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Assessment of Postnatal Weight Gain Patterns and its Predictors Among Very Low Birth Weight Preterm Neonates Admitted to Neonatal Intensive Care Unit of Selected Public Hospitals, Addis Ababa, Ethiopia

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Abstract

Back ground: *Very low birth weight (≤1500 grams, <37 weeks gestation) is a leading cause of newborn mortality, significantly predicting deaths in the first 28 days.*

Objective: *To assess pattern of post natal weight gain and its predictor among very low birth weight preterm neonates admitted in neonatal intensive care units.*

Methods: *An institutional-based retrospective study was conducted on a sample of 422 very low birth weight (VLBW) preterm neonates from January 2022 to January 2025. Data were collected, coded, and entered using Kobo Toolbox, and then exported to SPSS Version 27 for analysis. Variables with a p-value < 0.25 were used for bivariate analysis and entered into multivariate logistic regression analysis, with $p < 0.05$ considered statistically significant. Adjusted odds ratios with 95% confidence intervals and p-values were considered.*

Result: *A total of 413 samples were analyzed, and 78.2% exhibited adequate postnatal weight gain, with an average weight gain of 19.6 g/kg/day. Factors significantly associated with adequate weight gain were delivery via SVD: AOR = 2.56 (1.40-4.69), regaining birth weight within 14 days: AOR = 4.91 (1.28-18.75), feeding every two hours: AOR = 3.30 (1.79-6.10), kangaroo mother care: AOR = 4.42 (2.38-8.21), and oxygen use for less than 9 days: AOR = 2.75 (1.30-5.84).*

Conclusion & Recommendations: *The postnatal weight gain in VLBW neonates exceeded the recommended guidelines outlined in the Ethiopian neonatal intensive care unit. Based on these findings, we recommend implementing enhanced care protocols for very low birth weight preterm neonates, prioritizing early detection and management of comorbidities, and encouraging optimal feeding practices.*

Keywords: Very Low Birth Weight, Preterm, Neonates, Postnatal, Weight Gain Patterns.

Abbreviations
AAU: Addis Ababa University
AGA: Appropriate For Gestational Age
AOR: Adjusted Odds Ratio.
BSC: Bachelor of Science
CI: Confidence Interval

CS: Caesarean Section
GA: Gestational Age
KMC: Kangaroo Mother Care.
LBW: Low Birth Weight.
NEC: Necrotizing Enter Colitis
NICU: Neonatal Intensive Care Unit.
SPSS: Statistical Package for Social Science.
RDS: Respiratory Distress Syndrome
SVD: Spontaneous Vaginal Delivery.
VLBW: Very Low Birth Weight.
WHO: World Health Organization.

Brief Information on the Study

What is Already Known in this Topic?

Research on postnatal weight gain patterns among very low birth weight preterm neonates has identified that these infants often encounter significant challenges in achieving optimal growth due to their immature physiology and increased susceptibility to various health complications. Previous studies suggest that environmental factors within neonatal intensive care units; such as feeding practices, gestational age at birth, and staff education and expertise: are critical predictors of growth outcomes. However, in the Ethiopian socio-cultural context, there is very limited research on interventions aimed at enhancing weight gain and preventing comorbidities.

What This Study Adds

The current study aims to examine the postnatal weight gain patterns of very low birth weight preterm neonates admitted to selected public hospitals in Addis Ababa, Ethiopia. The findings will be valuable for policymakers, educators, researchers, and healthcare providers, contributing to improved overall healthcare outcomes related to very low birth weight in the study area.

How this Study Might Affect Research, Practice, or Policy

This study provides valuable evidence on the postnatal weight gain patterns of preterm neonates. The results can serve as baseline data for other researchers and assist policymakers in developing standardized guidelines for nutritional interventions. Additionally, the findings and recommendations can help in planning as capacity-building initiatives for healthcare workers.

The Primary and Secondary Outcomes for the Study

Primary Outcome: The study aims to assess the rate and pattern of postnatal weight gain in very low birth weight preterm neonates over a specified period during their stay in the neonatal intensive care unit.

