Open Access

Original Article

Comparison of Neonatal Outcome of Late Pre-Term Neonates Associated with and Without Intrauterine Growth Retardation

Hassnain Shahid, Farooq Ikram, Maryam Saleem*, Hafiz Zulqarnain, Saeed Zaman, Atif Naseem Abbasi

Department of Pediatric, Pak Emirates Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, *Department of Pediatric, Combined Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To compare the neonatal outcome of late pre-term neonates with and without intrauterine growth retardation at a nursing intensive care unit of our hospital.

Study Design: Comparative cross-sectional study.

Place and Duration of Study: Pak Emirates Military Hospital, Rawalpindi Pakistan, from Jun 2021 to Jan 2022.

Methodology: Patients were divided into two groups for comparison, late pre-term neonates with and without intrauterine growth retardation. Intrauterine growth retardation was assessed via ultrasound examination at >29 and <34 weeks of gestation. Neonatal outcome parameters were compared in neonates with and without intrauterine growth retardation.

Results: A total of 110 neonates were included in the final analysis. Of them, 69(62.7%) were male, while 41(37.3%) were females. Patients were divided into two groups for the sake of comparison. Fifty-eight (52.7%) had no intrauterine growth retardation, while 52(47.3%) had intrauterine growth retardation. Statistical analysis revealed that longer duration of admission, hypoglycemia and hyperbilirubinemia were found statistically significantly more in late pre-term neonates who had intrauterine growth retardation as compared to those who did not have intrauterine growth retardation (p-value<0.05).

Conclusion: Intrauterine growth retardation was a commonly observed finding among neonates who were born at late pre-term. Neonates with intrauterine growth retardation were more at risk of certain complications like long stay at the neonatal intensive care unit, hypoglycemia and hyperbilirubinemia.

Keywords: Intrauterine growth retardation, Neonates, Outcome, Pre-term.

How to Cite This Article: *Shahid H, Ikram F, Saleem M, Zulqarnain H, Zaman S, Abbasi AN. Comparison of Neonatal Outcome of Late Pre-Term Neonates Associated with and Without Intrauterine Growth Retardation. Pak Armed Forces Med J 2023; 73(6): 1707-1710.*
DOI: https://doi.org/10.51253/pafmj.v73i6.8605

INTRODUCTION

Pakistan is in an evolving phase in introducing new specialities in pediatric medicine, and neonatology is one of these specialities. Nursing intensive care units (NICU) have been equipped more with trained staff and modern machinery to improve neonatal outcomes.[1,2] In a country like ours, where many pregnancies remain un-booked, the burden comes on neonatal intensive care units (NICU) receiving many referrals.[3] Multiple baby and mother-related problems lead to indications of NICU admissions in neonates.[4]

Homeostasis maintained inside the mother's body makes it a perfect place for the baby to live for nine months. However, in some cases, multiple factors may make the environment harsh for the baby.[5,6] Disruption in maternal homeostasis or any disease process in the maternal body may lead to multiple complications in the baby, including pre-term birth, intrauterine growth retardation, infections, metabolic problems, low APGAR score at birth or intrauterine or early neonatal death.[7,8,9]

In a country like ours, where healthcare facilities are still in the evolving phase, and ante-natal care is also compromised, many neonates are born before the term. They are prone to various complications in the early and late neonatal period. A recent local study concluded that late pre-term neonates born in our part of the world had more mortality and morbidity as compared to neonates who were born at term.[10] Limited local data is available regarding the comparison of neonatal complications in late pre-term neonates with and without IUGR. We, therefore, planned this study with the rationale to compare the neonatal outcome of late pre-term neonates with and without intrauterine growth retardation at a nursing intensive care unit of our hospital.

