Analysis of Key Factors In Maternal Anemia Causing Low Birth Weight of Babies

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ABSTRACT
Anemia in pregnant women has been regarded detrimental to fetal growth and pregnancy outcome. Low birth weight and preterm delivery have been persistently linked to anemia in pregnancy. **Objectives**: The purpose of the study was to find out association of maternal anemia with LBW and to study other related factors. **Materials and methods**: Present study was a cross sectional type interviewing all mothers delivering live born singleton neonate in study place (Postnatal ward of ahospital affiliated to a medical college) with pretested predesigned schedule. Statistical analysis was done using SPSS software and chi square test. **Results**: LBW was found to be more common in mothers with anemia, inadequate antenatal visits, in mothers not taking jaggery or Iron Folic acid during antenatal period. **Conclusion**: The present study aims at compiling all the significant factors relating to the low birth weight babies and maternal anemia. To reduce and eliminate anemia in pregnant mothers we suggest a three-pronged attack with the key motives as to prevent, to manage and to endure (the care initiated).**Key Words**: Maternal, Anemia, LBW

I. INTRODUCTION:
Anemia during pregnancy is an important public health problem in India as in many other developing countries. According to the report of the National Family Health Survey, 2015–2016 (NFHS-4), about 50.3% of the pregnant women in India were anemic[1].

As per the World Health Organization (WHO), hemoglobin of less than 11gm/dl at term and haematocrit of less than 0.33 is called anemia[2,3].According to the WHO, during pregnancy, maternal anemia is identified by hemoglobin levels less than 11.0g/dL and may be divided into three levels of severity: mild anemia (Hb levels 9 to 10.9g/dL), moderate anemia (Hb levels 7 to 8.9g/dL), and severe anemia (Hb levels less than 7g/dL)[4].

The World Health Organization (WHO) defines low birth weight (LBW) as weight at birth below 2500 grams regardless of gestational age. As per the latest National Family Health Survey (NFHS-4), about 18% of Indian children below five years of age are born with LBW in 2015–16. Stunted growth is more common in children with LBW. It affects the child's schooling outcomes, productivity and cognitive development. It is also associated with increased risks of childhood illnesses, infections, chronic physical and mental disordersand other such diseases in later part of life[5].

Anemia in the pregnant woman has multiple effects on pregnancy and fetal growth. It is been observed that that there is a physiological drop in hemoglobin (Hb) in the mid-trimester. This is attributed to increase in plasma volume, and hence a decrease in blood viscosity. This aids in better circulation in the placenta. Anemia in the pregnant woman has been regarded as a detrimental factor to the fetal growth and the outcome of pregnancy. Low birth weight and preterm delivery have been persistently linked to anemia in the pregnancy[6].

The identification of risk factors is important for predicting low birth weight because it allows the initiation of riskspecific management for women at-risk. Identifying these risk factors may provide insights into a better understanding of the mechanisms leading to low birth weight[7].
The aim of this study is to find out the prevalence of anemia in pregnant women during child birth, association between maternal anemia and low birth weight babies so as to encourage all women to have regular antenatal check-ups and diagnosing anemia as early as possible in pregnancy and correcting it to prevent low birth weight babies.

II. MATERIAL AND METHODS:

Study area and period: Study was carried out in postnatal ward of a hospital affiliated to medical college from January 2014 to December 2015.

Studypopulation: InclusionCriteria: All mothers delivering live born neonateinstudy place.Exclusioncriteria:1) Mothers with multiple pregnancy. 2) Neonates with congenitalmalformations, chromosomalanomaliesandhemolytic disease of the newborn.

Nature of study:Cross sectional study. Sample size:600 (taken by consecutive samplingtechnique.)

StudyTool: Pretested, predesigned schedule.

Datacollection:Interviews with the mother were conducted after explaining the purpose,benefits, risks and confidentiality of thestudy.Schedule contained pertinent questionsregarding number of ANC visits during pregnancy, intake of iron folic acid, jaggery, reasons for not taking adequate IFA, symptoms of maternal anemia, maternal pallor andmaternal haemoglobin.

Data analysis: By SPSS version 21 program in the computer and appropriate statistical tests.