Secondary Outcomes: a) Identification of various predictors affecting weight gain, including: Maternal factors (e.g., age, health status), Neonatal factors (e.g., gestational age, birth weight), Nutritional interventions (e.g., type of feeding), and Clinical interventions. b) Evaluation of the frequency and extent of weight loss in VLBW preterm neonates during NICU admission. c) Assessment of the correlation between weight gain patterns and the average length of NICU stay.

Background

According to the WHO, very low birth weight (VLBW) refers to neonates with a birth weight of 1500 grams or less and born before 37 weeks of gestation [1]. Approximately 90% of VLBW babies are considered growth-restricted if their postnatal weight gain is less than 15 g/kg/day by 36 weeks gestation, indicating developmental delays and placing them below the 10th percentile on a standardized intrauterine growth curve [2]. Factors such as early postnatal weight loss, the degree of intrauterine growth restriction, and the level of care provided significantly influence a baby's postnatal weight gain [3].

This study highlights the lack of evidence regarding postnatal weight gain patterns and predictors in VLBW preterm infants in Ethiopia. Addressing this gap could enhance management guidelines and improve early nutritional practices, helping to minimize postnatal weight loss and ensure adequate weight gain [4].

A cross-sectional study conducted at Aider Comprehensive Specialized Hospital found that neonates with a birth weight of less than 1500 grams had increased odds of mortality—by 49%, 70%, and 80%—compared to those weighing 1500–2449 grams, 2500–3999 grams, and more than 4000 grams, respectively [5]. Additionally, an observational study in Jimma reported a prevalence of VLBW and prematurity at 14.6% and 10.2%, respectively [6]. Understanding the trajectory of weight gain, the factors predicting successful postnatal growth, and interventions to support this growth is crucial for reducing morbidity and mortality among this high-risk group [7]. By identifying key predictors of postnatal weight gain, healthcare providers can make evidence-based decisions that optimize growth, reduce complications, and ultimately improve survival and neurodevelopmental outcomes. The WHO estimates that over 20 million low birth weight neonates are born annually, accounting for 15-20% of all births. These infants often face both short- and long-term health consequences [8]. Poor postnatal weight gain, which can contribute to mortality, may be influenced by feeding practices, medical complications, and the quality of care provided to these vulnerable neonates [9].

A study conducted in South India reported a postnatal weight gain of 16.24 g/kg/day until discharge, indicating good weight gain [10]. Conversely, a study in Tanzania found an average weight gain of 12.7 g/kg/day in VLBW preterm neonates [11]. A prospective study in Iran revealed that neonates delivered via C-section gained less weight than those delivered vaginally [12]. Similarly, a U.S. study indicated that neonates born by C-section experienced poorer weight gain patterns [13].

Kangaroo Mother Care (KMC) has been shown to positively affect the growth of VLBW infants and increase breastfeeding rates [14]. In the KMC group, the mean age for regaining birth weight was significantly lower (15.68 vs. 24.56 days), and the average daily weight gain was significantly higher (22.09 vs. 10.39 g) compared to controls [15]. The feeding protocol for VLBW preterm neonates typically involves nasogastric tube feedings of 10 ml/kg of body weight at 2–3-hour intervals [16], while other VLBW infants are generally fed gavage with increments of 20 ml/kg at the same intervals.

Among neonates requiring prolonged invasive ventilation and oxygen treatment, 23.03% experienced poor postnatal weight gain [6]. A study in a tertiary care center in Southern India found that among 40 neonates, 45% regained birth weight within 14

days, while 55% experienced delays. Of those with delays, 50% had sepsis. Additionally, 24 neonates developed neonatal hyperbilirubinemia, with 77.3% of those experiencing weight gain delays also having hypoglycemia during their NICU stay [17]. Prolonged oxygen use (more than 9 days) in VLBW preterm neonates is associated with poor postnatal weight gain, often below the expected rate of 15 g/kg/day. This poor weight gain is linked to factors like respiratory distress syndrome and other medical complications [18].

