

Umbilical Cord Care Attitude among the Caregivers and the Rate of Development of Omphalitis

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Citation: Amaan A, Kumer Dey S, Zahan K, et al. Umbilical Cord Care Attitude among the Caregivers and the Rate of Development of Omphalitis. *Microbiol Infect Dis*. 2022; 6(4): 1-5.

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Received: 09 Jun 2022; **Accepted:** 15 Jul 2022; **Published:** 20 Jul 2022

ABSTRACT

Background: Of the annual 2.5 million global neonatal deaths, most occurring in developing countries, and one-third to one half are attributed to infections. In low-income countries like Bangladesh, where home delivery is common and attendance by skilled personnel is low, many babies are born in unhygienic conditions and infections of the umbilical cord stump are common. Exposure of the freshly cut umbilical cord stump to pathogens may lead to local cord infections (omphalitis) that may progress to systemic infection and death.

Objective: To evaluate the pattern of umbilical cord care practices and the rate of development of omphalitis.

Methodology: It was a prospective observational study included 80 neonates. This study was conducted over a period of six months from May to November 2013 in the obstetrics unit of department of obstetrics and gynaecology, Sher-E-Bangla Medical College Hospital, Barisal.

Results: A total 80 out born neonates, accompanying their mothers who were admitted due to their post-partum complications from home delivery, were included in this study. Among them twelve (15%) were found to have omphalitis, of which nine (11.25%) were with mild omphalitis and three (3.75%) with moderate omphalitis. Umbilical cords were mostly (58.75%) cut by used shaving blades and tied by washed thread from home (88.75%). Most of the caregivers (65%) had educational qualification below primary level. Forty-two (52.5%) of the eighty caregivers had not heard about WHO recommended dry cord care method. All of the caregivers applied traditional substances to the cord and mustard oil was the commonest (75%) practice. It was applicable in all omphalitis cases. Statistically significant relationship ($p < 0.05$) was found with omphalitis and cord cutting instrument, topical application of traditional substances to the cord, caregivers' educational status and knowledge about dry cord care.

Conclusion: Omphalitis rate among enrolled newborn was 15% cutting cord with unsterile instruments, applying traditional substances to the cord and low educational status among the care givers are related with development of omphalitis.

Keywords

Omphalitis, Umbilical cord care, Dry cord care.

Introduction

Globally, 2.5 million children died in the neonatal period, at an average of 18 deaths per 1,000 live births in 2018. A majority of this mortality were accounted from low- and middle-income countries (LMIC) [1]. Neonatal sepsis affects 6 to 21 babies per 1000 livebirths and is identified as one of major causes of newborn morbidity and mortality [2]. In the developing world sepsis accounts for 26% of all neonatal death [2-6].

38% of deliveries in Bangladesh still take place in the home and in only 42% of cases, a skilled birth attendant is present [7]. In primary care settings, poor cord hygiene due to improper handling of the infant's cord is a major contributor to the occurrence of neonatal sepsis [8].

Umbilical cord is one of the main portals of entry for microorganisms that can cause newborn sepsis. This could be attributable to the prevailing sub-optimal hygienic conditions in the environment of the baby that could result in a localized umbilical cord infection (omphalitis), with potential spread of the microorganisms into the bloodstream via the patent umbilical vessels resulting in septicemia or infection of other organs. Optimal umbilical cord care practices during the first week of life have significant potential to reduce neonatal death secondary to sepsis [8-10].

A hygienic umbilical cord refers to a dry umbilical stump without signs of redness, warmth, swelling, pain, foul smell or pus [8]. Contamination of umbilical cord can lead to local infections characterized by pus, erythema, swelling or systemic infections (e.g. sepsis), and is often caused by unclean cord cutting instrument or through subsequent cord care practices. Such cord infections are associated with an increased risk of sepsis and neonatal mortality [11,12].

The term clean cord care can be defined as [10] cutting the cord with a new or sterilized instrument (or a clean delivery kit) as well as appropriate cord care, is a standard measure of newborn care [10,11].

Umbilical infection (omphalitis) is common among newborns in developing countries and may predispose to life-threatening neonatal sepsis. Incidence rates in newborns in nurseries from developing countries range from 2 per 1000 to 54 per 1000, with figures from Turkey as high as 77 per 1000 live birth. Case fatality rates range from 0-15% in this hospitalized [11]. Around the world, substances are placed on the cord stump to promote healing. These substances have included powders, food, oils, herbs or spices, hot compresses, charcoal, antiseptics, tar, machine or motor oil, breastmilk, petroleum jelly, animal dung, among others. These practices are potentially harmful for the newborns, causing infection, especially sepsis [9].

