Original Article

Study of cord blood haemoglobin estimation in preterm and term babies

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Abstract

Introduction: Interest in the clinical significance of cord Blood haemoglobin has considerable increased during last decade. Hemoglobin level and packed cell volume are higher in term low birth weight new born compared to preterm. Each gram of Hemoglobin yield 35 mg. of Unconjugated Bilirubin. Cord hemoglobin level compared to birth weight and gestational age is studied, is Finally a deviation from normal values has been found in certain infants. The present investigation undertaken to study the change in level of Hb From the cord blood in low birth weight babies. **Material and Method:** One hundred infants born in department of obstetrics and gynecology was investigated. In no case was pregnancy complicated by any reason. All infants were delivered spontaneously without any complication by vaginal delivery spontaneously **Aims and Objective**: 1) The aims of the study is to estimate the level of hemoglobin in cord blood of preterm and term infants. 2) To compare the level of hemoglobin with their gestation age group. 3) To estimate the amount of Hb in cord blood in preterm and term babies. **Discussion:** We found that the cord blood hemoglobin with gestation age of infant when correlated the normal level of hemoglobin that a cord blood should contain is 13.0-19.0gm/dl, it should varies with gestational age, weigth of baby, hemoglobin value of mother, weight of mother, type of delivery (whether normal vaginal delivery or caesarean section). **Conclusion:** The results of this study show that Hb levels of cord blood in the studied population are lower than normal values, Thus, new born infants in our study (especially cesasrean section newborns) are at greater risk of early and accelerated physiological anemia.
Keywords: Cord Blood, preterm, Hemoglobin.

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INTRODUCTION

Interest in the clinical significance of cord Blood hemoglobin has considerable increased during last decade. Hemoglobin level and packed cell volume are higher in term low birth weight new born compared to preterm. Each gram of Hemoglobin yield 35 mg. of Unconjugated Bilirubin Cord hemoglobin level compared to birth weight and gestational age is studied, is Finally a deviation from normal values has been found in certain infants. The present investigation undertaken to study the change in level of Hb From the cord blood in low birth weight babies. Hemoglobin level in fetus increase with progression of pregnancy, reaching highest levels in life. Hemoglobin serves as iron reserve in fetus and is needed for the infant to adapt with anemia. Many factors can decrease Hemoglobin levels at birth and lead to accelerated physiological anemia. Hence, the infant would require earlier administration of iron drops. Identification of these factors and immediate management is essential to child health. This study was performed to compare Hemoglobin levels in cord blood of neonate and their relationship with gestational age and birth weight of the baby. A new born presents the culmination of developmental events from conception and implantation through organogenesis. The embryo requires red cells for the transport of maternal oxygen to permit this growth and development, Birth brings dramatic changes in circulation and oxygenation, which affect hematopoiesis, as the new born makes the transition to a separate biological existence. The infant blood composition

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changes markedly during the second and third trimesters. The mean hemoglobin fetuses progressively increases from 9.0 ±2.8 g/dl at age 10 weeks to 16.5±4.0 g/dl39weeks. Cord blood: is a sample of blood taken from a new born baby's umbilical cord blood. It contains a rich source of stem cells, which could potentially be used in the treatment over 75 different diseases, including leukemia, lymphoma and anemia. Many expecting parents choose to bank their newborn's cord blood, as it may be useful in the future, should the child or a related family member fall victim to a disease that is potentially treatable by cordblood stem cells. Premature birth preterm birth:3 expulsion of the fetus from the uterus before termination of the normal gestation period, The cordblood hb of prolonged pregnancy of few subjects remains constant level i.e., childrens born in the 43rd weeks or later, does not contain more hemoglobin than cord blood from infants born in the 40th, 41st or 42nd week the mean value in the 43rd week is16.92g.and for the other three 17.07g. per 100ml.Gosta Rooth et.al. comparing mean hemoglobin levels of umbilical cordblood in neonats with maternal hemoglobinand delivery pattern8mean Hb level of the the studied group was 13.24g/dl, which was significantly lower than corresponding parameters (P value=0.000). Hb levels in the umbilical cord, Blood of new borns delivered by cesarean section were lower than Hb levels of those with normal delivery.3Maternal and cord blood metal concentrations and low birth weight--a case-control study. All concentrations were lower in the low-birth weight group except for the maternal iron level. No significant differences between the low birth weight and control groups were found for copper, lead, and magnesium in either maternal or cord blood. A randomized controlled trial of delayed cord clamping in very low birth weight preterm. A randomized controlled trial of delayed cord clamping in very low birth weight preterm infants et.al during Umbilical cord blood nutrients in low birth weight babies in relation to birth weight and gestational age6 The evaluation of cord blood hemoglobinreticulocyte percentage and maternal Antiglobin Titer in the prognosis of hemolytic diseases of the new born (erythroblastosis fetalis 5the antibody titer of the maternal serum at term determined by the indirect antiglobulin technique is not quite such a good prognostic index of the chance of survival of live born Rh-positive infants as either values for cord-blood hemoglobin or reticulocyte percentage. Titration values of the maternal serum have the distinct advantage that they can be determined before birth, and so give guidance in the management of the case, including the early induction of labor

AIMS

The aims of the study is to estimate the level of hemoglobin in cord blood of preterm and term infants.