To sum up, this study emphasizes the scarcity of data on postnatal weight gain patterns and predictors in VLBW preterm infants in Ethiopia. Addressing this gap could significantly enhance current management guidelines and reinforce early nutritional interventions, which are essential for minimizing postnatal weight loss and promoting optimal weight gain.

Significance of the Study

This study examines the patterns of postnatal weight gain and its predictors for very low birth weight (VLBW) preterm neonates, offering valuable insights for both clinical care and public health. Infants born before 37 weeks of gestation and weighing less than 1500 grams are at high risk for morbidity and mortality due to their underdeveloped organ systems. Postnatal weight gain is a crucial indicator of overall health, nutritional status, and the quality of neonatal intensive care unit (NICU) management. By identifying modifiable factors that influence weight gain, this study highlights opportunities for clinical interventions aimed at promoting better growth and development. Understanding the key predictors of postnatal weight gain enables healthcare providers to make evidence-based decisions that optimize growth, reduce complications, and ultimately enhance survival and neurodevelopmental outcomes.

The significance of this study lies in its potential to improve both immediate neonatal care and long-term health outcomes for VLBW preterm infants. The findings will help reduce the burden of preterm birth and refine neonatal care practices in Ethiopia, providing insights that can inform clinical protocols and public health interventions.

Conceptual Framework

The conceptual framework, illustrated in (Figure 1), depicts how postnatal weight gain in very low birth weight (VLBW) preterm infants is influenced by several factors. These include maternal and newborn socio-demographic characteristics, obstetric factors, feeding practices, and major comorbidities [3, 19, 20].

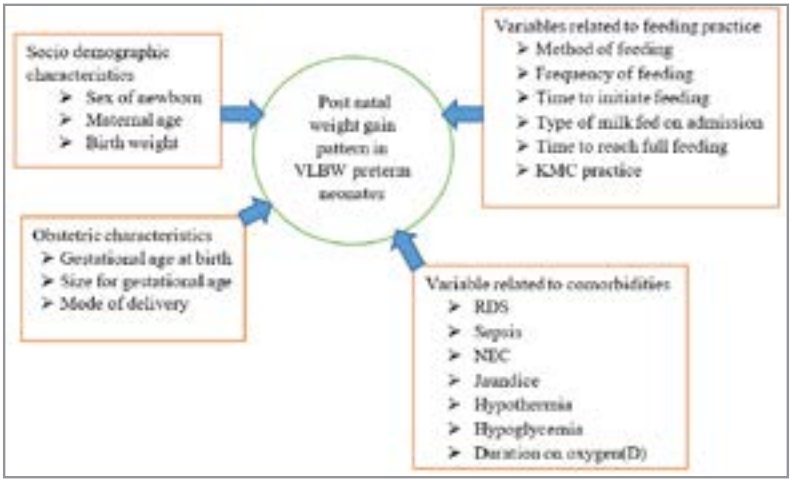

Figure 1: Conceptual framework for postnatal weight gain pattern and its predictors in very low birth weight preterm neonates.

Objectives of the Study

General Objective

- To assess the postnatal weight gain pattern and identify its predictors among very low birth weight preterm neonates admitted in neonatal intensive care unit of selected public hospitals in Addis Ababa, 2025.

Specific Objectives

- To determine postnatal weight gain pattern in very low birth weight preterm neonates admitted in neonatal intensive care unit of selected public hospital in Addis Ababa, 2025.
- To identify predictors of postnatal weight gain in very low birth weight preterm neonates admitted in neonatal intensive care unit of selected public hospital in Addis Ababa, 2025.

Methodology

Study Design, Settings and Period

A facility-based retrospective study was conducted among very low birth weight (VLBW) preterm neonates in selected public hospitals in Addis Ababa from February to April 2025. Addis Ababa, the capital city of Ethiopia, has a population of approximately 4,794,000 as of 2020 and is home to 98 governmental health centers and 12 hospitals.

Using a lottery method, three hospitals were selected for the study: Saint Paulo's Hospital Millennium Medical College, which handles over 2,500 deliveries annually; Gandhi Memorial Hospital, which provides 40-50 deliveries daily; and Yekatit 12 Hospital Medical College (Abebech Gobena Maternity and Child Health Hospital). These hospitals are known for their diverse patient populations and comprehensive healthcare services, making them valuable locations for assessing postnatal weight gain patterns and identifying predictors among VLBW preterm neonates.

