International Journal of Contemporary Pediatrics
Chaudhari AR et al. Int J Contemp Pediatr. 2023 Feb;10(2):168-170
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20230078

Original Research Article

Neonatal polycythemia: incidence and associated factors

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Received: 08 January 2023
Revised: 22 January 2023
Accepted: 23 January 2023

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ABSTRACT

Background: The chief concern in neonatal polycythemia (NPC) is the development of complications due to hyper viscosity. We aimed to study risk factors, clinical features, laboratory investigations, management and outcome of neonates with polycythemia at our set up.
Methods: A prospective study was conducted in the frame of January 2021 to January 2022 at tertiary care institute in Ahmedabad, all neonates with gestational age ≥34 weeks were evaluated and those with venous hematocrit more than 65% or hemoglobin exceeding 22 mg/dl were included in the study. The clinical features and laboratory parameters were noted. Asymptomatic neonates or neonates with mild polycythemia were observed for rising hematocrit or development of symptoms whereas symptomatic neonates or neonates with moderate and severe polycythemia were subjected to interventions as needed.
Results: Incidence of polycythemia in this study was 11.18 per 100 neonates. The most common symptoms observed were jaundice in 68 (43.3%) neonates, followed by lethargy in 33 (21%). Other symptoms observed were refusal to feed (18.4%), respiratory distress (11.4%), jitteriness (6.3%), decrees urine output (2.5%), and cyanosis (1.2%). The noted laboratory abnormalities were hyperbilirubinemia (43.3%) followed by thrombocytopenia (40.1%), hypoglycemia (28%) and hypocalcemia (4.4%). The 35.6% neonates require hydration and 22.5% of neonates required partial exchange transfusion, rest were managed conservatively.
Conclusions: the study suggested that polycythemia is a frequent problem among neonates. More than one third of them can be asymptomatic indicating the importance of assessing the associates' risk factors.

Keywords: Hyperbilirubinemia, Jaundice, Neonates, Polycythemia

INTRODUCTION

Neonatal polycythemia (NPC) is defined as a venous hematocrit equal to or greater than 65%. It is, defined as a venous hematocrit value higher or equal to 65% or a venous hemoglobin concentration exceeding 22 gm/dl, is associated with blood hyper viscosity. Hyper viscosity is defined as a viscosity greater than 14.6 centipoises at a shear rate of 11.5 seconds. The increase in hematocrit in the neonate is due to three mechanisms: response to hypoxia, blood transfusions, and hemoconcentration due to decreased plasma volume. Associated factors can be either maternal or neonatal factors.[1-5]

As this viscosity increases, there is an often-progressive impairment of tissue oxygenation and perfusion, possibly causing significant damage. Symptoms of hypoperfusion correlate better with blood viscosity as compared to hematocrit. However, viscosity is difficult to measure and the unavailability of instruments to measure viscosity in neonatal intensive care units, hyper viscosity is usually suspected in presence of suggestive symptoms or an abnormally high hematocrit.[6-8]

The frequency of NPC is reportedly between 1.5-4% AIIMs, but the results are significantly affected by many confounding factors.

Clinical manifestations include CNS manifestations such as lethargy, poor feeding, tremors, jitteriness; renal include oliguria; cardiopulmonary include tachycardia, tachypnea, cyanosis, congestive heart failure; gastrointestinal include poor feeding, abdominal distension, necrotizing enterocolitis.[9,10]

NPC is also known for its long-term squeal like gross motor, fine motor and speech delays, spastic diplegia, mono paresis, hemiparesis. Known laboratory abnormalities are hypoglycemia, hyperbilirubinemia, hypo-calcaemia, hypomagnesaemia, and thrombocytopenia. Polycythemia in newborns may be a compensatory mechanism for the intrauterine hypoxia or secondary to the fetal transfusions.[9] The definitive treatment for the polycythemia is partial exchange transfusion.[11]

Importance of NPC is more in developing country like India, where NPC is a significant problem, but hidden due to lack of awareness and paucity of literature. Hence this study was undertaken to find out the incidence, clinical profile, and therapeutic end points of polycythemia in neonates.

