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Comparing the Effectiveness of Mother Milk Application on Umbilical Cord Separation with Sulfa Powder for Newborn

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Abstract: *The study aimed to evaluate the effectiveness of mother milk application on umbilical cord separation compared with sulfa powder for newborn.*
Research design: *A quasi-experimental design.*
Settings: *The study was conducted at the Governmental Hospital at AlKarak, South Jordan Obstetric Department Inward and at the Maternal and Child Health Center, Pediatric Out-patient at AlKarak, affiliated to Ministry of Health Jordan.*
Sample: *A purposive sample size was included100 neonates randomly assigned into two groups (50) in mother milk group, and was (50) in sulfa powder group.*
Tools*: Structured interview schedule and observational checklist for observing signs of umbilical cord healing, time of cord separation and infection signs for cord.*
Result: *The study was showed; mother milk application on the umbilical cord reduces the time of separation for neonates cord.*
Conclusion: *Mother milk application on caring of umbilical cord leads to rapid time of cord separation, reduce the umbilical cord infection and it can be used as an not cost effect, easy, and noninvasive method, that consider as a safer practice for caring umbilical cord*
Recommendation*: Further studies are suggested to strengthen the results and to evaluate the influence of the different methods on enhance of the umbilical cord care and replicate this study on another population and large sample.*
Keywords: *Mother milk, Umbilical cord, Sulfa powder, Health newborn, Separation tim*e

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I. Introduction

Neonatal infections at umbilical cord, leading to the highest of morbidity and mortality incidence rate for neonates in developing countries, regarding for neonates are exposed to unsafe procedures. The most of deaths occurring in developing countries, according to WHO, 2013, where at the neonatal period 5 million die each year at this period of life (***Kisa et al., 2013)***. Mother breast milk have a highly anti-bodies, so these consider to have a protective agents on the skin problems ***(Chalmers et al., 2011).*** Breast milk also has general antibacterial and antiviral action. Furthermore give newborn good immunity, mother breast milk enhance growth of skeletal system and reform. Human milk is a source of two items of growth factors were the transforming growth factors alpha and beta (TGF-A and TGF-B) and the insulin-like growth factors 1 and 2 (IGF-1and IGF-2) ***(Pakkanen & Ginjala, 2003***). Growth factors alpha and beta are responsible to enhance musculoskeletal and cartilage reform moreover promoting healing of injure. Growth factors alpha and beta are involved in embryonic development where normal cell activities, cell proliferation, and tissue reform. Insulin-like growth factors 1 has anabolic and advantage for wound-healing ***(Wong &Whaly, 2013).***

Many efforts were reducing the umbilical cord infection. From the different methods are previously used, for example using antiseptic such as alcohol 70 %, povidone iodine (beta dine) 10 %, for a traditional method by using ghee, honey, or sulfa powder (Neomycin bacitracin powder) in Jordan ***(Khader, 2008).*** In some countries are treated the infection of umbilical cord neonates by using a aseptically techniques. On another hand another countries interested to give the protection for the umbilical cord from infection by effect topical mother breast milk. Some reports showed administrating the topical breast milk leading to decreasing time of umbilical cord stump separation time compared to antiseptic or non-antiseptic managements. The management's costs vary according to the method used. Hence, it is very important to find cheap substitution care; mostly for low- income countries for example breastfeeding/milk ***(Darwish et al., 2012).*** Administration of local antimicrobial agents to the cord stump is most argumentative trend that cleansing the cord cares reducing the

risk of infection. In 1997 randomized controlled of literature review researches versus another different strategy of cord care conclude that application of local antimicrobial is the best for promoting the cord stump cleaning ***(Myo, 2011).*** Also mothers use at home traditional methods from antiseptic agents for caring umbilical cord increased a danger, where the solution used should not be expired at the date or should be used in correct concentration ***(Mousa, 2015).***

