

## Effect Of Topical Application Of Chlorhexidine On Umbilical Cord Of Newborn Babies Of Mothers Admitted In Postnatal Wards.

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### Abstract:

A study to assess the effect of topical application of chlorhexidine on umbilical cord of newborn babies of mothers admitted in postnatal wards from selected hospitals of Sangli, Miraj Kupwad corporation area. The study objectives to assess the difference between pre test and post test scores of umbilical cord stump in control group and to assess the difference between pre test and post test scores of umbilical cord stump in experimental group, to compare the difference between pretest and post test scores of umbilical cord stump between control and experimental group. Hypothesis for the study are H<sub>0</sub>- There is no effect of chlorhexidine application on umbilical cord stump, H<sub>1</sub>- There is effect of chlorhexidine application on umbilical cord stump. Quantitative research approach with two group pre test post test was used for this study. The conceptual framework used in this study was general system theory by Ludwig Von Bertalanffy. 30 samples were selected for the study by non-probability purposive sampling technique (15 experimental group and 15 control group). Experimental group had application of chlorhexidine for 7 days. Whereas in control group the cord was kept dry and routine care was given. Data was collected using demographic data and observation checklist. The data was analysed using descriptive and inferential statistics. The study result was, in experimental group after application of chlorhexidine to the umbilical cord it was seen that in post observation the cord had mild redness in control group and in experimental group there was no redness as the p value is 0.03, and for the characteristic of discharge from umbilical cord in control group there was watery discharge and in experimental group there is no discharge observed and the p value is 0.013. and there was no swelling in control group as well as in experimental group there was no swelling, (p value is 0.03 therefore p < 0.05) the colour of cord in control group was brown which shows that it is in the process of dryness where and in experimental group the colour of cord was black which shows that it is completely dry. Hence it was revealed that there was significant difference between control and experimental group. The application of chlorhexidine on umbilical cord stump shows early healing and drying as compared to control group. The study concluded as it was

observed that after application of chlorhexidine on umbilical cord stump there was early healing and drying of umbilical cord as compared to control group

**Keywords:** Assess, Effect, Topical application

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### **Introduction:**

The umbilical cord is made up of blood vessels and connective tissue that connects the infant to the placenta in the uterus. A membrane that is usually bathed in amniotic fluid covers it. The umbilical cord provides nutrients and oxygen to the baby during pregnancy, but it is no longer required after that, so it is clamped and snipped. The wound heals as the cord stump dries and falls off. During pregnancy, the placenta contains all material for foetal development and removes waste products<sup>1</sup>.

After the delivery the umbilical cord serves no purpose. The necrotic tissue of the umbilical cord is a potential site for infection immediately after birth. Bacterial colonization from cord stump infection is the factor that increases morbidity and mortality of infants in developing countries.

As per world health organisation, infection causes neonatal deaths all over the world ,over75% of these some tend to occur in as soon as the baby is born or in the initial week , with the umbilical cord acting as the entry point. The umbilical cord is a popular place for bacteria to colonise. Cord stump infection, which may significantly increase morbidity and mortality, is a potential result of bacterial colonisation. The skin and umbilical cord of the newborn begin to colonise with bacteria such as saprophytic bacteria supplied through the mother by skin touch. The colonization of umbilical cord is through the micro-organisms from birth attendant's vagina, skin, and hands. Septicaemia, which can result in neonatal morbidity and mortality, can be caused by bacteria tracking along the umbilical vessels. The onset of omphalitis begins on the third and fourth day of life<sup>2</sup>.

These organisations often suggest that soap, water, and drying materials are required for umbilical cord care, the application of antiseptic solutions can lead to slow separation of umbilical cord to and has few benefits. In some countries with low mortality, the child may get few infections in the first week of life, maternal wellbeing, and time taken for the cord to split should all be considered significant outcomes<sup>3</sup>.

