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HEMATOLOGICAL PATTERNS IN PRETERM INFANTS RECEIVING CRITICAL CARE

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Abstract

Background: *Respiratory Distress Syndrome (RDS) is a common and serious complications in preterm infants, primarily due to a deficiency of pulmonary surfactant. Premature infants, especially those born before 34 weeks, are highly susceptible. In developing countries like Pakistan, RDS burden is exacerbated by limited access to care, delayed referrals, and insufficient prenatal corticosteroid use. Early identification and intervention can significantly reduce morbidity and mortality.*

Objectives: *The study aims to assess the hematological profiles of preterm infants in critical care settings, identifying patterns in blood parameters related to clinical outcomes like survival and disease severity.*

Methodology: *A total of 120 preterm neonates were admitted to the neonatal ward at Shaikh Ziad Hospital, PEADS Larkana, over a three-month period. Clinical data were also extracted, complete blood counts were taken, and the data were grouped and analyzed based on the underlying diagnosis of RDS. SPSS software version 25 was used to analyze the data, which included mean, chi-square test, and ANOVA tests; a P value of less than 0.05 was deemed significant.*

Results: *The study involved 120 infants, with 86.7% successfully discharged, with male infants accounting for 60.8% of admissions. Most were preterm, with 66 born preterm. Most infants were delivered at the hospital, with cesarean section being the most common. Most infants were admitted within the first 24 hours of life. The study found that the hematological profiles of healthy and deceased infants were significantly different, with lower hemoglobin levels, reduced red blood cell counts, higher white blood cell counts, and lower corpuscular volume, suggesting potential hematologic instability.*

Conclusion: *The study shows that most neonates admitted to critical care responded well to treatment and were discharged, with males being more common. Hematological analysis showed normocytic blood profile.*

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INTRODUCTION

A newborn's respiratory distress (RD), which can be caused by a number of reasons, is the most frequent reason for hospitalization (1). However, the chance of RD rises to 50% at 30 weeks, 75% at 28 weeks, and 90% at 26 weeks, even though it only affects 1% of live births. Recognizing the signs and symptoms of respiratory distress in neonates is crucial for providing fast and accurate therapy. This article will go over the signs, causes, and potential remedies for neonatal respiratory distress. Although there has been a notable improvement in developed countries in recent years, with only 10% of premature babies experiencing respiratory distress (RD), the condition is still a major problem in low-middle income countries, where 90% of preterm neonates die as a result of respiratory distress (2,3). Apnea, cyanosis, grunting, inspiratory stridor, nasal flaring, poor feeding, and tachypnea (breathing more than 60 times per minute) are some of the signs that can appear. Meconium aspiration syndrome (MAS), pneumonia, tansient tachypnea of the newborn (TTN), infections, and hyaline membrane disease (HMD) in premature infants are the main causes of respiratory distress (4). Premature babies are more likely to experience respiratory distress and to contract infections like pneumonia and bronchiolitis because of their underdeveloped lungs. In order to get insight into the current state of neonatal health in this specific area, a study was carried out at the PEDS facility Shaikh Zaid facility in District Larkana. For the purpose of future planning and improved care of these infants, it is critical to draw attention to the typical causes of newborn distress that have been observed in relatively underprivileged areas.

Material and Method:

From July 1, 2025, to September 30, 2025, a three-month cross-sectional study was carried out at the PEAIDS ward of Shaikh Ziad Hospital in CMC Larkana. We examined 120 preterm newborns who were admitted to the neonatal ward and born between 26 and less than 36 weeks of gestation. The neonates' full clinical history was taken, including their birth weight, gestational age, and any current complaints. The institutional ethics committee approved this study.

On the first day of the preterm, peripheral blood samples were taken in an EDTA vacutainer for Complete Blood Counts (CBC). A completely automated Sysmex XN 350 Haematology analyzer was used to perform CBC. Leishman-stained peripheral blood smears were analyzed. Other than those resulting from the normal course of disease progression, no predicted risk factors were included in this study.

SPSS (Statistical Package for Social Sciences) version 25.0 was used to analyze the data. Both tabular and graphical formats were used to display the results. For quantitative data, mean ± SD was computed; for qualitative data, chi-square and ANOVA tests were used to determine the relationship between two or more attributes. The two independent groups were compared using an unpaired t-test for quantitative data variables. P-values less than 0.05 were regarded as significant. The institutional ethics committee approved this study.

Results:

The study involved 120 infants, as shown in Table 1.0, with 86.7% successfully discharged, with male infants accounting for 60.8% of admissions. Most were preterm, with 66 born preterm. Most infants weighed over 2000 grams, with 78 delivered at the hospital. Cesarean section was the most common delivery method, followed by normal vaginal delivery. Most infants were admitted within the first 24 hours of life, with 25.0% admitted after this critical early period.

