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The Effect of Umbilical Cord Care on the Duration of Cord Separation in Newborns

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Abstract

Background: Umbilical cord care is an essential component of newborn care as it influences cord separation time and the risk of neonatal infection. Open and closed cord care methods are commonly used in the community, yet their effectiveness remains debated. **Purpose**: This study aimed to analyze the effect of open compared to closed umbilical cord care methods on cord separation time among newborns. **Methods**: This quantitative study employed a quasi-experimental posttest only control group design involving 60 newborns divided equally into open and closed care groups. Data were collected through observation until natural cord separation occurred. Descriptive analysis was conducted, followed by Shapiro–Wilk normality testing and Mann–Whitney test due to non-normal data distribution. **Results**: The results showed that the mean separation time in the open care group was 5.40 days, while in the closed care group it was 8.47 days. The Mann–Whitney test revealed U=6.000; Z=−6.654; p=0.000 (p<0.05), indicating a significant difference between the two methods. **Conclusion**: It is concluded that open cord care is more effective in accelerating cord separation and is recommended for newborn care practice.

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1. INTRODUCTION

The neonatal period is the most critical phase of the life cycle, as newborns are susceptible to infections—including umbilical cord infections—that can lead to neonatal sepsis (WHO, 2022). The process of umbilical cord separation generally occurs within 5–15 days of birth and is influenced by the care method employed (Susilo & Safrida Hatriana Risdianawati, 2024). Improper care can increase the risk of colonization by pathogenic bacteria such as *Staphylococcus aureus* and *Escherichia coli*, contributing to the development of omphalitis (Kusuma et al., 2022).

"Dry cord care" is recommended because it is easy to implement, cost-effective, and supports the natural separation process (Hsieh & Chen, 2022). In Indonesia, umbilical cord infections remain a significant cause of neonatal mortality, accounting for approximately 15–20% of all newborn deaths (Indonesian Ministry of Health, 2023). Nevertheless, practices involving covered cord care or the use of traditional substances persist in the community; these methods potentially delay cord separation and increase infection risk (Rosyada et al., 2021).

Several studies indicate that open cord care is more effective at accelerating separation compared to covered methods (Asiyah, 2017). However, other research has found no statistically significant difference, even though the average separation time was faster with the open method (Hidayati, 2020). A study by Putri et al. (2023) also reported that the majority of infants receiving open care experienced cord separation within 5 days or less.

Previous studies have also examined various factors and approaches that may influence umbilical cord separation and neonatal cord health**.** Research has explored the effectiveness of open cord care compared with other approaches, including the use of colostrum and breast milk, indicating that different cord-care practices may result in differences in the duration of cord separation. Rostarina et al. (2021)

reported differences in cord separation time among newborns receiving open care, colostrum, and breast milk-based care (Rostarina et al, 2021). Similarly, Santi and Sari (2022) reported that open cord care was associated with faster drying of the umbilical stump and no signs of infection during the observation period (Santi et al, 2022).

In addition to the care method itself, newborn and environmental factors may also need to be considered when evaluating the duration of umbilical cord separation**.** Factors such as the newborn's characteristics, environmental hygiene, and maternal practices may influence the process of cord separation and the risk of complications. Therefore, consideration of these factors is important when interpreting differences in cord separation time between open and closed cord-care methods. The effectiveness of open cord care has also been investigated in relation to infection prevention; a case study by Timisela et al. (2023) reported no signs of infection during five days of open cord care and cord separation on the fifth day (Timisela et al, 2023).

A preliminary study in the working area of the Pamotan Community Health Center (Puskesmas) revealed that most mothers still utilize covered care methods, resulting in an average separation time of 8–10 days, whereas the open method averaged 5–6 days. This situation highlights a variation in care practices that warrants scientific validation. Therefore, this study aims to determine the effect of umbilical cord care on the duration of umbilical cord separation in newborns within the working area of the Pamotan Community Health Center.

2. METHOD

This study employed a quantitative approach with a quasi-experimental, posttest-only control group design. It was conducted in November 2025 within the working area of the Pamotan Community Health Center (Puskesmas), Rembang Regency. The study population consisted of all mothers with newborns during the specified period (60 infants), all of whom were included in the sample via total sampling. Respondents were grouped according to the umbilical cord care method applied: open care (30 infants) and closed care (30 infants). Inclusion criteria comprised mothers with infants aged 0–28 days who possessed a Maternal and Child Health (MCH) handbook and consented to participate; infants hospitalized or mothers who were ill were excluded. The independent variable was the umbilical cord care method (open=1, closed=0) based on "clean and dry" principles, while the dependent variable was the duration of umbilical cord separation, calculated in days from birth until natural detachment.

