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Effect of Early Essential Newborn Care and Breastfeeding on Reducing Perinatal Morbidity versus Routine Birth Care

Sahiba Dost, Sadia Aftab, Majida Zafar, Sobia Luqman, Kinza Shakeel, Tahreem Sehar

ABSTRACT

Objectives: To compare perinatal morbidity and breastfeeding practices between infants who received Early Essential Newborn Care (EENC) during the first 90 minutes of life versus those who received routine care.

Study Design and Setting: The study design is a comparative cohort study. The study was performed at the Department of Maternal Child Health (MCH), Pakistan Institute of Medical Sciences (PIMS), Islamabad.

Methods: The study involved 600 live singletons vaginally born infants conducted in a hospital setting. Infants were divided into one group receiving routine birth care and the other receiving EENC. The differences between the two groups in terms of health outcomes were analyzed employing Chi-square tests, t-tests, and logistic regression.

Results: EENC significantly reduced the rate of hypothermia compared to the routine care group ($p < 0.001$). Exclusive breastfeeding at discharge was particularly higher in the EENC group ($p < 0.001$), as was breastfeeding within the first hour ($p < 0.001$). The mean length of hospital stay for the EENC group ($p = 0.01$) was also shorter. We performed Logistic regression analysis and found that EENC was independently associated with reduced odds of neonatal infection ($p < 0.001$), respiratory distress ($p = 0.004$), and jaundice requiring treatment ($p = 0.002$).

Conclusion: Early Essential Newborn Care has a major impact on improving neonatal health outcomes with an increase in breastfeeding initiation, reduction in perinatal morbidity, and facilitated faster recovery from illnesses. EENC should be considered an important strategy for promoting newborn health in the hospital setting.

Keywords: Infant, Newborn?, Perinatal Care?, Breast Feeding?, Morbidity?

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INTRODUCTION

According to the World Health Organization (WHO), perinatal morbidity includes illness or conditions that are experienced by the newborn and the mother, defined as 22 completed weeks' gestation until seven days after birth.[1] Perinatal morbidity poses a continued major public health issue worldwide, especially in low and middle-income countries, where neonatal morbidity and mortality are compounded due to deficit access to quality healthcare services and low financial resources.[2] Although neonatal illnesses are largely preventable with appropriate and timely care, they remain one of the primary causes of complications in the long-term health of infants as well as infant deaths.[3] The United Nations Children's Fund (UNICEF) estimates that a large proportion of neonatal deaths are attributable to preventable causes that are related to poor perinatal care practices.[4]

Timely and appropriate Early Essential Newborn Care (EENC) has been shown to significantly reduce neonatal morbidity and mortality. [5] The core components of EENC include early drying and rapid warming of the newborn, early initiation of breastfeeding, and aseptic umbilical cord care. [6] These practices play a crucial role in stabilizing the newborn immediately after birth, reducing the risk of

infections, and fostering mother-infant bonding, which is essential for the baby's physical and emotional development. [7] Several studies have demonstrated that EENC effectively reduces neonatal complications such as hypothermia, infections, respiratory distress, and jaundice—conditions that are among the leading causes of perinatal morbidity and mortality, particularly in resource-limited settings. [8, 9]

A critical component of newborn care is the early initiation of breastfeeding.[10] Breastfeeding within the first hour of life ensures that the newborn receives colostrum, a nutrient-rich first milk containing essential antibodies that protect against infections and strengthen the infant's immune system.[11] Early initiation of breastfeeding has been strongly associated with a reduced incidence of neonatal infections, a major contributor to perinatal morbidity worldwide.[12] Furthermore, establishing breastfeeding early promotes long-term health benefits, including improved cognitive development, reduced risk of chronic diseases later in life, and enhanced maternal health. The WHO and UNICEF recommend exclusive breastfeeding for the first six months of life due to its well-documented benefits for infant growth, development, and survival.

Despite these well-established benefits, routine birth care practices still pose barriers to optimal newborn care in many healthcare settings, particularly in regions with underdeveloped healthcare infrastructure. Traditional practices such as delayed cord clamping, lack of immediate skin-to-skin contact, and late initiation of breastfeeding remain prevalent despite evidence suggesting they are less effective in preventing perinatal morbidity compared to EENC. Moreover, while delayed cord clamping has been linked to improved infant iron levels, it may also contribute to neonatal jaundice and other health complications.

