

## ORIGINAL ARTICLE

**Comparison of Umbilical Cord Care: Chlorhexidine 4% Versus Dry Cord Care**

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**ABSTRACT**

**Objective:** To determine the efficacy of chlorhexidine 4 % versus dry cord in neonatal cord care to prevent infections and reducing healing time in a hospital setting.

**Study Design:** Randomized Controlled Trial.

**Place and Duration of Study:** At Department of Paediatrics Cantonment general hospital, Rawalpindi from 1 December 2016 to 30 November 2017.

**Materials and Methods:** Total 200 newborns were divided into two groups by randomization using lottery method; Group A comprising of 100 newborns were applied with chlorhexidine 4% on umbilical cord, once a day for a week and group B 100 newborns were advised conventional dry cord care. They were called for follow up visit after 1 week and later contacted telephonically till the separation of umbilical cord. Newborns with delayed healing or any signs of infection were called again for follow up examination. The day of separation of umbilical cord and signs of infection were recorded for each neonate.

**Results:** The mean duration of separation and healing of umbilical cord in group A (chlorhexidine 4%) and group B (dry cord care) was  $8.35 \pm 3.73$  and  $6.98 \pm 2.59$  days respectively. The difference in healing and duration of separation of umbilical cord in two groups was statistically significant ( $p=0.003$ ). Signs of infection observed in group A and group B were 5% and 4% respectively. Hence statistically insignificant ( $p=0.73$ ).

**Conclusion:** The umbilical cord care with 4% chlorhexidine or conventional dry method has similar results in terms of frequency of infection in a hospital setting. However healing time in terms of mean duration of separation of umbilical cord is prolonged with the application of 4% chlorhexidine to the cord stump.

**Key Words:** Chlorhexidine 4 %, Dry cord care, Newborn, Umbilical Cord Care.

**Introduction**

Among deaths noted in children younger than 5 years, neonatal deaths account for more than 40%.<sup>1</sup> In high mortality settings, about half of neonatal deaths are caused by infections involving sepsis, pneumonia, meningitis and tetanus neonatorum.<sup>2</sup> In Pakistan 30% of neonatal deaths are due to sepsis.<sup>3</sup> Such a high rate of mortality needs to be addressed by certain cost effective interventions like use of topical antiseptics that limit the growth of bacteria around the umbilical stump.<sup>4</sup>

One of the important causes of neonatal mortality is omphalitis.<sup>5</sup> Any delay in separation of umbilical cord increases the chances of infection as it is ideal for bacterial colonization.<sup>6</sup> Application of harmful

substances to umbilical cord like ash, oil, lead based compounds (surma) and rarely cow dung are being practiced in rural areas of Pakistan.<sup>3</sup> Even in urban areas like Karachi, 74 % mothers were applying various substances to the cord stump like mustard oil, coconut oil, butter and turmeric in a study conducted by Gul S et al.<sup>7</sup> Approaches that reduce chances of neonatal infections include hand washing, skin cleansing with antiseptics such as chlorhexidine, use of clean birth kits and early breastfeeding.<sup>3</sup> According to a new recommendation for umbilical cord care issued by WHO in January 2014, for newborns who are born at home in high mortality settings, chlorhexidine 4% should be applied to the cord stump daily for 1 week. For newborns who are born in hospital or at home in low neonatal mortality setting, clean dry cord care is recommended.<sup>8</sup> Dry cord care was the recommendation of WHO in 1998 but in 2016 researchers working on chlorhexidine found that mothers were fond of applying one or the other substance on the cord stump.<sup>9</sup> These traditional practices led to the development of WHO