Primary data were collected through direct observation and recording of the separation time using observation sheets, alongside a care practice questionnaire adapted from a published instrument. Secondary data were obtained from birth registers and MCH handbooks. Data processing involved editing, coding, entry, and cleaning using SPSS version 22. Univariate analysis was used to describe respondent characteristics and the mean duration of cord separation, while bivariate analysis employed the Mann–Whitney test—due to the non-normal distribution of the data ($p<0.05$)—at a significance level of 0.05. This study received ethical approval from the Health Research Ethics Committee of Universitas Muhammadiyah Purwokerto (reference number KEPK/UMP/01/1/2026) and a research permit (reference number 1863/G-3/UMKU/XI/2025).

3. RESULTS AND DISCUSSION

The study involved 60 newborn infants from the working area of the Pamotan Community Health Center. The gender distribution showed that 22 infants (36.7%) were male and 38 (63.3%) were female. Regarding the umbilical cord care method, each group consisted of 30 infants (50%) receiving open care and 30 infants (50%) receiving closed care.

Table 1. Respondent Characteristics

Gender	Frequency	Percent (%)
Male	22	36,7
Female	38	63,3
Total	60	100%

Source: 2025 Primary Data

Table 2. Umbilical Cord Care Method

Ubilical Cord Care Method	Frequency	Percent (%)
Open	30	50
Sealed	30	50
Total	60	100%

Source: 2025 Primary Data

Descriptive analysis shows that the mean time to umbilical cord separation in the open care group was 5.40 days (SD=0.814; min=4; max=7), whereas in the closed care group, it was 8.47 days (SD=1.074; min=7; max=11).

Table 3. Descriptive Statistics for Umbilical Cord Separation Time

Group	n	Mean	SD	Min	Max
Open	30	5,40	.814	4	7
Sealed	30	8,47	1,074	7	11

Source: 2025 Primary Data

The Shapiro–Wilk normality test results indicated that the data for both groups were not normally distributed ($p<0.05$); therefore, the analysis proceeded using the Mann–Whitney test. The test results showed values of U=6.000, Z=-6.654, and p=0.000 ($p<0.05$), indicating a significant difference between the open and closed care methods regarding the duration of umbilical cord separation.

Table 4. Mann-Whitney Test Results

Group	n	Mean Rank	Sum of Ranks
Open	30	15,70	471,00
Sealed	30	45,30	1359,00

Source: 2025 Primary Data

Table 5. Mann-Whitney Test Statistics

Statistik	Nilai
Mann-Whitney U	6,000
Z	-6,654
p-value	0,000

Source: 2025 Primary Data

The results of this study indicate that the open umbilical cord care method significantly accelerates cord separation compared with the closed method. The mean cord separation time was shorter in the open-care group than in the closed-care group, indicating that the method of umbilical cord care may influence the duration of cord separation. This finding provides evidence supporting the use of open cord care as an approach to facilitate the natural separation of the umbilical stump.

The difference in cord separation time between the open and closed care groups may be explained by the physiological process of tissue desiccation. In the open-care method, the umbilical stump is exposed to air, which facilitates moisture evaporation and promotes drying of the tissue. This process may accelerate tissue necrosis and subsequent natural separation of the umbilical stump. In contrast, covering the stump may retain moisture around the cord, potentially slowing the desiccation process. The high water content of Wharton's jelly may further explain the role of air exposure in facilitating the physiological drying process of the umbilical stump. From a microbiological perspective, a moist environment may also provide conditions that support bacterial growth and potentially affect the condition of the umbilical stump.

The findings are consistent with previous evidence supporting the use of dry umbilical cord care. Dry cord care emphasizes maintaining the umbilical stump clean and dry without unnecessary application of substances (World Health Organization, 2022). Previous studies have reported that open cord care may result in earlier cord separation than closed care, while other studies have demonstrated a similar trend despite the absence of statistically significant differences (Al-Shehri, 2019; Lestariningsih & Husain, 2022). In particular, Putri et al. (2023) reported that most newborns receiving open cord care experienced cord separation within five days or less. The consistency of these findings suggests that maintaining a dry environment around the umbilical stump may facilitate its natural separation (Putri et al, 2023).