Hospitalization financial efforts and managements needed for newborn suffering from cord infection. So that the effectiveness of cord stump care is most useful, as considered is to prevent cord stump infection. The signs as redness of the skin, hotness at umbilical cord area, edema or foul discharge from the umbilical cord may lead to the stress for mothers. It can be treated with antibiotics. Furthermore another neonatal infection as entrocolitis may be resulting from poor hygienic status. This enhance in less cost effective management. One from these methods is the naturally suitable mother milk administration on the umbilical stump ***(Obuekwe, 2014). WHO (2014*)** examined that, in developed countries, umbilical cord infections for the individual cases, founded continue to occur in aseptic nurseries. Regardless providing the healthcare cord care practice, educating is very important. Teaching caregiver must involve the healthy sings of the umbilical stump, particularly when not applied a "drying" agent. Furthermore it is necessary to be sure those caregivers receive useful consistent umbilical cord care information. As caregiver knowledge leaflet is being compiled this will provide new evidence based knowledge to enhance caregiver to use an informed methods about how caregiver care apply umbilical cord care for their baby's ***(Sherrill et al., 2014).***

A topical of mother milk on the umbilical stump for newborn is a method in Kenya. Regarding to WHO, the breast milk have antibiotics agents. WHO has involved mother milk administration to the umbilical stump as harmless and safer method ***(WHO, 2013)*** As the mother breast milk cheap, is easily obtainable at any time to the newborn and is sterile, that necessary to explain the how to us breast milk topically to save newborn free from umbilical stump infection in developing countries (***Basavanthappa, 2011***).

Significance of the study

The infections of umbilical cord in developing countries leading to increased morbidity and mortality rate of newborns ***(Dhanawade, 2014).*** In Jordan, mothers are use current traditional methods and beliefs in caring for newborns for help directing appropriate managements to improve umbilical cord stump care, differed from alcohol swab use, sulfa powder (neomycin bacitracin powder) application, and Cigarettes ash***(Khader, 2008).*** While the mother milk is an easily available at any time, noninvasive method and no cost benefits, replace for other applications methods using for cord care. So research the availability of using mother milk application to safe infants from cord stump infections in developing countries very serious ***(WHO, 2013).***

Aim of the study

Evaluate the effectiveness of mother milk application on umbilical cord separation compared with sulfa powder for newborn.

Hypothesis

- Mother milk administration will be effective in decreasing time of cord separation.
- Mother milk group haven't signs of umbilical cord infection, bleeding continuation and mucoid secretion compared to sulfa powder group.

II. Material And Methods

Research design

A quasi-experimental design was used.

Setting

The both settings first one is the Governmental Hospital at AlKarak, South Jordan obstetric department inward and second was Maternal and Child Health Center, pediatric out-patient at AlKarak, affiliated to Ministry of Health Jordan, the study was conducted, which contained a large number of newborn mother's undergone caesarean section and second sitting for child follow up.

Sample

A purposive sample method was be utilized in this research. Sampling was 100 neonates divided into two identically groups randomly divided into the mother breast milk and sulfa powder groups by tossing a coin. The mother breast milk group comprised (50 neonates) and was received local application of mothers' breast milk. Compared to sulfa powder was included the same number (50 neonates) and was received the sulfa powder care. Mothers should be participated voluntarily in the study. Neonates who were met the inclusion criteria at the time of data collection were considered as accessible population.

The inclusion criteria

- Healthy newborn gestation age at (37-42 weeks), and their mothers delivered by caesarean section.
- Normally birth weight from (2.750 to 3.750) grams.
- Haven't any health problems; roomed-in with their mothers.
- Mother can gives child breastfeeding and willing to co-operate for study and apply their breast milk to their babies' umbilical cord stump.

Exclusion criteria

- Newborns admitted to neonatal intensive care unit were critically ill.
- Newborns that were had any congenital anomalies.
- Low birth weight and premature babies were excluded.

The software G Power version 3.0.10 was used to define the appropriate sample size for study, which is identify as (100 neonates two groups), each chosen regarding to the random way into two groups, first group who received mothers breast milk application, and second group who received sulfa powder.

Data collection tools

Three tools were utilized for collecting data

Tool (I): Interview Questionnaire Sheet related recruited sample (mothers and their neonates), was utilized to collect in English language it consists of three parts.

Part (1): Socio-demographic data for studied mothers that included: Parity and residence.

Part (2) :Socio-demographic data for studied newborn that included: code no, gender, birth weight and gestational age.

Part (3): Mother's back-ground about cord care strategy that included mother's beliefs and habits about umbilical cord care methods. Researchers will ask questions by simple methods used Arabic language and reported mother answers in the interview questionnaire sheet. Interview will consume about 5 to10 minutes.

