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# Study on Maturity, Birth weight and Weight for gestational age outcomes in Newborns born to Anaemic mothers

Dr.N.S.Vithal Rao[1], Dr.K.V.Ramana Rao[2], Dr.M.Manoj Kumar[3].
[1](Professor, Paediatrics, Siddhartha Medical College, Vijayawada, AP.)
[2](Assistant Professor, Paediatrics, Siddhartha Medical College, Vijayawada, AP.)
[3](Post Graduate, Paediatrics, Siddhartha Medical College, Vijayawada, AP.)
Corresponding Author: Dr.K.V.Ramana Rao.MD.,

***Abstract:*** *The present study aims at studying the various Maturity, Birth weight and Weight for gestational age outcomes in Newborns born to non-anaemic, moderately anaemic, & severely anaemic mothers. This study is a Hospital based Prospective observational study conducted from January 2016 to June 2017 on newborns and their mothers in the age group of 18 to 35 years delivered at Department of Maternal & Child Health, Govt. General Hospital, Siddhartha Medical College, Vijayawada, AP., For the ease of analysis, sample size is limited to 1000 by Quota sampling technique after exclusion criteria. The distribution of sample population is as follows, Non Anaemic (NA) group 257 cases (25.7%), Moderately Anaemic (MA) 677 cases (67.7%) and Severely Anaemic (SA) group includes 66 cases (6.6%). The mean birth weight of newborns of severely anaemic mothers, 2.03 Kgs is significantly lower than that in moderately anaemic, 2.77 Kgs and non-anaemic groups 3.02 Kgs (p value= <0.00001). Incidence of preterm births in severely anaemic mothers is grossly higher than those in moderate and non-anaemic groups 88.57% (SA), 12.45% (MA) and 4.66% (NA) respectively (p<0.00001). The present study also showed there is a higher incidence of SGA births among the severely anaemic mothers (81.82%) as compared to moderately anaemic (16.54%) and non-anaemic (7%) groups.*

***Keywords:*** *Anaemia, term, preterm, birth weight and gestational age.*

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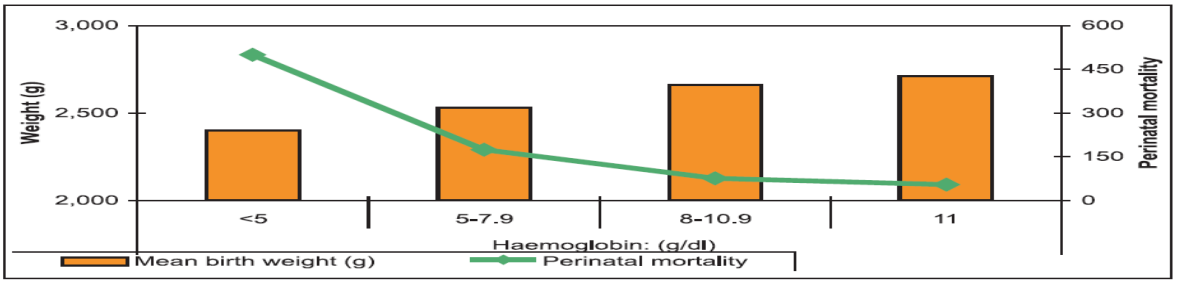
## I. Introduction

Prevalence of anaemia in India is among the highest in the world and is higher particularly in pregnant women and preschool children. Even among higher income educated segment of population also About 50 per cent of children, adolescent girls and pregnant women are anaemic. Inadequate dietary iron and folate intake due to low vegetable consumption, perhaps low B12 intake and poor bioavailability of dietary iron from the fibre, phytate rich Indian diets are the major factors responsible for high prevalence of anaemia. Increased requirement of iron during growth and pregnancy and chronic blood loss contribute to higher prevalence in the specific groups[1].

Maternal anaemia during pregnancy, defined by the World Health Organization as Haemoglobin (Hb) concentration < 11g/dl, poorly to bodes the mother and the fetus[1,2]. The adverse effects depend upon the severity and duration of anaemia and the stage of gestation. Women with chronic mild anaemia, where anaemia is well compensated, may go through pregnancy and labour without any adverse consequences[3]. Maternal morbidity and mortality increases with increased severity of anaemia and neonatal mortality and morbidity increases with increased severity of maternal anaemia[4,5]. Maternal Hb <8mg/dl is associated with low birth weight (LBW) due to prematurity and intrauterine growth restriction. Perinatal mortality rate increases by 2-3 folds when maternal Hb is < 8 g/dl and 8-10 folds when maternal Hb is < 5 g/dl [6].

