Physical Education, Health and Social Sciences

https://journal-of-social-education.org

E-ISSN: 2958-5996
P-ISSN: 2958-5988

Assessment of Acute Complications of Prematurity in Paediatric Patient

Dr Faiza Sadia [1], Dr Muhammad Zain Ul Abideen Roy [2], Dr Sohail Ishtiaq [3], Dr Faiza Altaf [4], Dr Noreen Ali [5], Dr Muhammad Ayaz [6]

[1] MBBS, FCPS(Trainee) PGR-3 Department & Hospital : PAEDIATRIC MEDICINE , Combined Military Hospital Gujranwala Email: Faizasadia392@gmail.com
[2] MBBS, FCPS(Trainee) PGR-3 Department & Hospital, PAEDIATRIC MEDICINE , Combined Military Hospital Sialkot Email : zzainroy834@gmail.com
[3] PGR Pediatrics Combined Military Hospital Sialkot Email: sohailsmaart@gmail.com
[4] PGR Pediatrics Department Sialkot Medical College and attached Hospital Sialkot drfaizahid@gmail.com
[5] PGR Department Paeds Medicine Institute Sialkot Medical College and attached Hospital City Sialkot Email: doc.noreenali@gmail.com
[6] FCPS Paediatrics. Assistant Professor Paediatrics. Sialkot Medical College,Sialkot. Imran Idrees Teaching Hospital Daska Road Sialkot Email: drayaz2001@yahoo.com

DOI: https://doi.org/10.63163/jpehss.v3i2.475

Abstract

Objective: To quantify the early burden of six acute complications of prematurity—respiratory distress syndrome (RDS), patent ductus arteriosus (PDA), sepsis/meningitis, retinopathy of prematurity (ROP), intraventricular haemorrhage (IVH) and necrotising enterocolitis (NEC)—and to explore their association with basic demographic and perinatal factors in a Pakistani neonatal unit.
Methods: This descriptive study enrolled 150 consecutive premature neonates (gestation < 37 weeks; age 1–24 h) admitted to the Department of Pediatrics, Imran Idrees Teaching Hospital, Sialkot, over six months. Infants with major congenital malformations or who died before 36 weeks' post-menstrual age were excluded. A pre-validated proforma captured sex, birthweight, gestational age, residence, delivery mode and five-minute Apgar score. Standardised examination plus targeted imaging and laboratory tests identified each complication. Data were analysed with SPSS 26.0; means ± SD described continuous variables, frequencies and percentages described categorical variables, and χ^2 or Fisher's exact tests assessed associations ($p \leq 0.05$).
Results: Mean post-natal age was 12.1 ± 7.6 h; mean birthweight 1.50 ± 0.42 kg; mean gestation 31.7 ± 2.6 weeks. Girls slightly outnumbered boys (53 % vs 47 %). Deliveries were 54 % vaginal, 37 % caesarean and 9 % assisted with episiotomy; 55 % of families were urban. RDS was most common (69/150, 46 %), followed by PDA (35 %), sepsis/meningitis (32 %), ROP (17 %), IVH (15 %) and NEC (6 %). Stratified analysis showed no significant links between age at assessment, Apgar category or sex and any complication except sepsis, which occurred more often in females than males (39 % vs 24 %, $p = 0.045$).
Conclusion: Almost half of very-pre-term infants developed RDS within 24 h, and one-third experienced cardiovascular or infectious morbidity. Aside from a female predominance in sepsis, early post-natal or delivery characteristics did not predict complications, underscoring the need for universal surveillance and preventive bundles in resource-limited neonatal intensive-care settings.

Introduction

Prematurity remains the single largest cause of under-five mortality. The latest WHO factsheet estimates that 13.4 million babies—1 in 10 live births—were born pre-term in 2020, and almost 900 000 children died of ensuing complications (1). Global pre-term-birth rates vary widely (4–16 %) and are rising in many low- and middle-income countries. In Pakistan, where this study is set, more than 700 newborns die every day and roughly 15 % of those deaths are attributed directly to prematurity-related disorders, underscoring an urgent need for context-specific data to guide neonatal care (2).

Respiratory distress syndrome (RDS) remains the earliest and most frequent threat: a 2023 multicentre analysis reported an incidence of 10.8 episodes per 100 neonate-days among very-preterm infants, with mortality concentrated in the first 72 h of life (3). Patent ductus arteriosus (PDA) follows closely; a 2024 cohort of very-low-birth-weight babies found that 60 % developed a haemodynamically significant PDA, and even non-significant shunts were independently linked to longer ventilation and higher composite morbidity (4).