Several studies have investigated the impact of EENC and early breastfeeding on neonatal health outcomes, particularly in low-resource settings where access to advanced medical interventions is limited. However, despite growing evidence supporting the benefits of EENC, there remains a lack of comparative research directly evaluating EENC versus routine birth care practices in terms of perinatal morbidity. Additionally, the long-term health outcomes of mothers and infants with EENC are poorly understood. The purpose of this study is to fill these gaps by comparing EENC, which included initiating exclusive breastfeeding within the first 90 minutes of life, versus routine birth care practices on neonatal health outcomes. The results from this study will contribute to the field of neonatal health by providing recommendations to enhance newborn health practices using evidence-based approaches, especially in resource-limited settings, to improve maternal and infant outcomes on the whole.

METHODOLOGY

In this study, the Early Essential Newborn Care (EENC) with early breastfeeding initiation was compared with routine birth care practices using a comparative cohort design to determine the perinatal morbidity reduction effect. The study was carried out in one of the largest maternity hospitals, the Department of Maternal Child Health (MCH), Pakistan Institute of Medical Sciences (PIMS), Islamabad. The duration of the study was 6 months i-e from 1st April 2023 to 1st October 2023. following the approval of the research synopsis from Ethical Review Board (ERB) No. F, 1-1/2015/ERB/SZABMU/1213, Dated: 30-11-2023.

The sampling technique adopted was non-probability consecutive sampling. The sample size was determined based on an anticipated 7% absolute reduction in perinatal morbidity rates between the EENC and routine care groups. This estimation was informed by previous studies demonstrating significant improvements in neonatal outcomes following EENC implementation.[13] Assuming a 95% confidence level and 80% power, a total of 300 infants per group (n=600) was calculated as the minimum required sample size to detect a statistically significant difference in perinatal morbidity.

The study included vaginally born, live, singleton infants delivered within the study period to control for temporal bias. Eligible mothers were aged between 18 and 45 years, and their newborns had no major congenital anomalies. Infants were excluded if they were born preterm, had severe birth defects, required immediate resuscitation at birth, or if their mothers did not consent to participate.

Data were collected through a combination of prospective observations and retrospective medical records. Maternal demographic and clinical details, including age, parity, gestational age at delivery, and medical history, were recorded. Delivery-related information such as mode of delivery, birth weight, and Apgar scores were also documented. Neonatal outcomes were assessed by measuring body temperature within the first 30 minutes of life to evaluate thermal regulation. The initiation of exclusive breastfeeding within the first hour was noted, and perinatal morbidity was assessed by tracking neonatal infections, jaundice requiring treatment, respiratory distress, and hypoglycemia during the first seven days of life. We also noted the length of the stay in the hospital for those participants who developed complications requiring a longer hospital stay. In addition, health system data were gathered and coded to include healthcare provider practices and infant care patterns of practice related to cord clamping, initiating breastfeeding, and skin-to-skin care.

The 600 infants were designated to the Early Essential Newborn Care (EENC) group or the Routine Care group depending on the care practices at birth. Infants were not randomly assigned but identification followed hospital protocol and maternal preferences. Thus, 300 infants received the EENC protocol and 300 infants were designated to the Routine Care group. Infants who received skin-to-skin contact, an opportunity to breastfeed early, and

thermoregulation as part of the EENC protocol were placed into this group, while those who received the standard routine care were assigned to this group.

To ensure valid and consistent data collection, data from the Early Essential Newborn Care (EENC) group was prospectively documented during the labor and delivery room and the first 90 minutes of life. Observations were regarding key practices such as skin-to-skin contact, initiation of breastfeeding, and thermal care. In contrast, data from the routine care group was retrospectively documented from the medical records, collecting data on initiation of breastfeeding, clamp cord events, and other immediate newborn care interventions. Continued monitoring occurred until discharge from the hospital, with pediatric staff documenting the newborn's health status until discharge, and assessing for any morbidities.

SPSS 25 statistical software was used for the data analysis. Baseline characteristics were descriptively summarized, and bivariate analysis utilized chi-square tests for categorical variables, and t-tests or Mann-Whitney U tests for continuous variables. For confounding variables such as maternal age, parity, and gestational age, a multivariate analysis was performed. Logistic regression was used to evaluate the independent effect of EENC on the outcome of morbidity in neonates, with $p < 0.05$ considered significant.

RESULTS

The demographic and clinical characteristics of the study participants were similar between the EENC and Routine Care groups, with no statistically significant differences observed in maternal age ($p = 0.76$), parity ($p = 0.52$), gestational age ($p = 0.45$), mode of delivery ($p = 0.42$), birth weight ($p = 0.95$), or Apgar score at five minutes ($p = 0.87$) (Table 1).

