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EFFECTIVENESS OF TOPICAL APPLICATION OF BREAST MILK AND POVIDONE IODINE ON UMBILICAL CORD HEALING AMONG THE NEWBORNS

Betcy K. Jayims[1*] and Bhasura Chandrachood[2]

[1]Msc Nursing Student, Dept. of Child Health Nursing, Bishop Benziger college of Nursing, Kollam.
[2]Professor, Dept. of Child Health Nursing, Bishop Benziger College of Nursing, Kollam.

***Corresponding Author: Betcy K. Jayims**
Msc Nursing Student, Dept. of Child Health Nursing, Bishop Benziger college of Nursing, Kollam.

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ABSTRACT
A comparative study to assess the effectiveness of topical application of breast milk and povidone iodine on umbilical cord healing among newborns in selected hospitals at kollam. The objectives of the study were to assess the effectiveness of topical application of breast milk on umbilical cord healing among the newborns (group 1), to assess the effectiveness of topical application of povidone iodine on umbilical cord healing among the newborns (group 2) and to compare the effectiveness of topical application of breast milk in group 1 and povidone iodine in group 2 on umbilical cord healing among the newborns. A quasi experimental time series design was used and consisted of 80 newborns born by Caesarean section were randomly assigned to Group 1 and Group 2. The tools used were demographic proforma and an observational checklist for assessing umbilical cord healing process. The intervention was provided to both groups thrice a day for seven days including cord swab culture on day 3 and at cord separation. Healing process was assessed on day 3, 5 and 7.The data collected was analyzed with descriptive statistics and inferential statistics. On comparing the signs of infection on Group 1 and Group 2, it showed that abnormal findings in Group 2 were comparatively higher than Group 1. On comparing the overall healing process between groups on day 3, day 5 and day 7, calculated 'z' value was greater than table value. It concludes that there is a significant difference in healing process among the newborns with topical application of breast milk in comparison to povidone iodine. The findings of study suggest that topical application of breast milk helps in early detachment of cord, less infection and better cord healing in comparison to povidone iodine.

KEYWORDS: Newborn; umbilical cord; topical application of breast milk and povidone iodine; healing.

INTRODUCTION
"The motherhood is a blessing from the Almighty God. It is the right of every woman to become a mother. The birth of the baby brings happiness and joy towards the family. It is the duty of the care givers to protect the child from various diseases and provide a healthy living environment to maintain a good health."

Each year approximately one million newborns worldwide die from infection caused by bacteria that enter the body through the umbilical cord. The WHO estimate that 4 million children die during the neonatal period each year, with most deaths occurring in the developing countries. Infections are the most important cause of neonatal mortality. WHO estimated that 3, 00000 infants die annually from tetanus and further 4, 60000 die due to severe bacterial infection of which umbilical cord infection are an important precursor.[1]

Globally, ten million infants and children die each year before their fifth birthday, 99% of these deaths occur in developing countries.[2]

Infant mortality rates ranged from 4.40 per 1,000 live births for Asian or Pacific Islander mothers to 12.40 for non-Hispanic black mothers. Infant mortality was higher for male infants and infants born preterm or at low birth weight.[3]

According to the UNICEF, India's infant mortality rate shown a minor decline in 2012 compared to 2011. Infant Mortality rate decreased from 44 deaths for every 1000 live births in 2011 to 42 deaths for every 1000 live in 2012.[4]

The registered infant mortality rates of Kerala were seven deaths for every 1,000 births in comparison with the national average of 34 during last year.[4]

The four leading causes of infant death— cord infections, congenital malformations, low birth weight, and sudden infant death syndrome—accounted for 46% of all infant deaths.[3]

The World Health Organization recommends improving newborn care practices at birth in order to reduce morbidity and mortality. It is referred to as essential newborn care, in which clean cord care is one of the important factor in preventing early neonatal infection.[5]

Research references show breast milk application as a better effective method in cord care. So, the investigator thought of conducting a comparative study to assess the effect of breast milk over povidone iodine application on umbilical cord healing among the newborns. The study findings could be of help in bringing out evidences based practice in present study set up.

OBJECTIVES

1. To assess the effectiveness of topical application of breast milk on umbilical cord healing among the newborns (group 1).
2. To assess the effectiveness of topical application of povidone iodine on umbilical cord healing among the newborns (group 2).
3. To compare the effectiveness of topical application of breast milk in group1 and povidone iodine in group 2 on umbilical cord healing among the newborns.