III. RESULTS:

The mothers were interviewedwithin24hoursof delivery and mothersand new-borns' parameters were recorded on a pretested questionnaire. The study was undertaken to find about risk factors related to maternal anemia which may have influence on birth weight and their association, if any with low birth weight. All the associations were found to be statistically significant (p< 0.05).

Birth weight: In this study out of 600 new-borns, 106(17.7%) were low birth weight. Mean birth weight was 2801.78 gm.

Severity of anemia: In 600 mothers taken as subject, 348 (58%) had anemia during childbirth. Majority that is 182(52.2%) had mild anemia, 150(43.1%) had moderate anemia, while 4.5% had severe anemia.

Percentage of LBW decreased with increasing maternal hemoglobin levels. It was 50%, 28%, 20.3% and 7.5% in mothers with hemoglobin levels <7, 7-9.9, 10-10.9 and >11 gm/dl respectively. (Figure 1)

Initiation of antenatal visits: Proportion of LBW was very high in mothers who had never undergone any antenatal visits (66.7%). Among those who had taken antenatal visits, LBW percentage was found to be highest in those who initiated antenatal visit in 3rd trimester as compared to those in 1st and 2nd trimester.

Number of antenatal visits: LBW babies were found more (59.2%) in mothers with inadequate antenatal visits (<4 visits).

Jaggery intake: Percentage of LBW was higher (20.2%) in babies of mother who did not take jaggery during their pregnancy as compared to those who take jaggery (9.3%).

Iron and folic acid: The proportion of LBW was low among those mothers who were taking iron folic acid during pregnancy.

In mothers who took adequate iron folic acid tablets (100 or more) during pregnancy, the percentage of LBW born was only 3.4% as compared to 31.6% in those who took less than 100 tablets.

Reasons of non-compliance with IFA regimen: In the 304 mothers who did not take iron folic acid or took less than 100 tablets during pregnancy, the most common reason for not taking iron folic acid was side effects like gastritis (36.84%) followed by non-availability of iron folic acid tablets at health centre (31.25%). Other reasons were no antenatal visit (16.44%) and family not permitting anymedications to be taken.

Anemic symptoms observed: Following were the symptoms of anemia present in pregnancy: fatigue (46.2%), nausea (10.8%), giddiness (9.7%), headache (8.8%), blurring of vision (6.8%), shortness of breath (6.3%) and swelling (4.8%).

LBW percentage was higher (30.5%) in mothers with pallor present on examination.

Figure1: Birth weight distribution according to maternal hemoglobin (n=600)
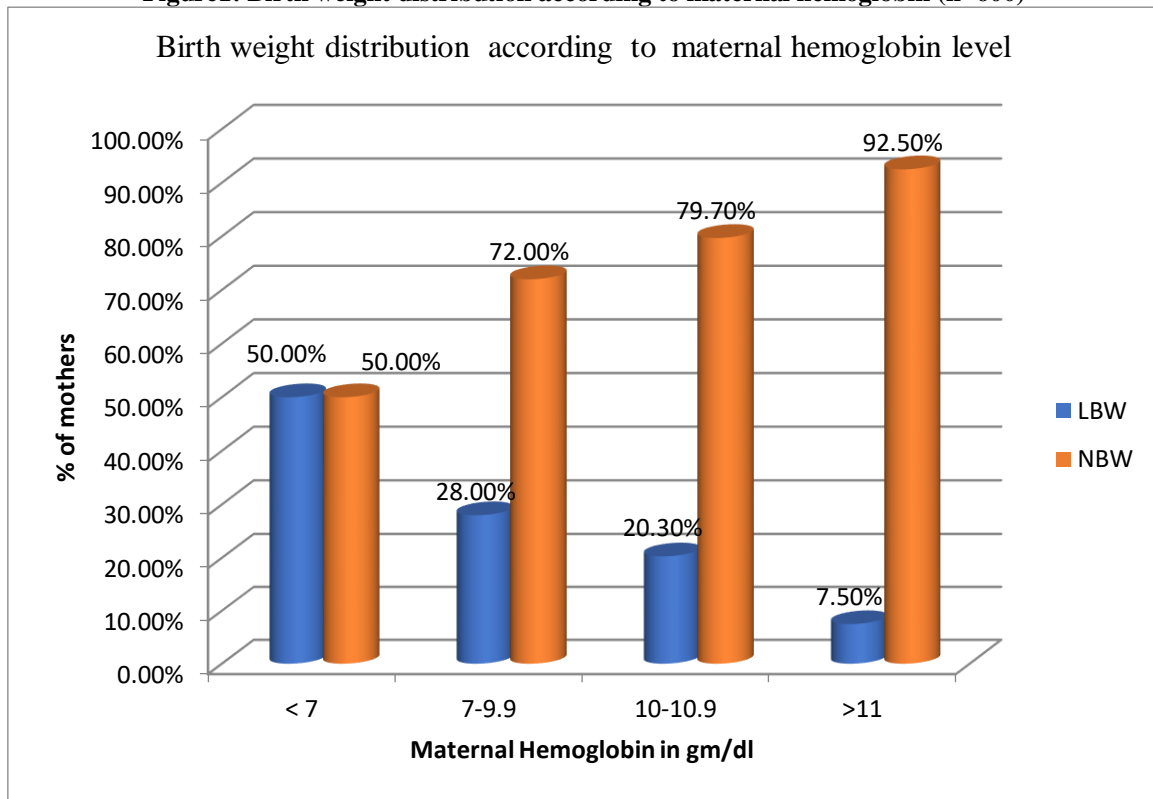
IV. DISCUSSION:

