Original article:

Foetal outcome in pregnant women with anaemia

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Abstract:

Background: Anaemia in pregnancy is one of the most important and common public health problems not only in India but also in most of the South East Asian countries. Anaemia is the most common nutritional deficiency disorder in the world. There is predominance of iron deficiency anaemia (nutritional anaemia). In pregnancy, it is one of the leading causes responsible for adverse foetal outcome. ***Objective***: To find out the situation and causes of anaemia in pregnant women at MMIMSR during the study period with special reference to the severity of the disease and to find out foetal outcome in pregnant women with anaemia. ***Methods*:** The study was conducted in Department of Obstetrics and Gynaecology, MMIMSR, Mullana, Ambala(India). The study was carried out between the period of october 2012 to September 2014.A total of 200 cases of moderate and severe anaemia were included in the study on the basis of simple random sampling method and 200 cases of non anaemic subjects were included to serve as controls for the anaemic group, during the study period. Hb gm/dl was taken as criteria for deciding anaemia cases and also to classify them according to the severity. Cases were classified according to WHO criteria. ***Results:*** Out of 200 cases of anaemia, 70% were moderately anaemic (Hb 7 – 9.9gm/dl) and 30% were severly anaemic (Hb < 7gm/dl). Microcytic hypochromic type of anaemia (82.5%) was more prevalent suggesting nutritional inadequacies as cause of anaemia. Adverse foetal outcome in the form of preterm birth (17%), still birth (3.5%), low birth weight babies (27.5%), neonatal morbidity (23.3%) was more in the anaemic group than non anaemic controls. ***Conclusion*:** Anaemia in pregnancy has adverse foetal outcome in the form of decreased birth weight, increased perinatal morbidity and mortality.

Keywords: Anemia; Pregnancy; Microcytic hypochromic; foetal outcome

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Introduction

Anaemia in pregnancy is one of the most important and common public health problems not only in India but also in most of the South East Asian countries. About 16% to 40% of maternal deaths occur due to anaemia. Anaemia also increases maternal morbidity significantly.

Most of the pregnant patients presenting to outpatient department have iron deficiency anaemia. Along with physiological causes, social causes are also responsible for anaemia during pregnancy like early age at marriage, teenage pregnancy, ill spacing between two pregnancies and poor supplementation of iron, malnutrition, endemic diseases like malaria and worm infestations. Standards laid by WHO suggest haemoglobin below 11 gm/dl as anaemia. According to standards laid down, incidence of anaemia during pregnancy in India ranges from 65% to 75%.[1]

The prevalence of anaemia all over the world is 51% and is as high as 87.5% amongst pregnant women in India.[2] Anaemia, the most preventable cause that can improve perinatal health.

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Aim

To study outcome of pregnancy in cases of Moderate and Severe Anaemia.

Objectives

Anaemia in pregnancy is one of the most important and common public health problems not only in India but also in most of the South East Asian countries.

Anaemia is the most common nutritional deficiency disorder in the world. WHO has estimated that prevalence of anaemia in pregnant women is 14 per cent in developed and 51 per cent in developing countries and 65-75 percent in India.[1]

The high prevalence of anaemia is recognized to be contributory to under nutrition of the foetus and infant mortality.

Adverse effects of anaemia on the foetus

1. Foetal growth restriction (FGR).
2. Preterm birth.
3. Intrauterine foetal deaths due to severe placental insufficiency. The incidence of still birth and preterm births have been found to decrease if iron therapy has been administered before 30 weeks of gestation.
4. Long term effects: Studies have shown that severe anaemia in the mother may result in behavioural abnormalities in children and reduced cognitive skills and impaired schooling later. This is said to be due to deficiency of chemical mediators in the foetal brain as a result of maternal iron deficiency.

In view of high prevalence of anaemia in pregnancy and its serious adverse consequences on both mother and baby, prevention and management of anaemia has become a very high priority in obstetric and public health practice.

So, present study was carried out to observe the effects of anaemia on foetal outcome and its prevalence.

Material and methods

The present study was conducted in Department of Obstetrics and Gynaecology, MMIMSR, Mullana, Ambala. The study was carried out between the periods of October 2012 to September 2014.

The objectives of the study were

a) To find out the situation and causes of anaemia in pregnant women at MMIMSR during the study period with special reference to the severity of the disease.

b) To find out the perinatal outcome.

