found the infection rate of bacterial colonization among infants who received natural drying for newborn cord care was higher in comparison with those whose umbilical cords were swabbed with 70% alcohol.

In contrast, some institutions take different perspectives on the matter of umbilical cord care. Some institutions hold that allowing the cord to dry naturally is more effective and more convenient than applying a special solution. World Health Organization and American Academy of Pediatrics had recommend that swabbing with sterilized dry cotton in maintaining the periumbilical area dry rather than alcohol or other cleansing solutions was more beneficial to lower infection risk (Anderson and Philip, 2004). Dore *et al.* (1998) compared 70% alcohol versus natural drying for newborn cord care and found that umbilical cord separation was shorter with the natural drying than with the alcohol swab by 1.7 days, moreover, there were no umbilical infections in either group. Another study involving 180 Thai newborns was conducted to investigate the time required for cord separation, parental satisfaction, and rate of infection using three different methods of umbilical cord care: use of sterilized dry cotton without any antiseptic agent, swabbing with alcohol, and swabbing with triple dye. The results showed that the use of dry cotton was associated with the fastest cord separation, and the highest parental satisfaction, as well as no significantly higher risk in bacterial colonization (Chamnanvanakij *et al.*, 2005). Shoaib *et al.* (2005) performed the same research in a group of 70 newborns and found that the average time required for cord separation was 4.7 days with application of dry cotton, compared with 6.4 days with application of 70% alcohol. Moreover, the infection rate using dry cotton was lower than that using 70% alcohol.

To sum up, using alcohol or not using to keep the area dry for umbilical care may yield varying results. Furthermore, many of the previous reports were conducted among newborns in underdeveloped or developing countries. Because of differences in hygiene conditions, it may be inappropriate to use these conclusions to guide cord care in Taiwan. To the best of our knowledge, no studies regarding umbilical cord care have been conducted in Taiwan. Therefore, the purposes of this study were to compare the average time required for cord separation, rate of infection, and parental satisfaction between the following groups: those whose parents cared for the umbilical cord by applying 95% alcohol, and those whose parents used sterilized dry cotton without antiseptic solution to keep the cords clean and dry. The findings may be a scientific foundation for umbilical cord care for Taiwanese newborns.

2. Methods

2.1 Research design and sampling

A quasi-experimental design was used to study newborns in a medical center in Taipei from July 2008 to January 2009. Eligibility criteria were as follows: (1) full-term newborn with a birth weight of more than 2,500 g; (2) not previously discharged and returning for ongoing treatment; (3) first baby of the family; and (4) consent to participate in the study obtained from parents. To ensure an appropriate



statistical power, with α of 0.05, power of 0.8, and an effect size of 0.49 based on the consideration of cord separation (Chamnanvanakij *et al.*, 2005; Cohen, 1992), a sample of 127 participants was finally collected as appropriate for the analysis.

2.2 Procedure

This study was approved by the Institutional Review Board of target hospital. To ensure patients' rights, the researchers explained the purposes of the study and procedures to the parents of participating infants. Informed consent was obtained after the parents understood and agreed to participate in the study. The infants were assigned to two groups according to their birth date. Those who were born on even-numbered days were assigned to group A, in which 95% alcohol was applied to clean the umbilical cord after discharge. Those who were born on odd-numbered days were assigned to group B, in which sterilized dry cotton without antiseptic solution were applied to clean and allow the area to air-dry after discharge. The parents of infants were given a different educational manual based on the arrangement for care model.

2.3 Data Collection

After the participants were discharged, telephone interviews were conducted every other day by the research coordinator to follow the schedule of newborn care among them. During the interviews, parents were asked to record whether their newborn's umbilical cord cut showed bloody exudate, had become odorous, or was still wet longer than three days after the umbilical cord fell off; the parents were asked to bring their babies back to the hospital if above-mentioned conditions occurred. When the baby was one month old, the parents were asked to bring the baby back to the hospital for a checkup. The educational manual was then submitted to the researcher.

Review of medical records was also applied to collect demographic information including maternal age, educational level, and method of birth, as well as the gender and weight of the newborn. The number of days required for cord separation was calculated from the sheet in the educational manual.

In this study, parental satisfaction was also investigated using a structured questionnaire at the time of checkup of infant. It was developed by the investigators from a review of the literature and in consultation with experts on umbilical cord care. It consisted of nine questions with responses given using a five-point Likert scale with one point indicating "very unsatisfactory" and five points indicating "very satisfactory." Thus the full-scale score range is from 9 to 45, with higher scores indicating increased satisfaction. The questionnaire, assessed with content validity, was peer reviewed to determine the correlation between the objective of the study with the content and questions by three experts (one holder with Msc degree specializing in maternity nursing, one obstetrician and one paediatrician). The content validity index (CVI) was used to quantify the extent of agreement between three experts. The four point Likert scale was used to assess the results: 4 representing very suitable; 3, suitable; 2, unsuitable; 1, very unsuitable. The results indicated that the CVI of the questionnaire was 0.82, indicating an acceptable level of content validity (Yaghmaie, 2003). Cronbach's α derived from the present data yield a coefficient 0.76.