Hypotheses

The following research hypotheses and sub hypotheses were formulated. Hypotheses will be tested at 0.05 level of significance.

H_1: There will be a significant difference in the healing process based on the pre assessment and post assessment scores of umbilical cord healing among group 1 newborns on topical application of breast milk.

H_{1a}: There will be a significant difference in the healing process based on the pre assessment and post assessment scores of umbilical cord healing among group 1 newborns on topical application of breast milk, in terms of colour of cord.

H_{1b}: There will be a significant difference in the healing process based on the pre assessment and post assessment scores of umbilical cord healing among group 1 newborns on topical application of breast milk, in terms of texture of cord.

H_{1c}: There will be a significant difference in the healing process based on the pre assessment and post assessment scores of umbilical cord healing among group 1 newborns on topical application of breast milk, in terms of umbilical cord infection.

H_{1d}: There will be a significant difference in the healing process based on the pre assessment and post assessment scores of umbilical cord healing among group 1 newborns on topical application of breast milk, in terms of drying process of cord.

H_2: There will be a significant difference in the healing process based on the pre assessment scores and post assessment of umbilical cord healing among group 2 newborns on topical application of povidone iodine.

H_{2a}: There will be a significant difference in the healing process based on the pre assessment and post assessment scores of umbilical cord healing among group 2 newborns on topical application of povidone iodine, in terms of colour of cord.

H_{2b}: There will be a significant difference in the healing process based on the pre assessment and post assessment scores of umbilical cord healing among group 2 newborns on topical application of povidone iodine, in terms of texture of cord.

H_{2c}: There will be a significant difference in the healing process based on the pre assessment and post assessment scores of umbilical cord healing among group 2 newborns on topical application of povidone iodine, in terms of umbilical cord infection.

H_{2d}: There will be a significant difference in the healing process based on the pre assessment and post assessment scores of umbilical cord healing among group 2 newborns on topical application of breast milk, in terms of drying process of cord.

H_3: There will be a significant difference in healing process among the newborns with topical application of breast milk in comparison to povidone iodine.

H_{3a}: There will be a significant difference in healing process among the newborns with topical application of breast milk in comparison to povidone iodine, in terms of colour of cord.

H_{3b}: There will be a significant difference in healing process among the newborns with topical application of breast milk in comparison to povidone iodine, in terms of texture of cord.

H_{3c}: There will be a significant difference in healing process among the newborns with topical application of breast milk in comparison to povidone iodine, in terms of umbilical cord infection.

H_{3d}: There will be a significant difference in healing process among the newborns with topical application of breast milk in comparison to povidone iodine, in terms of drying process of cord.

MATERIAL AND METHODS

Research approach

Quantitative research approach was used for the study.

Research design: Quasi experimental time series design.

Setting of the study

The study conducted in Bishop Benziger Hospital Kollam.

Population

In the present study, the population was healthy term newborns born by caesarean section.

Variables

Independent variable: In this study, it is the application of the breast milk and povidone iodine on the umbilical cord.

Dependent variable: In this study, it refers to healing of the umbilical cord among newborns.

Sample and sampling technique

In the present study, the samples are healthy term newborns born by caesarean section of Bishop Benziger Hospital, Kollam. The sampling technique is purposive sampling technique.

Sample size: The sample size is 80, Group 1-40, Group 2-40.

Sampling criteria

Inclusion criteria

- Healthy term babies born by caesarean section.
- Newborns of mothers who were willing to participate in study.

Exclusion Criteria

- Newborns with congenital problems.
- Newborns delivered by normal vaginal delivery.
- Newborns who are sick and requires minimum handling.

Tool / Instruments

A tool used for the data collection is a vehicle that could best obtain the data pertinent to the study and at the same time adds to the body of knowledge in the discipline.[36]

Part 1: Demographic Proforma - it includes gender, date of birth, vital signs, anthropometric measurements, time of cord clamping, apgar score, gestational age, antenatal and intranatal condition of mother and foetus and condition of cord at birth.

Part 2: Observational check list on umbilical cord healing including normal features of cord (colour, texture),parameters to assess umbilical cord infection (redness, swelling, discharge, foul smell, skin tenderness around cord, infant fussiness, lethargy, fever), bacterial culture, drying process of cord, detachment of cord.