Internationally, since 1998, the World Health Organization

(WHO) has advocated for the use of dry umbilical cord care (keeping the cord clean without application of anything and leaving it exposed to air or loosely covered by a clean cloth & in case it becomes soiled, it is only cleaned with water). To reduce the risk of sepsis in places where home deliveries are common, neonatal mortality rate exceeds 30 per 1000 live births and there is practice of applying potentially harmful substances to the freshly cut cord, the WHO recommendation is applying 7.1% chlorhexidine digluconate solution at birth or gel delivering 4% chlorhexidine daily to the cord stump during the first week of life. The application of chlorhexidine to the cord as an alternative to the standard recommendation for dry cord care is particularly relevant where harmful substances are traditionally placed on the cord, and it can serve as a safe substitute [5,12,13]. Several successful trials in South Asia supported this practice.

The objective of this study was to determine the prevailing patterns of umbilical cord care practices among the mothers/caregivers of the newborns among the home delivery cases and to estimate the rate of development of omphalitis among them.

Methodology

This observational study was performed during the period from May to November 2013 in Obstetrics unit of department of obstetrics and gynecology, Sher-E-Bangla Medical College Hospital (SBMCH), Barisal. Some mothers in the ward were admitted due to their post-partum complications because of home delivery. The newborns who were accompanying these mothers were enrolled and observed in this study. Among them, those who already had clinical features of sepsis & those who were subsequently got admitted in neonatal unit were excluded. Prior permission was obtained from the ethical review committee of SBMCH and informed written consent was taken from each of the participant caregivers.

Omphalitis was defined as an umbilical infection, which occurs due to lack of cleanliness at the time of division of umbilical cord, and lack of care of the umbilical stump. Its seriousness lies in the possibility of extension of this infection to portal vein, liver, peritoneum, or hematogenous spread. It was graded into 3 categories: mild omphalitis (redness, swelling or pus restricted to the cord stump), moderate omphalitis (redness, swelling or pus extending to the skin at the base of the cord stump less than 2 cm), severe omphalitis (inflammation extending >2 cm from the cord stump, with or without pus) [14].

A semi-structured questionnaire was used to collect data from the caregivers and thorough clinically examining the newborns.

Data were analyzed by using SPSS version 17. The qualitative data were analyzed with chi-square (χ^2) test. The level of significance, $P = <0.05$, was considered statistically significant.

Results

Systematic random sampling enrolled 103 neonates. Every 3rd

newborn was enrolled. Of them 23 were subsequently found already having clinical features of perinatal complications (sepsis, perinatal asphyxia). They were subsequently got admitted in neonatal unit and were excluded from the study. Finally, eighty neonates (77%) were enrolled in the study, who accompanied their mothers who were admitted in the obstetrics unit due to their post-partum complications from home delivery. Most of them were female, age < 3days, term, hailing from rural areas, from a low socioeconomic background, from multiparous mothers and were delivered by nonskilled birth attendants (Table 1).

Table 1: Distribution of background characteristics among children born at home (n=80).

Variables	Frequency	Percentage
Gender		
Male	37	46.25%
Female	43	53.75%
Age of the newborn		
Less than 3 days	64	80%
More than 3 days	16	20%
Gestational age		
Pre term	23	28.75%
Term	57	71.25%
Residence		
Urban	09	11.25%
Rural	71	88.75%
Monthly income		
Below 10,000/month	74	92.5%
Above 10,000/month	06	7.5%
Educational status		
Below primary	52	65%
Above primary	28	35%
Maternal occupation		
Housewife	80	100%
Service holder	00	00
Maternal age		
Below 18	09	13.75%
18-40	69	86.25%
>40y	00	00
Parity		
Primi	33	41.25%
Multy	47	58.75%
Antenatal Care		
Less than 4 visits	57	71.25%
4 or more visits	23	28.75%
Skilled attendant at birth		
No	67	83.75%
Yes	13	16.25%

A total 80 out born neonates were included in this study. Among them twelve (15%) were found to have omphalitis (Table 2), of which nine (11.25%) were with mild omphalitis and three (3.75%) with moderate omphalitis (Figure 1).

Table 2: The Rate of Development of Omphalitis (n=80).