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recommendation of using chlorhexidine gel instead of applying harmful substances to the cord stump.<sup>8</sup> Regarding safety profile of chlorhexidine, it is generally safe and is extensively used in medical settings since 1950. Only few side effects like contact sensitivity, dermatitis, urticaria and photosensitivity have been reported. Percutaneous absorption of chlorhexidine when used as a body wash or for cord care has no reported side effects. However this absorption is more likely to occur when used on premature and underweight neonates.<sup>10</sup> A high quality evidence suggests that chlorhexidine cord care in the community setting reduces 50% chances of omphalitis.<sup>11</sup> A meta-analysis revealing the efficacy of Chlorhexidine 4% in reducing the risk of omphalitis, concludes a reduction of 27 to 56% compared to dry cord care. However the protection is most fruitful in the 1st week of life.<sup>12</sup> WHO recommends dry cord care as a suitable method, though several studies support this recommendation. Still this method is controversial.<sup>6</sup> Two African trials conducted at Tanzania and Zambia failed to show superiority of Chlorhexidine over dry cord care.<sup>8</sup> There is much controversy over the umbilical cord separation time as some studies favor chlorhexidine while others show dry cord care to be more effective in reducing umbilical cord extraction time.<sup>13,14,15,16</sup> Other than one community based study, none of such study is found in a hospital setting in Pakistan. This study was planned to determine the effectiveness of chlorhexidine 4% in comparison to dry cord care in hospital setting. Also to compare the extraction time of umbilical cord in both groups and risk of possible omphalitis.

### Materials and Methods

This Randomized Controlled Trial was conducted at Department of Paediatrics Cantonment general hospital, Rawalpindi from 1 December 2016 to 30 November 2017 with Non-probability consecutive sampling technique. All babies delivered in cantonment general hospital were included in study. Any sick newborn that required admission to hospital was not included in the study. Informed written consent was taken from parents. Gestational age, gender, weight and mode of delivery were noted. All newborn were randomized based on lottery method into two groups. Group A comprising of 100 newborns were applied with chlorhexidine 4%

on umbilical cord, once a day for one week and group B 100 newborns were advised conventional dry cord care. They were called for follow up visit after 1 week and later contacted telephonically till the separation of umbilical cord. Newborns with delayed healing or any signs of infection were called again for follow up examination. The duration of separation of umbilical cord and signs of infection were recorded for each neonate. Enrolled subjects completed this study. Signs of infection were further categorized into mild (redness, swelling or pus restricted to the cord stump), moderate (redness, swelling or pus extending to the skin at the base of the cord stump less than 2 cm) and severe (inflammation extending more than 2 cm from the cord stump, with or without pus).<sup>3</sup>

Data were analyzed using SPSS version 23. Frequency and percentage were calculated for categorical variables like gender whereas mean and standard deviation were calculated for numerical variables. Categorical comparisons were made using the chi square test. Numerical comparisons like mean duration of separation of umbilical cord was made using independent samples t-test. A p value < 0.05 was considered statistically significant.

### Results

The study population included 106 (53%) male and 94 (47%) female babies. Group A included 27 (41.54%) male and 38(58.4%) female babies. Group B included 34 (52.3%) male and 31(47.7%) female newborns. Gestational age, weight and mode of delivery in both groups are shown in table I. More late preterm were enrolled in group A than group B i.e. 66.7% versus 33.3%. Low birth weight neonates were 66.7% in group B while 33.3% in group A. More neonates delivered by SVD i.e. 80.4% in group B while 61.8% by Caesarean section in group A. These differences had no statistically significant effect on frequency of infection and umbilical cord extraction time.

The mean duration of separation and healing of umbilical cord in group A and group B was  $8.35 \pm 3.73$  and  $6.98 \pm 2.59$  days respectively. The difference in healing and duration of separation of umbilical cord in two groups was statistically significant ( $p= 0.003$ ) as shown in Table II. Infection observed in group A and group B was 5% and 4% respectively. Hence statistically insignificant ( $p=0.73$ ) as shown in Table

III. Mild infections were seen in 4% babies in both groups. Moderate infection was found in only 1 baby in group A. None of the neonate developed severe infection in both groups.

**Table I: Gestational age, Weight and Mode of Delivery in Group A and B (n=200)**

Characteristics		Cord care	
		Chlorhexidine 4% n (%)	Dry cord care n (%)
Gestational age	Late preterm	6(66.7)	3(33.3)
	Term	94(49.2)	97(50.8)
Weight	<2.5kg	2(33.3)	4(66.7)
	>2.5kg	98(50.5)	96(49.5)
Mode of delivery	SVD	11(19.6)	45(80.4)
	Caesarean delivery	89(61.8)	55(38.2)

**Table II: Days of Separation of Umbilical Cord in Group A and Group B (n=200)**

Statistics	Cord care		P-Value
	Chlorhexidine 4%	Dry cord care	
Mean $\pm$ SD	8.35 $\pm$ 3.73	6.98 $\pm$ 2.59	0.003

