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Original Research Article

Effect of Early Essential Newborn Care on Reducing the Neonatal Morbidity and Mortality

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Abstract: *Neonatal morbidity and mortality remain critical public health challenges, particularly in low- and middle-income countries.* ***Objective:*** *To assess the impact of EENC on neonatal hypothermia, early-onset sepsis, NICU admissions, breastfeeding initiation, and mortality in a tertiary care setting.* ***Methods:*** *This prospective observational study was conducted at Sheikh Zayed Hospital, Rahim Yar Khan. A total of 85 neonates were enrolled in the study. The sample size was determined based on previous research suggesting a significant reduction in neonatal complications with EENC implementation.* ***Results:*** *The post-EENC group showed a significant reduction in hypothermia (7.1% vs. 24.7%, p=0.01) and early-onset sepsis (8.2% vs. 18.8%, p=0.04) compared to the pre-EENC group. NICU admissions decreased (10.5% vs. 22.3%, p=0.03), and timely breastfeeding initiation improved markedly (92.9% vs. 58.8%, p=0.001). Although neonatal mortality was lower in the EENC group (1.2% vs. 7.1%), this difference was not statistically significant (p=0.09). No adverse outcomes associated with EENC were reported.* ***Conclusion:*** *EENC is a safe and effective strategy that significantly improves early neonatal outcomes. Its implementation is associated with reduced hypothermia, infections, and NICU admissions, as well as enhanced early breastfeeding. These findings support the routine adoption of EENC protocols in clinical practice to reduce preventable neonatal morbidity and mortality.*

Keywords: Breast Feeding, Hypothermia, Infant, Newborn, Intensive Care Units, Neonatal, Sepsis

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Introduction

Neonatal morbidity and mortality represent a critical global health concern, especially in resource-limited settings where infrastructure, trained personnel, and standardized clinical protocols are often lacking. According to the World Health Organization (2020), an estimated 2.4 million neonatal deaths occur globally every year, and approximately 75% of these take place during the first week of life (1). Most of these deaths are preventable with timely and evidence-based interventions. Early Essential Newborn Care (EENC) has emerged as a cornerstone strategy to address these avoidable causes by promoting universal, standardized care immediately after birth (2). EENC encompasses a package of interventions designed to ensure the stability and survival of the newborn in the immediate postpartum period. This includes immediate and thorough drying of the newborn, delayed cord clamping (after at least one minute), immediate skin-to-skin contact with the mother, early initiation of exclusive breastfeeding, and hygienic cord care (3). These seemingly simple practices are underpinned by decades of research in neonatal physiology and have been shown to significantly reduce complications such as neonatal hypothermia, sepsis, hypoglycemia, respiratory distress, and even intrapartum-related stillbirths. One of the central features of EENC is skin-to-skin contact, which plays a crucial role in thermoregulation, glucose homeostasis, and cardiorespiratory stabilization of the newborn (4). This practice also enhances maternal-infant bonding and increases the likelihood of successful breastfeeding. Initiation of breastfeeding within the first hour of life, the so-called “golden hour,” has been shown to reduce the risk of neonatal death by 22%. Furthermore, delayed cord clamping allows for continued placental transfusion, leading to improved neonatal hemoglobin levels, better iron stores, and reduced risk of anemia in infancy (5). Despite the clear benefits, the implementation of EENC in clinical practice remains inconsistent. This is particularly true in developing countries like Pakistan, where traditional delivery practices, lack of awareness among health workers, and high patient loads often hinder optimal newborn care (6). A 2021 UNICEF report revealed that in many public sector hospitals, immediate newborn care is deprioritized in favor of maternal stabilization, leading to missed opportunities in the critical first hour of life (7). Additionally, inadequate training and poor adherence to neonatal resuscitation and early care protocols further compromise outcomes (8). Studies from countries such as Nepal, the Philippines, and Cambodia, where EENC has been systematically implemented, demonstrate dramatic reductions in neonatal sepsis, hypothermia, and overall mortality (9). For instance, in a WHO-led initiative in the Philippines, institutionalizing EENC led to a 40% reduction in neonatal deaths due to asphyxia and infection within two years. However, data from South Asian countries, including Pakistan, are still sparse, and most existing studies lack robust methodology or adequate follow-up (10).Thus this study was designed to assess the impact of EENC on neonatal hypothermia, early-onset sepsis, NICU admissions, breastfeeding initiation, and mortality in a tertiary care setting.

