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PERINATAL OUTCOME IN SEVERE ANAEMIA COMPLICATING PREGNANCY

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ABSTRACT: BACKGROUND: Anaemia is the commonest global public health problem and especially harmful when the pregnancy is complicated by anaemia. Women in reproductive age group are more vulnerable for iron deficiency anaemia with an estimated prevalence of around 70 to 80% in pregnant women. **MATERIAL AND METHODS:** The aim of the study was to analyse the foetal outcome in the hospitalised pregnant women with severe anaemia. This is a prospective study carried out at maternity ward of Government General Hospital, Kurnool of Andhra Pradesh, India over a period of one year from October 2007 to September 2008. **RESULTS:** Total of 9731 deliveries occurred during the study period, 282 (2.89 %) were severely anaemic at the time of delivery. Majority of the women were of 20-24 years age (68.4%) with second gravidas 37.5%, term gestation 52.1%, preterm deliveries 47.9%, lower socio-economic status 87.6% and Unbooked cases 67.4% and low birth weight in 53.2% cases, intra uterine growth retardation and intra uterine foetal death contributes to 12.8% and 16.7% cases respectively. A total of 36 (12.8%) neonates required admission in neonatal intensive care unit and 16(5.7%) of them died. **CONCLUSION:** Severe anaemia during pregnancy has adverse perinatal outcome in the form of low birth weight, preterm birth, intrauterine growth retardation and intrauterine death. Regular iron supplementation during the antenatal period, management of anaemia and improving the nutritional status of the mother will improve the adverse neonatal outcome and decreases perinatal morbidity and mortality.
KEYWORDS: Haemoglobin (Hb), low birth weight, severe anaemia, prevalence, pregnancy, perinatal outcome, preterm birth.

INTRODUCTION: Anaemia is one of the most common intractable nutritional problems in the world. According to World health organization , there are around two billion people suffering from anemia.[1] Iron deficiency is the most commonly recognised nutritional deficit anaemia in developing countries. World health organization uses the following haemoglobin cut offs to define anaemia in pregnant women: 100 to 110g/l for mild anaemia, 70 to 100g/l for moderate anaemia and 70g/l for severe anemia.[2]

The total iron requirement during pregnancy is 700-1400 mg and in addition must have at least 500 mg of iron stores to fulfil the requirements of gestation without the need for iron supplementation. The overall requirement is 4-6 mg per day but these increases to 6-8mg per day in the last weeks of pregnancy. Inadequate dietary iron and poor bioavailability of dietary iron from the fibre, phytate rich Indian diets are the major factors responsible for poor absorption and high prevalence of anaemia. Other causes of anaemia during pregnancy include megaloblastic anaemia, acquired haemolytic anaemia, anaemia caused by acute blood loss, anaemia of inflammation or malignancy, aplastic or hypoplastic anaemia. Hereditary causes of anaemia during pregnancy include thalassemias, sickle cell hemoglobinopathies and hereditary haemolytic anemias.[3]

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Anaemia during pregnancy is associated with adverse maternal and perinatal outcome. Several studies have shown that preterm delivery is associated with anaemia during pregnancy.[4]

Small for gestational age and low birth weight neonates are increasingly observed in women with anaemia. Foetal growth restriction is another commonly observed condition in maternal anaemia resulting from malnutrition. Low haemoglobin concentration was associated with significantly decreased APGAR score value during the first and fifth minute after delivery.[5] Peri partum maternal iron deficiency has also been associated with childhood developmental problems.[6] Infants of iron deficient mothers is at risk of developing iron deficiency anaemia at birth and infancy.[7]

The iron deficiency can negatively affect the cognitive development in infants.[8] There is usually a 2 to 3-fold increase in perinatal mortality rate when maternal haemoglobin levels fall below 8.0g/dl and 8-10 fold increase when maternal haemoglobin levels fall below 5.0g/dl. 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 8.0g/dl.[9]

The association between anaemia and birth outcomes may be stronger if the anaemia occurs at one time during pregnancy rather than at another time.[10] Disparities in women's nutrition status are primarily related to women's access to resources and income, including better diets and access to health care, regardless of whether they lived in rural or urban areas.[11] Another risk factor for maternal anaemia is adolescent pregnancies. The burden of reproduction combined with growth doubles the risk of adverse maternal and perinatal outcome.[12] Hookworm infestation and malaria being very common in tropical countries adds to the cause of anaemia in pregnancy. The risk of anaemia multiplies in such cases.