Source Population

The source population consisted of all medical records of very low birth weight (VLBW) preterm neonates admitted to the neo-

natal intensive care units of selected public hospitals in Addis Ababa.

Study Population

The study population included medical records of VLBW preterm neonates admitted to the neonatal intensive care units of these selected public hospitals from January 2022 to January 2025, covering a three-year period.

Sample Size Determination

The sample size was determined using a single proportion formula, considering a prevalence (P) of poor postnatal weight gain at 50%. The critical value for a normal distribution at a 95% confidence interval (Zα/2) is 1.96. The margin of error (d) was set at 0.05. The sample size was calculated as follows: $n= \frac{(2^{\alpha}/_{2})^{2} \times p(1-p)}{d^{2}} \quad \frac{(1.96)^{2} \times 0.5(1-0.5)}{0.05^{2}}$ =384. After adding a 10% non-response rate, the final sample size was adjusted to n = 422.

Inclusion and Exclusion Criteria

All medical records of VLBW preterm neonates admitted in NICU in the first day of birth was included and Medical records of neonates with twin or triplet birth, had congenital malformations and/or chromosomal disorders diagnose during birth and neonates who died/discharged within 7 days before physiologic weight gain began and incomplete charts was excluded from the study.

Inclusion and Exclusion Criteria

Inclusion Criteria

All medical records of very low birth weight (VLBW) preterm neonates admitted to the neonatal intensive care unit (NICU) within the first day of birth were included in the study.

Exclusion Criteria

Medical records were excluded if they belonged to neonates who were part of a twin or triplet birth, had congenital malformations or chromosomal disorders diagnosed at birth, or if they died or were discharged within 7 days before physiological weight gain began. Incomplete medical charts were also excluded from the study.

Sampling Procedure

A systematic random sampling technique was employed to select the medical records of very low birth weight (VLBW) preterm neonates from each hospital. The total number of VLBW preterm neonates admitted to the neonatal intensive care unit (NICU) during the data collection period was estimated using the registration books.

As shown in (Table 1), the average number of VLBW preterm neonates admitted over three years (from January 2022 to January 2025) was 460 at Saint Paulo's Hospital Millennium Medical College, 295 at Yekatit 12 Hospital and 340 at Gandhi Memorial Hospital. Proportional allocation was then used to determine the number of records to be selected from each hospital.

Table 1: Sampling Procedures for Very Low Birth Weight Preterm Neonates Admitted to the NICU in Selected Public Hospitals of Addis Ababa (January 2022 - January 2025)

Selected Public hospital in Addis Ababa	Total number of VLBW preterm neonates	By proportional allocation	Total
Saint.paulos hospital	460	177	422
Gahandi memorial hospital	340	131	
Yekatit 12 hospital	295	114	

Data Quality Assurance

Data quality was ensured throughout the processes of collection, coding, entry, and analysis. To minimize bias and enhance data integrity, all data collectors and supervisors received training prior to the data collection phase. Regular supervision was conducted during data collection, with each chart checked for consistency, completeness, and proper documentation.

Two weeks before the actual data collection, a pretest was conducted at Tikur Anbesa Specialized Hospital on 5% of the sample size (n=21) to evaluate the clarity, application, and availability of the data collection instruments. Supervisors observed data collectors to ensure adherence to protocols and proper data collection methods.

Data Management and Analysis

Data was collected, coded, and entered using Kobo Toolbox, then exported to SPSS Version 27 for further analysis and cleaning. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were used for continuous variables.

Binary logistic regression analysis was conducted to examine the associations between dependent and independent variables. Variables with a p-value < 0.25 were selected as candidates for further analysis and entered into a multivariate logistic regression model to account for potential confounding factors. Significant associations with postnatal weight gain were identified at a p-value < 0.05.

