

Comparative Study of Dry Cord Care Versus Application of 4% Chlorhexidine on Umbilical Cord in Newborns

Irfan^{1,*}, Farooq², Subhannaya K³

¹Assistant Professor, Dept. of Microbiology, ²Associate Professor, Dept. of Preventive and Social Medicine, Al-Ameen Medical College, Athani Road, Bijapur, Karnataka, ³Professor, Dept. of Microbiology, KVG Medical College, Sullia, Karnataka

***Corresponding Author**

E-mail: drirfanbijapur@gmail.com

Abstract

Introduction: In developing countries, umbilical cord infections constitute a major source of neonatal morbidity and pose significant risk for mortality.

Methods: Prospective analytical study was conducted at KVG Medical College and Hospital, Sullia with an objective to study the aerobic bacteriological profile of umbilical cord in newborn and their characterization and to compare two umbilical cord care regimens, that is, dry cord care, and 4% chlorhexidine for their impact on colonization and infection. 50 cases, each in category of dry cord care and 4% chlorhexidine application on umbilical cord were studied.

Results: The study showed that 4% chlorhexidine application to the umbilical cord though appeared to reduce colonization with *S.aureus*, fail to inhibit it completely.

Conclusion: Antimicrobial application may enhance colonization with more dangerous multidrug resistant staphylococci (MRSA and MR-CONS). 4% chlorhexidine appeared to be superior to dry cord care in preventing clinical manifestation in infants.

Keywords: 4% chlorhexidine, Dry cord care, Newborns, Infant mortality

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Introduction

The World Health Organization (WHO) estimates that approximately four million children die during the neonatal period each year, with most deaths occurring in developing countries.^{1,2} Infections are the most important cause of infant mortality, of which, umbilical cord infections are an important precursor^{2,3,4} Many studies have been carried out to compare different regimens and their effect on infection rates, colonization and length of cord separation.^{5,6,7,8} The overall results conclude that more the cord is treated, the longer it will take to separate.

Hence, an evidence-based approach to cord care is important to address the issue. By introducing easy-to-follow guidelines, it may be possible to reduce infection rates. Objective of the study was to study the aerobic bacteriological profile of umbilical cord in new born and their characterization and to compare two umbilical cord care regimens, that is, dry cord care, and 4% chlorhexidine for their impact on colonization and infection.

Material and Methods

Data was collected from Sullia Township which is situated at the foothills of Western Ghats, predominantly inhabited by rural people. KVG Medical College and Hospital(KVGMCH) is a tertiary care centre catering to the needs of people around Sullia Taluk covering about 1,50,000 population. New borns delivered at KVGMCH in Sullia during one and half-year period from November 2009 to May 2011 were enrolled for the study. Informed consent was taken from parents of new born who met inclusion criteria. All new borns born in the hospital during the study period were included, except those infants receiving antibiotics or infants developing any complications requiring hospitalization or infants subjected to umbilical catheterization.

As per the laid procedure, soon after delivery the cord was tied with sterile thread, clamped and cut with sterile instrument. Pre-warmed linen was used to clean new borns. No bathing of the new born was done and the clamp had been left in-situ until cord separated. New borns were cared by 24-hour rooming-in method. A total of 100 new borns were enrolled in the study group. They were segregated into two study groups using a simple randomization method in which during the time of birth, the new born were randomly allotted into different groups and cord care was given as per the groups under study. The groups were:

Group 1(n=50): Dry cord care.

Group 2(n=50): 4% chlorhexidine application.

Group 1: Dry cord care – With no topical application keeping the cord dry and exposed to air.

Group 2: Topical application of 4% chlorhexidine solution within 24-h of birth and daily once thereafter with a sterile gauze to the cut end and surface of the cord for the next three days.

Results

A total of 100 new born infants were enrolled in our study. There were 50 infants in each i.e., dry cord

care and 4% chlorhexidine group. The mean birth weight (g) was 2830 ± 394.87 and 2762 ± 488.8 respectively. In both groups, majority of the babies were of full term and normal vaginally delivered. Sex wise dry cord care group had equal number of male and female infants (25 each) and 28 male and 22 female new borns babies in chlorhexidine group.