Condition of Umbilical Cord	Number of Neonates	Percentage (%)
Healthy	68	85
Omphalitis	12	15
Total	80	100

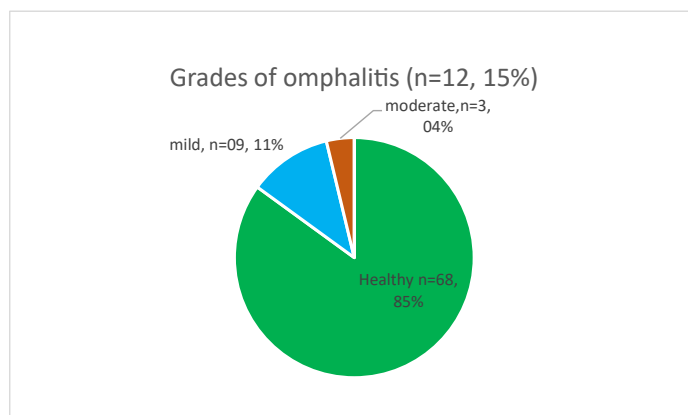


Figure 1: Grades of Omphalitis.

Among the newborns 71 (88.75%) were found to be tied by thread from home and remaining 09(11.25%) were with new sterile cord clamp from market. Statistically there is no significant relationship between instruments used in tying the cord and omphalitis, where $\chi^2 = 1.790$, $p = 0.181$ (Table 3).

Table 3: Instruments used in tying umbilical cord and omphalitis (n=80).

Instruments used	Frequency	Percent	p value
Thread from home	71	88.75	0.181
New sterile cord clamp	09	11.25	
Total	80	100.0	

Among 80 neonates, 47 (58.75%) were found having their cord cut with used blade from home, among which 12 (25.53%) developed omphalitis. Omphalitis was significantly more among those in whom a used blade was used in cutting the cord ($p=0.002$) (Table 4).

Table 4: Instruments Used in Cutting Umbilical Cord and Omphalitis (N=80).

Instruments used	Healthy	Omphalitis	χ^2 Value	p value
Used blade from home (n=47, 58.75%)	35	12	9.912	0.002
New shaving blade from market (n=33, 41.25%)	33	00		
Total	68	12		

All of the caregivers applied traditional substances to the cord and mustard oil was the commonest (75%) practice. Out of 80 neonates, 60 (75%) were found to had mustard oil applied to the umbilical cord and boric powder in 20 (25%). 25% of the newborns, in whom mustard oil was used, developed omphalitis. There was a statistically significant association between omphalitis and application of mustard oil to the umbilical cord ($n=60$, 75%), $\chi^2 = 4.706$, $p=0.03$ (Table 5).

Table 5: Application of substances to umbilical cord and omphalitis. (n=80).

Pattern of hand washing	Healthy	Omphalitis	χ^2 Value	p value
Mustard oil (n=60)	48	12	4.706	0.03
Boric powder (n=20)	20	00		
Total	68	12		

The hand-washing attitude before handling the neonates by the caregivers was not satisfactory. Only 62.5% caregivers were found to ensuring hand hygiene before handling their newborn. It was not significantly associated for omphalitis, where $\chi^2 = 1.150$, $p=0.284$ (Table 6).

Table 6: Frequency of Ensuring Hand Hygiene Before Handling the Neonates and Omphalitis (N=80).

Pattern of hand washing	Healthy	Omphalitis	χ^2 Value	p value
Occasional (n=23)	18	05	1.150	0.284
Don't wash (n=57)	50	07		
Total	68	12		

The development of omphalitis was significantly low in those having educated caregivers. Most of the caregivers (65%) had educational qualification below primary level. 91.6% of those who developed omphalitis had their caregivers educational qualification below primary level. Educational qualification of mother was found statistically significant (Table 7).

Table 7: Educational Status of the Care Givers and Omphalitis.

Educational status of caregivers	Healthy	Omphalitis	χ^2 Value	p value
Below primary (n=52)	41	11	4.413	0.036
Primary and above (n=28)	27	01		
Total	68	12		

Forty two (52.5%) of the eighty caregivers did not hear regarding WHO recommended dry cord care. Those who developed omphalitis have their caregivers ignorant about WHO recommended dry cord care ($p= 0.000$; $\chi^2 = 12.773$) (Table 8).

Table 8: Relation in Between the Knowledge of Dry Cord Care and Omphalitis.