OBJECTIVE

1. To compare the level of hemoglobin with their gestation age group.
2. To estimate the amount of Hb in cord blood in preterm and term babies.
3. To note the changes in the weight with Hb level.
4. The study will help us evaluating the changes in cordblood Hb. in pre and term babies
5. Incidence of hyperbilirubinemia and polycythemia may be more.

MATERIALS AND METHODS

This study is conducted in department of pediatric in coordibnation with obstetric and gynecology department of Bhaskar general Hospital on 100 infants born in department of obstetrics and gynaecology was investigated. In no case was pregnancy complicated by any reason. All infants were delivered spontaneously without any complication by vaginal delivery spontaneously. In order to obtain the reliable information on duration of gestation age, the dates on menstrual age was carefully checked. Only cases with regular menstrual cycle were included and in which the duration of pregnancy was doubt was excluded. Cord blood is taken from a new born baby's maternal side of umbilical cord. Cord blood is obtained by syringing out the blood the umbilical cord at the time of child birth, after the cord has been detached from the newborn. After removal of the new born from the operative field, the free end of the cord was wiped with betadine to ensure sterility of the collections. While the placenta was still inutero, the umbilical vein was punctured and the cord blood was collected by gravity in the collection tube.

Efforts were made to obtain maximal volumes from each collection. The delivery of the new born was not influenced in any way and, in particular, the clamping of the cord was not accelerated nor the delivery of the placenta delayed. After collection, 2ml of venous blood were obtained from the mother side the corresponding paper work and processed within the following within 24 hours. Blood is collected from placental side of cord. Placenta weighed and examined for abnormalities and infarcts and clots. Hemoglobin estimated by Shalie's method. Estimation of hemoglobin by sahlies method: sahlis acid hematin method Principle: hemoglobin is converted to acid hematin by N/10 HCL. The acid hematin solution is further diluted until its color matches with that of permanent standard of the comparator block.

Requirements: 1) sahlis hemoglobinometer.2)

N/10Hcl.3) Distilled water.4) Dropper.5) Materials for sterile blood collection.

Procedure: Taking all aseptic precaution the collected blood is taken up to 20cu.mm mark of the pipette. Then transfer the blood from pipette into hemoglobin tube containing. N/10Hcl by immersing the tip of the pipette into the acid solution. Wait 10 minutes. Dilute the acid hematin by adding distilled water drop by drop. The solution nshould be mixed and the color should be compared with that of standard. Then the reading should be noted in grams%. Baby's gestational age is estimated by using modified Ballard's score. Baby weighed to the nearest 50 gram. Parents consent for the study is taken. after Explaining the implication of study in their language.

Inclusion Criteria

1. Gestational age28-41weeks
2. GENDER-males and females
3. TYPE OF DELIVERY- babies born by normal labour and caesarean deliveries

Exclusion Criteria

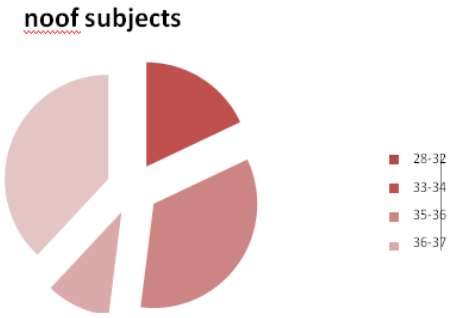
1. GESTATIONAL AGE- <28weeks and>41weeks.
2. Twin deliveries.
3. Babies born to mother with Gestational Diabetes.
4. Breech presentation.
5. Multiple pregnancies.
6. Women who give birth by CS.
7. Pre-eclampsia.
8. Hypertension, anemia, evidence of IUGR or congenital malformation

RESULT AND OBSERVATION

Duration of pregnancy inweeks	37-38	38-39	39-40	40-41
no of subjects	26	8	10	6

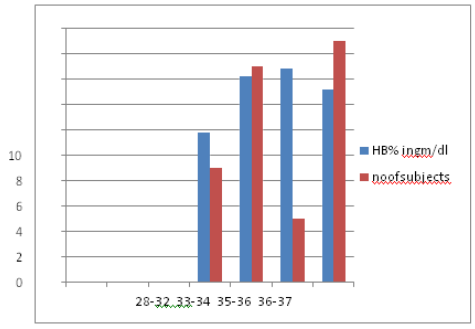
From table, it is noted that the number of infant born in gestation age (weeks)37-38 is 26, 38-39 is 8, 39-40 is 10 and 40-41 is 6