Technique/Intervention

Umbilical cord care as an intervention, Breast milk application in Group 1 and povidone iodine application in Group 2.

Data collection process

The data will be collected after obtaining prior administrative permission and informed consent from parents. The tools for data collection procedure are demographic proforma including gender, date of birth, vital signs, anthropometric measurements, time of cord clamping, apgar score, gestational age, antenatal and intranatal condition of mother and foetus and condition of cord at birth. The umbilical cord checklist including normal features of cord (colour, texture),parameters to assess umbilical cord infection (redness, swelling, discharge, foul smell, skin tenderness around cord, infant fussiness, lethargy, fever), bacterial culture, drying process of cord, detachment of cord.

The newborn was kept for 24 hours observation in NICU and then the babies were shifted to postnatal ward. First day, observation of cord status will be done in NICU. The babies will be selected alternatively to group1 and group2 from postnatal wards.

Next day onwards breast milk was applied on the umbilical cord thrice a day to group one and povidone iodine was applied on the umbilical cord thrice a day to group two for seven days. The post interventional assessment carried out on 3rd day, 5th day, and 7th day for both the groups.

Umbilical cord swab culture

The swab was collected 2 times from each sample of newborns to detect bacterial growth among the two groups. The first swab was collected on 3rd day and second swab at the time of cord separation. The swab will be sent for culture and is incubated for 48 hours in the laboratory and conclusions were made on the basis of result graded as: sterile, scanty, moderate and heavy.

Plan for data analysis

The researcher will analyze the data by using descriptive and inferential statistics based on the objectives and hypotheses of the study. To compute the data, a master data sheet was prepared by the investigator.

Sections were analyzed under following headings

Section A

Description of sample characteristics.

Section B

Evaluation of effectiveness of topical application of breast milk on umbilical cord healing in Group 1.

a) Overall item wise analysis and distribution of sample in Group 1 in terms of umbilical cord status on day 1, day 3, day 5 and day7.
b) Evaluation of effectiveness of topical application of breast milk on umbilical cord healing in terms of colour of cord.
c) Evaluation of effectiveness of topical application of breast milk on umbilical cord healing in terms of texture of cord.
d) Evaluation of effectiveness of topical application of breast milk on umbilical cord healing in terms of umbilical cord infection.
e) Evaluation of effectiveness of topical application of breast milk on umbilical cord healing in terms of drying process of cord.

Section C

Evaluation of effectiveness of topical application of povidone iodine on umbilical cord healing in Group 2.

a) Overall item wise analysis and distribution of sample in Group 2 in terms of umbilical cord status on day 1, day 3, day 5 and day7.
b) Evaluation of effectiveness of topical application of povidone iodine on umbilical cord healing in terms of colour of cord.

c) Evaluation of effectiveness of topical application of povidone iodine on umbilical cord healing in terms of texture of cord.
d) Evaluation of effectiveness of topical application of povidone iodine on umbilical cord healing in terms of umbilical cord infection.
e) Evaluation of effectiveness of topical application of povidone iodine on umbilical cord healing in terms of drying process of cord.

Section D

Compare the effectiveness of topical application of breast milk (Group 1) and povidone iodine (Group 2) on umbilical cord healing.

a) Comparison of umbilical cord colour among newborns with topical application of breast milk (Group 1) and povidone iodine (Group 2).
b) Comparison of umbilical cord texture among newborns with topical application of breast milk (Group 1) and povidone iodine (Group 2).
c) Comparison of umbilical cord infection status among newborns with topical application of breast milk (Group 1) and povidone iodine (Group 2).
d) Comparison of umbilical cord drying among newborns with topical application of breast milk (Group 1) and povidone iodine (Group 2).
e) Comparison of umbilical cord separation time among newborns with topical application of breast milk (Group 1) and povidone iodine (Group 2).

RESULTS AND DISCUSSION

Description of sample characteristics

This section describes the characteristics of newborns in terms of gender, anthropometric measurements and Apgar score. This data is presented in following figures 1-6.