Table 1.0 Demographic and Clinical Characteristics of Neonates with Respiratory Distress

Variable	Subcategory	Frequency (n)	Percentage (%)
Total Admissions		120	100.0
Outcome	Discharged	104	86.7

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	Expired	16	13.3
Gender	Male	73	60.8
	Female	47	39.2
Gestational Age	Preterm (<37 weeks)	66	55.0
	Term (≥37 weeks)	54	45.0
Birth Weight	1000–1499 grams	5	4.2
	1500–1999 grams	30	25.0
	>2000 grams	85	70.8
Place of Birth	Inborn	78	65.0
	Outborn	42	35.0
Mode of Delivery	Cesarean Section	72	60.0
	Normal Vaginal Delivery	48	40.0
Age at Admission	≤ 24 hours	90	75.0
	> 24 hours	30	25.0

Data show in Table 2.0 that the infants revealed a mean hemoglobin level of 13.5 g/dL, hematocrit of 40.5%, red blood cell count of 4.1 million per microliter, and white blood cell count of 13.1 $\times 10^3/\mu L$. Neutrophils and lymphocytes made up 55.2% and 34.3% of total white cells, respectively. Platelet counts were 176 $\times 10^3/\mu L$, corpuscular volume was 97.5 femtoliters, and hemoglobin was 30.0 picograms.

Table 2.0 CBC Parameters in Preterm Infants with RDS

CBC Parameter	Mean ± SD
Hemoglobin (g/dL)	13.5 ± 1.8
Hematocrit (%)	40.5 ± 4.5
RBC Count ($\times 10^6/\mu L$)	4.1 ± 0.6
WBC Count ($\times 10^3/\mu L$)	13.1 ± 3.7
Neutrophils (%)	55.2 ± 7.5
Lymphocytes (%)	34.3 ± 6.0
Platelet Count ($\times 10^3/\mu L$)	176 ± 61
MCV (fL)	97.5 ± 8.2
MCH (pg)	30.0 ± 3.0
MCHC (g/dL)	31.2 ± 1.4
RDW (%)	17.2 ± 2.3

The study compared hematological profiles of healthy and deceased infants in Table 3.0. Hemoglobin levels were significantly lower in the deceased group, while red blood cell counts were reduced. White blood cell counts were higher in the deceased group, possibly due to severe stress or infection. Neutrophil percentages and lymphocyte levels were also lower in the deceased group. Platelet counts showed a significant difference, with the deceased group having a higher mean count. The death group had lower mean corpuscular volume and red cell distribution width, suggesting potential hematologic instability.

Table 3.0 Comparison of Healthy and Deceased Preterm Infants' CBC Parameters

CBC Parameter	Healthy (n=104)	Death (n=16)	P-value
Hemoglobin (g/dL)	14.6 ± 1.5	12.9 ± 1.9	0.001**
Hematocrit (%)	44.2 ± 3.9	39.0 ± 4.6	0.000**

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RBC Count (×10^6/µL)	4.5 ± 0.4	4.0 ± 0.6	0.002**
WBC Count (×10^3/µL)	11.0 ± 2.8	14.2 ± 4.1	0.004**
Neutrophils (%)	49.1 ± 6.8	56.5 ± 8.1	0.002**
Lymphocytes (%)	38.4 ± 5.6	33.0 ± 6.4	0.001**
Platelet Count (×10^3/µL)	218 ± 62	162 ± 54	0.000**
MCV (fL)	95.0 ± 7.3	99.2 ± 8.5	0.056
MCH (pg)	31.2 ± 2.6	29.5 ± 3.0	0.041*
MCHC (g/dL)	32.1 ± 1.3	30.6 ± 1.6	0.003**
RDW (%)	15.8 ± 1.6	17.9 ± 2.4	0.001**

Discussion:

In order to evaluate factors like gestational age, birth weight, mode of delivery, and outcomes, the study examined the clinical characteristics and demographics of 120 neonates who were admitted to a NICU in Larkana, Sindh. In our study, the mortality rate was 13.3% and the overall discharge rate was 86.7%.It is slightly greater than the 10.9% found by U Shaikh et al. (2023) from Hyderabad [5]. These disparities could be explained by regional differences in NICU resources, early referral practices, and timely access to care. Our data showed that 60.8% of admissions were male, which is consistent with studies conducted in other parts of Pakistan, including one by Dera Ismail Khan by Khan et al. (2024), which discovered that 62% of NICU admissions were male [6].This trend of male predominance is often observed and may be explained by either a higher genetic susceptibility in male neonates or a gender-based bias in health-seeking. Of the neonates in our data, 70.8% weighed more than 2000 grams at birth, whereas only 4.2% weighed between 1000 and 1499 grams, which is regarded as extremely low. Nonetheless, a study discovered that 35% of NICU admissions had birth weights under 2000 grams [7]. This disparity could be due to regional differences in prenatal interventions, nutrition, and maternal care.showing that elective surgeries and emergency interventions brought on by fetal distress or maternal complications may be the cause of high cesarean rates. Seventy-five percent of neonates were admitted within 24 hours of birth, indicating a robust early referral system that significantly improves neonatal outcomes, especially in high-risk deliveries. 70% of newborns in Karachi were admitted within 24 hours of their birth, according to data. In [9]