There is significant association of maternal anemia with LBW and similar findings were seen in the study by Kant S et al[8]. Bharti et al[9] reported a prevalence of low birth weight in about 20% of the new born babies. This is comparable to our study.

Suryanarayna et al[10] reported a prevalence of 2.3%, 12.9 %, 38.2% and 46.6% for maternal hemoglobin levels less than 7 gm%, 7-9.9 gm%, 10-10.9 gm%, >11 gm% respectively. Their results have similarities to our study.

Patel et al[11] reported their observations with antenatal care registration and predicted the factors that arose with late registration. About 80.4% of pregnant women registered for antenatal care after 12 weeks of gestation. Similar results were noted by Patel et al[12] while assessing maternal anemia and underweight as determinants of pregnancy outcomes. Most of the pregnant mothers registered for antenatal clinics after the first trimester and consequently had a higher prevalence of LBW babies. Our study showed highest prevalence of LBW babies in the mothers who initiated their first antenatal visit in the third trimester.

da Fonseca et al[13] reported adequacy of number of antenatal visits and their association with an increased risk of LBW babies, similar to our study. Yang et al[14] reported that after supplementing the diet with jaggery in the treatment group in the third trimester of pregnancy there was a significant increase of haemoglobin levels compared to control group. They also reported similar benefits and improvements in birth outcome when the diet of the pregnant mothers was fortified with iron and folic acid. Similar results were observed by Hoa et al[15].

Kamau et al[16] reported forgetfulness, literacy of mother, cost, availability of IFA tablets, inadequate counselling, lack of knowledge and perceived side effects among the causes of non-compliance of IFA regimen with many factors similar to the present study. They also reported many additional factors as birth order, inadequate distribution and beliefs such as ill effects of consuming medications during pregnancy.

V. CONCLUSION:

Maternal anemia plays a pivotal role in birth weight of new born babies. To reduce and eliminate anemia in pregnant mothers we suggest a three-pronged attack with the key motives as to prevent, to manage and to endure(the care initiated) as in Table 1:

Table 1: Motives and Actions to reduce maternal anemia

Motives	Actions
To prevent	Initiate early ANC, nutrient fortification
To manage	Classify anemia (if present), (apart from) medical management, Fortification with jaggery and IFA and other nutrients
To endure (the care initiated)	Eliminate causes of non-compliance to IFA, regular screening for anemic symptoms and signs during ANC visits, education and counseling of mothers at regular intervals

If the maternal anemia is approached in a systematic and planned manner with early preventive measures and prompt diagnosis,the anemia, if managed and the care sustained which was initiated, the prevalence of maternal anemia shall reduce. As a result of which prevalence of LBW will also reduce.

REFERENCES:

[1]. National Family Health Survey (NFHS-4): India Fact sheet; 2015-16. Available from: http://www.rchiips.org/nfhs.