METHODOLOGY

The comparative cross-sectional study was conducted at the Nursing Intensive Care Unit of Pak Emirates Military Hospital Rawalpindi from June 2021 to January 2022 after approval from the Ethical Review Board Committee (via IREB letter no. A/28/EC

Correspondence: Dr Hassnain Shahid, Department of Pediatric, Pak Emirates Military Hospital, Rawalpindi Pakistan
Received: 29 Jul 2021; revision received: 01 Mar 2023; accepted: 07 Mar 2023

1399/2022). The sample size was calculated by the WHO Sample Size Calculator with the expected percentage of hypoglycemia in both groups, i.e. with IUGR as 24% and without IUGR at 6%.[11] Non probability consecutive sampling technique was used to gather the sample.

Inclusion Criteria: All late pre-term neonates admitted to the Nursing Intensive Care Unit were included in the study.

Exclusion Criteria: The late pre-term neonates with severe congenital malformations, those who could not survive at the time of birth or those who had intrauterine death were excluded.

Written informed consent from the parents or guardians of the potential participants or their care-givers were taken. Late pre-term birth was defined as the birth of a baby between 34 and 36 weeks of gestation.[12] Intrauterine growth retardation was defined as height less for gestational age.[13] and diagnosed by a consultant radiologist and gynaecologist based on ultrasound examination performed between the 29th and 34th week of gestation.[14] Outcome parameters (only morbidity parameters, not mortality) was observed by consultant paediatrician or neonatologist within a first week of admission in NICU.

Statistical Package for Social Sciences (SPSS) version 26.0 was used for the data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. Chi-square test was applied to explore the inferential statistics. The *p*-value lower than or up to 0.05 was considered as significant.

RESULTS

A total of 110 neonates were included in the final analysis. Of them, 69(62.7%) were male, while 41 (37.3%) were females. Median age of the study participants was 3.25(1-4 days). Fifty-eight (52.7%) had no intrauterine growth retardation, while 52(47.3%) had intrauterine growth retardation (Table-I). More than five days of NICU stay 62(56.4%) was the most common complication seen in study participants, followed by neonatal sepsis 57(51.8%). Out of the total study participants, 28(25.4%) had transient tachypnea, 26(23.6%) had hypoglycaemia, and 29(26.3%) had hyperbilirubinemia.

Patients were divided into two groups for comparison, late pre-term neonates with and without intrauterine growth retardation. Statistical analysis revealed that longer duration of admission (*p*-value <0.001), hypoglycemia (*p*-value-0.002) and hyperbilirubinemia (*p*-value-0.007) were found statistically significantly more in late pre-term neonates who had intrauterine growth retardation as compared to those who did not have intrauterine growth retardation (Table-II).

Table-I: Characteristics of Neonates included in the Study (n=110)

Study Parameters	n(%)
Median Age (IQR)	3.25(1-4 days)
Gender	
Male	69(62.7%)
Female	41(37.3%)
Intrauterine Growth Retardation	
No	58(52.7%)
Yes	52(47.3%)
Poor Neonatal Outcomes	
More than 5 days stay at NICU	62(56.4%)
Transient tachypnea	28(25.4%)
Hypoglycemia	26(23.6%)
Hyperbilirubinemia	29(26.3%)
Neonatal sepsis	57(51.8%)
Neonatal death	01(0.9%)

Table-II: Comparison of Neonatal Outcome in Late Pre-Term Neonates with and without Intrauterine Growth Retardation (n=110)

Outcome Parameters	No Intrauterine Growth Retardation n=58	Intrauterine Growth Retardation n=52	*p*-value
Length of Stay			
<5 days	36(62.1%)	12(23.1%)	<0.001
>5 days	22(37.9%)	40(76.9%)	
Transient Tachypnea of Newborn			
No	46(79.3%)	36(69.2%)	0.226
Yes	12(20.7%)	16(30.8%)	
Hypoglycemia			
No	51(87.9%)	33(63.4%)	0.002
Yes	07(12.1%)	19(36.6%)	
Neonatal Sepsis			
No	44(75.8%)	37(71.1%)	0.576
Yes	14(24.2%)	15(28.9%)	
Hyperbilirubinemia			
No	35(60.3%)	18(34.6%)	0.007
Yes	23(39.7%)	34(65.4%)	

DISCUSSION

Neonates who need organ support are admitted to nursing intensive care units in order to provide them with adequate quality care. Neonates who are born before time are prone to have multiple systemic problems and complications. Even among those born before time, there may be a group that may be more at risk of developing complications. Neonates who were born late pre-term and have growth-related issues as

well in intrauterine life may be more prone to complications and poor early neonatal outcomes.[13,14] This study, therefore, was conducted to compare the neonatal outcome of late pre-term neonates with and without intrauterine growth retardation at a nursing intensive care unit of our hospital.

