

**AETIOPATHOLOGICAL AND CLINICAL STUDY OF ANEMIA IN NEWBORNS
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ABSTRACT

Background: Anemia possesses a special diagnostic problem during neonatal period because at no other time in life, is anemia known to occur due to such varied causes, as occurs in the first week of life. Numerous physiological changes lead to rapid changes in normal haematological parameters after birth, and throughout the neonatal period. Present study was conducted to determine the aetio-clinico-pathological study of anaemia in Newborns in our institute. **Aims and Objectives:** The study was carried out with the objectives to find out the prevalence of anemia in neonatal age group and to study the clinical and aetiopathological aspects of anemia in neonatal age group in hospitalised patients. **Materials and Methods:** Hospital based observational study conducted over a period of 2 years (Oct 2013 to Oct 2015) at neonatal wing of SCB medical college Cuttack, India. All enrolled Newborn cases were screened in detail for anemia. Questionnaire technique was applied for data collection along with various lab investigations. Various data obtained were displayed in tables and charts, statistical analysis of the observations were done using percentages, averages & t tests. **Results:** Out of 272 cases, 106 were anemic with a prevalence of 39%. Prevalence of anemia in male babies (43.42%) were more than that of female babies (33.33%). Anaemia was more prevalent among term (43.48%) than that of preterms, and was more prevalent in 1st week of life (41.1%). The major neonatal associated factors of anemia were maternal anemia, birth asphyxia (47.17%), neonatal sepsis (36.63%), APH & neonatal hyperbilirubinemia. **Conclusion:** Prevention of neonatal anemia should be started from the antenatal period with special emphasis on maternal factors, proper perinatal monitoring, preventing maternal anemia followed by creating awareness and boosting confidence of mothers regarding better child rearing habits. The public should be made aware about anemia and adolescent girls should be counselled regarding cost effective healthy diets and its advantages in future life.

KEY WORDS: Anaemia, Newborn, Tertiary care centre.**BACKGROUND**

Hematology of the neonates remains a cardinal concern even because of the unique blood picture and varying range of normal haematological parameters in the newborn period. Anemia possesses a special diagnostic problem during neonatal period because at no other time in life, is anemia known to occur due to such varied causes, as occurs in the first week of life.^[1] Neonatal period is the most dynamic period because of profound alterations and adjustments during transit of fetus from dependent, hypoxic, intrauterine life to totally independent neonatal life thus numerous physiological changes lead to rapid changes in normal haematological parameters after birth, and throughout the neonatal period.^[1]

The cause of anemia frequently can be ascertained by detailed history and physical examination, particular importance being given to family history (anemia, cholelithiasis, unexplained jaundice, splenomegaly), maternal medical history (especially infections), and obstetrics history (previous pregnancies, length of gestation, method of and difficulty in delivery). The age at which anemia becomes manifest also is of diagnostic importance. Significant anemia at birth is generally due to blood loss or alloimmune hemolysis. After 24 hours, internal haemorrhages and other causes of hemolysis becomes evident. Anemia that appears several weeks after birth can be caused by a variety of conditions, including abnormalities in the synthesis of haemoglobin beta chains, hypoplastic RBC disorders, and the physiologic anemia of infancy or prematurity.^[2] Anemia,

defined as hematocrit (Hct) or Hemoglobin (Hb) concentration $>2SD$ below mean for age.^[3]

AIMS AND OBJECTIVES

The present study was carried out with the objectives to find out the prevalence of anemia in neonatal age group & to study the clinical and aetiopathological aspects of anemia in neonatal age group in hospitalised patients.

MATERIALS AND METHODS

The study was a Hospital based observational study conducted over a period of 2 years (Oct 2013 to Oct 2015) at neonatal wing of SCB medical college Cuttack, India. Institutional ethics committee of the hospital approved the study. Neonates with gestational age >28 to 40 wk & postnatal age ≤ 14 days were included in the study. Neonates with very serious conditions in whom lab tests could not be performed, who expired or discharged before being evaluated & neonates with major congenital anomalies were excluded from the study. Anemia was defined as $Hb < 12\text{gm/dl}$ in preterms & $Hb < 13\text{gm/dl}$ in term infants. All enrolled cases were screened in detail for anemia. Questionnaire technique was applied for data collection along with various lab investigations. The written questionnaire was well explained to the participants in local language. Various data obtained were displayed in tables and charts, statistical analysis of the observations were done using percentages, averages & t- tests.