Result

Socio-Demographic and Obstetric Factors for VLBW Preterm Neonates

A total of 413 very low birth weight preterm neonates were included in the final analysis with 97.8% of response rate. The remaining 2.2% medical charts were excluded due to missing data. Of the included neonates 220(53.3%) males. 220(54.9%) of neonates were delivered by spontaneous vaginal delivery and 55.2 % of neonates were in KMC unit. The average gestational age of preterm very low birth weight neonates were 31.7±2.48 weeks, among those neonate 262(63.4%) and 309(74.8%) were classified as VLBW early preterm neonates. The mean birth weight of the neonate was 1266.7±165 gram and the average maternal age at delivery was 27.3±5 years.

Average Postnatal Weight Loss, Time to Regain Birth Weight, and Average Discharge Weight of VLBW Preterm Neonates

This finding reveals that majority of infants 270(65.4%) experienced an average weight loss of 10% or less in the first week,

categorized as "adequate" weight loss (219 out of 270 infants). In contrast, 34.6% of infants lost more than 10% of their birth weight, which is considered "poor" weight loss (104 out of 143 infants). This suggests that most newborns are able to maintain a healthier weight trajectory shortly after birth.

When examining the time taken to regain birth weight, an overwhelming majority of infants (97.1%) achieved this milestone within 14 days (316 out of 401 infants). Only a small fraction (2.9%) took longer than 14 days to regain their birth weight, indicating that timely recovery is typical among the newborns studied.

The analysis of Z scores at birth reveals that 58.1% of infants had a Z score greater than 1.29 (203 out of 241 infants), suggesting a higher than average birth weight. Conversely, 41.9% of infants had a Z score of 1.29 or lower (120 out of 172 infants), indicating a diverse range of birth weights within the sample as shown in (Table 2).

At discharge, a significant majority (78.5%) of infants had a Z score greater than 1.29 (281 out of 324 infants), which may reflect improved growth and health outcomes during their hospital stay. In contrast, only 21.5% of infants were discharged with a Z score of 1.29 or lower (42 out of 89 infants).

Table 2: Postnatal Weight Loss and Z-Score in Very Low Birth Weight Preterm Neonates at Selected Public Hospitals in Addis Ababa, 2025 (n=413)

Variables	Categories	Postnatal weight gain		N	Percentage (%)
		Adequate	Poor		
Average weight loss in the first week	<=10%	219	51	270	65.4%
	>10%	104	39	143	34.6%
Time to regain birth weight in the second week	<=14 days	316	85	401	97.1%
	>14 days	7	5	12	2.9%
Z score at birth	<=1.29	120	52	172	41.9%
	>1.29	203	38	241	58.1%
Z score at discharge	<=1.29	42	47	89	21.5%
	>1.29	281	43	324	78.5%

Distribution of Variables Related to Hospitalization and Comorbidities Among VLBW Preterm Neonates

From the total VLBW preterm neonates, the majority 182(44.1%) stayed for more than 22 days, Length of hospital stay Mean± SD is 23.9±12.9days, and 244(59.1%)were on oxygen for more than 9 days, and 80(19.4%) were died after 7 days of post natal age. Among VLBW preterm neonates who had poor postnatal weight gain, 90/413(21.6%) had multiple comorbidities more than one diagnosis.