The study population's mean hemoglobin level was 13.5 ± 1.8 g/dL, slightly lower than the reference values reported by Danish et al. (2009) in healthy Karachi neonates.[10] The inclusion of preterm and term neonates, which can drastically lower neonatal hemoglobin levels, alterations in the timing of cord clamping, or changes in the nutritional status of the mother could all be the cause of the disparity. [11] At 40.5 ± 4.5%, the cohort's hematocrit value was marginally lower than the Karachi reference, indicating maternal anemia or early cord clamping, which are public health issues in rural Sindh. [10] The population's average red blood cell count was 4.1 ± 0.6 ×10^6/µL, which was in line with earlier findings but marginally less than the 4.8 ± 0.4 ×10^6/µL found in related studies. In [12] Although our data was marginally below previously published values from Islamabad and Karachi, the mean corpuscular volume, hemoglobin, and concentration were all within expected neonatal ranges. [12, 10]. The study found a WBC count of 13.1 ± 3.7 ×10^3/µL, which is typical of neonates experiencing physiological leukocytosis due to perinatal stress and immune system immaturity. The results are comparable to those reported in Karachi and Addis Ababa, with a median concentration of 12.4 ×10^3/µL. [13]

Our study revealed a significantly lower platelet count of 176 ± 61 ×10^3/µL compared to the 256 ± 76.5 ×10^3/µL reported by Danish et al [10]. Platelet counts consistently decrease, possibly due to regional differences in maternal health,

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neonatal nutrition, or technical aspects, but remain within acceptable reference intervals.

Conclusion:

The study reveals that most neonates admitted to critical care responded well to treatment and were discharged, with male neonates being more common. Most were preterm and had a birth weight above the low threshold, indicating moderate prematurity. Hematological analysis showed a normocytic blood profile, but significant deviations in critically ill infants may indicate infection or inflammatory responses. These findings emphasize the importance of routine hematological parameters in neonatal intensive care.

REFERENCES:

Reuter S, Moser C, Baack MJPir. Respiratory distress in the newborn. 2014;35(10):417.

Bacha LT, Hailu WB, Tesfaye Geta EJSOM. Clinical outcome and associated factors of respiratory distress syndrome among preterm neonates admitted to the neonatal intensive care unit of Adama Hospital and Medical College. 2022;10:20503121221146068.

Bamat N, Fierro J, Wang Y, Millar D, Kirpalani HJCDoSR. Positive end-expiratory pressure for preterm infants requiring conventional mechanical ventilation for respiratory distress syndrome or bronchopulmonary dysplasia. 2019(2).

Mugheri, I. A., Mugheri, D., Kazi, M. A., Shaikh, N. F., & Faisal, K. (2025). CHILDREN WITH SEVERE ACUTE MALNUTRITION: AN EVALUATION OF THEIR HEMATOLOGICAL PARAMETERS: A STUDY CONDUCTED IN LARKANA. *Insights-Journal of Life and Social Sciences*, *3*(1), 63-71.

Shaikh, U., Parakash, A., Shaikh, M., Hussain, T., & Hussain, W. (2023). Risk factors of low birth weight among neonates at A Tertiary Care Hospital Karachi. *The Professional Medical Journal*, *30*(09), 1185-1190.

Khan, M. A. (2024). Causes and prevalence of prenatal and neonatal mortality in the District Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan. *Indian Journal of Medical Sciences*, *76*(2), 72-77.

Ghosh, C., & Wojtowycz, M. (2021). Effect of gestational disorders on preterm birth, low birthweight, and NICU admission. *Archives of Gynecology and Obstetrics*, *303*(2), 419-426.

Korchynska, O. O. (2025). Cesarean section–a pathological pattern of the mother and the newborn.

Tanveer, S., Basheer, F., Motlaq, F. M., Khushdil, A., Nawaz, R., & Khan, F. A. (2019). Pattern of admission and outcome of neonates admitted to tertiary care neonatal ICU: Neonatal Admission Pattern in NICU and Outcome. *Journal of Fatima Jinnah Medical University*, *13*(3), 116-120.

Qaiser, D. H., Sandila, M. P., Ahmed, S. T., & Kazmi, T. (2009). Haematological reference values for full-term, healthy, newborns of Karachi, Pakistan. *JPMA. The Journal of the Pakistan Medical Association*, *59*(9), 618-622.

Andersson, O., Hellström-Westas, L., Andersson, D., & Domellöf, M. (2011). Effect of delayed versus early umbilical cord clamping on neonatal outcomes and iron status at 4 months: a randomised controlled trial. *Bmj*, *343*.

Ziad, Z., Arshad, A., Fatima, N., Majeed, L., & Anwar, N. (2025). Clinical, hematological and cytogenetic analysis of Chronic Myelomonocytic Leukemia in Pakistan: A single-center cross-sectional study. *The Professional Medical Journal*, *32*(07), 828-836.

Tiruneh, T., Kiros, T., & Getu, S. (2020). Hematological reference intervals among full-term newborns in Ethiopia: a cross-sectional study. *BMC pediatrics*, *20*(1), 417.