2.4 Data Analysis



The data were analyzed using SPSS version 15.0. For the descriptive statistical results, demographic data, number of days required for cord separation, parental satisfaction, and method of birth were presented as percentage, mean, and standard deviation as appropriate. Subsequently, the independent t-test and the chi-square test were applied to assess the basic properties for inferential statistics. Whether using the multivariate analysis, such as multiple linear regression, to test the mean difference in time to cord separation, the rate of infection, and parental satisfaction between the groups depended on the heterogeneity of the basic properties occurring.

3. Results

The 127 newborns participating in this study included 67 males (52.8%) and 60 females (47.2%). The primary method of birth was cesarean section (72.4%). The mean birth weight was 3125 (± 346) g. The average age of the mothers when giving birth was 31.7 (± 3.8), and most of them were of high education level (above 12th grade) ($\pm 81.1\%$). No cases of infection occurred during the study. The average time required for cord separation with alcohol application was 13.2 (± 4.4) days, compared with 11.8 (± 4.0) days with use of sterilized dry cotton ($t=2.05$; $p=0.04$). The total parental satisfaction score for the sterilized dry cotton group was 31.6 (± 2.8), compared with 30.1 (± 3.2) for the 95% alcohol group ($t=-2.82$; $p<0.01$) (Table 1).

Table 1. Characteristics of infants (n=127)

Characteristics	95% alcohol (n=64)	Sterilized cotton (n=63)	χ^2/t (p)
Maternal education			
≤ 12 th grade (%)	9 (14.1)	15 (23.8)	$\chi^2=1.97$ (0.16)
> 12 th grade (%)	55 (85.9)	48 (76.2)	
Delivery modes			
virginal delivery (%)	46 (71.9)	46 (73.0)	$\chi^2=0.02$ (0.89)
cesarean section (%)	18 (28.1)	17 (27.0)	
Infant's gender			
female (%)	30 (46.9)	37 (58.7)	$\chi^2=1.79$ (0.18)
male (%)	34 (53.1)	26 (41.3)	
Birth weight (gram)*	3116 \pm 340	3135 \pm 355	$t=0.30$ (0.76)
Maternal age*	31.9 \pm 3.5	31.5 \pm 4.0	$t=-0.62$ (0.54)
Cord separation time (days)*	13.2 \pm 4.4	11.8 \pm 4.0	$t=2.05$ (0.04)
Parental satisfaction*	30.1 \pm 3.2	31.6 \pm 2.8	$t=-2.82$ (0.00)

Note. *Data presented as mean \pm SD.

4. Discussion

In this study, no cases of infection occurred in either group of infants. We found that cleaning the cord with 95% alcohol, compared with sterilized cotton without antibacterial agent, lengthened the mean time to umbilical cord separation by nearly two days, as well as diminished the scores of parental satisfaction. The finding about the infection rate was consistent with previous articles (Chamnanvanakij *et al.*, 2005; Dore *et al.*, 1998; Shafique *et al.*, 2006; Shoaieb *et al.*, 2005), revealing that the continued use of alcohol on the umbilical cord among healthy infants appears unwarranted. Despite the result being



opposite to findings from other studies (Janssen *et al.*, 2003; Nourian *et al.*, 2009), which may be because the cleansing agents in those studies were different from ours, inducing the baseline for comparison was different. Another possible reason was that dissimilar hygiene conditions might also lead to this discrepancy.

As for cord separation time, the average time required for cord separation in our study was in concordance with the findings (Dore *et al.*, 1998; Shafique *et al.*, 2006). The contributing factor may be that sterile solutions would impede tissue reconstruction, leading to a longer healing time (McConnell *et al.*, 2004; Medves and O'Brien, 1997). Thus, it is unnecessary to apply sterile solutions for cord care in healthy newborns. Swabbing the cord area by sterilized dry cotton to allow the area to air-dry naturally may be more sensible.

In this study, the level of parental satisfaction was higher with the use of sterilized cotton than with the use of 95% alcohol, which was in accordance with the finding by Chamnanvanakij *et al.* (2005). We postulated that the higher satisfaction associated with using dry cotton might be related to its convenience. Umbilical cord care with alcohol requires practice, with repeated swabbing with 95% alcohol followed by swabbing with dry cotton. Using only sterilized dry cotton is clearly simpler. Moreover, avoiding alcohol application reduces newborn discomfort. These advantages may lead to higher parental satisfaction to some extent.

Several limitations of this study need to be mentioned. First, participants for this study were recruited from a hospital in northern Taiwan, so the inferences drawn from the results were restricted in the generalizability. More diverse samples who were collected by nation-wide survey should be considered in the future study. Second, this study was limited to comparison of 95% alcohol and sterilized dry cotton for umbilical cord care, so various solutions with differing proportions of alcohol or antibacterial agents might be included in future research. Despite the above methodological concerns, our study has made the following contribution. Our analysis was corresponding to the data based on 127 newborns in Taiwan, which was calculated in consideration of the acceptable statistical power; therefore, the results from 127 cases may typically reflect the effects of 95% alcohol in comparison with natural drying for umbilical cord care among healthy newborns.

5. Conclusion

In this evidence-based study regarding umbilical cord care among Taiwanese newborns, we found that application of sterilized dry cotton markedly shortened the cord separation time by nearly two days, and elevated higher parental satisfaction. Simply use of sterilized cotton without antibacterial agents to keep the cord area dry seems to be more effective and convenient than using 95% alcohol, so the application of alcohol in daily umbilical cord care among healthy newborns may be reconsidered in the further.

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