(N=80)

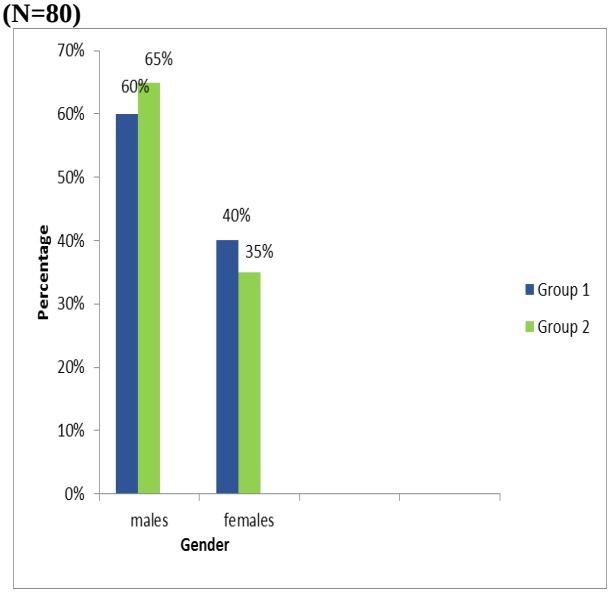

Figure 1: Percentage wise distribution of newborns according to gender.

The data presented in figure 1shows the percentage wise distribution of gender among newborns. Most of the samples of the group 1 were males (60%) and 40 % were females while in Group 2, 65 % were males and 35 % were females.

(N=80)

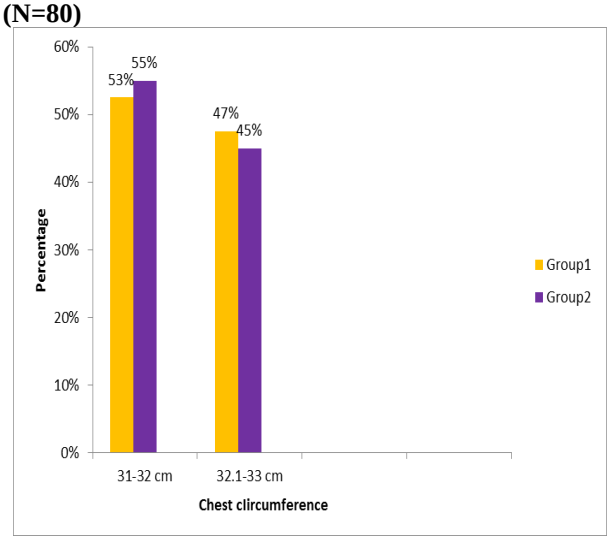

Figure 2: Percentage wise distribution of newborns according to their chest circumference.

The data presented in figure 2 reveals that 53 % of newborns in Group 1 and 55 % of newborns in Group 2 had a chest circumference ranging between 31- 32 cm. The remaining, 47% of newborns in Group 1 and 45% of newborns in Group 2 had a chest circumference ranging between 32.1- 33 cm.

(N=80)

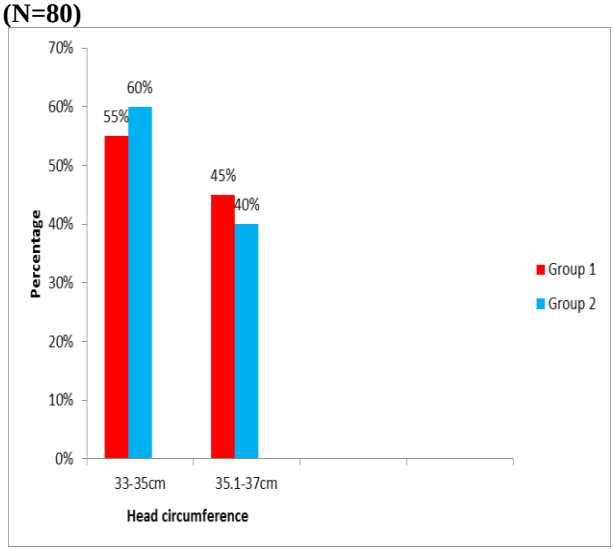

Figure 3: Percentage wise distribution of newborns according to head circumference.

The data presented in figure 3 shows that 55% of newborns in Group 1 and 60 % of newborns in Group 2 had a head circumference ranging between 33- 35 cm and 45% of newborns in Group 1 and 40% of newborns in Group 2 had a head circumference ranging between 35.1- 37 cm.