METHODS

A prospective study was conducted in the frame of January 2021 to January 2022 at GCS medical college, hospital and research centre, Ahmedabad, Gujarat. All neonates with gestational age ≥34 weeks were evaluated and those with venous hematocrit more than 65% or hemoglobin exceeding 22 mg/dl were included in the study. Simple random sampling technique was utilized for the current research. Neonates with gestational age less than 34 weeks, sepsis, metabolic disease and congenital anomalies were excluded from the study. Total 157 neonates were included in the study.

Demographic information included gestational age, birth weight and gender of the baby and various risk factors if any were noted. All relevant investigations were performed as indicated according to clinical condition. The clinical features and laboratory parameters were noted. Asymptomatic neonates or neonates with mild polycythemia were observed for rising hematocrit or development of symptoms whereas symptomatic neonates or neonates with moderate and severe polycythemia were subjected to the interventions as needed.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5% respectively.

RESULTS

A prospective study was conducted in the frame of January 2021 to January 2022 at tertiary care institute in Ahmedabad.

Incidence of polycythemia in this study was 11.18 per 100 neonates. Males were affected more than females (Table 1). The most common symptoms observed were jaundice in 68 (43.3%) neonates, followed by lethargy in 33 (21%). Other symptoms observed were refusal to feed (18.4%), respiratory distress (11.4%), jitteriness (6.3%), decrees urine output (2.5%) and cyanosis (1.2%) (Table 2), 66 neonates were found to be asymptomatic. The noted laboratory abnormalities were hyperbilirubinemia (43.3%) followed by thrombocytopenia (40.1%), hypoglycemia (28%) and hypocalcemia (4.4%). The 35.6% neonates require hydration and 22.5% of neonates required partial exchange transfusion, rest were managed conservatively. All neonates were discharged and no deaths were noted in our study.

Table 1: Gender wise distribution of study participants.

Gender	Number	Percentage (%)
Male	89	56.68
Female	68	43.31
Total	157	100

Table 2: Distribution according to symptoms.

Symptoms	Number	Percentage (%)
Jaundice	68	43.3
Lethargy	33	21
Refusal to feed	29	18.4
Respiratory distress	18	11.4
Jitteriness	10	6.3
Decrees urine output	4	2.5
Cyanosis	2	1.2

DISCUSSION

In this study the incidence of polycythemia was found to be 11.18 per 100 neonates. In comparison with previous studies, it varies between (0.4-5%).[12,13] Male was affected more than female. This may be due to random sample collection as no such difference was found in literature.[14,15]

Concerning signs and symptoms, jaundice, lethargy, respiratory distress and hypoglycemia were the main finding respectively. No feeding problems, jitteriness and cyanosis encountered in this study. In a study done in United States army hospitals 1986, they found that jaundice, respiratory distress and hypoglycemia present with the percentage of (33.5%, 6.6% and 13%) respectively. In another three studies from India, the first

one in January 1990 in New Delhi demonstrated the presence of lethargy, respiratory distress and jitteriness with a percentage of (11.1%, 14.8% and 25.9%) respectively.[16] The another study done in April 1990 in Chandigarh showed the presence of jaundice, lethargy, respiratory distress, hypoglycemia and feeding problems with a percentage of (26% , 15% , 10% , 10.8% and 13%) respectively.[17] In the another study in 1994 in Karnataka, they found that lethargy, hypoglycemia and feeding problems encountered with a percentage of (51%, 51% and 34%) respectively.[18]

Maternal age has been a controversial factor; in isolated reports, it is a risk factor, and in others, it is not. However, age determines obstetric risk and is associated with pathologies, such as hypertension and diabetes, so it is necessary to carry out new studies to confidently establish this relationship. Finally, assuming the limitations inherent to cross-sectional studies, these arguments have the character of approximations without prejudice. They can be incorporated as data that guide future investigations.

CONCLUSION

The present study suggested that polycythemia is a frequent problem among neonates. Male predominance was noticed. Jaundice was the main presentation followed by lethargy, respiratory distress and hypoglycemia. The 66 neonates were found to be asymptomatic. All neonates were discharged and no deaths were noted in our study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Chaudhari AR, Phalak AM, Chauhan PG, Goriya AN, Prajapati PS. Neonatal polycythemia: incidence and associated factors. Int J Contemp Pediatr 2023;10:168-70.