Neonatal health outcomes were significantly better in the EENC group compared to routine care. Hypothermia was observed in 8.0% of neonates in the EENC group, whereas it was significantly higher at 20.0% in the Routine Care group ($p < 0.001$). Breastfeeding initiation within one hour was notably higher in the EENC group (92.0%) compared to 60.0% in the Routine Care group ($p < 0.001$). Similarly, exclusive breastfeeding at discharge was higher in the EENC group (88.0%) than in the Routine Care group (65.0%) ($p < 0.001$). Perinatal morbidity outcomes also showed significant differences, with neonatal infection occurring in 4.0% of the EENC group compared to 12.0% in the Routine Care group ($p < 0.001$), jaundice requiring treatment in 6.0% versus 15.0% ($p = 0.002$), and respiratory distress in 3.0% versus 10.0% ($p = 0.004$). The length of hospital stay was significantly shorter in the EENC group (3.5 ± 1.2 days) compared to the Routine Care group (4.2 ± 1.4 days) ($p = 0.01$) (Table 2).

Logistic regression analysis further confirmed the benefits of EENC in reducing neonatal morbidity outcomes. The odds of neonatal infection were significantly lower in the EENC group (OR = 0.32, 95% CI: 0.20–0.50, $p < 0.001$). Similarly, the odds of respiratory distress (OR = 0.29, 95% CI: 0.12–0.64, $p = 0.004$) and jaundice requiring treatment (OR = 0.42, 95% CI: 0.25–0.71, $p = 0.002$) were significantly reduced. Additionally, neonates in the EENC group had significantly higher odds of exclusive breastfeeding at discharge (OR = 0.28, 95% CI: 0.16–0.48, $p < 0.001$). These odds ratios were adjusted for sociodemographic variables (Table 3).

DISCUSSION

The present study emphasizes the majority of benefits of Early Essential Newborn Care (EENC) over routine care in the neonatal outcome. Newborn infants who received EENC had improved thermal stability, increased exclusive breastfeeding, and lower perinatal morbidity when compared to newborn infants who received routine care. These results are congruent with previous studies that have emphasized early postnatal interventions (skin-to-skin contact, early breastfeeding initiation, and thermal protection) as postnatal interventions that can reduce morbidity and mortality.

The EENC group observed a significant reduction in hypothermia in the EENC group. Only 8% of the newborns experienced hypothermia compared to 20% of the EENC group ($p < 0.001$). These results are consistent with a study by Mansoor S, et al. (2025) from Jamshoro, Pakistan, who demonstrated that early skin-to-skin contact promotes neonatal body temperature regulation and prevents hypothermia.[14] Likewise, Ramaswamy et al. (2022) conducted a meta-analysis that found immediate postnatal skin-to-skin contact significantly improved thermal stability and decreased rates of neonatal hypothermia.[15] The positive thermal outcomes in the EENC group support WHO recommendations advocating immediate postnatal care interventions for thermoregulation, particularly in resource-limited settings. The results also revealed significant differences in breastfeeding initiation between the two groups. In the EENC group, 92% of neonates initiated breastfeeding within the first hour of life compared to 60% in the routine care group ($p < 0.001$). Additionally, exclusive breastfeeding at discharge was higher in the EENC group (88% vs. 65%, $p < 0.001$). These findings align with previous research by Sangild PT et al. (2021) from Denmark, who found that early breastfeeding initiation reduces neonatal mortality by ensuring early colostrum intake, which provides essential nutrients and passive immunity.[16] Another study by Borg B et al. (2022) from Australia and a literature review by Layuk N et al., (2021) indicated that early initiation of breastfeeding within the first hour significantly decreases the risk of neonatal infections.[17, 18] The high rates of exclusive breastfeeding in the EENC group reinforce the role of early breastfeeding practices in promoting continued breastfeeding beyond hospitalization.

Table 1: Demographic and Clinical Characteristics of Study Participants

Characteristic	EENC Group (n = 300)	Routine Care Group (n = 300)	p-value
Maternal Age (years, Mean ± SD)	29.5 ± 5.6	29.6 ± 5.7	0.76
Maternal Parity, n (%)			
Primipara	150 (50.0%)	155 (51.7%)	0.52
Multipara	150 (50.0%)	145 (48.3%)	
Gestational Age (weeks, Mean ± SD)	38.9 ± 1.2	39.0 ± 1.1	0.45
Mode of Delivery, n (%)			
Spontaneous Vaginal	240 (80.0%)	245 (81.7%)	0.42
Assisted Vaginal	60 (20.0%)	55 (18.3%)	
Birth Weight (kg, Mean ± SD)	3.3 ± 0.5	3.3 ± 0.5	0.95
Apgar Score (5 minutes, Mean ± SD)	8.5 ± 0.6	8.5 ± 0.6	0.87