(N=80)

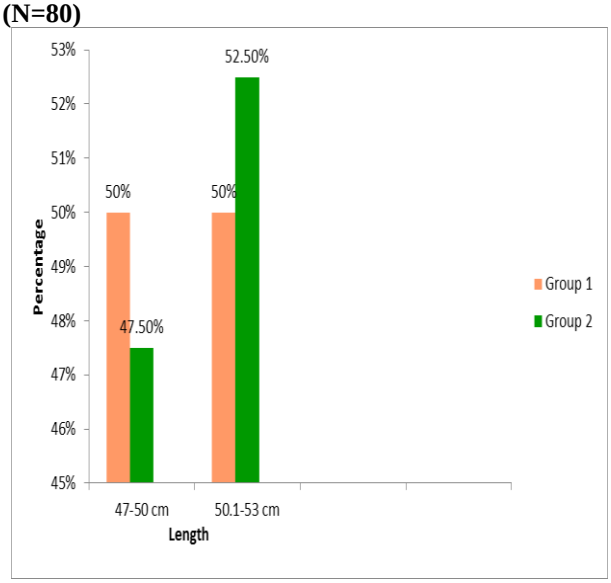

Figure 4: Percentage wise distribution of newborns according to length.

The data in the figure above describes that in Group 1, 50% of newborns had the length ranging between 47-50 cm and other 50% has 50.1-53 cm. In Group 2, 47.5% of newborn had length between 47-50 cm and remaining 52.5% had 47-50 cm.

(N=80)

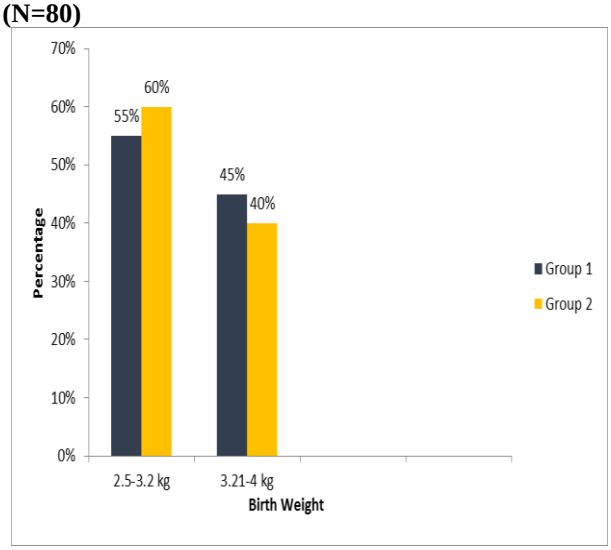

Figure 5: Percentage wise distribution of newborns according to birth weight.

The figure above presents data that, in Group 1, 55% of the newborns had birth weight between 2.5-3.2 kg and 45% had weight between 3.21-4 kg. In Group 2, 60% had birth weight between 2.5-3.2 kg and 40% had weight between 3.21-4 kg.

(N=80)

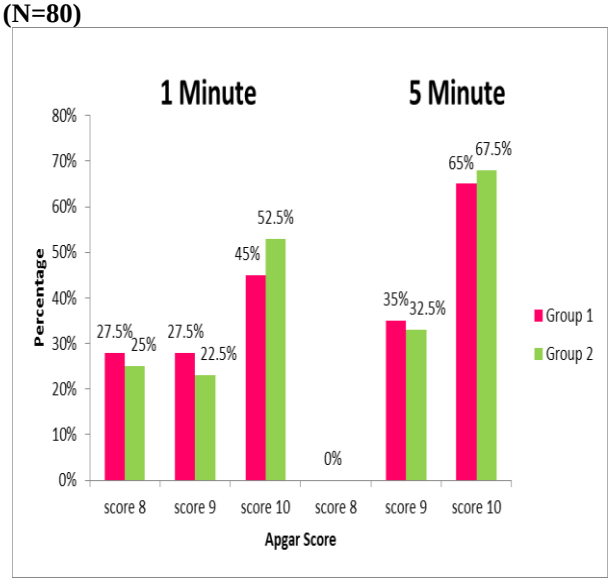

Figure 6: Percentage wise distribution of newborns as per Apgar score at 1 minute and 5 minute.