**Table III: Frequency of Infection in Group A and Group B (n=200)**

Signs of infection		Cord care		P-Value
		Chlorhexidine 4% n (%)	Dry cord care n (%)	
Yes	Total	5(5%)	4(4%)	0.733
	Mild	4(4%)	4(4%)	
	Moderate	1(1%)	0	
	Severe	0	0	
No		95(95%)	96(96%)	

## Discussion

The present study shows that there was no significant difference between chlorhexidine 4% and dry cord care group regarding signs of infection in a hospital setting. However duration of separation of umbilical cord was prolonged by application of chlorhexidine to the cord stump. This did not have an effect on the frequency of infection in both groups. In a community based study conducted in a rural district of Pakistan, topical application of chlorhexidine 4% reduced the incidence of omphalitis by 42% in comparison with the dry cord care. This finding is contrary to our results as no difference was observed between the two groups. The mean cord separation time was 6.2 $\pm$ 1.3 days in

Chlorhexidine group and 5.9  $\pm$ 1.5 days in dry cord care group that is statistically insignificant but contrary to our results as it was prolonged in chlorhexidine group.<sup>3</sup> A community based study was conducted in Bangladesh to assess the effect of cord cleansing with Chlorhexidine 4% on neonatal mortality. It was found to be lower in neonates who received single application of 4% Chlorhexidine in comparison with dry cord care. There was no effect of application of chlorhexidine for a week to reduce neonatal mortality. However there was a significant difference of serious cord infection in this group versus dry cord care.<sup>1</sup> This finding is again contrary to our results. Moreover mortality risk was not assessed in our study. A Cochrane review published in July 2004 included 21 hospital studies. The conclusion of the review stated that topical application of various agents to the cord was not superior to dry cord care in terms of systemic infections as found in our study.<sup>17</sup> A study conducted in India compared the effectiveness of chlorhexidine with dry cord care and results showed the superiority of chlorhexidine over dry cord care. The mean time to cord separation was 8.92 $\pm$ 2.77 days (shorter) in former group and 10.31 $\pm$ 3.23 days in latter. This is in contrast to our findings as it was vice versa. However no difference was noted in terms of umbilical sepsis as in our study.<sup>18</sup> A meta-analysis published by Bhutta et al showed the effect of umbilical cord cleansing with chlorhexidine versus dry cord care on omphalitis and neonatal mortality in community settings in developing countries. Three trials were included that were done in Nepal, Pakistan and Bangladesh. In Pakistan trial there was no difference in the time of separation of cord. However, Nepal and Bangladesh trial showed longer separation time in chlorhexidine group (1.08 and 2.41 days respectively) compared to dry cord care group, consistent with our results.<sup>19</sup> Khairuzzaman et al in Bangladesh found that chlorhexidine reduces the risk of mild omphalitis with single application of chlorhexidine and moderate omphalitis both in single and multiple chlorhexidine cleansing group as compared to dry cord care group. None of the neonates developed severe infection in their study. This is in contrast to our study as both groups had similar frequency of mild infection and only 1% developed moderate infection in chlorhexidine

group. However severe category of infection was not found in both groups similar to the above study.<sup>20</sup> A study conducted in Gadaba and Konda Dora tribes for umbilical cord care practices showed that 96% of Gadaba and 95.3% of Konda Dora newborns were applied with oils or ash of vegetative origin and also different powders.<sup>19</sup> Our study also revealed the fact that despite of proper counselling regarding cord care, mothers used to apply different substances like oil, spirit, pyodine, onion and powder to the cord stump.

Current study supports the WHO recommendation of preference of dry cord care in low neonatal mortality settings. Dry cord care is simple, cheap and cost effective. Limitation of our study is that actual practice of hand washing cannot be monitored in both groups. Further studies are required to prove the efficacy of chlorhexidine 4 % in hospital settings.

### Conclusion

The umbilical cord care with 4% chlorhexidine or conventional dry method has similar results in terms of frequency of infection in a hospital setting. However healing time in terms of mean duration of separation of umbilical cord is prolonged with the application of 4% chlorhexidine to the cord stump.

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