RESULTS

During the study period total 2770 newborns were admitted, out of which 2052 were ≤ 2 wk older. After excluding 1780 cases 272 cases were screened for anaemia. Out of 272 cases 106 were anemic with a prevalence of 39%.(Table-1) 33.96% preterms and 66.04% terms in the study were anemic.(Table-2) Prevalence of anemia in male babies (62.26 %) were more than that of female babies (37.74 %).(Table-3) Anemia was more prevalent in 1st week of life (69.82 %). (Table-4)

Anemia was an incidental finding (61.3%), followed by paleness (18.87 %), combined paleness with hepatosplenomegaly (10.38 %), icterus (5.7%) and shock (3.8%).(Table-5) 70% anemic neonates were born to mothers of lower socioeconomic status, whereas 22.64% and 6.6% were born to middle and upper socioeconomic status respectively.(Table-6) Normal vaginal delivery was associated with 81.13% cases while caesarean section accounted for 18.87%. (Table-7) Eight (7.55 %) of all neonates with anaemia were born to mothers with P. falciparum malaria during present pregnancy.(Table-8) 67.93% anemic neonates were born to mothers who had documented anemia in third trimester of pregnancy. (Table-9) Maternal APH was associated with only 2 (2 %) neonates with anemia.(Table-10) The other associated factors of neonatal anemia were birth asphyxia (47.17%),

neonatal sepsis (36.63%), & neonatal hyperbilirubinemia.(Table-11 and 12)

Table 1: Prevalence of anemia in Newborns.

| Groups | No of Groups (n=272) | Percentage (%) | p-value |
|-------------------------|----------------------|----------------|---------|
| Patients with anemia | 106 | 39.0 | P<0.001 |
| Patients with no anemia | 166 | 61.0 | |

Table 2: Anemia profile in term and preterm (n=106).

| Preterm | | Term | |
|-------------|------------|-------------|------------|
| No of Cases | Percentage | No of Cases | Percentage |
| 36 | 33.96 | 70 | 66.04 |

Table 3: Gender profile (n=106).

| Male | | Female | |
|-------------|----------------|-------------|----------------|
| No of cases | Percentage (%) | No of cases | Percentage (%) |
| 66 | 62.26 | 40 | 33.74 |

Table 4: Age profile (n=106).

| 0-7 day | | 8-15 day | |
|-------------|----------------|-------------|----------------|
| No of cases | Percentage (%) | No of cases | Percentage (%) |
| 74 | 69.81 | 32 | 30.19 |

Table 5: Presenting features of neonatal anemia (n=106).

| Symptoms and signs | No of cases (n=106) | Percentage |
|------------------------------|---------------------|------------|
| Co-incidental | 65 | 61.32% |
| Pale | 20 | 18.87% |
| Pale with hepatosplenomegaly | 11 | 10.38% |
| Icteric | 6 | 5.66% |
| Shock | 4 | 3.77% |

Table 6: Socioeconomic status as a risk factor of anemia (n=106).

| Socioeconomic Status | No of Cases | Percentage |
|----------------------|-------------|------------|
| Lower SES | 75 | 70.76 |
| Middle SES | 24 | 22.64 |
| Upper SES | 7 | 6.60 |

Table 7: Mode of delivery as a risk factor of neonatal anemia (n=106).

| Mode of delivery | No of cases(n=106) | Percentage (%) |
|-------------------|--------------------|----------------|
| Vaginal | 86 | 81.13 |
| Caesarean section | 20 | 18.87 |

Table 8: Maternal malaria as a risk factor of neonatal anemia (n=106).

| Maternal Malaria | No of cases | Percentage |
|-------------------------|-------------|------------|
| H/O Maternal Malaria | 8 | 7.55 |
| No H/O Maternal Malaria | 98 | 92.45 |

Table 9: Maternal Anemia as a risk factor of neonatal anemia (n=106).

| Maternal status | Neonatal anemia | |
|----------------------------------|-----------------|----------------|
| | No of cases | Percentage (%) |
| H/O anemia in third trimester | 72 | 67.93 |
| No H/O anemia in third trimester | 34 | 32.07 |

Table 10: Maternal APH as a risk factor of neonatal anemia (n=106).

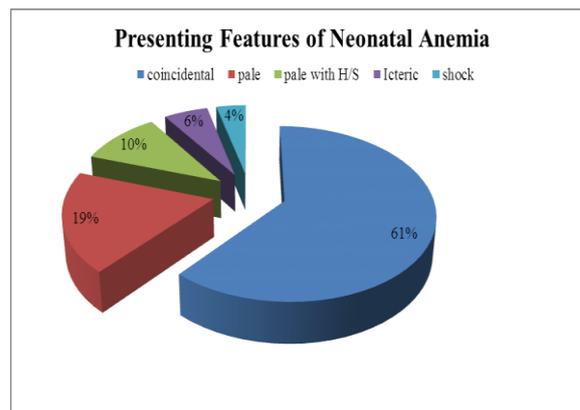
| Maternal status | Neonatal anemia | |
|-----------------|-----------------|----------------|
| | No of cases | Percentage (%) |
| H/O APH | 2 | 2% |
| No H/O APH | 104 | 98% |

Table 11: Neonatal sepsis as a risk factor of anemia.

| Risk factor | Anemic neonate | |
|-----------------|---------------------|----------------|
| | No of cases (n=106) | Percentage (%) |
| Neonatal sepsis | 42 | 39.63% |
| No sepsis | 64 | 60.37% |