Table 1: Baseline characteristics of the subjects

| Characteristics | Dry cord care, n=50 | Chlorhexidine, n=50 |
|------------------------------|---------------------|---------------------|
| Sex | | |
| 1. Male | 25 | 28 |
| 2. Female | 25 | 22 |
| Birth weight(g): Mean +/- SD | 2830.0 ± 394.87 | 2762.80 ± 488.8 |
| Gestational age | | |
| 1. Term | 46 | 42 |
| 2. Pre term | 4 | 7 |
| 3. Post term | Nil | 1 |
| Type of delivery | | |
| 1. Normal vaginal | 36 | 26 |
| 2. Caesarian section | 14 | 24 |

Table 2: Distribution of organisms in the umbilical swab cultures on day 4

| Organism Isolated on day 4 | Dry cord care, n=50 No.(%) | 4 % Chlorhexidine, n=50 No. (%) |
|--|-------------------------------|------------------------------------|
| No growth | 07(14) | 08(16) |
| Staphylococcus aureus | 26(52) | 13(26) |
| Cons (coagulase negative staphylococcus) | 14(28) | 16(32) |
| MRSA (methicillin resistant staphylococcus aureus) | 00(00) | 05(10) |
| Methicillin resistant cons | 01(02) | 05(10) |
| Gram positive bacilli | 00(00) | 02(04) |
| Gram negative bacilli | 01(02) | 00(00) |
| Mixed growth | 01(02) | 01(02) |

Table 3: Observation of the umbilical cord area

| Clinical Observation | Dry cord care, n=50 No (%) | 4% Chlorhexidine, n=50 No (%) |
|---------------------------|-------------------------------|----------------------------------|
| Redness | 06(12) | 01(02) |
| Swelling | 00(00) | 00(00) |
| Discharge | 00(00) | 00(00) |
| Fever | 03(06) | 00(00) |
| Omphalitis | 00(00) | 00(00) |
| Sepsis clinically treated | 03(06) | 00(00) |

Discussion

Current cord care recommendations are chiefly based on research in hospital nurseries of developed countries. Such recommendation cannot be wholly applied to developing countries, where most deliveries take place at home, unclean substances may be applied to cord stump, different bacteria may cause cord infections and resources are scarcer. In the view of development of resistance, use of topical antibiotics is

not recommended. In a 24-hour rooming-in system as the mother is the main care giver and if the clean cord is practiced, application of an antiseptic to the stump is not probably needed.³

Present study showed that *S. aureus* is the predominant colonizer of the umbilical cord. Higher colonization (51%) of umbilical cord was seen in dry cord care group than 4% chlorhexidine groups (25%). The study confirms the finding of earlier western

studies^{8,9} that use of dry cord care alone will lead to an unacceptably high colonization risk with *S. aureus*. The relationship between cord colonization is well established and often the infection occurs after the infant has been discharged.¹⁰

Earlier studies have demonstrated that 4% chlorhexidine is quite effective in reducing *S. aureus* colonization of the umbilical cord.^{8,11,12} One of the important observations of the study was the higher colonization of MRSA (10%) and MR-CONS (10%) in 4% chlorhexidine group where as in dry cord care colonization, MRSA was absent and MR-CONS was only 2%. This may imply that methicillin resistant staphylococci were resistant to 4% chlorhexidine. The colonization with these organisms may be further enhanced by reduced competition by resident normal flora due to application of antimicrobials. It was reported that prophylactic application of antimicrobial agents to cord stump though controlled staphylococcal pyoderma and omphalitis, prevention of colonization by one microorganism resulted in colonization by others of equal or greater pathogenicity.³

Although 1% chlorhexidine was reported to promote colonization with *S. epidermidis*,¹³ no over growth of CONS was observed with 4% chlorhexidine.¹⁴

In the 4% chlorhexidine group, infants appeared healthier with only 2% of the group showed some redness in the umbilical area. These finding implies that 4% chlorhexidine application to umbilical cord is superior in preventing clinical manifestations in infants. A 4% detergent-water chlorhexidine solution (Hibiscrub) was shown to be effective in controlling staphylococcal and streptococcal infections of the skin and cord. It is opined that it causes significant delay in cord separation time; its application to the cord may be limited to the first few days in the hospital.^{10,11,14}

WHO recommends that hospital and community based studies are needed in developing countries to compare the risk of cord infection and neonatal tetanus when cord is kept clean, dry and nothing applied to it with the risk when an antimicrobial or a dusting powder is applied. Reports of such studies are scanty from developing countries in general and hardly any from India. Present study was an attempt to compare umbilical cord care regimens to provide data in developing country.

Conclusion

The study showed that 4% chlorhexidine application to the umbilical cord though appeared to reduce colonization with *S. aureus*, fail to inhibit it completely. Antimicrobial application may enhance

colonization with more dangerous multidrug resistant staphylococci (MRSA and MR-CONS). 4% chlorhexidine appeared to be superior to dry cord care in preventing clinical manifestation in infants.

Conflicts of Interest: None

Source of Support: Nil

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