Methodology

This prospective observational study was conducted at Shiekh Zaid women Hospital Larkana from January 2024 to January 2025.. A total of 85 neonates were enrolled in the study. The sample size was determined based on previous research suggesting a significant reduction in neonatal complications with EENC implementation. Using a 95% confidence level and 80% power, 85 participants were considered sufficient to detect statistically meaningful differences between groups. Data was collected using a non-probability consecutive sampling technique. Neonates were included if they were born at a gestational age of 34 weeks or more, were singleton live births, and were delivered within the study hospital. Consent from the mother was mandatory for participation. Neonates with known congenital anomalies, those requiring advanced neonatal resuscitation beyond routine drying and stimulation, and neonates

transferred out of the facility within the first hour post-delivery were excluded from the study.

Data collection was done using a structured proforma. Information was recorded on maternal demographics, delivery characteristics, each step of the EENC protocol, and the health status of the newborn. The intervention involved implementing the WHO-recommended EENC package for all enrolled neonates. This included immediate and thorough drying within 30 seconds of birth, skin-to-skin contact on the mother's chest for at least one hour, delayed cord clamping for one to three minutes, initiation of exclusive breastfeeding within the first hour, and hygienic cord care. The protocol was executed by trained midwives and neonatal nurses using a standardized checklist to ensure consistency and quality. Neonatal outcomes in the post-intervention (EENC) group were compared with those from a retrospective control group comprising 85 neonates born in the same setting prior to the implementation of EENC. The control group was matched based on gestational age and delivery mode to reduce confounding and improve the validity of the comparison. Follow-up was conducted for 7 days post-delivery, either during the hospital stay or via follow-up calls, to monitor early neonatal outcomes such as feeding initiation, infections, and admissions.

Data were analyzed using SPSS version 26. Continuous variables such as birth weight and time to breastfeeding initiation were presented as means with standard deviations, and group differences were evaluated using independent sample t-tests. A p-value of 0.05 or less was considered statistically significant.

Results

A total of 85 neonates were included in the analysis. The mean gestational age at delivery was 38.2 ± 1.6 weeks, with no significant difference between the pre-EENC and post-EENC groups. The average birth weight was 2.91 ± 0.42 kg, and male neonates slightly outnumbered females in both groups. Maternal age, parity, and delivery method were comparable between the groups, ensuring that demographic differences did not confound the intervention outcomes. (Table1)

Table 1: Baseline Characteristics of Neonates

Variable	Pre-EENC (n=42)	Post-EENC (n=43)	p-value
Gestational Age (weeks)	38.1 ± 1.5	38.3 ± 1.7	0.42
Birth Weight (kg)	2.87 ± 0.41	2.95 ± 0.43	0.18
Male Gender (%)	54.8%	51.2%	0.71
Hypothermia (%)	24.7%	7.1%	0.01
Suspected Early-Onset Sepsis (%)	18.8%	8.2%	0.04

The proportion of newborns requiring NICU admission dropped significantly from 22.3% before EENC to 10.5% after EENC (p = 0.03), indicating better immediate neonatal outcomes. Neonatal mortality also decreased from 7.1% to 1.2%, although this difference did not reach statistical significance (p = 0.09). Importantly, early breastfeeding within the first hour of birth increased dramatically from 58.8% to 92.9% (p = 0.001), suggesting that EENC had a strong impact on promoting timely breastfeeding. Additionally, the percentage of newborns with a healthy Apgar score (≥7 at 1 minute) improved from 76.4% to 88.3%, though this change was not statistically significant (p = 0.12). (Table 2)

Table 2: NICU Admission and Neonatal Mortality

Outcome	Pre-EENC (n=42)	Post-EENC (n=43)	p-value
NICU Admission (%)	22.3%	10.5%	0.03
Neonatal Mortality (%)	7.1%	1.2%	0.09
Breastfeeding Within 1 Hour (%)	58.8%	92.9%	0.001
Apgar Score ≥7 at 1 minute (%)	76.4%	88.3%	0.12

The incidence of hypothermia was significantly lower in vaginal deliveries (6.0% vs 20.0%, p = 0.03), emphasizing the protective nature of normal delivery in thermal regulation. NICU admission rates were lower among vaginal births (10.0%) compared to cesarean deliveries (17.1%), though this difference was not statistically significant (p = 0.28). Breastfeeding within the first hour was also much more common in vaginal births (88.0%) than in cesarean deliveries (65.7%, p = 0.01), possibly due to less maternal-infant separation. (Table 3)

Table 3: Neonatal Outcomes by Mode of Delivery

Outcome	Vaginal Delivery (n=50)	Cesarean Delivery (n=35)	p-value
Hypothermia (%)	6.0%	20.0%	0.03
NICU Admission (%)	10.0%	17.1%	0.28
Breastfeeding < 1 Hour (%)	88.0%	65.7%	0.01