Table 12: Baseline data in NB with Anaemia (Compilation).

| Characteristics | NB with Anemia (n =106) |
|-----------------------------|-------------------------|
| Term | 70 (66.04%) |
| Preterm | 36 (33.96%) |
| Male | 66 (62.26%) |
| Female | 40 (37.74%) |
| 0-7 days | 74 (69.81%) |
| 8-15 days | 32 (30.19%) |
| Socioeconomic status | |
| Lower | 75 (70.76%) |
| Middle | 24 (22.64%) |
| Upper | 7 (6.60%) |
| Mode of delivery | |
| Vaginal | 86 (81.13%) |
| Caesarean | 20 (18.87%) |
| Maternal malaria | 8 (7.85%) |
| Maternal anemia | 72 (67.93%) |
| APH | 2 (2%) |
| Birth asphyxia | 50 (47.17%) |
| Hyper bilirubinemia | 18 (17%) |
| Sepsis | 42 (39.63%) |
| Twin twin transfusion | 2 (1.89%) |
| Mode of presentation | |
| Coincidental | 65 (61.32%) |
| Pale | 20 (18.87%) |
| Pale with H/S | 11 (10.38%) |
| Icterus | 6 (5.66%) |
| Shock | 4 (3.77%) |

**Figure 1: Presenting Features of Neonatal Anemia.**

DISCUSSION

The prevalence of neonatal anemia was found to be 39.0% is highly significant ($p < 0.001$). This rate is almost similar to the studies conducted by Brabin B J *et al* who found the prevalence of anemia ranging from 23-66% in neonates in malaria endemic areas of Malawi.^[4] The prevalence of anemia in male babies (62.26%) were more than that of female babies (37.74%). The results of this study is similar to that done by Yang *et al*, who found that male infants stood a higher risk of anemia than female infants due to relatively high erythropoietic activity in boys during fetal life, smaller iron stores despite their higher body weight.^[5]

33.96% preterms and 66.04% terms in this study were anemic and all were less than 2 weeks of life. No previous study was carried out regarding prevalence of anemia in newborns among preterms and terms. Though Folquet Amorissani M *et al* 2007 found the incidence of anemia in premature babies to be 17.5%, and Jain R found nearly 85% of ELBW babies got transfusions for correction of anemia during hospital stay.^[6,7] Neonatal anemia was found more frequently (41.11%) in the 1st week of life. No similar observation is available in previous studies. High incidence of Neonatal anaemia in 1st week of life might be due to the association of preterms and sick neonates which are usually admitted as early as possible. Anemia was commonly an incidental finding (61.3%) followed by paleness with hepatosplenomegaly (29.3%). The next common presentation was icterus (5.7%) followed by shock. Out of 106 86 Newborns with anaemia (81.13%) were born by normal vaginal delivery and 20 cases (18.86%) by cesarean section. This finding is in contrast to the studies conducted by Yao AC *et al* and Cohen F *et al* who found that anemia following CS occurred when the infant was held above the placenta before clamping the cord. The reason for this difference may be attributed to our setting of the research which is a referral centre.^[8] So most of the deliveries are conducted in peripheries where emergency CS facilities are lacking so vaginal delivery is the preferred mode of delivery. Eight (7.55%) of all neonates with anaemia were born to mothers with *P. falciparum* malaria during present pregnancy. This

observation is quite low in comparison to the study conducted by Brabin B J (2004) who found the prevalence of fetal anemia to be 23.4% when mothers had malaria during pregnancy.^[4] 75.36% neonates were born to mothers who had documented anemia during third trimester of pregnancy. This finding is similar to that published by WHO World database for prevalence of anemia (1993-2005) for India (73.4-75.1%).^[9]

Maternal APH was associated with only 2 (2 %) neonates with anemia. Previous studies conducted by Novak F. *et al* and Neligan GA *et al* showed 4-10% of all infants born following abruptio placenta or placenta previa had anemia during postnatal period.^[10] The major associated factors of neonatal anemia were maternal anemia (67.93%), birth asphyxia (47.17%), neonatal sepsis (36.63%), & neonatal hyperbilirubinemia. The blood transfusions given in our setup is similar to the guidelines given by Murray NA, 2004.^[11]

CONCLUSION

Prevention of neonatal anemia should be started from the antenatal period with special emphasis on maternal factors, proper perinatal monitoring, preventing maternal anemia followed by creating awareness and boosting confidence of mothers regarding better child rearing habits. During antenatal period which is crucial for both the baby and the mother it must be ensured that the mother takes the stipulated iron & folic acid supplementation for which the village ASHA's role is essential. The public should be made aware about anemia and adolescent girls should be counselled regarding cost effective healthy diets and its advantages in future life. Since the time period of the study was short, the sample size was small and the community was not taken into consideration the results are inconclusive. This small piece of work will throw some light for conducting more studies in anemia in newborns.

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