Anaemia being very common in the pregnant population of area of study, the present study aims to ascertain the association between maternal anaemia at the time of delivery and outcome in the neonate.

METERIALS AND METHODS: This is a prospective study carried out at maternity ward of Government general hospital, Kurnool over a period of one year from October 2007 to September 2008. Pregnant women with severe anaemia that is, haemoglobin levels less than 7g/dl at the time of delivery were included in the study. Patients had undergone haemoglobin estimation, packed cell volume and routine investigations. Woman with severe anaemia were recruited in the study after stratifying inclusion and exclusion criteria. Only women with single ton pregnancies were included. Pregnant women with severe anaemia prior to the onset of labour and patients who presented with anaemia due to acute bleeding episodes at the time of delivery were excluded from the study.

Data collected in a standardised proforma incorporating socio-demographic characteristics (Age, parity, residence and education), details of antenatal care, haemoglobin level, treatment details and perinatal outcomes (Maturity of the foetus, preterm birth, low birth weight, intra uterine growth retardation and intra uterine deaths). Gestational age in weeks was calculated from the first day of last menstrual period. Preterm delivery was defined as delivery before 37 completed weeks of gestation. Low birth weight was defined as birth weight less than 2.5kg. Still birth was delivery of dead infant after 24 weeks of gestation. Perinatal outcome was assessed in terms of baby weight, maturity of baby, intrauterine death, neonatal intensive care unit admissions, follow up and mortality.

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Data analysis was done using Statistical Package for Social Science version 21 with usual descriptive methods. The result for each parameter (Number of percentages) for discrete data and averaged (mean ± standard deviation) for continuous data.

RESULTS: Total number of deliveries during the study period were 9731 and out of them 282 (2.89%) were severely anaemic and fulfilling the inclusion criteria. From the total of 282 women included in the study, mean haemoglobin was 5.74 and standard deviation was 1.05 and mean packed cell volume was 17.13 with standard deviation of 2.22 as shown in table1. In 96% of the cases registered, the type of anaemia was of microcytic and hypochromic variety.

Sl. No.	Haemoglobin % level	No. of patients
1	5-7 grams	243 (86.2%)
2	<5 grams	39 (13.8%)
3	**Total**	**282 (100%)**
4	Mean level ± SD	5.74±1.05
5	Mean packed cell volume level ± SD	17.13±2.22
Table 1: Severe anaemia – Haemoglobin status		

Sl. No.	Characteristics	No. of Patients (%)
1	**Age Distribution**	
	< 20 years	13 (4.6)
	20-24years	193 (68.4)
	25-29years	56 (19.9)
	30 years & above	20 (7.1)
	Total	**282(100.0)**
2	**Gravida Distribution**	
	Primi Gravida	98 (35.0)
	Second Gravida	105 (37.5)
	Third Gravida	58 (20.7)
	Fourth Gravida	19(6.8)
	Total	**282(100.0)**
3	**Gestational Age**	
	> 37weeks	147(52.1)
	34.-37weeks	73(25.9)
	< 34weeks	62(22.0)
	Total	**282(100.0)**
4	**Socio-economic Status**	
	Low	247(87.6)
	Middle	35(12.4)
	Total	282 (100.0)
5	Booked Status	
	Booked	92(30.6)

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	Un booked	190(67.4)
	Total	**282(100.0)**
Table 2: Socio demographics characteristics at admission to the maternity		

Majority of the women were in the age group of 20-24 years (68.4%). Most of the women were second gravidas (37.5%) and primi gravidas were (35%). Around 52.1% women were in term gestation while as much as 47.9% deliveries were preterm. A higher proportion of patients belonged to the lower socio-economic status (87.6%) and was unbooked (67.4%).