**Fig. 1:** Relation between Maternal anaemia and Perinatal mortality



## II. Materials & Methods

This study is a Hospital based Prospective observational study conducted from January 2016 to June 2017 on newborns and their mothers in the age group of 18 to 35 years delivered at Department of Maternal & Child Health, Govt. General Hospital, Siddhartha Medical College, Vijayawada, AP. As the prevalence of anaemia is very high and the volume of deliveries conducted per year is very large, for the ease of analysis, sample size is limited to 1000 by the Quota sampling technique**.** Inclusion criteria includes all the newborns whose maternal haemoglobin < 7 gms/dl were included in Severely anaemic (SA) group, whose maternal haemoglobin in the range of 7 gms/dl to 9.9 gms/dl in Moderately anaemic (MA) and the newborns whose maternal haemoglobin is > 10 gms/dl were in Non anaemic (NA) group, which includes mildly anaemic mothers also. Exclusion criteria, pregnant women with one of the following at registration will be excluded, Diabetes mellitus, Hypertension (including pregnancy-induced hypertension), Toxoplasmosis, Rubella, Cytomegalovirus and Herpes infections, Diagnosed renal or cardiac illness, Smoker or alcoholic, Haemoglobinopathies (e.g. Thalassemias), Multiple gestation and evidence of Perinatal foetal distress. During the study period that satisfies the above said inclusion criteria will be included in the study after obtaining appropriate consent and is approved by the college ethical committee.

All the three groups were compared for maturity, birth weight and weight for gestational age at birth. Maturity is assessed using the modified Ballard scoring system, and outcomes were grossly classified as Preterm (<37weeks gestation) and Term (>37weeks gestation). Birth weight is obtained from the records of delivery room which were recorded at the time of birth. Weight for gestational age is estimated as Appropriate for Gestational Age (AGA) or Small for Gestational Age (SGA) on estimates from intrauterine growth charts for weight. All the obtained parameters were organised into a master chart and statistical analyses were performed, Incidences of term birth, preterm birth and AGA and SGA births were calculated using Microsoft Excel 2013 version software

## III. Observations and Results:

During the period of study from January 2016 to June 2017, total number of deliveries were 11443, number of abortions were 342, No. of IUDs were 168, Cases excluded by criteria 2434, Eligible cases 9009, Sample selected by quota sampling technique were 1000. Prevalence of non anaemic cases were (including mild anaemia) 257 ( 25.7%), moderately anaemic 677 (67.7%) and severely anaemic were 66 ( 6.6%).

**Table. 1 :** Mean maternal Hb% among study groups (Standard Deviation)

| | Non Anaemic | Mod. Anaemic | Sev. Anaemic |
|---|---|---|---|
| Mean Hb% | 10.75 (0.78) | 8.66 (0.85) | 6.36 (0.54) |

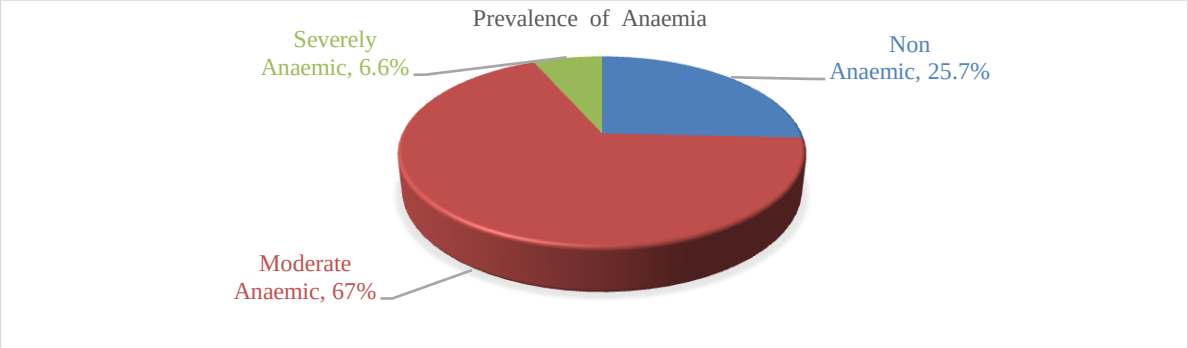



**Fig. 2 :** Prevalence of Anaemia in Three groups

Outcome of growth parameters (The birth weight), comparison of mean birth weight among different groups, in SA group it is 2.03 Kgs, in MA group it is 2.77 Kgs and in NA group it is 3.03 Kgs. There is a decline in the mean birth weight of newborns as there is a fall in maternal Hb%. The results of this study suggest that the incidence of LBW babies compared to non LBW babies is significantly high among the severely anaemic mothers (52, 78.79% vs. 14, 21.21%) when compared to that of moderately anaemic (109, 16.1% vs. 568, 83.9%) and non anaemic mothers (22, 8.56% vs. 235, 91.44%).