Table 2: Neonatal Health Outcomes by Care Group

Outcome	EENC Group (n = 300)	Routine Care Group (n = 300)	p-value
Thermal Regulation, n (%)			
Hypothermia (temperature <36.5°C)	24 (8.0%)	60 (20.0%)	<0.001
Breastfeeding Initiation, n (%)			
Initiation within 1 hour	276 (92.0%)	180 (60.0%)	<0.001
Exclusive breastfeeding at discharge	264 (88.0%)	195 (65.0%)	
Perinatal Morbidity, n (%)			
Neonatal Infection (sepsis/pneumonia)	12 (4.0%)	36 (12.0%)	<0.001
Jaundice requiring treatment	18 (6.0%)	45 (15.0%)	0.002
Respiratory Distress	9 (3.0%)	30 (10.0%)	0.004
Length of Hospital Stay (days, Mean ± SD)	3.5 ± 1.2	4.2 ± 1.4	0.01

Table 3: Logistic Regression Results for Neonatal Morbidity Outcomes

Outcome	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Neonatal Infection (sepsis/pneumonia)	0.32	0.20 - 0.50	<0.001
Respiratory Distress	0.29	0.12 - 0.64	0.004
Jaundice Requiring Treatment	0.42	0.25 - 0.71	0.002
Exclusive Breastfeeding at Discharge	0.28	0.16 - 0.48	<0.001

Note: Odds ratios were adjusted through multiple logistic regression for sociodemographic variables.

The study demonstrated a significant reduction in neonatal morbidity among infants receiving EENC. Neonatal infection rates were lower in the EENC group (4% vs. 12%, $p < 0.001$), as were rates of jaundice requiring treatment (6% vs. 15%, $p = 0.002$) and respiratory distress (3% vs. 10%, $p = 0.004$). These findings are consistent with those of Johansson et al. (2024) from Sweden, who reported that early skin-to-skin contact reduces the risk of neonatal infections by promoting breastfeeding, which enhances immune protection. [19] Additionally, another study conducted by Tran et al. (2021) from Vietnam found that early neonatal interventions significantly decrease the likelihood of post-delivery complications. [20] The study by Brimdyr K, et al. (2023) from the USA observed a reduction in respiratory distress in the EENC group that may be attributed to the physiological stabilization facilitated by immediate skin-to-skin contact. [21]

The mean length of hospital stay was significantly shorter in the EENC group (3.5 vs. 4.2 days, $p = 0.01$). This finding aligns with studies by Alsadaan N, et al. (2023) from Saudi Arabia, which suggest that improved neonatal health outcomes from early interventions contribute to shorter hospital stays and reduced healthcare costs.[22] Shorter hospitalization durations not only benefit healthcare systems by reducing resource utilization but also enhance maternal-infant bonding and decrease the risk of hospital-acquired infections.

Logistic regression analysis confirmed that the beneficial effects of EENC on neonatal health outcomes were independent of potential confounders such as maternal age and parity. Infants in the EENC group had significantly lower odds of neonatal infection (OR = 0.32, $p < 0.001$), respiratory distress (OR = 0.29, $p = 0.004$), and jaundice requiring treatment (OR = 0.42, $p = 0.002$). These findings are consistent with research by the World Health Organization (WHO) and UNICEF, emphasizing the effectiveness of immediate newborn care practices in improving survival rates and reducing neonatal complications.[23-25]

The findings of this study have significant implications for hospital policies and clinical guidelines. The evidence strongly supports the integration of EENC into standard neonatal care protocols in hospital settings. Training healthcare providers on the importance of early skin-to-skin contact, timely initiation of breastfeeding, and effective thermal care should be a priority in the hospital setting. Moreover, making EENC an established norm can help reduce rates of neonatal morbidity and length of hospital stay, which in turn improves neonatal survival and reduces the burden on healthcare services.

CONCLUSION

EENC offers significant improvements in health outcomes for newborns as compared to routine care. Newborns receiving EENC are more likely to maintain normal thermal stability; initiate breastfeeding within one hour of birth; and morbidity, including infections, jaundice, and respiratory distress, during their stay. These results support the importance of early care interventions in the first 90 minutes of life, which is consistent with global health recommendations for newborn care

Authors Contribution:
Sahiba Dost: Substantial contributions to conception and design, acquisition of data, analysis and interpretation of data; Drafting the article & revising it critically for important intellectual content; Final approval of the version to be published.
Sadia Aftab: Acquisition of data, analysis and interpretation of data; Drafting the article, Final approval of the version to be published.
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Qurrat-ul-Ain: Drafting the article, Final approval of the version to be published
Tahreem Sehar: Analysis and interpretation of data, Final approval of the version to be published

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