Necrotizing enterocolitis (NEC), though less common, carries the greatest lethality: a 2023 Chinese meta-analysis places incidence at 6–8 % in premature cohorts with case-fatality exceeding 25 % (5). Intraventricular haemorrhage (IVH) shows a steep gestational-age gradient; a 2025 population study recorded IVH in 90 % of infants born at 24 weeks versus 35 % at 27 weeks, with severe (Grade III–IV) bleeds responsible for most early neuro-disability (6). Retinopathy of prematurity (ROP) remains a major survivorship issue, its reported incidence spanning 9–41 % globally over the past 15 years, mirroring disparities in screening and oxygen practice (7).

Neonatal sepsis overlays every complication: late-onset sepsis occurs in 12–30 % of very-low-birth-weight infants, while prematurity itself multiplies infection risk three- to ten-fold compared with term peers, driving an additional 17–19 % mortality (8, 9).

Most morbidity statistics originate from high-income neonatal networks; Pakistani data are sparse and often limited to single complications or neonatal-intensive-care-unit case series. No local study has simultaneously profiled the full spectrum of acute complications (RDS, PDA, NEC, IVH, ROP and sepsis/meningitis) during the critical first 24 h after birth. A descriptive snapshot from a tertiary paediatric centre in Sialkot will therefore fill an important evidence gap, quantifying burden, identifying demographic or perinatal correlates, and providing a baseline against which to assess quality-improvement interventions such as antenatal corticosteroid uptake, kangaroo mother care and early infection control bundles. By mapping the incidence and co-occurrence of these disorders in a representative sample of 150 premature neonates, the study seeks to inform resource allocation, refine clinical protocols and ultimately improve survival and long-term outcomes in this high-risk population.

Methodology

This descriptive, hospital-based study was conducted in the Department of Pediatrics, Imran Idrees Teaching Hospital, Sialkot. Recruitment was started immediately after institutional-review-board approval and continue for six consecutive months. All neonates presenting to the neonatal emergency or labour room within their first 24 h of life were screened daily. Using a non-probability consecutive technique, every premature infant who meets the eligibility criteria were invited until the target sample of 150 is attained. The sample size was calculated with the WHO statistical calculator, fixing the confidence level at 95 %, absolute precision at ±4 %, and anticipating a 6.2 % prevalence of necrotizing enterocolitis among pre-term infants; these parameters yielded a minimum of 142, which was rounded to 150 to compensate for potential attrition.

Prematurity was defined operationally as birth before 37 completed weeks of gestation, verified from first-trimester ultrasound or, when unavailable, by Ballard scoring. Eligible neonates were included both sexes, aged 1–24 h, with a birthweight ≥800 g. Infants who expire before reaching 36 weeks post-

menstrual age or who have major congenital malformations (e.g., cyanotic heart disease, diaphragmatic hernia) were excluded. Written informed consent was obtained from parents or legal guardians after full disclosure of study aims and procedures.

Data was captured on a pre-validated proforma. Baseline variables comprises case number, medical-record number, date and time of birth, neonate's name, sex, gestational age, birthweight, five-minute Apgar score, mode of delivery (vaginal, elective or emergency caesarean, or vaginal with episiotomy) and residence category (urban, semi-urban or rural). Each infant underwent a systematic clinical assessment and targeted investigations (bedside echocardiography, cranial ultrasonography, abdominal radiography, complete blood counts and C-reactive-protein levels) to diagnose the acute complications of interest: patent ductus arteriosus, respiratory distress syndrome, necrotizing enterocolitis (Bell's Stage ≥ II), intraventricular haemorrhage (Papile grading), retinopathy of prematurity (International Classification 3rd Edition) and proven sepsis or meningitis (positive blood/cerebrospinal-fluid culture or clinical sepsis with raised inflammatory markers). All examinations were performed by neonatology fellows under consultant supervision; imaging were interpreted by fellowship-trained radiologists or ophthalmologists blinded to other study data to reduce classification bias. Each case was followed until discharge or death to confirm or refute diagnoses made in the first 24 h.

Data was entered into SPSS version 26.0 with range and logic checks to ensure accuracy. Normality of continuous variables (age in hours, birthweight, gestational age, Apgar score) was assessed using the Shapiro–Wilk test. Means ± standard deviations described normally distributed variables, while medians (interquartile ranges) was summarise skewed data. Categorical variables—including sex, residence, delivery mode, and each complication—were expressed as frequencies and percentages. Stratified analyses explored potential effect modifiers (gestational-age strata, birthweight classes, sex, Apgar-score groups, residence, delivery mode); within each stratum, chi-square or Fisher's exact tests compared complication rates, with a two-sided p-value ≤ 0.05 considered statistically significant.