**Table 2**: Incidence of LBW and Non LBW babies in Three groups

| | Non Anaemic | Moderate | Severe |
|---|---|---|---|
| LBW | 22 (8.56%) | 109 (16.1%) | 52 (78.79%) |
| Non LBW | 235 (91.54%) | 568 (83.9%) | 14 (21.21%) |
| Total | 257 | 677 | 66 |

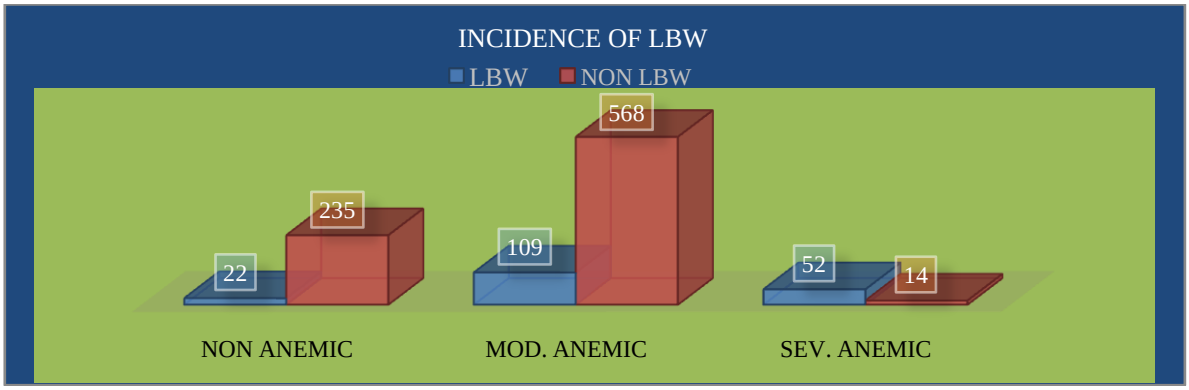



**Fig.3** : Incidence of LBW and Non LBW babies in Three groups

Maturity, There is a significantly higher incidence of preterm births among the severely anaemic group (35, 53.1%, term vs. 31, 46.9%, preterm) as compared to moderately anaemic (602, 88.93% vs. 75, 11.07%) and non anaemic groups (245, 95.34% vs. 12, 4.66%).

**Table 3 :** Incidence of Term and Preterm births

| | NA (%) | MA (%) | SA (%) |
|---|---|---|---|
| Term | 245 (95.34) | 602 (88.93) | 35 (53.1) |
| Preterm | 12 (4.66) | 75 (11.07) | 31 (46.9) |
| Total | 257 | 677 | 66 |

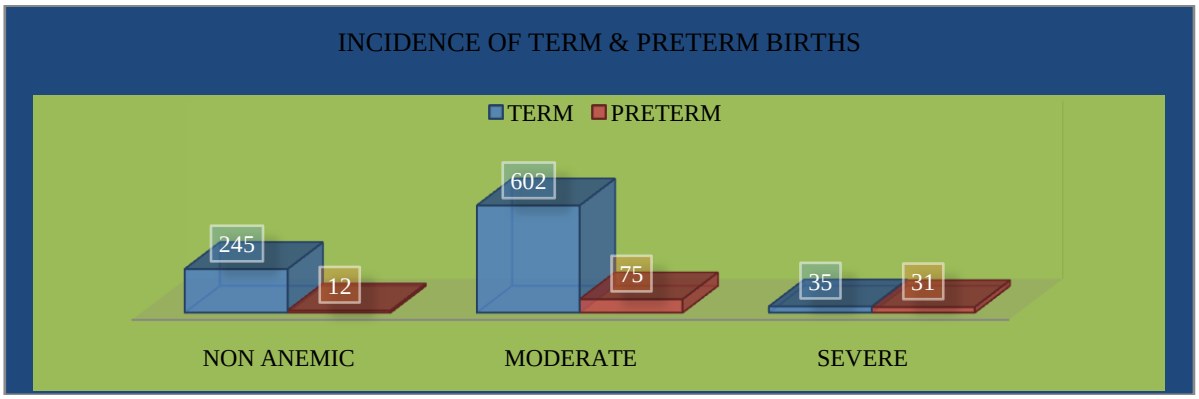



**Fig. 4:** Incidence of Term and Preterm births

Weight for gestational age, there is a significantly higher incidence of SGA births among the severely anaemic group (12, 18.18%, AGA vs. 54, 81.82%, SGA) as compared to moderately anaemic group (565, 83.46% vs. 112, 16.54%) and non anaemic groups (239, 92.99% vs. 18, 7.01%).