Inclusion criteria

• A total of 200 cases of moderate and severe anaemia were included in the study on the basis of simple random sampling method and 200 cases of non anaemic subjects were included to serve as controls for the anaemic group, during the study period.

- Hbgm/dl was taken as criteria for deciding anaemia cases and also to classify them according to the severity.
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Antenatal women with moderate anaemia (Hb-7-9.9gm/dl)

Antenatal women with severe anaemia (Hb < 7gm/dl).

Antenatal women with moderate and severe anaemia otherwise having no other medical problem.

Exclusion criteria

Antenatal women with no anaemia (Hb ≥11gm/dl)

Antenatal women with mild anaemia (Hb-10-10.9 gm/dl)

Antenatal cases with other associated diseases were excluded.

Cases of bad obstetric history for any other reason.

Methods

All study subjects were studied in full details with reference to age, present pregnancy details regarding the number of antenatal visits, ill health, chronic infection or infestation any time during pregnancy were studied. Mode of delivery, intrapartum and postpartum complications were studied.

Detailed neonatal examination and neonatal complications were noted.

Women were investigated for:-

1. Complete haemogram.
2. Urine Routine Examination and Microscopy:
3. Stool Routine Examination and Microscopy:
4. Peripheral Blood Smear for evidence malarial parasite.
5. Serum iron and serum total iron binding capacity to know the iron stores.
6. Serum Iron/Folate/Haemoglobin Electrophoresis (when required)
7. Any Other Investigations as and when required.

Only Hb was done in the control group.

Ethical Clearance: This research proposal was accepted by the Ethics Committee of M. M. Institute of Medical Sciences & Resarch, Mullana (Ambala), India.

Results

The study subjects were divided into two groups.

200 cases of moderate and severe anaemia

200 non anaemic controls

Table-1: Distribution of study subjects according to age

Age (years)	Cases		Controls	
	N=200	%	N=200	%
≤ 19 Yrs.	31	15.5	28	14
20-29 Yrs.	158	79	164	82
≥ 30 Yrs.	11	5.5	8	4
Total	200	100	200	100

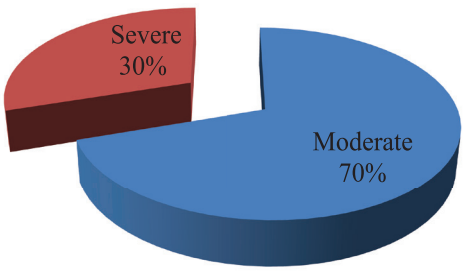
CC = 0.061, P = 0.691 (NS)

Table - 2: Distribution of cases according to the severity of anaemia

Severity of anaemia	No. of cases (N=200)	%
Moderate	140	70
Severe	60	30
Total	200	100

It is observed that out of 200 anaemia cases 70% were moderately anaemic and 30% were severely anaemic.

Graph 1: Showing severity of anaemia



Graph 2: Showing symptom analys

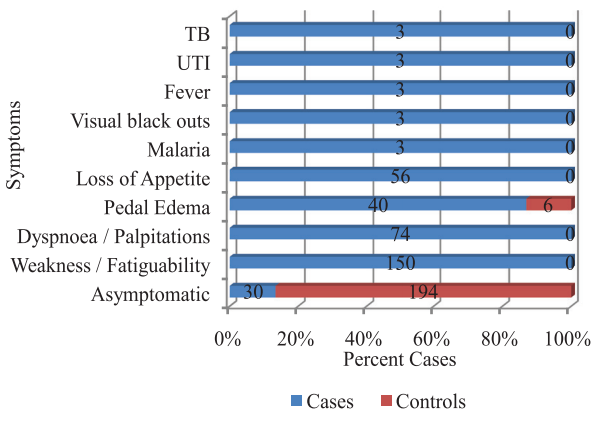


Table - 3: Symptom analysis of anaemic cases and control group

Symptoms	Cases		Controls	
	N = 200	%	N = 200	%
Asymptomatic	30	15	194	97
Weakness / Fatiguability	150	75	0	0
Dyspnoea / Palpitations	74	37	0	0
Pedal Edema	40	20	6	3
Loss of Appetite	56	28	0	0
Malaria	3	1.5	0	0
Visual black outs	3	1.5	0	0
Fever	3	1.5	0	0
UTI	3	1.5	0	0
TB	3	1.5	0	0

p<0.001 (HS)

85% of anaemic women had symptoms suggestive of anaemia. The common symptoms were weakness/ fatiguability in 75%, dyspnoea/ palpitations in 37% and pedal edema in 20% of anaemic cases.