Neonatal sepsis is the third leading cause of death in babies in their first month of life. bacteria may enter the body via the freshly cut umbilical cord, causing neonatal sepsis and may lead to death. Optimal umbilical cord care practises for newborn babies and their first few days of life, particularly in areas with poor hygiene, have the ability to prevent these unnecessary newborn

deaths. Neonatal sepsis is the third leading cause of death in babies in their first month of life, accounting for more than 15% of all neonatal deaths worldwide.<sup>4</sup>

Few studies from developed countries have found that applying a topical antimicrobial to the cord stump reduces harmful bacteria colonisation in hospital nurseries when compared to no treatments. The impact of topical antimicrobials on infection control is less certain.<sup>6</sup>

Chlorhexidine is the most studied antiseptic in newborn infants among the other antiseptics available. Following the application of chlorhexidine, several studies have shown a substantial reduction in the rates of bacterial colonisation of the umbilical cord.<sup>7</sup>

The umbilical cord is a one-of-a-kind tissue that consists of two arteries and one vein that are covered by Wharton's jelly, a mucoid connective tissue, and a thin mucous membrane. The foetus receives nutrients and oxygen from the blood flowing through the cord, while carbon dioxide and metabolic wastes are carried away. The umbilical vessels become constricted but not obliterated when the cord stops pulsing. Therefore the cord should be clamped tightly so that it prevents bleeding and keeps the umbilical vessels occluded, and it must be trimmed with a sterile instrument to avoid infection. After cutting the cord, the stump quickly dries out, turning black and stiff<sup>8</sup>.

Similarly, the cord stump's devitalized tissue can be a site for bacterial growth, sometimes various substances can be applied when the cord is kept moist and unclean. For a few days after birth, the umbilical vessels are still patent, allowing direct access to the bloodstream in the newborn baby, the umbilical stump is a common entry point for infection. It is therefore essential to keep the baby clean and dry in order to avoid infection<sup>9</sup>.

After birth, the umbilical cord is crucial. It's a crucial location for bacterial colonisation. According to the World Health Organization, 3,000,000 children die each year from tetanus, and another 4,60,000 die from serious bacterial infections, of which umbilical cord infections are a common precursor. In developed nations, where procedures are untrained and unclean, there is a continuous need for affordability. Neonatal sepsis is a risk factor for umbilical cord colonisation. The umbilical cord is the first site for umbilical colonisation that, is 48-72 hours after birth. The umbilical cord sepsis can cause bacterial infection and may

Routine cord care includes washing the stump with alcohol on a daily basis and applying a dusting powder or an antimicrobial solution. Zinc oxide, talc, starch, or alum, among other ingredients, are currently used in powders in varying proportions. Hexachlorophane or chlorhexidine are also found in certain powders. The most prevalent antimicrobial compounds are triple dye, iodine tincture,

iodophors, antibiotic ointments, silver sulphadiazine, and chlorhexidine. In some cases, the umbilical cord stump is only handled once during birth, in others it is treated everyday where as in some whenever the diaper is changed, this is followed until there is healing of umbilical cord<sup>13</sup>.

Several researchers suggest that using chlorhexidine decreased the risk of sepsis and umbilical cord infections by 77 % when compared to dry cord care. This result is supported with other studies that have found that using chlorhexidine on the umbilical cord inhibits cord infection and sepsis<sup>14</sup>.

It is recommended that using chlorhexidine for newborn umbilical cord in developed countries would prevent infection, based on evidence of low to moderate quality. The world health organization also recommended that 4% of chlorhexidine is useful for daily cord care. Accordingly it can be proposed that chlorhexidine cord application should be integral part of essential newborn cord care<sup>15</sup>.

#### **Materials and Methods:**

A quantitative research approach was adopted for the present study with quasi experimental two group pre testpost test design. The independent variables was chlorhexidine and dependent variable was status of umbilical cord. Where as research variables are birth weight, age, parity, term and day of cord separation.

The present study setting was selected as per needs and criteria. The settings were the maternity hospitals from Sangli, Miraj and Kupwad corporation area. Population consisted of newborn babies who were delivered through LSCS. The samples were newborn babies from maternity units of selected hospitals from Sangli, Miraj and Kupwad corporation area.