**Table 4**: Incidence of AGA and SGA in Three groups

| | Non Anaemic | Mod. Anaemic | Sev. Anaemic |
|---|---|---|---|
| AGA | 239 (92.99%) | 565 (83.46%) | 12 (18.18%) |
| SGA | 18 (7.01%) | 112 (16.54%) | 54 (81.82%) |
| Total | 257 | 677 | 66 |

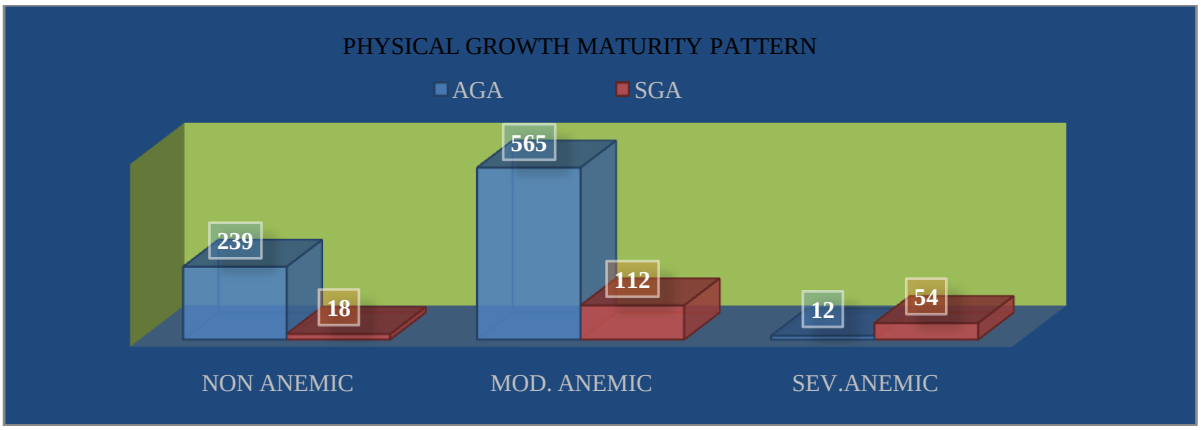



**Fig.5** : Incidence of AGA and SGA in Three groups

## IV. Discussion

Prevalence of maternal anaemia, the overall prevalence of anaemia in this region is 92.9% of which mild, moderate & severe anaemia constituted 18.6%, 67.7% & 6.6% respectively and the prevalence of non-anaemia is found to be 7.1%. The overall prevalence of anaemia is higher by nearly 10% as compared to the estimates of DLHS-4 survey (82.4%). This difference in prevalence is as expected, as the place of study is a tertiary referral centre where most of the cases are referred from peripheral health centres for deliveries and anaemia complicating pregnancies as one of the cause of referral. A study done by Manjulatha B et al., at a tertiary care hospital showed closer results, the prevalence of anaemia was 99% and 76.5% were having moderate anemia, 6.5% were having severe anaemia [7].

Maternal anaemia and birth weight, in the present study maternal anaemia is significantly associated with LBW in neonates. The mean birth weight in Kgs of newborns of non anaemic vs. moderately anaemic vs. severely anaemic mothers was 3.02(0.45), 2.77(0.48), and 2.03(0.61) respectively (standard deviation in parenthesis). The incidence of LBW babies is significantly high among more anaemic groups which showed an increasing trend with worsening anaemia. Incidence rates of LBW were as follows, non anaemic (8.5%), moderately anaemic (16.1%), and severely anaemic (78.78%), which is statistically significant, with p value <0.00001. A study done by Dalal E et al., showed similar results of mean birth weight in Kgs (SD) 2.29 (0.12) and 2.81 (0.14) among anaemic and non anaemic groups with a p value of <0.0001 signifying low mean birth weights among newborns of anaemic mothers [8]. A study by Sangeetha VB et al., showed an increased incidence of LBW babies among anaemic mothers (63%) vs. non anaemic mothers (12%) [9].