Tool (II): Observational checklist follow up for monitoring signs of umbilical cord healing, time of cord separation and infection signs for cord, this checklist was designed by the researchers and will fill by here, based on the aim of the study in English language. This tool was included two parts.

Part (1): Checklist observational to observe the mothers compliance to different care methods for umbilical cord, according to time separation. It was regarding to assess the separation time which includes the complete separation from the skin by days, bleeding and mucoid secretion after separation day.

Part (2): Observation checklist to follow up appearance or absent for the signs of infection regarding to baby cord in two visits, (first and the second visit). It was utilized to assess the presence or absent the signs of infection regarding baby cord as fever for baby, hotness and redness and bad odor of cord stump until cord separation occur.

Validity and reliability of the study tools

The study tools were rechecked for comprehensiveness, appropriateness, and legibility by three experts in the pediatric nursing specialist to clarity the face and validity. In the light of their revision, modifications in the face validity were carried out.

Ethical consideration

Before conduction of the pilot study as well as the study protocol was approve by Pertinent. The researchers introduced themself to recruited sample and the written informed consent was obtained from each mother. At the first meeting was providing a complete description of the study. The researchers assured that the data collected and information was confidential and was used only for the purpose of the study. No health hazards were presented. Participants were assured that all their data were highly confidential: anonymity was also assured through assigning a number for each child instead of names to protect their privacy.

Pilot study

A pilot- tested for feasibility, clarity and time requires being applies. The pilot study was carried out on 10 neonates and their mothers. Participants of the pilot were excluded from the sample.

Procedure of data collection

The actual field work was carried out at the first week of January up to the April of May 2017 for data collection. An official permission was obtained from the both pervious mentioned settings; also mothers'

agreement to participate in the study will obtain. Written consent from mothers will be obtained that participation is voluntary and have the right of accepting or refusing participation in the study. After that, the researchers were visited the sitting of the study two days/week (Saturday and Wednesday) from 9.00 am to 2.00 pm. The researchers introduced themself and explains the aim of the study, to all mothers & there neonates whose met the inclusion criteria to gain their understanding and cooperation. All participants were constituted 100 mothers and their neonates divided randomly into two groups, were mother milk group who's applied application of mothers' milk as a method for umbilical cord care and sulfa powder group, who received sulfa powder care. All participants in the studied sample were asked to not using other tools. Data collected from recruited mothers through interviewing questionnaire and observational checklist for monitoring manifestations of umbilical cord healing, time of cord separation and alarming signs of infection. At the first, the researchers collected socio-demographic characteristics regarding the mother's as age, residence, educational level and parity. And neonatal data as gestational age and gender. Also data related to mother backgrounds' related to different methods of caring umbilical cord. The researchers asked questions in a simple Arabic language and recorded the answers in the interview tool. Interview was taken about 5 to10 minutes for each participant. Each participant interviewed to know her backgrounds' about the best methods for caring cord. At the first in the operating room the umbilical cord of the newborns cute under competently aseptic technique condition in studied groups. Also all instructions for the mothers in studied sample done, as the researchers instructed all mothers to wash their hands with running water and soap after to implementation of the umbilical cord stump care to ensure from safety precautions and prevention of the potential infection and researchers gave the all instructions for the mothers that not using anything else to the baby cord, including the application of mother milk or sulfa powder according mother group and the umbilical cord area must be covered to encourage healing and decrease incidence of infection. Researchers were instructed mothers about methods of the umbilical cord cleansing and the surrounding umbilical cord area 3 times per day and as needed during diaper care. After that for mother milk group**,** mothers asked after hand washing done with running water and soap to squeeze (3-5 drops) from breast milk on the stump part of the cord and its ended part of cord and allow the breast milk for drying on the cord and the care should started four hours after birth, to ensure the mother completely conscious after cesarean section operation. The researchers instructed the mother to administrate milk drops after birth once every three times per day until cord separation and 2 days still cord separation. For sulfa powder group, the researchers asked the mothers cleansing umbilical cord stump by sulfa powder with swab, starting 4 hours after birth and every 12 hours till 2 days still cord separation**.** After childbirth at hospital and days number three, seven and two days still umbilical cord separation at home the observation for studied groups done. After that the mothers educated to fill the sheet. The researchers were using telephone calls to complete the follow-up with the mothers; to get the information about the date of umbilical cord separation. infection sings for umbilical cord if present or not and delayed the time for cord separation or any signs for blood leakage or mucoid discharge the newborn immediately visited by neonatologist.