Inclusion criteria was newborn who stays for minimal 8 days in units and newborn babies with birth weight of >2000grams whereas the exclusion criteria was newborn babies requiring umbilical catheterization and newborn babies with any anomaly involving umbilical cord. Minimum sample size is calculated by using power analysis statistical formula. Sample size was 30 in which 15 experimental and 15 control. The sampling method used was purposive sampling method

The data collection tool included development of tool, description of the tool and scoring system. Selection and development of the tool was done based on the study i.e. to assess the effect of application of chlorhexidine on umbilical cord.

After an extensive review and study of literature, books and journals were done before developing the tool as well as discussion with guide is done and experts opinion also taken and the tool was developed under the guidance of the guide to collect the data.

The tool contains two sections, section 1: demographic data and section 2: observation checklist. In section 1 the demographic data contained birthweight, gestation age, parity, term and day of cord separation.

To ensure the content validity of the tool was submitted to experts along with demographic data, observational checklist. With suggested corrections needed changes were done with guide discussion and final tool was prepared.

Institutional ethical committee, meeting was held in Bharati Vidyapeeth Deemed to be University College of Nursing, Sangli and the research proposal was approved. Permission was obtained from private hospital of Sangli and Miraj to conduct pilot study and the main study. Informed written consent was obtained from the mothers prior to conducting the study.

Official permission was taken from concerned authorities. The investigator discussed the study with gynaecologist from particular hospitals. Informed consent was taken from postnatal mothers. 30 samples were selected for the study as per the criteria 15 samples were selected for experimental and 15 were for control group. The data was collected and recorded for 6 days in experimental group and in control group until the cord falls off.

A prior permission was taken from the concerned authorities of the hospitals. Informed written consent was obtained from mothers of newborn babies included in studies by explaining the purpose and objectives of study

Observation of umbilical cord was done on the day when baby was included in the study. In experimental group 1 ml of 4% chlorhexidine was applied soon after the first observation and procedure was continued for 7 days. Every day observation of the cord was done for one time before application of chlorhexidine. In control group routine hospital care was continued for 7 days.

Based on the objectives of the study, frequency, percentage, mean, sd were calculated to pre and post test score. Unpaired t-test is calculated to get pre test and post test score.

### **Results and Discussion**

Based on the objectives of the study, frequency, percentage, mean, sd were calculated to pre and post test score. Unpaired t-test is calculated to get pre test and post test score.

Frequency and percentage distribution is done for demographic variables. Effectiveness of chlorhexidine was observed by comparing the mean of pre test and post test score of characteristics like redness, discharge, swelling and colour of cord between control and experimental group. The mean of all characteristics was greater in post test and p value was less

than 0.005 which characteristics showed there is significant difference between control and experimental group and p value is less than 0.005 which showed application of chlorhexidine on umbilical cord stump is effective for early separation of cord.

**Table no 1: Frequency and percentage distribution of demographic variables**

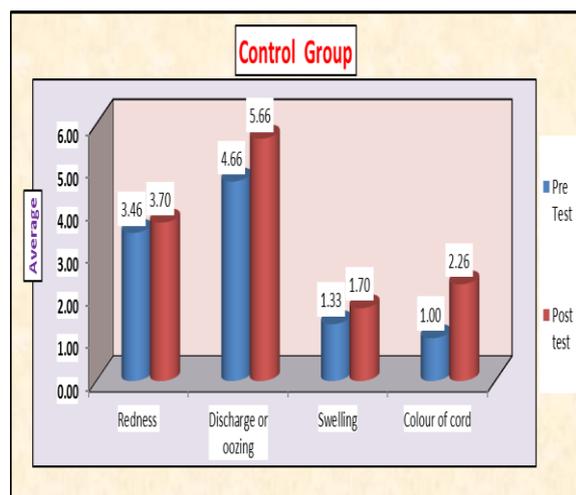
n = 30

Sr. no.	Variable	Groups	Control		Experimental	
			Freq.	%	Freq.	%
1	Birth weight(kg)	2-2.5	6	40	6	40
		2.5-3	6	40	8	53.33
		3-3.5	3	20	1	6.67
2	Gestational age (weeks)	35-37	7	46.67	6	40
		38-40	8	53.33	9	60
3	Term	Full term	11	73.33	9	60
		Pre term	4	26.67	6	40

Table no 1 show that, in the experimental group maximum 53% of babies have birth weight between 2.5-3 kg and in control group maximum 40% babies have birth weight between 2-3 kg and 60% mothers belong to 38 to 40 weeks of gestational age in experimental group. where as in control group 53% mothers belong to 38 to 40 weeks of gestational age .73% of babies are full term in control group and 60% in experimental group.