Mallick *et al*. published a study in 2019 comparing neonatal outcome parameters, including hypoglycemia.[15] They revealed that complications like hypoglycemia, hypothermia, respiratory morbidity needing support, jaundice needing treatment, feeding difficulties, birth asphyxia, and sepsis were found in neonates who were born at late pre-term and had intrauterine growth restriction. Our study design was slightly different as we compared late pre-term neonates with IUGR to those with normal growth. We found that the complication rate was significantly higher in neonates with IUGR. A Nepalese study published in 2015 analysed mortality patterns of neonates who were born before term and had growth restrictions.[16] They found that the mortality rate was very high in neonates who were born before term and had 16 times more chance of dying in the neonatal period. We did not study mortality patterns but morbidity patterns in the neonatal period and found out that intrauterine growth retardation was a commonly observed finding among neonates who were born at late pre-term. Neonates with intrauterine growth retardation were more at risk of certain complications like long stay at the neonatal intensive care unit, hypoglycemia and hyperbilirubinemia.

Adverse fetal outcomes in pregnant women with intrauterine growth restriction were studied in the Turkish population by Acmaz *et al*.[17] in 2021. They came up with the findings that diaphragmatic parameters were deranged more in patients with IUGR and had prolonged NICU admission. We did not study diaphragmatic parameters, but all other morbidity parameters, especially hypoglycemia and longer NICU admission, were found statistically significantly more in neonates with IUGR as compared to those without IUGR. Kreko *et al*.[18] in 2019 compared the neonatal morbidity of neonates with intrauterine growth restricted to those who were appropriate for gestational age who were born at late pre-term. They found out that hypoglycemia, polycythemia, feeding intolerance, birth asphyxia, seizures and secondary sepsis were found more in neonates with IUGR. Longer duration of NICU stay, hypoglycemia and hyperbilirubinemia were seen more in neonates with IUGR in our study as well.

Neonates with IUGR should be considered high-risk neonates and should be dealt with special care to avoid immediate, long term and short-term complications.

LIMITATIONS OF STUDY

This data from one nursing intensive care unit could not be generalised. Ultrasound examination and diagnosis of IUGR depends upon the operator or investigator, and multiple physicians were involved, so there could be bias in the results. More studies involving multiple centres and better study design may generate findings that could help us formulate local guidelines.

CONCLUSION

Intrauterine growth retardation was a commonly observed finding among neonates who were born at late pre-term. Neonates with intrauterine growth retardation were more at risk of certain complications like long stay at the neonatal intensive care unit, hypoglycemia and hyperbilirubinemia.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

HS & FI: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

MS & HZ: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

SZ & ANA: Concept, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Al-Wassia H, Saber M. Admission of term infants to the neonatal intensive care unit in a Saudi tertiary teaching hospital: cumulative incidence and risk factors. Ann Saudi Med 2017; 37(6): 420-424. https://doi.org/10.5144/0256-4947.2017.420
2. Quddusi AI, Razzaq A, Hussain S, Hussain A. Pattern of neonatal admission at the Children's Hospital and the Institute of Child Health, Multan. J Ayub Med Coll Abbottabad 2012; 24(2): 108-110
3. Chow S, Chow R, Popovic M. A Selected Review of the Mortality Rates of Neonatal Intensive Care Units. Front Public Health 2015; 3(1): 225. https://doi.org/10.3389%2Ffpubh.2015.00225
4. Fisher AL, Sangkhae V, Presicce P, Chougnet CA, Jobe AH, Kallapur SG, et al. Fetal and amniotic fluid iron homeostasis in healthy and complicated murine, macaque, and human pregnancy. JCI Insight 2020; 5(4): e135321. https://doi.org/10.1172/jci.insight.135321
5. Salman M, Rathore H, Arif S, Ali R, Khan AA, Nasir M, et al. Frequency of Immediate Neonatal Complications (Hypoglycemia and Neonatal Jaundice) in Late Preterm and Term Neonates. Cureus 2021; 13(1): e12512.