Among the cases, 53.2% of low birth weight babies were present in the study and 150 neonates (53.2%) were below 2.5 kgs. The increased incidence of low birth weight in the present study could be due to low nutritional status, low income, illiteracy and poor antenatal care. The birth weight of neonates ranged from 1000 to 3700 grams and mean birth weight is 2300 grams. 36 babies (12.8%) required neonatal intensive care unit admission for various reasons. Out of 36 babies 20 of them (7.1%) survived, remaining 16(5.7%) died in neonatal intensive care unit despite treatment.

Sl. No.	Parameter		No. of women	Percentage (%)
1	Preterm birth	34-37 wks	73	25.9%
		<34 wks	62	22%
2	Low birth weight	<2.5 kg	127	45%
		<1.5 kg	23	8.15%
3	Intra uterine growth Restriction		36	12.77%
4	NICU admissions		36	12.8%
5	Intrauterine death and still births		47	16.7%
6	Early neonatal death		16	5.7%
7	Perinatal mortality		63	22.4%
Table 3: Neonatal outcome in severe anaemia				

Intra uterine growth retardation is said to be present in babies whose birth weight is below the tenth percentile of the average for gestational age. In present study Intra uterine growth retardation is seen in 12.77% of cases because severe anaemia causes uteroplacental insufficiency. Intrauterine death, the most adverse perinatal outcome was seen in 16.67% of the total deliveries in the present study. Major cause of intra uterine death (IUD) remained miscellaneous. As mentioned in the table 4, out of the 47 intrauterine deaths, pregnancy induced hypertension was seen in 25.53% cases. The major causes of perinatal death are prematurity and foetal asphyxia. Perinatal morbidity is substantial and correlates strongly with preterm birth, abruptio placentae and foetal growth restriction. Abruption coupled with pregnancy induced hypertension was seen in 17.02% cases.

Abruption singly resulting in IUD was observed in 6.38% cases. Majority of the foetal morbidity in less severe cases of abruption is due to prematurity, low birth weight, foetal growth restriction and neonatal anaemia. Premature separation of placenta leads to foetal hypoxia and foetal

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death in delayed cases. A marked elevation in still birth rate is observed if the separation exceeds 50% of the placental area.

Sl. No.	Causes	No. of Babies	Percentages (%)
1	Pregnancy induced Hypertension	12	25.53%
2	Pregnancy induced Hypertension + Abruption	8	17.02%
3	Abruption	3	6.38%
4	Pregnancy induced Hypertension + Placenta previa	2	4.25%
5	Placenta previa	1	2.12%
6	Others	21	44.68%
Table 4: Causes of Intra uterine death in severe anaemia			

DISCUSSION: Anaemia, one of the most prevalent nutritional deficiency diseases affecting pregnant women poses risk not only to mother but also results in adverse perinatal outcomes like prematurity, low birth weight, intra uterine growth retardation and intrauterine death of the foetus. Poor iron status may affect immune function adversely and thus increase the host susceptibility to genital tract infections. Iron deficiency may increase the stress hormones norepinephrine and cortisol, low haemoglobin concentrations may cause chronic hypoxia, which can activate the body's stress response and thus increase circulating levels of corticotrophin releasing hormone, and iron deficiency may increase oxidative stress of the placenta.[13]

Sl. No.	Parameter	Ali AAA et al	Singhal et al	Sangeeta et al	Rameswari et al	Present study
1	Preterm birth	11.5%	32.59%	38%	40%	47.9%
2	Low birth weight	20.7%		63%	50%	53.15%
3	Intra uterine growth restriction		6.62%	12%	14%	12.77%
4	Intra uterine foetal death and Still birth	13.8%	16.85%	4%	8%	16.67%
5	NICU admission		15.46%		34%	12.8%
6	Early neonatal death		8.06%			5.7%
7	Perinatal Mortality		22.27%		20.82%	22.37%
Table 5: Severe anaemia –Neonatal outcome in different study groups						

In the present study the risk of preterm delivery was found to be 47.9% which is higher compared to Theresa O Scholl et al study (26%).[4] Preterm deliveries are associated with higher incidence of low birth weight, intrauterine death and poor foetal maturity. Poor foetal maturity has been found in association with multigravida pregnancies, low socio-economic group and unbooked cases. Similar results were noted in a study conducted by Ali AAA et al.[14] In the retrospective case control study conducted by Ali AAA et al 20.7% cases were associated with low birth weight in pregnant women with severe anaemia.