The data presented in figure 6 shows the percentage wise distribution of Apgar score among newborns. The figure describes that in Group 1, in first minute, 45% of the samples had an Apgar score of 10, 27.5% each had an Apgar score of 8 and 9 and in fifth minute, 65% of samples had an Apgar score of 10, 35% comes had a score of 9. In Group 2, the Apgar score in first minute is that 52.5% had a score of 10, 22.5% belongs to score 9, 25% belongs to score 8 and in fifth minute, 67.5% had the score of 10, 32.5% of the samples had score of 9.

Effectiveness of topical application of breast milk on umbilical cord healing in group 1.

There is a significant difference between the pre assessment and post assessment scores of umbilical cord healing in terms of colour and texture of cord, umbilical cord infection and drying process among Group 1.

Comparison of effectiveness of topical application of breast milk over povidone iodine on umbilical cord healing

The present study concludes that there is a significant difference in healing process among the newborns with topical application of breast milk in comparison to povidone iodine.

The present study finding reveals that the breast milk group had reduced infection rate in comparison to povidone iodine group.

The present study findings shows that breast milk group had shorter cord separation time than povidone iodine group.

DISCUSSION

Effectiveness of topical application of breast milk on umbilical cord healing in group 1

There is a significant difference between the pre assessment and post assessment scores of umbilical cord healing in terms of colour and texture of cord, umbilical cord infection and drying process among Group 1.

The present study finding reveals that the breast milk group had reduced infection rate and cord separation time in comparison to povidone iodine group.

The present study is consistent with another study which was conducted in Shahid Sadougi University of Medical Sciences and Health Service, Yazd, Iran, to compare the extraction time and infection rate of umbilical cord by applying povidone iodine, human milk and dry care. The neonates were visited on the 3rd and the 7th day after birth and follow-up was maintained telephonically until umbilical separation. Topical application of human milk on umbilical cord stump decreased separation time and reduced incidence rate of omphalitis than the povidone iodine and dry cord care group.[34]

The present study finding shows that there was reduced rate of bacterial colonization and cord separation time among Group1with topical application of breast milk than Group 2 with topical application of povidone iodine.

Another study which is consistent with the present finding was conducted in Minia University Hospital, Egypt to assess the effectiveness of topical application of breast milk and alcohol on cord separation time and bacterial colonization. The result shows that topical application of human milk reduces cord-separation time and pathogenic bacterial colonization and can be used as easy, cheap and non invasive methods for umbilical cord care in developing countries.[33]

Another study which supports the present study, which was conducted in BLDEA's hospital, Bijapur, to assess the effectiveness of breast milk application on the umbilical cord in terms of cord separation time. The result shows that the breast milk application had great impact in reducing the timing of cord separation.[31]

Comparison of effectiveness of topical application of breast milk over povidone iodine on umbilical cord healing.

The present study concludes that there is a significant difference in healing process among the newborns with topical application of breast milk in comparison to povidone iodine.

The present study finding reveals that the breast milk group had reduced infection rate in comparison to povidone iodine group.

The present findings are supported by another study which was conducted turkey to assess the effect of umbilical cord care in terms of cord separation time and omphalitis, by three methods: topical application of povidone iodine, mother's milk twice daily or dry cord care. The breast milk group had reduced cord infection than the other two groups. The babies in the topical milk group had shorter cord separation time than in dry cord care and povidone iodine group. Breast milk application was found to be a best practice for umbilical cord care.[11]

The findings of present study is contradictory with a quasi experimental study which was conducted in Mangalore, to assess the effectiveness of topical application of breast milk and dry cord care on umbilical cord drying. The purposive sampling technique was used for selection of samples. The finding showed that breast milk group had no signs of infection and aided in early falling off cords.

The present study findings shows that breast milk group had shorter cord separation time than povidone iodine group.

The study which is consistent with the present study was conducted in Iran to compare the effect of topical application of human milk, ethyl alcohol 96%, and silver sulfadiazine on umbilical cord separation time in newborn infants. The mean cord separation time in the human milk group was significantly shorter than the other three groups. Breast milk could be substituted for other topical agents for umbilical cord care.

CONCLUSION

The following conclusion was made based on the findings of the study:

- The study finding shows that there were lesser signs of infection in Group 1 in comparison to Group 2.
- The study finding shows that the Group 1 newborns had lesser bacterial colonization in the cord, in comparison to Group 2.
- Topical application of breast milk had a shorter mean cord separation time when compared to the povidone iodine group.
- The study concludes there is a significant difference in healing process among the newborns with topical application of breast milk in comparison to povidone iodine.

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