https://doi.org/10.7759/cureus.12512
6. Khowaja WH, Leghari AL, Hussain AS, Ariff S, Khan IA. Frequency and Early Complications of Late Preterm Infants: A Descriptive Analysis from Two Secondary-care Hospitals of Karachi. Cureus 2019; 11(9): e5789. https://doi.org/10.7759/cureus.5789.
7. Sharma D, Shastri S, Sharma P. Intrauterine Growth Restriction: Antenatal and Postnatal Aspects. Clin Med Insights Pediatr 2016; 10(3): 67-83. https://doi.org/10.4137/CMPed.S40070
8. Colella M, Frérot A, Novais ARB, Baud O. Neonatal and Long-Term Consequences of Fetal Growth Restriction. Curr Pediatr Rev 2018; 14(4): 212-218. https://doi.org/10.2174/1573396314666180712114531
9. Ortigosa Rocha C, Bittar RE, Zugaib M. Neonatal outcomes of late-preterm birth associated or not with intrauterine growth restriction. Obstet Gynecol Int 2010; 2010(1): 231842. https://doi.org/10.1155/2010/231842
10. Haroon A, Ali SR, Ahmed S, Maheen H. Short-term neonatal outcome in late preterm vs. term infants. J Coll Phys Surg Pak 2014; 24(1): 34-38.
11. Ortigosa Rocha C, Bittar RE, Zugaib M. Neonatal outcomes of late-preterm birth associated or not with intrauterine growth restriction. Obstet Gynecol Int 2010; 2010(3): 231842. https://doi.org/10.1155/2010/231842
12. Chew LC, Verma RP. Fetal Growth Restriction. Treasure Island (FL): StatPearls Publishing; 2021, Available at: https://www.ncbi.nlm.nih.gov/books/NBK562268/
13. Karnati S, Kollikonda S, Abu-Shaweesh J. Late preterm infants - Changing trends and continuing challenges. Int J Pediatr Adolesc Med 2020; 7(1): 36-44. https://doi.org/10.1016%2Fj.ijpam.2020.02.006
14. Karataşlı V, Kanmaz AG, İnan AH, Budak A, Beyan E. Maternal and neonatal outcomes of adolescent pregnancy. J Gynecol Obstet Hum Reprod 2019; 48(5): 347-350. https://doi.org/10.1016/j.jogoh.2019.02.011
15. Mallick AK, Venkatnarayan K, Thapar RK, Tewari VV, Shaw SC. Morbidity Patterns of Late Preterm Babies Born Small for Gestation. Indian J Pediatr 2019; 86(7): 578-583. https://doi.org/10.1007/s12098-019-02925-4
16. Kc A, Wrammert J, Nelin V, Ewald U, Clark R, Målqvist M, et al. Level of mortality risk for babies born preterm or with a small weight for gestation in a tertiary hospital of Nepal. BMC Public Health 2015; 15(2): 877. https://doi.org/10.1186/s12889-015-2232-1
17. Acmaz G, Ozdemir F, Sahin E, Sahin ME, Madendag Y, Demir TB, et al. Adverse fetal outcomes in patients with IUGR are related with fetal diaphragm evaluation parameters. Paediatr Respir Rev 2021; 37(3): 48-53. https://doi.org/10.1016/j.prrv.2020.07.005
18. Kreko E, Kola E, Sadikaj F, Dardha B, Tushe E. Neonatal Morbidity in Late Preterm Infants Associated with Intrauterine Growth Restriction. Open Access Maced J Med Sci 2019; 7(21): 3592-3595. https://doi.org/10.3889%2Foamjms.2019.832