Statistical Analysis

The data were presented, organized, tabulated and analyzed by using SPSS version 21. Data were expressed as frequency and percentage, Comparison between two groups and had done by using Chi-square test (X^2) for qualitative data. Significance level for person relation was used. Statistical significance was considered at P-value <0.05.

III. Results

Table (1): Distribution of the studied sample regards to socio- demographic data

Variables	Items	Mother Milk (No=50)		Sulfa Powder (No=50)		X^2	*P-Value*
		No	%	No	%	***5.769**	**0.016***
A- Data of neonates Gender	Boys	20	40.0	32	18.0		
	Girls	30	60.0	18	12.0		
Birth Weight (kg)	2.500 < 3	29	58.0	29	58.0	2.100	0.35
	3 < 3.500	21	42.0	19	38.0		
	≥3.500	0	0.0	2	4.0		
Gestational	< 38	17	34.0	15	58.0	1.255	0.533
	38 - 42	32	64.0	35	38.0		
	> 42	1	2.0	0	4.0		
B- Data of mothers Age	20 < 30	21	42.0	9	18.0	***6.492**	**0.031***
	30 < 40	24	48.0	35	70.0		
	≥40	5	10.0	6	12.0		
Education Level	Illiterate	1	2.0	6	12.0	4.197	0.241
	Read & write	11	22.0	12	24.0		
	Diploma	19	38.0	15	30.0		
	University	19	38.0	17	34.0		
Parity	Primi Para	33	66.0	8	16.0	***25.94**	**0.000****
	2	11	22.0	25	25.0		
	3>4	6	12.0	17	34.0		
Residence	Urban	18	36.0	25	50.0	1.999	0.157
	Rural	32	64.0	25	50.0		

Table (1) shows that the boys constituted approximately (40%) in mother milk group, where girls constituted more than half (60%) in sulfa powder group. Regarding neonatal birth weight was more than half (58%) in mother milk group and sulfa powder group that 2.500 < 3kg. Concerning gestational age more than half (58%) were< 38 weeks in sulfa powder group, while (64%) were 38 to 42 weeks in gestational age for mother milk group. Adding more than of half (70%) were aged 30 < 40 in sulfa powder group, where 48% of them at the same age in mother milk group,38% of mothers were educated to the diploma and university level in mother milk group. regarding sulfa group (30%, 34%) of mothers were educated to the diploma and university level in sulfa powder group. Concerning parity, the majority of them primi para (66%) in mother milk group, while the majority of them (34%) were3>4 in sulfa powder group. Adding more than half (64%) were living in rural areas in mother milk group. While approximately half (50%) were living in rural and urban areas in sulfa powder group.

Table (2): Mothers back grounds' regarding to different methods of cord care.

Variables	Mother Milk (No=50)						Sulfa Powder(No=50)						X^2	*P-Value*
	Always		Sometimes		Never		Always		Sometimes		Never			
	No	%	No	%	No	%	No	%	No	%	No	%		
Use Sulfa Powder	11	22.0	18	36.0	21	42.0	45	90.0	3	6.0	2	4.0	****47.05**	****0.00**
Soup and water	10	20.0	18	36.0	22	44.0	7	14.0	21	42.0	22	44.0	0.76	0.68
Salty water	10	20.0	18	36.0	22	44.0	6	12.0	21	42.0	23	46.0	1.25	0.54
Olive oil	45	90.0	2	4.0	3	6.0	6	12.0	22	44.0	22	44.0	****60.93**	****0.00**
Cooking oil	9	18.0	18	36.0	23	46.0	10	20.0	9	18.0	31	62.0	4.23	0.12
Alcohol 70%	9	18.0	17	34.0	24	48.0	10	20.0	9	18.0	31	62.0	3.40	0.18
Breast Milk	5	10.0	5	10.0	40	80.0	9	18.0	5	10.0	36	72.0	1.53	0.51
Dusting powder	10	20.0	18	36.0	22	44.0	10	20.0	10	20.0	30	60.0	3.51	0.17
Betadine10%	9	18.0	18	36.0	23	46.0	11	22.0	9	18.0	30	60.0	4.13	0.13
Cord band on abdomen	9	18.0	17	34.0	24	48.0	0.0	20.0	10	20.0	30	60.0	2.53	0.28
Cigarettes ash	8	16.0	18	35.0	24	48.0	11	22.0	9	18.0	30	60.0	4.14	0.13