Weight for gestational age, a significant fall in birth weight due to increase in prematurity rate and intrauterine growth retardation has been reported when maternal haemoglobin levels were below 8.0 g/dl. This explains the higher incidence of SGA than AGA with worsening maternal anaemia. Multiple studies from the past suggest the same results. The present study showed there is a higher incidence of SGA births among the severely anaemic mothers (81.81%) as compared to moderately anaemic (16.54%) and non-anaemic groups (7%). The study by Sangeetha VB et al., reported an incidence of 63% of SGA births among anaemic groups which was significantly higher than non anaemic group which was only 13%, the results of which are supportive for the present study [9]. The study by Huang L et al., reports that there was a significantly higher incidence of preterm and IUGR babies in anaemic mothers thus higher incidence of SGA births [10]. A meta-analysis by Kozuki N et al., concluded that, moderate to severe anaemia was significantly associated with SGA, where as there was no relationship with milder anaemia [11]. Results of all the above studies support the results in the present study and there is no conflict of opinion.

## V. Conclusions

The overall prevalence of anaemia in this study is 92.9%. Distribution of spectrum is Mild anemia (18.6%), Moderate (67.7%), Severe (6.6%) and Non anemia (7.1%). The mean birth weight of newborns in Kgs of severely anemic mothers [2.03 (0.61)] is significantly lower than that in moderately anemic [2.77 (0.48)] and non anemic groups [3.02 (0.45)] (p value= <0.00001). Incidence of preterm births in severely anaemic mothers is grossly higher than those in moderate and non anaemic groups 88.57% (SA), 12.45% (MA) and 4.66% (NA) respectively (p value= <0.00001). In view of the high prevalence of maternal anaemia in pregnancy and its adverse neonatal consequences, prevention and treatment of maternal anaemia is of high priority in this region. Our study demonstrates that most adverse effects occur when maternal Hb is <7g/dl. Hence, greater emphasis should be given for achieving and maintaining maternal Hb >7g/dl during the third trimester. Screening for anaemia is mandatory in the clinics and also in home settings by community health care providers may help. A well designed, prospective study with a larger sample and multiple input variables with confounders being

eliminated is necessary to address the long term effects of maternal anaemia in various trimesters and parity in consideration on maternal and neonatal health and to devise strategies beyond routine iron and folic acid supplementation, so as to prevent the adverse neonatal outcomes consequent to maternal anaemia which leads to healthier further generations.

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## References

[1]. World Health Organization. Assessing the iron status of populations: *report of a Joint World Health Organization/Centres for Disease Control and Prevention Technical Consultation on the Assessment of Iron Status at the Population Level*, Geneva, Switzerland, 6-8 April 2004 - 2005.
[2]. World Health Organization. *Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. 2011*. Download from: http://www.who.Int/vmnis/indicators/haemoglobin.pdf 2017
[3]. Kalaivani K. Prevalence & consequences of anaemia in pregnancy. *Indian J Med Res*. 2009 Nov 1;130(5):627-33.
[4]. Prema K, Kumari SN, Ramalakshmi BA. Anaemia and adverse obstetric outcome. *Nutr Rep Int*1981; *23*: 637-43.
[5]. Ramachandran P. Maternal nutrition—effect on foetal growth and outcome of pregnancy. *Nutrition reviews*. 2002 May 1;60(s5).
[6]. Bora R, Sable C, Wolfson J, Boro K, Rao R. Prevalence of anemia in pregnant women and its effect on neonatal outcomes in Northeast India. *The Journal of Maternal-Foetal& Neonatal Medicine*. 2014 Jun 1;27(9):887-91
[7]. Manjulatha B, Padmasri P, Sravanthi TP. Prevalence of Anaemia in Pregnant Women in Tertiary Care Centre. *IOSR J Den Med Sci*. 2015;14:91-5.
[8]. Dalal E, Shah J. A Comparative Study on Outcome of Neonates Born to Anaemic Mothers versus Non Anaemic Mothers. *National Journal of Medical Research*. 2014 Dec 1;4(4):270-3.
[9]. Sangeeta VB, Pushpalatha S. Severe maternal anemia and neonatal outcome. *Sch J App Med Sci*. 2014;2(1C):303-9.
[10]. Huang L, Purvarshi G, Wang S, Zhong L, Tang H. The Influence of Iron-deficiency Anemia during the Pregnancy on Preterm Birth and Birth Weight in South China. *Journal of Food and Nutrition Research*. 2015 Nov11;3(9):570-4.
[11]. Kozuki N, Lee AC, Katz J. Moderate to severe, but not mild, maternal anemia is associated with increased risk of small-for-gestational-age outcomes. *The Journal of nutrition*. 2012 Feb 1;142(2):358-62.

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