**Table no 2: Difference between pretest and posttest scores for status of umbilical cord in control group.** n=30

Sr. no.	Characteristics	Pre test score		Post test score		t value	p value
		Mean	Sd	mean	Sd		
1	Redness	3.46	0.74	3.7	0.5	2.82	0.01
2	Discharge	4.66	1.44	5.66	0.48	3.62	0
3	Swelling	1.33	0.48	1.7	0.5	5.29	0
4	Colour of cord	1	0	2.26	0.5	10.72	0



**Fig no.1 Difference between pretest and posttest scores for status of umbilical cord in control group**

Tableno 2: shows that for redness the pre test mean is 3.46 and sd is 0.74 and the post test mean is 3.70 and sd is 0.50 and the t value is 2.82, p value is 0.01 which is less than  $p < 0.05$  which states that there is significant difference between pre test and post test in control group.

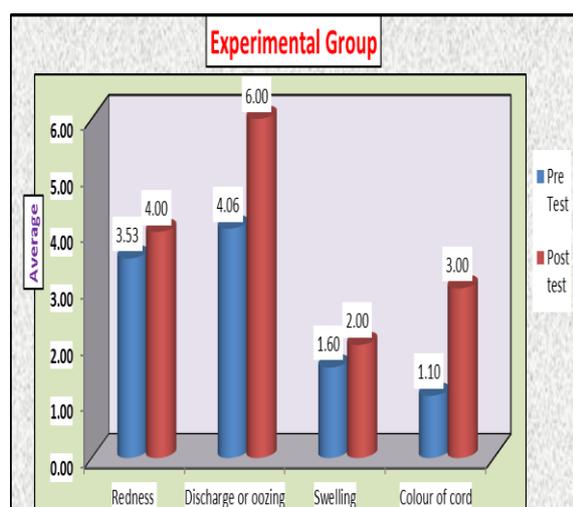
For assessment of discharge the pre test mean is 4.66 and s.d is 1.44 and in the post test the mean is 5.66 and sd is 0.48 hence the t value is 3.62 and p value is 0.00, which is less than  $p < 0.05$  which states that there is significant difference between pre test and post test in control group.

For swelling the pre test mean is 1.33 and s.d is 0.48 and in post test the mean is 1.70 and sd 0.50 hence t value is 5.29 and 0.00 which is less than  $p < 0.05$  which states that there is significant difference between pre test and post test in control group.

In colour of cord in pre test the mean is 1.00 and sd is 0.00 and in post test mean is 2.26 and sd is 0.50 and t value is 10.72 and p value is 0.00 which is less than  $p < 0.05$  which states that there is significant difference between pre test and post test in control group.

**Table no 3: Difference between pretest and posttest score for status of umbilical cord in experimental group. n=30**

Sr. no.	Characteristics	Pre test score		Post test		T value	p value
		mean	sd	mean	sd		
1	Redness	3.53	0.64	4	0	2.82	0.01
2	Discharge	4.06	1.22	6	0	6.12	0
3	Swelling	1.6	0.5	2	0	3.06	0.01
4	Colour of cord	1.1	0.3	3	0	29	0



**Fig no 2: Difference between pretest and posttest score for status of umbilical cord in experimental group**

Table no.3 shows that for redness the pre test mean is 3.53 and sd is 0.64 and in post test mean is 4.00 and sd is 0.00 and the t value is 2.82 and p value is 0.01 which is less than  $p < 0.05$  which states that there is significant difference between pre test and post in experimental group.