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However in the present study, 53.2% low birth weight neonates were recorded. The increased number of low birth weight neonates can be attributed to higher growth restricted foetuses and prematurity.

In Singhal et al study 56 neonates (15.46%) were admitted in neonatal intensive care unit, where 27(7.4%) were recovered. The Neonatal intensive care unit admissions and the outcome were similar in the present study and the study by Singhal et al. Perinatal mortality in the present study and Singhal et al study was similar. Overall neonatal outcome of present study was similar to Rameswari et al and Singhal et al study. In a prospective study conducted by R. Tripathi et al, prematurity was seen in 11.2% cases of severe microcytic anaemia, foetal growth restriction in 13.4% cases.[15] Incidence of prematurity is much higher in the present study compared to study by R. Tripathi et al. The present study has ascertained increased risk of low birth weight, preterm delivery and Intra uterine growth restriction. These conclusions are similar to earlier study conducted by Farah Wali Lone et al[16] and Singhal et al.

16.7% of the deliveries resulted in intrauterine death of foetus owing to maternal anaemia.

The causes of intra uterine deaths and still births was utero placental insufficiency, pregnancy induced hypertension and anti-partum haemorrhage. All the above mentioned studies substantiate the present study regarding adverse perinatal outcome. Eighteen women were treated with two packs of packed cell transfusions. Ninety women were treated with one point of packed cell transfusion. Twenty women were treated with two point of packed cell transfusion. Rest of the management of normal delivery was as per the protocol and caesarean sections were done for obstetrical indications. Post-delivery stay in hospital was 2-14 days.

Government of India in collaboration with World Health Organisation, United Nations international children's emergency fund (UNICEF) and Federation of obstetrics and Gynaecological society of India (FOGSI) launched the 12 by 12 initiative on 23 April 2007 which is aimed to raise the haemoglobin during the adolescence.[17] It is highly beneficial to build up iron store at distance of pregnancy by supplementing iron to adolescent girls. This not only improves pregnancy outcome but also decreases the disability adjusted life in years (DALY). The root cause of anaemia starts from the childhood itself. Even today gender discrimination, illiteracy, early marriages, early child bearing, poor spacing of child births, poor acceptance of contraception and poor prenatal care are common practises in rural parts of India .This scenario has to be addressed by voluntary and governmental organisations. It is estimated that around 25% women in developing countries have their first child by 19 years of age.[18]

When pre pregnancy haemoglobin status is good maternal and foetal outcome will be improved. Most of the pregnancies with severe anaemia result in poor foetal outcome. Low birth weight is one of the major causes of the four million neonatal deaths for year in developing countries. Neonatal deaths account for 38% of child deaths under the age of 5 years. If the millennium development goal to reduce the number of child deaths under the age of 5 years by two-thirds by 2015 is to be achieved, a substantial reduction in neonatal deaths is required.[19] Neonates with anaemia are more prone for infections and chronic morbidity. The common risk factors for anaemia are poverty, illiteracy, religious taboos, less access to antenatal care and malnutrition. Interventions must be focused on preventive aspects .Promoting consumption of iron fortified staple food will build iron stores for all women of reproductive age before and after pregnancy. Routine iron supplementation in antenatal period for all healthy pregnant women as a public health measure will improve pregnancy outcome.

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Investing in iron fortification of staple foods was ranked as the third best "world investment" in 2008 by the Copenhagen (A group of leading economists tasked with prioritizing interventions to tackle world problems based on both impact and cost-benefit analyses).[20]

CONCLUSION: Anaemia complicating pregnancies have adverse perinatal outcomes contributing to increased perinatal morbidity and mortality. Anaemia during infancy must be treated to prevent cognitive impairment in childhood. Perinatal mortality remains most easily preventable with supplementation of iron and folic acid and improving the maternal nutritional status. Initiative is required to maintain high haemoglobin levels prior to pregnancy. At community level food fortification with iron, education about nutrition rich in iron, parasitic infestation control and improvement of sanitation has to be done. Community health workers must be trained to identify anaemia cases in the periphery, supply iron tablets to all antenatal mothers and immediate referral to tertiary care center.

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