Table (2) illustrate that in mother milk group, the most of mothers refine that them always using olive oil (90%) as a method of umbilical cord care. About (36.5%) reported they sometimes soup and water, salty water were used, cooking oil, dusting powder and beta dine 10% were(36%), and only (10%) reported that breast milk were used. While sulfa powder group most of the mothers described that they always sulfa powder

(90%), about (44%) identified that they sometimes using olive oil and only (18 % and 10%) were always and sometimes using breast milk of the umbilical cord care.

Table (3): Distribution of the studied sample regards to time of cord separation per days.

Variables	Mother Milk (No=50)		Sulfa Powder(No=50)		X^2	*P-Value*
	No	%	No	%		
Between 4-6 Days	45	90.0	11	22.0	**20.64****	**0.00****
From 6 to 10	5	10.0	0	0.0	**5.26***	**0.02***
>10	0	0.0	39	78.0	**63.93****	**0.00****

Table (3) displays clearly the time separation for the umbilical cord was previously in mother milk group than sulfa powder group. It showed 90% of mother milk group neonates had their cord separation at the 4^{th} to 6^{th} day after birth, and 10% only of them had their cord separation at the 6^{th} to 10^{th} day after birth at ($P\leq 0.001$). Compared to only (22%) of the neonates in the sulfa powder group had their cord separation at the 4^{th} to 6^{th} day after birth, while the majority78% of them had their cord separation at the >10 day after birth ($P\leq 0.001$) meaning the effectiveness of mother milk application.

Table (4): Distribution of the neonates regards to signs of cord infection in first and second visit.

Variables	First visit (3rd day)				P-value	Second visit (7th day)				P-value
	Mother Milk		Sulfa Powder			Mother Milk		Sulfa Powder		
	No	%	No	%		No	%	No	%	
Elevated baby body temperature	0	0.0	1	2.0	0.315	0	6.0	2	4.0	0.155
Hotness and mild redness	10	20.0	21	42.0	**0.017***	5	10.0	34	68.0	****0.00**
Moderate or severe redness	0	0.0	2	4.0	0.155	0	4.0	3	6.0	0.646
Severe redness with pus	0	0.0	5	10.0	***0.22**	1	2.0	17	34.0	****0.000**
Foul odor of cord	0	0.0	2	4.0	0.155	0	2.0	5	10.0	*0.022
Exudates from the cord as bleeding	1	2.0	3	6.0	0.022.*	0	2.0	5	10.0	0.092
Abnormal skin color	0	0.0	1	2.0	0.315	0	2.0	6	12.0	***0.015**

It is showed from table (4) the signs of cord infection for newborns were less in mother milk group as compared to sulfa powder group during the first and second follow -up visits. Where hotness and mild redness were (20%) at first visit in mother milk group, while at second visit were (10%), compared to sulfa powder group at hotness and mild redness were (42%) at first visit and at second visit were (68%).

Table (5): Comparison of mean scores time for cord separation among the studied sample.

variables	Mother Milk (No=50)		Sulfa Powder (No=50)		*t-test*	*P-Value*
	Mean	SD	Mean	SD		
Complete separation from the skin	0.333	0.000	0.260	0.14	-3.72**	<0.001
Bleeding after separation day	0.00	0.00	0.06	0.13	3.28*	0.05
Mucoid secretion after separation day	0.00	0.00	0.01	0.05	1.00	NS

Table (5) illustrated there were a highly statistically differences, where time of cord separation earlier in mother milk group where t-test were -3.72 at ($p<0.001$) than in sulfa powder group. Regarding bleeding after separation day was a significantly at t- test were 3.28 at (P 0.05) were less in mother milk than in sulfa powder group. Adding there was no statistically difference regarding secretion of mucoid after separation time in studied sample.