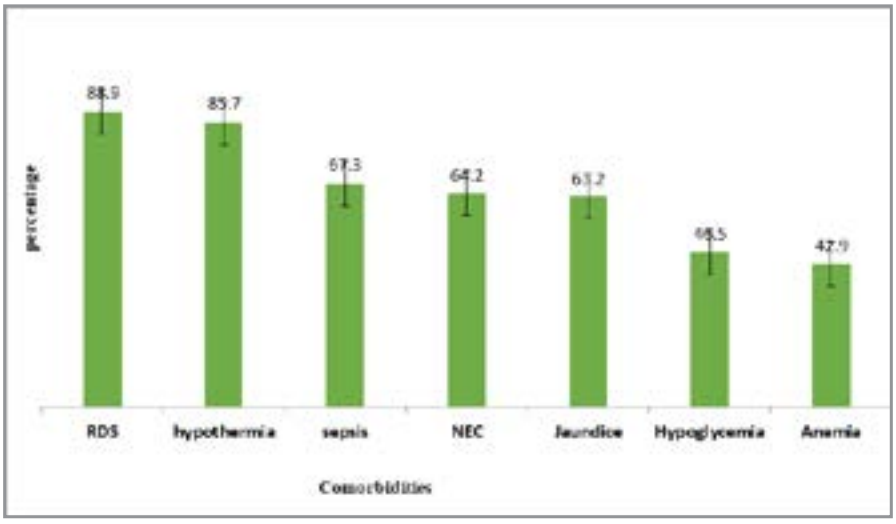

Figure 2: Comorbid Conditions Among Very Low Birth Weight Preterm Neonates with Poor Postnatal Weight Gain Admitted to the Neonatal Intensive Care Unit in Selected Public Hospitals in Addis Ababa,2025 (n=413).

Description of Very Low Birth Weight Preterm Neonate Feeding Practice and Kangaroo Mother Care Practice

From this study most very low birth weight preterm neonates initiated their first feed on their first day of life was 266(64.4%) and majorly the preferable milk 226(54.7%) was breast milk with NG-tube feeding every 2hr and kangaroo mother care was practiced which is 228(55.2%), and as depicted (Table 3) the majority of very low birth weight preterm neonates 232(56.2%) was rich their full feeding within seven days.

Table 3: Feeding Practices in Preterm Very Low Birth Weight Neonates at Selected Public Hospitals in Addis Ababa, 2025 (n=413)

Variables	Categories	Postnatal weight gain		N	Percentage (%)
		Adequate	Poor		
Types Of Milk	Breast milk	169	57	226	54.7%
	Formula	30	7	37	9%
	Mixed	124	26	150	36.3%
Method Of Feeding	Breast feeding	64	5	69	16.7%
	NG tube feeding	259	85	344	83.3%
Time Of First Feeding	1st day	121	45	266	64.4%
	>=2nd day	102	45	147	35.6%
Initial Volume Of Feeding	<=20ml/kg	197	64	261	63.2%
	>20ml/kg	126	26	152	36.8%
Frequency Of Feeding	<=every 2hr	270	39	309	74.8%
	>every 2hr	53	51	104	25.2%
Kangaroo Mother Care	Yes	196	32	228	55.2%
	No	127	58	185	44.8%
Time To Rich Full Feeding	<=7daays	170	62	232	56.2%
	8-14 days	110	18	128	31%
	15- <21days	35	6	41	9.9%
	>22 days	8	4	12	2.9%

Predictors of Postnatal Weight Gain among VLBW Preterm Neonates

The result of this study indicates that postnatal weight gain among very low birth weight (VLBW) preterm neonates revealed several significant factors. Key variables included the sex of the neonate, gestational age, the presence of conditions such as sepsis and necrotizing enter colitis (NEC), hypoglycemia, the mode of delivery, z-score at birth, the timing and frequency of feedings, the duration to regain birth weight, oxygen use, and engagement in kangaroo mother care. Notably, neonates delivered via spontaneous vaginal delivery were found to be 2.5 times more likely to achieve adequate postnatal weight gain compared to those born through cesarean section (Adjusted Odds Ratio [AOR] = 2.56, 95% Confidence Interval [CI] = 1.40–4.69). This suggests that the method of delivery plays a crucial role in the early growth outcomes of these infants.

Additionally, neonates who regained their birth weight within two weeks had 4.9 times greater odds of achieving adequate weight gain compared to those who took more than 14 days to regain their birth weight (AOR = 4.91, 95% CI = 1.28–18.75). This finding underscores the importance of timely weight recovery in the postnatal period as shown in (Table 4) below. The duration of oxygen use was also a significant predictor; VLBW preterm neonates requiring oxygen for less than 9 days were 2.75 times more likely to have adequate weight gain than those needing oxygen for longer (AOR = 2.75, 95% CI = 1.30–5.84). This indicates that shorter respiratory support may correlate with better growth outcomes.