Duration Of pregnancyin weeks	28-32	33-34	35-36	36-37
no of subjects	9	17	5	19



From table2, it is noted that the number of infant born in gestation age (weeks) 28-32 is 9, 33-34 is 17, 35-36 is 5 and 36-37 is 19

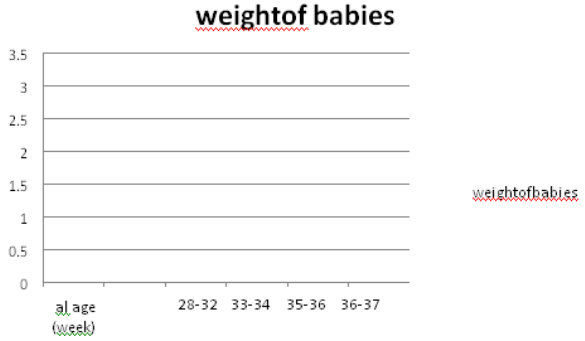
Duration Of pregnancyin weeks	28-32	33-34	35-36	36-37
HB% in gm/dl	11.8	16.2	16.8	15.2
No of subjects	9	17	5	19



From table3) it is noted that during the gestational age of 28-32 weeks 9 infants with hemoglobin of 11.8 are born, gestational age of 33-34 weeks 17 infants with hemoglobin of 16.2 are born, gestational age of 35-36 weeks 5 infants with hemoglobin of 16.8 are born, gestational age of 36-37 weeks 19 infants with hemoglobin of 15.2 are born.

Table 4: Term value

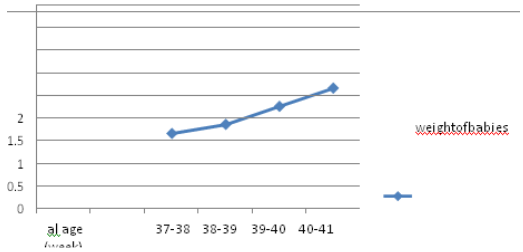
Duration of pregnancyin weeks	37-38	38-39	39-40	40-41
HB%in gm/dl	15.9	15.5	16.31	16.98
no of subjects	26	8	10	6



From table 5, It is noted that the number of infant born in gestation age (weeks) 28-32 is with weight of 2.4, 33-34 is 2.7, 35-36 is 52.8 and 36- 37 is 3.0

Table 5: Term

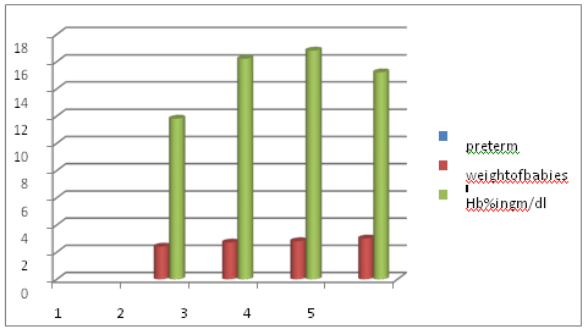
Gestationalage(al age(week)	37-38	38-39	39-40	40-41
weightof babies	3.2	3.4	3.8	4.2



From table 6, it is noted that the number of infant born in gestation age (weeks) 37-38 is born with weight of 3.2, 38-39 is 3.4, 39-40 is 3.8and 40-41 is 4.2

Table 7: Preterm

Weight of babies	2.4	2.7	2.8	3
Hb%ingm/dl	11.8	16.2	16.8	15.2



From table 7, It is noted that the number of infant born with birth weigth of 2.4 has 11.8gm/dl of hemoglobin, 2.7 is with 16.2gm, 2.8 is with 16.8gm/dl and 3.0 iswith15.2gm/dl

Table 8: Term

Weight of babies	3.2	3.4	3.8	4.2
Hb% in gm/dl	15.9	15.5	16.31	16.98

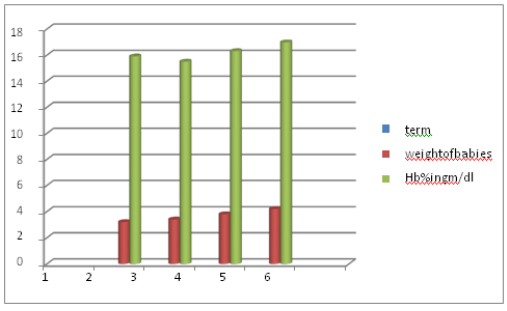


Table 8, it is noted that the number of infant born with birth weigth of 3.2 has 15.9gm/dl of hemoglobin, 3.4 is with 15.50gm, 3.8 is with 16.31gm/dl and 4.2 is with 16.98gm/dl.