IV. Discussion

It is very importance for caring the newborn umbilical cord stump immediate after childbirth. However, many researches focused on cord care, more often on managements as clamping time for cord and the use of local antimicrobials on the stump, and few researches focused has been given to methods that are "natural" or cultural. Jordanian mothers using traditional practices for umbilical cord caring for their neonates. The researchers found less study with the study topic of research. In Jordan sorrow from high incidence mortality and morbidity neonatal rates, they could be useful study in comparing the human milk application with sulfa powder group. The results of current study have been agreement with the aim of the study. Regarding social-demographic data of the two groups, the results of the study illustrated that mothers in the studied sample were mostly are: the thirtieth can read and write or high school graduates and universities. There were no statistically differences between studied sample regarding socio-demographic data of studied sample. This indicates that studied sample is homogeneous previously to the study.

Regarding mother's knowledge about the umbilical cord care, the results of the current research was differed other ways reported by the mothers in the studied sample (table2). The mothers' were mentioned always using olive oil (90%) for the umbilical cord care. About (36.5%) reported that they sometimes using soup and water, salty water, cooking oil, dusting powder and beta dine 10%, and the application of mother milk were always using only (10%). While in sulfa powder group most of the mothers described that they always sulfa powder (90%), about (44%) notify that they using olive oil and only (9 % and 5%) were always and sometimes using the application of mother milk for caring umbilical cord. These results agreed **Susan and Achora (2012**) who assessed knowledge and practice for mothers at postnatal period for the care of umbilical cord stump and convey that the knowledge on postnatal period cord care continuity was dependent on who was caring for the cord stump, that was good knowledge was present by the mothers who were helped by the students on midwifery experiment. Furthermore the study results presented the application of human milk was positive efficient related the cord separation early as clearly in table (3) the 4th to 6th day of age after birth where majority (90%) of mother milk group neonates had their separation of the cord, as compared at the >10 days after birth the majority78% of sulfa powder had their cord separation. Moreover it was a highly significant between the application mother milk group and sulfa powder care group in regarding to, time separation for neonates cord and signs related to infection. These in congruous with, **Yonis, (2010)** who founded that, separation time regarding umbilical cord for newborn in mother milk application was less than the traditional methods were (3+1 & 7+1 days respectively) ($P< 0.001$) .

Regarding manifestations of infection between mother milk and sulfa powder, the present research presented significant difference with depressing infection incidence in mother milk group than sulfa powder group. This may be due to, mother milk have effectiveness more than sulfa powder, and in depressing signs of infection of cord stump and mother milk has many immunologic and disinfecting agents which were important for umbilical cord stump separation. These results opposite with **Hajizadeh,.etal (2016).**Who notify no significant differences regarding the infection signs as (swelling, discharge, hotness and redness) in studied sample. As clearly in (table 5), there were a highly significant differences. The researchers notify that the separation time for cord mean between the mother milk group was significance where less in time ($p<0.001$) compared in the sulfa powder received group. On other hand after separation (day) were regarding the bleeding continuation was significantly less in time ($p<0.05$) between mother milk group compared the sulfa powder received. Regarding mucoid secretion after separation in studied sample there was no significant difference. This result is agreed with **Hossein and Golshan (2013)**, particular that the separation time mean score regarding umbilical cord had significant differences between the 3 groups ($p <0.0001$). The lowest time and the highest time for separation were particular to mother milk and ethanol groups respectively. Umbilical cord stump time of separation in neonates of the mother milk group had positive effect in compared with the other two groups.

V. Conclusion

Mother milk with its antimicrobial, have benefits which acts as a defensive factor for protecting the umbilical cord from infection as the newborn has no protective defensive methods immediate after birth regarding immature immune system. Furthermore the mother milk is also having effectiveness on decreased incidence of cord infection that enhance to decreased time separation of umbilical cord. So it was results that mothers milk is the useful and efficiency where leading to less timing for newborn umbilical cord separation.

Recommendations

- Compared the sulfa powder application with mother milk application on umbilical cord stump for neonates , the study results was decreasing the time of cord separation regarding the mother milk, it can be used as an not cost effect, easy, and noninvasive method, that consider as a safer practice for caring umbilical cord.
- Further studies are suggested to strengthen the results and to evaluate the influence of the different methods on enhance of the umbilical cord care.
- Replicate this study on another population and large sample.

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