Feeding frequency emerged as another important factor. Neonates fed every two hours were found to be 3.3 times more likely to achieve adequate postnatal weight gain than those fed less frequently (AOR = 3.30, 95% CI = 1.79–6.10). This highlights the role of frequent feeding in promoting weight gain.

Finally, VLBW preterm neonates participating in kangaroo mother care had 4.4 times greater odds of achieving adequate weight gain compared to those who did not receive this form of care (AOR = 4.42, 95% CI = 2.38–8.21). This underscores the positive impact of close physical contact and nurturing on the growth of these vulnerable infants.

Table 4: Multivariable Logistic Regression on Postnatal Weight Gain Patterns of Very Low Birth Weight Preterm Neonates in Selected Public Hospitals in Addis Ababa, 2025 (n=413)

Variables	Category	Weight gain pattern		COR(95%CI)	AOR(95%CI)	P
		Adequate (>15g/kg/d)	Poor(<15g/kg/d)			
Mode of delivery	SVD	194	33	2.598(1.602-4.21)	2.56(1.402-4.69)	0.002
	C/S	129	57	1	1	
Age	<14 D	316	85	2.655(0.82-8.57)	4.906(1.28- 18.75)	0.020
	>14D	7	5	1	1	
Duration of oxygen use	<9days	153	16	4.162 (0.134-0.43)	2.75(1.299-5.843)	0.008
	>9days	170	74	1	1	

Frequency of feeding	Every 2 hr	270	39	6.66(3.99-11.09)	3.3(0.1.79-6.097)	<0.001
	>every2 hr	53	51	1	1	
KMC	Yes	196	32	2.79(1.721-4.547)	4.42(2.38-8.205)	<0.001
	No	127	58	1	1	

Discussion

The results of this research indicate that 78.2% of the sample neonates achieved adequate postnatal weight gain, which is higher than the 73.9% reported in a study conducted in South Africa [21]. This discrepancy may be attributed to differences in sample size, methodology, and criteria for defining adequate weight gain. The average postnatal weight gain in this study was 19.9 ± 6.05 g/kg/day, exceeding the expected weight gain of 15 g/kg/day. This finding aligns with a study from South India, which reported an average gain of 16.24 g/kg/day [10]. Conversely, a study in Tanzania found a lower average of 12.7 g/kg/day, highlighting the variability in postnatal weight gain across different contexts [11]. The average time to regain birth weight in this study was 8.5 days, which is shorter than the 12 days reported in India [10] and significantly shorter than the 18 days observed in a study from the Amhara regional state comprehensive specialized hospital [22]. This shorter duration may indicate better feeding practices or care protocols in the current study.

In this study, VLBW preterm neonates who regained their birth weight within two weeks were 4.9 times more likely to achieve adequate weight gain compared to those who took longer than 14 days. This finding is consistent with the South African study [21], suggesting that good feeding tolerance and gastrointestinal maturity play essential roles in facilitating quicker weight recovery.

Another significant predictor of postnatal weight gain was the mode of delivery. Neonates delivered via spontaneous vaginal delivery (SVD) were 2.5 times more likely to achieve adequate weight gain compared to those born via cesarean section. This finding is supported by a study conducted in Iran [13], which suggests that cesarean deliveries may lead to greater initial weight loss, possibly due to the hydration status of the infants at birth. The study also found a significant association between feeding frequency and weight gain. Neonates fed every two hours were 3.3 times more likely to achieve adequate weight gain than those fed less frequently. This is consistent with findings from an Asian study [16], which reported that more frequent feeding enhances weight gain. Increased feeding frequency may allow for higher calorie intake and helps protect against conditions like necrotizing entero-colitis [23].

Additionally, neonates in kangaroo mother care were 4.4 times more likely to achieve adequate weight gain compared to those who were not. This aligns with research from Pakistan [14], indicating that kangaroo mother care positively impacts the growth of VLBW infants and increases breastfeeding rates. Finally, neonates who used oxygen for less than 9 days were 2.75 times more likely to achieve adequate postnatal weight gain than those requiring oxygen for longer. This observation is supported by a study in Korea [6], which noted that prolonged oxygen use is associated with poor weight gain, often due to underlying comorbidities such as respiratory distress syndrome [18].