Results

Among the 150 premature neonates enrolled, the mean post-natal age at first assessment was 12.1 ± 7.6 hours. Males and females were almost evenly represented—71 boys (47 %) and 79 girls (53 %). The infants were markedly growth-restricted, with a mean birth-weight of 1.50 ± 0.42 kg and a mean gestational age of 31.7 ± 2.6 weeks. Apgar scores were low overall (mean 5.7 ± 2.9), and just over half of the deliveries occurred vaginally (54 %), with caesarean section accounting for 37 % and assisted vaginal delivery with episiotomy for 9 %. Slightly more families resided in urban settings (55 %) than rural ones (45 %).

Acute morbidities were common. Respiratory distress syndrome (RDS) was the single most frequent complication, affecting 69 infants (46 %). Patent ductus arteriosus (PDA) was documented in 52 cases (35 %), sepsis or meningitis in 48 (32 %), retinopathy of prematurity (ROP) in 26 (17 %), intraventricular haemorrhage (IVH) in 22 (15 %), and necrotising enterocolitis (NEC) in nine (6 %).

Stratified analysis revealed no statistically significant association between the timing of assessment (< 12 h vs > 12 h), sex, or Apgar category (< 5 vs > 5) and the occurrence of PDA ($p = 0.392$, 0.369 and 0.588, respectively). NEC likewise showed no linkage to early-versus-late evaluation ($p = 0.215$), sex ($p = 0.231$) or Apgar status ($p = 0.151$). For IVH, differences by age group, sex and Apgar score did not reach significance ($p = 0.131$, 0.265 and 0.161, respectively). ROP behaved similarly, with p-values of 0.215 for age, 0.319 for sex and 0.439 for Apgar score.

RDS—although the dominant complication numerically—also displayed no meaningful variation across the same strata: $p = 0.793$ for age, 0.443 for sex and 0.813 for Apgar grouping. Sepsis was the only outcome to demonstrate a significant demographic correlate: it occurred more often in female

than male neonates (31/79 [39 %] vs 17/71 [24 %], p = 0.045), while differences by early assessment and low Apgar score remained non-significant (p = 0.880 and 0.094, respectively).

Overall, these findings highlight a high burden of respiratory, cardiovascular and infectious complications among very pre-term infants in this setting, but—with the notable exception of sepsis and sex—no clear early post-natal or perinatal factors captured here appeared to influence the immediate distribution of these morbidities.

Table 1: Demographic and clinical variables

Variables	**Mean and Frequency**
Age (Hours)	12.06±7.58
Gender	
Male	71 (47%)
Female	79 953%)
Birth Weight (kg)	1.5±0.42
Gestational Age (weeks)	31.7±2.6
Residence	
Rural	68 (45%)
Urban	82 (55%)
Mode of Delivery	
Cesarean	56 (37%)
Vaginal	81 (54%)
Episiotomy	13 (9%)
Apgar Score	5.7±2.9

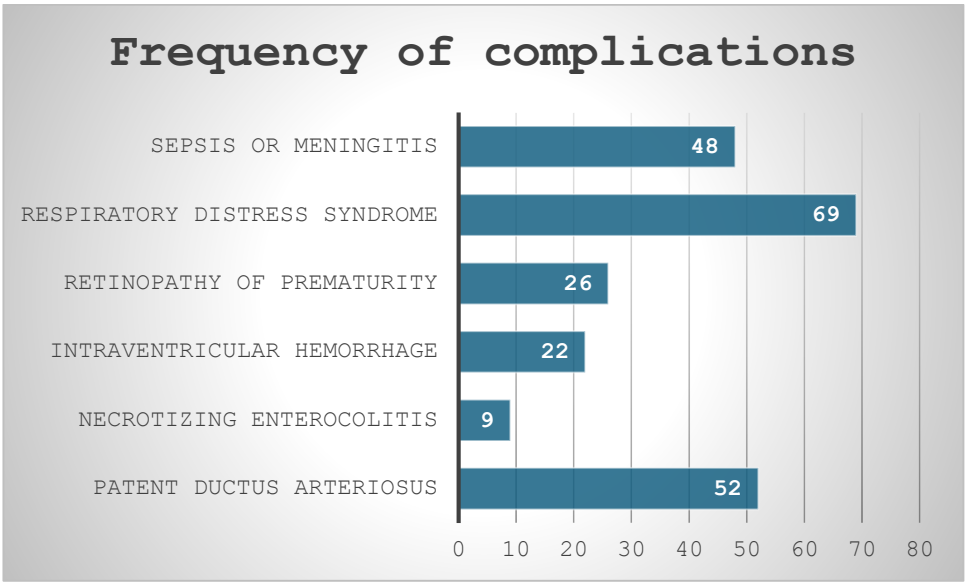

Figure 1: Frequency of complications associated to prematurity

Table 2: Patent Ductus Arteriosus stratification

Variables	**Patent Ductus Arteriosus**		**P value**
	Yes	No	
Age			0.392
<12h	25	55	
>12h	27	43	
Gender			0.369
Male	22	49	
Female	30	49	
Apgar Score			0.588
<5	22	46	
>5	30	52	