For discharge the pre test mean is 4.06 and s.d is 1.22 and in the post test the mean is 6.00 with sd is 0.00, t value is 6.12 and p value is 0.00 which is less than  $p < 0.05$  which states that there is significant difference between pre test and post in experimental group

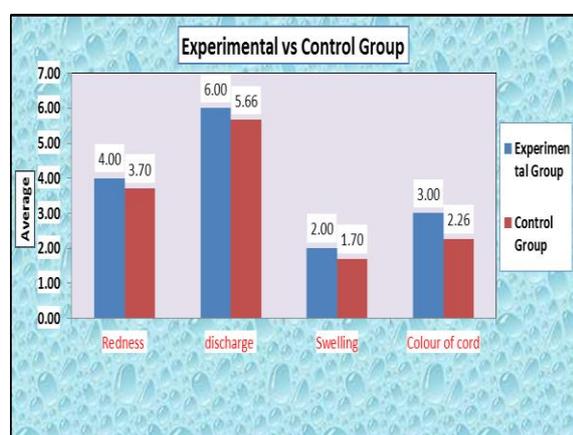
For swelling the pre test mean is 1.60 and s.d is 0.50 and in post test the mean is 2.0, sd 0.00 and t value is 3.06 and p value is 0.01 which is less than  $p < 0.05$  which states that there is significant difference between pre test and post in experimental group

In colour of cord in pre test the mean is 1.10 and sd is 0.30 and in post test mean is 3.00 with sd is 0.00, t value is 29.00 and p value is 0.00 which is less than  $p < 0.05$  which states that there is significant difference between pre test and post in experimental group.

**Table no 4: Comparison between experimental and control group for status of umbilical cord.**

n=30

Sr. no.	Characteristics	Control group		Experimental group		t value	p value
		mean	sd	mean	sd		
1	Redness	3.7	0.5	4	0	2.25	0.03
2	Discharge	5.66	0.48	6	0	2.64	0.013
3	Swelling	1.7	0.5	2	0	2.25	0.03
5	Colour of cord	2.26	0.5	3	0	6.2	0.001



**Fig no 3: Comparison between control and experimental group**

Table no 4.shows comparison between control and experimental group.

For post test in control group there was mild redness as the mean is 3.70 and sd is 0.50 and in experimental group there was no redness as the mean is 4.00 and s.d is 0.00 and the t value is 2.25 and p value is 0.03 which is less than 0.05 which shows that there is significant difference between control and experimental group.

For post test in control group there was watery discharge as the mean is 5.66 and sd is 0.48 and in experimental group there is no discharge as the mean is 6.00 and s.d is 0.00 and the t value is 2.64 and p value is 0.013 which is less than 0.05 which shows that there is significant difference between control and experimental group.

For post test in control group there was swelling, as the mean is 1.70 and s.d is 0.50 and in experimental group there was no swelling, mean is 2.00 and s.d is 0.00 and the t value is 2.25 and

p value is 0.03 which is less than 0.05 hence it shows that there is significant difference between control and experimental group.

For post test in control group the colour of cord was brown, as the mean is 2.26 and s.d is 0.50 and in experimental group the colour of cord was black as the mean is 3.00 and s.d is 0.00 hence the t value is 6.20 and p value is 0.01 which is less than 0.05. In experimental group for post test the colour of umbilical cord turns to black which means the cord is drying. Therefore it shows that there is significant difference between control and experimental group.

apart from above observations, the another observation was also done for the day of cord separation and in control group was on 8<sup>th</sup> day, 9<sup>th</sup> day, whereas in experimental group it was on 7<sup>th</sup> day.

### **Conclusion**

The study findings showed that application of chlorhexidine was effective in early drying and separation of cord as chlorhexidine is antiseptic solution which helps in prevention of infection. Chlorhexidine also helps in early drying of cord. Mothers also verbalized that they were happy as the cord dried early and there was no signs of infection and no any side effects also the cord separated early with chlorhexidine as compared to dry cord care.

### **Acknowledgement**

The researcher acknowledges the institutional authorities of BVCON and the study participants for the co-operation and all the stakeholders involve in completion of the research study.

### **Conflict of Interest**

No conflict of interest involved.

### **Funding Source**

The study was self-funded by researchers.

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