97% of the control group were asymptomatic and only 3% had pedal edema due to associated gestational hypertension.

Table - 4: Relationship of grade of anaemia with different mean blood parameters

Blood parameters (Mean value)	Moderate (N = 140)	Severe (N = 60)
PCV (%)	27.0	19.2
MCV (fl)	76.0	61.8
MCH (pg)	22.37	17.91
MCHC (%)	27.4	25.1
S. Iron (mg/dl)	59.74	60.15
S. TIBC (mg/dl)	447.44	477.20

- This table shows that mean PCV was 27.0% in the moderate anaemic group and 19.2% in the severely anaemic group.
- The mean MCV was 76.0fl in the moderately anaemic and 61.8fl in the severely anaemic group.

- The mean MCH was 22.37pg in the moderately anaemic and 17.91pg in the severely anaemic group.
- The mean MCHC was 27.4% in the moderately anaemic and 25.1% in the severely anaemic group.
- This shows that MCV, MCH and MCHC are all reduced in iron deficiency anaemia, which is the commonest type of anaemia in pregnancy.
- The mean S. Iron was 59.74 mg/dl in the moderately anaemic and 60.15 mg/dl in the severely anaemic group.
- The mean S. TIBC was 447.44 mg/dl in the moderately anaemic and 477.20 mg/dl in the severely anaemic group.

This shows that as the iron stores decrease in iron deficiency anaemia, serum total iron binding capacity increases.

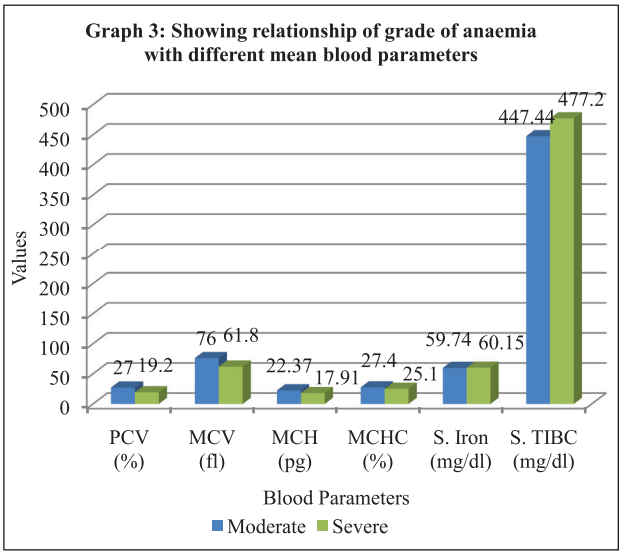


Table – 5: Type of anaemia in cases based on peripheral smear

Type of blood picture	Frequency	%
Microcytic hypochromic	165	82.5
Dimorphic	35	17.5
Total	200	100

- Maximum cases had microcytic hypochromic anaemia accounting for 82.5% of cases.
- Dimorphic anaemia was present in the balance 17.5% of the cases.

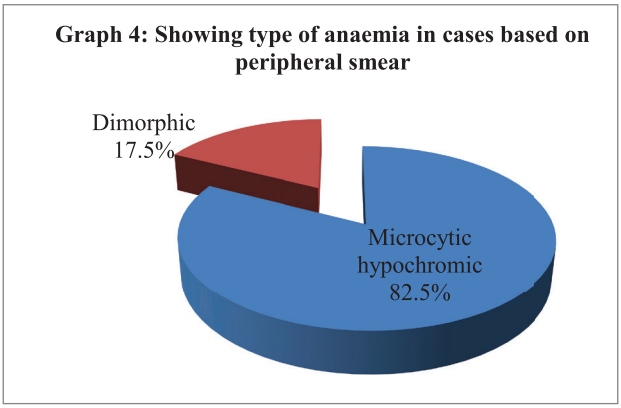
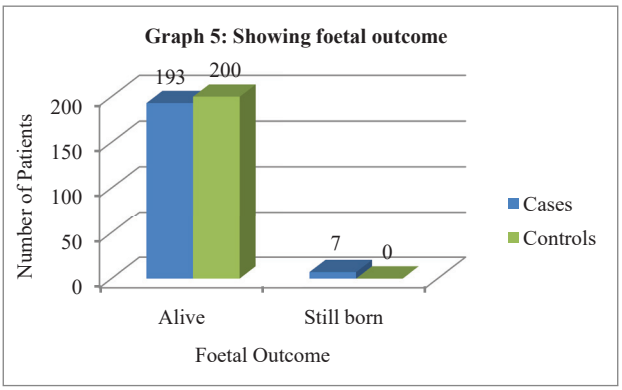