OBSERVATION

From table1: by comparing the two factor we observe that is the number of infants born in the gestational age is that gestation age (weeks) 37-38 is 26, 38-39 is 8, 39-40 is 10 and 40-41 is 6 From table 2 :by comparing the two factor we observe that is the number of infants born in the gestational age is that gestation age (weeks) 28-32 is 9,33-34 is 17, 35-36 is 5 and 36-37 is 19. From table 3: by comparing the three factor we observe that during the gestational age of 28-32 weeks 9 infants with hemoglobin of 11.8 are born, gestational age of 33-34 weeks 17 infants with hemoglobin of 16.2 are born, gestational age of 35-36 weeks 5 infants with hemoglobin of 16.8 are born, gestational age of 36-37 weeks 19 infants with hemoglobin of 15.2 are born. From table 4: by comparing the three factor we observe it is noted that during the gestational age of 37-38 weeks 26 infants with hemoglobin of 15.9 are born, gestational age of 38-39 weeks 8 infants with hemoglobin of 15.50 are born, gestational age of 39-40 weeks 10 infants with hemoglobin of 16.31 are born, gestational age of 40-41 weeks 6 infants with hemoglobin of 16.98 are born, From table 5: by comparing the two factor we observe that the number of infant born in gestation age (weeks) 28-32 is with weight of 2.4, 33-34 is 2.7, 35-36 is 2.8 and 36-37 is 3.0. From table 6:by comparing the two factor we observe that the number of infant born in gestation age (weeks)37-38 is born with weight of 3.2, 38-39 is 3.4, 39-40 is 3.8 and 40-41 is 4.2 From table 7: by comparing the two factor we observe that the number of infant born with birth weight of 2.4 has 11.8gm/dl of hemoglobin, 2.7 is with 16.2gm, 2.8 is with 16.8gm/dl and 3.0 Is with 15.2gm/dl From table 8: by comparing the two factor we observe that the number of infant born with birth weight of 3.2 has 15.9gm/dl of hemoglobin, 3.4 is with15.50 gm, 3.8 is with 16.31gm/dl and 4.2 Is with 16.98gm/dl.

RESULT

There was a significant and direct correlation between Hemoglobin of umbilical cord blood, gestational age, weight of baby born. And there was also significant and direct correlation between maternal Hb and pattern of delivery. Hb levels in the umbilical cord blood of new borns delivered by cesarean section were lower than Hb levels of those with normal delivery. The mean of the determination is 16.72g.Hb per 100ml. In38th week the hemoglobin value is 15.50g. and in 39th 16.31g. In the

40th week the Value is 16.98 and remains then at a constant level. similarly In 27-32th. Week the hemoglobin value is 11.8g. and in 33-34weeks the value is 16.2 g. In the 35-36th week the value is 16.8 and In 36-37 weeks the value is 15.2g. The mean Hb level of the studied group was 13.24±1.77g/dl, which was significantly lower than corresponding value (P value=0.000).

DISCUSSION

We found that the cord blood hemoglobin with gestation age of infant when correlated the normal level of hemoglobin that a cord blood should contain is 13.0-19.0gm/dl, it should varies with gestational age, weight of baby, hemoglobin value of mother, weight of mother, type of delivery (whether normal vaginal delivery or caesarean section). During our study we found that the cord blood hemoglobin value variation 11.8gm/dl-16.98gm/dl with gestational age from 27 weeks-41weeks. the level of hemoglobin is 28-32 weeks 9 infant with hemoglobin of 11.8 are born It was very less in around 11.8gm/dl in infants born in 27-32weeks of gestational age. There is substantial evidence that maternal iron deficiency anemia increases the risk of preterm delivery and subsequent low birth weight, and accumulating information suggests an association between maternal iron status in pregnancy and the iron status of infants post partum. Certainly, iron supplements improve the iron status of the mother during pregnancy and during the postpartum period, even in women who enter pregnancy with reasonable iron store

CONCLUSION

The results of this study show that Hb levels of cord blood in the studied population are lower than normal values, Thus, new born infants in our study (especially cesasrean section newborns) are at greater risk of early and accelerated physiological anemia.

SUMMARY

Interest in the clinical significance of infant hemoglobin has considerably increased during the last decade. A relationship between the cord blood hemoglobin and degree of maturity of the new born infant has been repeatedly demonstrate An accurate method for determination of the level of hemoglobin based on the duration of pregnancy has been previously presented. The association in pre term as well as in term infants with reference to cord blood hemoglobin has been studied. Finally a deviation from the normal values has been normal value has been found in certain pre term and term babies.

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