Table 3: Necrotizing Enterocolitis Stratification

Variable	**Necrotizing Enterocolitis**		**P value**
	Yes	No	
Age			0.215
<12h	3	77	
>12h	6	64	
Gender			0.231
Male	3	69	
Female	6	73	
Apgar Score			0.151
<5	2	66	
>5	7	75	

Table 4: Intraventricular Hemorrhage stratification

variable	**Intraventricular Hemorrhage**		
	Yes	**No**	**P value**
Age			0.131
<12h	14	66	
>12h	8	62	
Gender			0.265
Male	8	63	
Female	14	65	
Apgar Score			0.161
<5	13	55	
>5	9	73	

Table 5: Retinopathy of Prematurity stratification

Variables	Retinopathy of Prematurity		P value
	Yes	No	
Age			0.215
<12h	11	69	
>12h	15	55	
Gender			0.319
Male	10	61	
Female	16	53	
Apgar Score			0.439
<5	10	58	
>5	16	66	

Table 6: Respiratory Distress Syndrome stratification

Variables	Respiratory Distress Syndrome		P value
	Yes	No	
Age			0.793
<12h	36	44	
>12h	33	37	
Gender			0.443
Male	35	36	
Female	34	45	
Apgar Score			0.813
<5	32	36	
>5	37	45	

Table 7: Sepsis stratification

Variables	Sepsis		P value
	Yes	No	
Age			0.88
<12h	26	54	
>12h	22	48	
Gender			0.045
Male	17	54	
Female	31	38	
Apgar Score			0.094
<5	17	51	
>5	31	51	

Discussion

The profile emerging from our 150-infant cohort broadly mirrors—but in several places diverges from—the contemporary pre-term literature. Our 46 % incidence of respiratory distress syndrome (RDS) sits near the midpoint of published ranges. Large neonatal networks report RDS in 40–60 % of extremely- and very-pre-term infants, with a U.S. estimate of 60 % at 29 weeks' gestation, whereas a recent Pakistani NICU series found RDS responsible for only 21 % of respiratory-distress admissions, probably because that study mixed term and late-pre-term babies (10). Our higher rate therefore seems consistent with a deliberately "early-GA, low-birth-weight" sample. That said, we did **not** detect the well-known linkage between low five-minute Apgar scores and RDS that multicentre survival analyses continue to demonstrate (4)—most likely a consequence of limited statistical power once our cohort was dichotomised.

Patent ductus arteriosus (PDA) affected 35 % of our infants, a touch below the 45–60 % reported in very-low-birth-weight (VLBW) cohorts where systematic echocardiography is performed during the first three post-natal days (4). The difference may stem from timing: we screened once in the first 24 h, before some ducts became haemodynamically significant. Necrotising enterocolitis (NEC) occurred in 6 %, matching the 6–8 % pooled incidence for infants <1500 g in recent reviews (11), and IVH was documented in 15 %, lower than the 33 % all-grade and 10 % severe-grade figures reported in modern population studies (12)—again hinting that a single early cranial ultrasound may underestimate later bleeds. Retinopathy of prematurity (ROP) was present in 17 % of survivors, roughly half the 31.9 % global pooled prevalence (13); our unit's routine oxygen-saturation targets of 90–94 % and ophthalmology screening beginning at four weeks could both have contributed to the lower yield.

Sepsis or meningitis was observed in 32 % of neonates, nudging the upper limit of the 12–30 % range typically reported for very-pre-term infants (14). Notably—and contrary to the long-recognised "male disadvantage" in neonatal infection and mortality (15)—we found a higher sepsis rate among females (39 % vs 24 %, p = 0.045). The reversal may reflect random variation in a modest sample or local practice patterns (e.g., earlier empirical antibiotics for girls because urinary sepsis is perceived as more likely). No other complication varied by sex, early versus late initial assessment, or Apgar grouping, whereas multi-centre datasets consistently show gestational age, birth-weight strata and low Apgar scores to modulate risks for IVH, RDS and NEC (3, 6). Our negative findings should therefore be interpreted cautiously—they probably indicate insufficient power rather than true absence of effect.