Having knowledge regarding dry cord care	Healthy	Omphalitis	χ^2 Value	p value
Don't know (n=42)	30	12	12.773	0.000
Have heard about it (n=38)	38	00		
Total	68	12		

Discussion

Eighty healthy newborns were studied, who accompanied their mothers admitted due to post-partum complications from home delivery, in the obstetrics unit of department of obstetrics and gynecology in Sher-E-Bangla Medical College and Hospital, Barisal from May to November 2013. Among them majority were female (53%), term born (71%), age less than 3 days (80%), from rural areas (88%), from multiparous mothers (58%) & delivered by a traditional birth attendant (84%).

Among the study newborns, 12 (15%) cases were found to have omphalitis. This is consistent with the community based studies in Pakistan, Zambia and Tanzania, where 21.7%, 11.5 and 12% newborns diagnosed with omphalitis [12,14,15]. Among the cases of omphalitis, 75% were found mild variety, which is consistence with the study result from Zambia (79.4%), and Nigeria (76.9%) [16,18].

In case of tying the cords, 71 (88.75%) were found having their cord tied with thread from home and remaining 09 (11.25%) were with new sterile cord clamp from market. Omphalitis was found in 12 of those in whom cord was tied with thread from home. Statistically there is no significant difference between instruments used in tying the cord and omphalitis, where $p=0.181$. The entire respondent informed that, they washed the thread in hot water before tying the cord, which is in favor of clean cord care practice.

Instruments used in cutting the umbilical cord have been found to have significant effect on the incidence of omphalitis. None in this study was found to use sterile surgical blade. Among them, 47 (58.75%) were found to have their cord cut by previously used shaving blade from home, of whom 12 developed omphalitis. The remaining 33 (41.25%) used new shaving blade of which none were affected (Table 3). Statistically significant difference has been found in incidence of omphalitis between babies' umbilical cord cut with new or used blades, where $p=0.002$. This finding is consistent with other studies from south Asian and African countries where in nonsterile instruments are commonly used to cut the cord [19,21,22].

None of the neonates was found to be reared with dry cord care. In all case, caregivers applied some traditional materials to umbilical cord, among which 60 (75%) were found to apply mustard oil and another 20 (25%) boric powder. Such attitude of applying some substances, like mustard oil, spirit, saliva, ash, brick ash etc. has also been found in studies in Nepal, Kenya and Nigeria, Zambia, Ethiopia, Ghana [8,16,19,21-24]. Mustard oil was applied in all cases of omphalitis (Table 4). Statistically significant increase in incidence of omphalitis has been found with application of mustard oil ($n=60$, 75%) to the umbilical cord, $p=0.03$.

Out of eighty care givers, only 23 (28.75%) have been found to wash their hands occasionally before handling the neonates out of which five have developed omphalitis and the remaining 57 (71.25%) don't care about that, out of which seven have developed omphalitis (Table 5). It was not statistically significant for causing omphalitis ($p=0.284$) as it was also found in a community- based, cluster-randomized trial in Pakistan, where only in 2.14% cases, handwashing was practiced before handling the neonates and omphalitis developed in 5.26% cases who dont follow the hand washing practice [12]. In a study in Kenya, 27.9% caregivers were found to wash hands before taking care of the newborn [8].

In case of educational status among the caregivers, 52 (65%) were under primary level and the remaining 28 (35%) had an education above the primary level. Among the 12 omphalitis cases, 11 cases were found with caregivers having educational level below primary and 01 was with level above primary (Table 6). The influence of educational status of the caregivers on omphalitis was found statistically significant, $p=0.036$. Which was similar to the findings in a community-based, cluster-randomized trial in Nepal where it was found that infants born to mothers in the highest educational category had slightly less risk in development of omphalitis [16]. Forty two (52.5%) of the eighty caregivers had not heard about WHO recommended dry cord care method. Those who

developed omphalitis have their caregivers ignorant about WHO recommended dry cord care method & it was statistically significant, $p=0.000$ (Table 7).

Statistically significant relationship ($p < 0.05$) was found with omphalitis and cord cutting instrument, topical application of traditional substances to the cord, care givers' educational status and knowledge about dry cord care.

Limitations

No microbiological evaluation was done for the omphalitis cases in the study. Binary logistic regression analysis of the predictors for the outcome as omphalitis was also not done.

Conclusion

Omphalitis rate among enrolled newborn was 15%. Cutting cord with unsterile instruments, applying traditional substances to the cord and low educational status among the care givers were related with development of omphalitis.

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