[2]. Jaleel R, Khan A. Severe anemia and adverse pregnancy outcome. J Surg Pak (Int) 2008; 13: 147-50.

[3]. Levy A, Froser D, Katz M. Maternal anemia during pregnancy is an independent risk factor for low birth weight and preterm delivery. Eur J ObstetGynecolReprodBiol 2005; 122: 182-6.

[4]. Goonewardene M, Shehata M, Hamad A. Anemia in pregnancy. Best Pract Res Clin ObstetriGynaecol. 2012;26(1):3–24.

[5]. Zaveri A, Paul P, Saha J, Barman B, Chouhan P. Maternal determinants of low birth weight among Indian children: Evidence from the National Family Health Survey-4, 2015-16. PLoS One. 2020 Dec 31;15(12):e0244562. doi: 10.1371/journal.pone.0244562. Erratum in: PLoS One. 2021 Apr 8;16(4):e0250140. PMID: 33382769; PMCID: PMC7774977.

[6]. Kumar KJ, Asha N, Murthy DS, Sujatha M, Manjunath V. Maternal anemia in various trimesters and its effect on newborn weight and maturity: an observational study. Int J Prev Med. 2013;4(2):193-199.

[7]. Kumari S, Garg N, Kumar A, Guru PKI, Ansari S, Anwar S, Singh KP, Kumari P, Mishra PK, Gupta BK, Nehar S, Sharma AK, Raziuddin M, Sohail M. Maternal and severe anemia in delivering women is associated with risk of preterm and low birth weight: A cross sectional study from Jharkhand, India. One Health. 2019Aug 19;8:100098.

[8]. Kant S, Kaur R, Goel AD, Malhotra S, Haldar P, Kumar R. Anemia at the time of delivery and its association with pregnancy outcomes: A study from a secondary care hospital in Haryana, India. Indian J Public Health 2018;62:315-8.

[9]. Bharati P, Pal M, Bandyopadhyay M, Bhakta A, Chakraborty S, Bharati P. Prevalence and causes of low birth weight in India. Malays J Nutr. 2011 Dec;17(3):301-13. PMID: 22655452.

[10]. Suryanarayana R, Chandrappa M, Santhuram AN, Prathima S, Sheela SR. Prospective study on prevalence of anemia of pregnant women and its outcome: A community based study. J Family Med Prim Care. 2017;6(4):739-743. doi:10.4103/jfmpc.jfmpc_33_17

[11]. Patel PB, Rupani MP, Patel SS. Antenatal care registration and predicting factors of late registration among pregnant women. Trop Doct2013;43:9–12

[12]. Patel A, Prakash AA, Das PK, et al. Maternal anemia and underweight as determinants of pregnancy outcomes: cohort study in eastern rural Maharashtra, India. BMJ Open 2018;8:e021623. doi:10.1136/bmjopen-2018-021623

[13]. da Fonseca CR, Strufaldi MW, de Carvalho LR, Puccini RF. Adequacy of antenatal care and its relationship with low birth weight in Botucatu, São Paulo, Brazil: a case-control study. BMC Pregnancy Childbirth. 2014 Aug 1;14:255. doi: 10.1186/1471-2393-14-255. PMID: 25085236; PMCID: PMC4131026.

[14]. Yang Z, Huffman SL. Review of fortified food and beverage products for pregnant and lactating women and their impact on nutritional status. Matern Child Nutr. 2011;7 Suppl 3(Suppl 3):19-43. doi:10.1111/j.1740-8709.2011.00350.x

[15]. Hoa P.T., Khan N.C., van Beusekom C., Gross R., Conde W.L. & Khoi H.D. (2005) Milk fortified with iron or iron supplementation to improve nutritional status of pregnant women: an intervention

trial from rural Vietnam. Food and Nutrition Bulletin 26, 32–38.

[16]. Kamau, M.W., Mirie, W. & Kimani, S. Compliance with Iron and folic acid supplementation (IFAS) and associated factors among pregnant women: results from a cross-sectional study in Kiambu County, Kenya. BMC Public Health **18,** 580 (2018). https://doi.org/10.1186/s12889-018-5437-2