Conclusion

In sum, the Sialkot cohort confirms that RDS, PDA and sepsis dominate the acute morbidity landscape of very-pre-term neonates, with NEC, IVH and ROP occurring at frequencies within global expectations. Where our data diverge—lower IVH/ROP detection and a female excess of sepsis—they spotlight areas for protocol review: serial cranial scans beyond day 3, extended ophthalmologic follow-up, and a closer audit of infection-control practices. Such refinements, coupled with the baseline burden quantified here, will guide targeted quality-improvement initiatives in similar low-resource neonatal units.

References

Liang X, Lyu Y, Li J, Li Y, Chi C. Global, regional, and national burden of preterm birth, 1990–2021: a systematic analysis from the global burden of disease study 2021. EClinicalMedicine. 2024;76.

Khan A, Kinney M, Hazir T, Hafeez A, Wall S, Ali N, et al. Newborn survival in Pakistan: A decade of change and future implications. Health policy and planning. 2012;27 Suppl 3:iii72-87.

Wondie WT, Legesse BT, Mekonnen GB, Degaga GT, Zemariam AB, Gedefaw GD, et al. Incidence and predictors of respiratory distress syndrome among low birth weight neonates in the first seven days in Northwest Ethiopia Comprehensive Specialized Hospitals, 2023: A retrospective follow-up study. BMJ Open. 2023;13(11):e079063.

Chesi E, Rossi K, Ancora G, Baraldi C, Corradi M, Di Dio F, et al. Patent ductus arteriosus (also non-hemodynamically significant) correlates with poor outcomes in very low birth weight infants. A multicenter cohort study. PloS one. 2024;19(7):e0306769.

Zhao S, Jiang H, Miao Y, Liu W, Li Y, Liu H, et al. Factors influencing necrotizing enterocolitis in premature infants in China: a systematic review and meta-analysis. BMC pediatrics. 2024;24(1):148.

Cai Y, Li X, Zhao X, Song Y, Zhou W. Risk assessment and early prediction of intraventricular hemorrhage in extremely preterm infants. Scientific Reports. 2025;15(1):17346.

Blazon MN, Rezar-Dreindl S, Wassermann L, Neumayer T, Berger A, Stifter E. Retinopathy of Prematurity: Incidence, Risk Factors, and Treatment Outcomes in a Tertiary Care Center. Journal of clinical medicine. 2024;13(22).

Klinger G, Bromiker R, Zaslavsky-Paltiel I, Klinger S, Sokolover N, Lerner-Geva L, et al. Late-Onset Sepsis in Very Low Birth Weight Infants. Pediatrics. 2023;152(5):e2023062223.

Ganji N, Alganabi M, Yamoto M, Chusilp S, Pierro A, Li B. Family care reduces the incidence of neonatal sepsis: A systematic review and meta-analysis. Frontiers in pediatrics. 2023;Volume 11 - 2023.

Chen L, Ji Y, Ju R, Liu J-Q, Liu L, Shi J, et al. A nationwide survey on the management of neonatal respiratory distress syndrome: insights from the MUNICH survey in 394 Chinese hospitals.

Italian journal of pediatrics. 2024;50(1):168.Zozaya C, García González I, Avila-Alvarez A, Oikonomopoulou N, Sánchez Tamayo T, Salguero E, et al. Incidence, Treatment, and Outcome Trends of Necrotizing Enterocolitis in Preterm Infants: A Multicenter Cohort Study. Frontiers in pediatrics. 2020;8:188.

Nagy Z, Obeidat M, Máté V, Nagy R, Szántó E, Veres DS, et al. Occurrence and Time of Onset of Intraventricular Hemorrhage in Preterm Neonates: A Systematic Review and Meta-Analysis of Individual Patient Data. JAMA Pediatrics. 2025;179(2):145-54.

García H, Villasis-Keever MA, Zavala-Vargas G, Bravo-Ortiz JC, Pérez-Méndez A, Escamilla-Núñez A. Global Prevalence and Severity of Retinopathy of Prematurity over the Last Four Decades (1985-2021): A Systematic Review and Meta-Analysis. Archives of medical research. 2024;55(2):102967.

Coggins SA, Glaser K. Updates in Late-Onset Sepsis: Risk Assessment, Therapy, and Outcomes. NeoReviews. 2022;23(11):738-55.

Migliori C, Braga M, Siragusa V, Villa MC, Luzi L. The impact of gender medicine on neonatology: the disadvantage of being male: a narrative review. Italian journal of pediatrics. 2023;49(1):65.