Hypothermia was significantly less common in this group (4.4% vs 22.5%, p = 0.007), indicating that maternal education may play a role in promoting thermal care practices. Although not statistically significant, early sepsis rates were lower in babies of educated mothers (6.7%) compared to those of less educated mothers (15.0%, p = 0.19). Breastfeeding within the first hour was also more prevalent among educated mothers (93.3%) versus their less educated counterparts (72.5%, p = 0.01), reinforcing the link between education and early initiation of breastfeeding. (Table 4)

Table 4: Neonatal Outcomes by Maternal Education Level

Outcome	Educated Mothers (n=45)	Less Educated Mothers (n=40)	p-value
Hypothermia (%)	4.4%	22.5%	0.007
Early Sepsis (%)	6.7%	15.0%	0.19
Breastfeeding < 1 Hour (%)	93.3%	72.5%	0.01

Discussion

This study evaluated the impact of Early Essential Newborn Care (EENC) on critical neonatal outcomes such as hypothermia, early-onset sepsis, NICU admissions, neonatal mortality, and timely initiation of breastfeeding. The findings demonstrate that EENC significantly improves neonatal health indicators when implemented immediately after birth, particularly in resource-limited settings. One of the most prominent findings was the reduction in neonatal hypothermia in the EENC group (11). Hypothermia, which contributes to a cascade of complications including metabolic derangements and increased infection risk, was significantly lower (7.1%) in neonates who received EENC compared to those who did not (24.7%) (12) (13). This supports global evidence that thermal protection through immediate drying, skin-to-skin contact, and delayed bathing is essential to neonatal survival, especially in the first hour of life (WHO, 2017) (14). Another important outcome was the decline in early-onset neonatal sepsis. The EENC group showed a substantially lower sepsis rate (8.2%) than the control group (18.8%). This is consistent with other studies where hygienic cord care, minimized handling, and early breastfeeding contributed to immune system priming and a reduced risk of neonatal infections (15)(16). Early breastfeeding itself was significantly improved in the EENC group, with 92.9% of newborns being breastfed within the first hour, compared to 58.8% in the pre-EENC group. This immediate feeding is known to enhance neonatal immunity through colostrum intake and has been linked with improved thermoregulation and bonding. The NICU admission rate was also lower among neonates receiving EENC (10.5% vs. 22.3%), primarily due to fewer cases of hypothermia and sepsis. This result implies that EENC is not only beneficial for the newborn but also reduces strain on hospital resources and NICU occupancy, which is particularly relevant in low- and middle-income countries with limited intensive care capacity. Though the neonatal mortality rate in the EENC group was lower (1.2%) than in the pre-EENC group (7.1%), this difference was not statistically significant, likely due to the limited sample size. However, the trend suggests that with a larger cohort, this benefit might reach significance, aligning with findings from multicenter trials in Asia and Africa. Secondary analyses also revealed that maternal education and vaginal delivery were associated with better EENC adherence and improved outcomes (17). Educated mothers were more likely to breastfeed early, and vaginal delivery facilitated uninterrupted skin-to-skin contact, which is often delayed during cesarean sections. These findings underscore the importance of contextual factors such as health literacy and delivery practices in optimizing newborn care. Importantly, no adverse effects related to EENC practices were recorded, confirming the intervention's safety. The consistent reduction in key neonatal complications further emphasizes that EENC can be safely and effectively integrated into standard obstetric and neonatal workflows, even in settings with limited technological infrastructure (18). Collectively, these results strengthen the case for routine implementation of EENC protocols as a low-cost, high-impact intervention. Despite the limitations posed by a single-center design and modest sample size, the significant improvements in neonatal thermoregulation, infection control, and breastfeeding initiation make EENC a compelling strategy for newborn survival and well-being. Future efforts should focus on scaling this intervention across all birth settings, especially in regions with high neonatal mortality rates.

Conclusion

It is concluded that the implementation of Early Essential Newborn Care (EENC) significantly improves neonatal outcomes by reducing the incidence of hypothermia, early-onset sepsis, and NICU admissions, while also promoting timely initiation of breastfeeding. The practice proved to be safe, feasible, and effective even in resource-limited settings, highlighting its potential to serve as a critical intervention for reducing preventable neonatal morbidity and mortality.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-SZHRYK-974-24)
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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

GF (Post graduate trainee)
Manuscript drafting, Study Design,
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Review of Literature, Data entry, Data analysis, and drafting articles.
BM (Technical Officer)
Conception of Study, Development of Research Methodology Design,

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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