The duration of umbilical cord separation may also be influenced by factors beyond the type of cord-care method. Previous studies have examined newborn characteristics and environmental conditions as potential factors associated with the timing of cord separation. Birth weight has been investigated in relation to the duration of umbilical cord separation, suggesting that newborn characteristics should be considered when interpreting variations in cord separation time (Nurfadilah & Dewi, 2021). In addition, other studies have examined multiple factors that may influence the duration of cord separation, including characteristics of the newborn and the care environment (Puspitasari & Dewi, 2022; Rahayu, 2021). Therefore, although the present study demonstrated a significant difference between open and closed cord

care, these findings should be interpreted with consideration of other maternal, newborn, and environmental factors that may potentially influence the physiological process of cord separation.

The clinical relevance of these findings extends beyond the duration of cord separation. Appropriate umbilical cord care is an important component of newborn care because inappropriate practices may contribute to bacterial colonization and umbilical infection (Kusuma et al., 2022; Susilo & Risdianawati, 2024). The use of traditional substances or unnecessary coverings may alter the local environment of the umbilical stump and potentially prolong the separation process (Nurdiana & Fauziah, 2023; Rosyada et al., 2021). Therefore, midwives and other healthcare professionals should provide evidence-based education to mothers and families regarding hand hygiene, maintaining the umbilical stump clean and dry, and avoiding the application of unrecommended substances (World Health Organization, 2022).

The findings also highlight the importance of strengthening maternal education regarding appropriate umbilical cord care**.** Evidence concerning open cord care has indicated its potential to facilitate earlier cord separation, supporting the importance of maintaining the umbilical stump clean and dry (Sari & Lestari, 2021). Proper cord care also requires mothers and families to understand how to monitor the stump and recognize potential signs of infection. Community-based education and counseling can therefore play an important role in improving mothers' knowledge and ability to perform appropriate newborn cord care (Yuanita, 2022). These considerations are consistent with the broader WHO recommendations for newborn care, which emphasize appropriate cord care and infection prevention as components of essential newborn care (World Health Organization, 2023)

These findings also have implications for midwifery practice, particularly in strengthening postpartum counseling. The preliminary findings described in this study indicated that covered cord care remained common among mothers, with an average separation time of 8–10 days, compared with 5–6 days among newborns receiving open care. This variation highlights the potential influence of maternal knowledge and customary practices on newborn umbilical cord care. Evidence-based counseling should therefore focus not only on demonstrating appropriate cord care techniques but also on addressing traditional practices and explaining the rationale for keeping the umbilical stump clean and dry (Rosyada et al., 2021; World Health Organization, 2022). Such counseling may improve maternal adherence to recommended care practices and promote safer newborn care.

Nevertheless, the findings of this study should be interpreted in light of several limitations. The quasi-experimental design, which lacks randomization, allows for the presence of confounding factors that could not be fully controlled, including variations in household environmental hygiene, maternal adherence to care practices, bathing practices, and ambient humidity. Furthermore, this study only observed the duration of umbilical cord separation and did not microbiologically evaluate the incidence of infection. Consequently, the study cannot provide a comprehensive assessment of the safety profile of each care method, particularly with regard to infection prevention. The limited sample size and single-service-area setting also restrict the generalizability of the findings to the broader population.

Nevertheless, this study contributes to the existing evidence regarding the effectiveness of open umbilical cord care in accelerating cord separation among newborns. The findings reinforce previous evidence supporting clean and dry cord care and may contribute to the development of evidence-based standard operating procedures for umbilical cord care in primary healthcare facilities. However, further studies involving larger samples, stronger study designs, and direct assessment of infection outcomes are needed to strengthen the evidence regarding the effectiveness and safety of different umbilical cord care methods.

4. CONCLUSION

Based on the study results, it can be concluded that the open umbilical cord care method significantly accelerates the time to cord separation in newborns compared to the closed method. These findings support the recommendation of "dry cord care" practices in midwifery services. It is recommended that healthcare professionals enhance education for mothers and families regarding the importance of keeping the umbilical cord clean and dry and avoiding the use of traditional substances. Future research could consider other factors—such as environmental hygiene and maternal adherence—to enrich the scientific evidence regarding umbilical cord care.

Limitations of this study include a quasi-experimental design without full randomization; consequently, extraneous variables such as bathing habits, the use of other antiseptic agents, and environmental hygiene were not fully controlled. Potential bias exists within the respondent groups due to maternal preferences regarding the choice of care method. Other variables—such as maternal knowledge, environmental hygiene, or access to health information—were not analyzed in depth.

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