Conclusion

This study indicate that adequate postnatal weight gain among very low birth weight (VLBW) preterm neonates admitted to selected public hospitals in Addis Ababa was higher than the expected gain of 15 g/kg/day. Key factors associated with adequate postnatal weight gain included regaining birth weight within 14 days, being delivered via spontaneous vaginal delivery, using oxygen for less than 9 days, feeding every two hours, and participating in kangaroo mother care (KMC). These results highlight the importance of these factors in promoting healthy growth in VLBW preterm neonates.

Recommendations

Based on the findings: to improve health care outcomes for very low birth weight preterm neonates recommended:

- To promote early weight recovery by implementing interventions that support neonates in regaining their birth weight within the first 14 days.
- Encourage and facilitate spontaneous vaginal deliveries when medically appropriate, as these are associated with better weight gain outcomes.
- It is also important to optimize oxygen therapy by minimizing its duration to less than nine days when clinically feasible, thereby supporting better growth.
- Additionally, implement and promote Kangaroo Mother Care as a standard practice for eligible preterm neonates to enhance weight gain and overall health.
- For Neonatal Care Teams and Caregivers: Regularly track weight trajectories to identify and address growth faltering early and Provide training on the importance of early weight gain, proper feeding frequency, and kangaroo mother care practice.
- Conduct research studies to explore ways to optimize delivery methods and oxygen therapy practices to improve neonatal growth outcomes.

Limitation of the Study

Retrospective nature of the study; lack of data pertaining some information related to daily weight gain measurement. In addition to this limitation of this study is its reliance on secondary data. This introduces potential biases and inaccuracies inherent in the original data collection process, which are beyond the control of this research. Furthermore, the secondary data may not perfectly align with the specific research questions, potentially limiting the depth of analysis.

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Ethics Approval and Consent to Participate

Ethical clearance was obtained from the Institutional Ethical Review Board (IRB) with protocol number SNM/17/2025 of Addis Ababa University (AAU), College of Health Sciences, School of Nursing and Midwifery, Department of Nursing. A formal letter was submitted to the Addis Ababa Health Bureau, which then wrote to the head of the NICU department at each selected public hospital regarding the utilization of the charts. To ensure confidentiality, all data was anonymized; no personal identifiers, such as names or contact information, were recorded. Data was stored in a secure, password-protected database accessible only to authorized research team members.

Clinical Trial Number

Not applicable

Availability of Data and Materials

The data sets used and analyzed during the current study can be availed from the author based on reasonable request.

Competing Interests

This thesis is submitted as a partial achievement of the requirement for an MSc degree from the School of Postgraduate Studies at Addis Ababa University. This thesis has been deposited in the Library of Addis Ababa University and is made available to the user under the rules of the library. The authors declare that they have no conflicts of interest.

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Funding for this study was not provided by any institution or agency, but some stationary items, such as A4 size papers for photocopying data collection questionnaires, pencils, and research advisor assignments, were provided by the Addis Ababa University postgraduate office.

Authors' Contributions

This study is the result of joint research, and the contribution of each author is comparable to the others. The roles of each author are as follows:

- **Conceptualization:** Fekadu Aga and Teshome Habte,
- **Data curation:** Simeneh Tsegaye, Fekadu Aga, and Teshome Habte.
- **Formal analysis:** Simeneh Tsegaye.
- **Investigation:** Simeneh Tsegaye, Teshome Habte, and Fekadu Aga
- **Methodology:** Simeneh Tsegaye, and Teshome Habte
- **Project administration:** Simeneh Tsegaye
- **Software:** Simeneh Tsegaye,
- **Supervision:** Teshome Habte, and Fekadu Aga
- **Validation:** Fekadu Aga and Teshome Habte,
- **Visualization:** Fekadu Aga, Teshome Habte, and Simeneh Tsegaye
- **Writing – original draft:** Simeneh Tsegaye.
- **Writing – review & editing:** Fekadu Aga, Teshome Habte, and Simeneh Tsegaye

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