Table – 6: Table showing the foetal outcome in the study subjects

Foetal outcome	Cases (N=200)		Controls (N=200)	
	No. of cases	%	No. of cases	%
Alive	193	96.5	200	100
Still born	7	3.5	0	0
Total	200	100	200	100

CC = 0.185; P = 0.008 (HS)



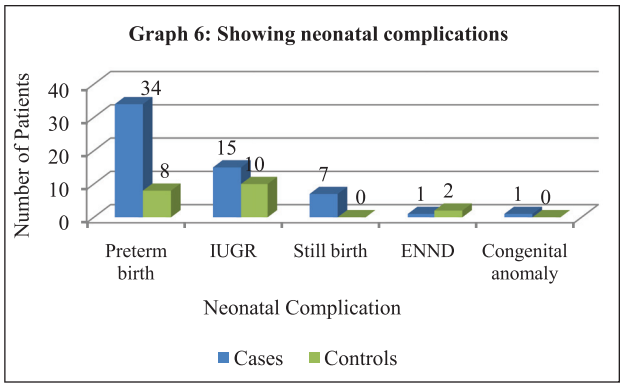
3.5% of the babies in cases were still born. There were no still births in the control group.

Table–7: Table showing the neonatal complications in the study subjects

Complication	Cases (N=200)		Controls (N=200)	
	No. of cases	%	No. of cases	%
Preterm birth	34	17	8	4
IUGR	15	7.5	10	5
Still birth	7	3.5	0	0
ENND	1	0.5	2	1
Congenital anomaly	1	0.5	0	0

CC = 0.208; P = 0.059 (NS)

ENND – Early Neonatal Death



- 17% of the babies in anaemic group were preterm as against only 4% in the control group.
- 7.5% of babies in anaemic group and 5% in the control group had IUGR.
- 3.5 % of the babies were still born in anaemic group.
- 0.5% of babies in anaemic group and 1% in the control group had early neonatal death.
- One baby in the anaemic group had congenital anomaly (Anencephaly).

Table–8: Distribution of birth weight in the babies of study subjects

Birth Weight (Kg)	Cases (N=200)				Controls	
	Moderate	Severe	Total	%	N=200	%
< 1	0	1	1	0.5	2	1
1-1.49	9	4	13	6.5	2	1
1.5-2.49	22	19	41	20.5	30	15
2.5-3.49	95	36	131	65.5	142	71
≥ 3.5	14	0	14	7	24	12
Total	140	60	200	100	200	100

CC = 0.249; P =0.010 (HS)

It is evident from the above table that the incidence of low birth weight babies (< 2.5 kg) is more - 27.5% in anaemic women as against 17% in non anaemic women.

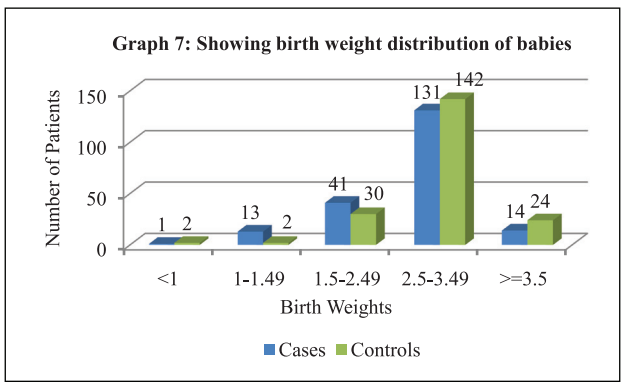
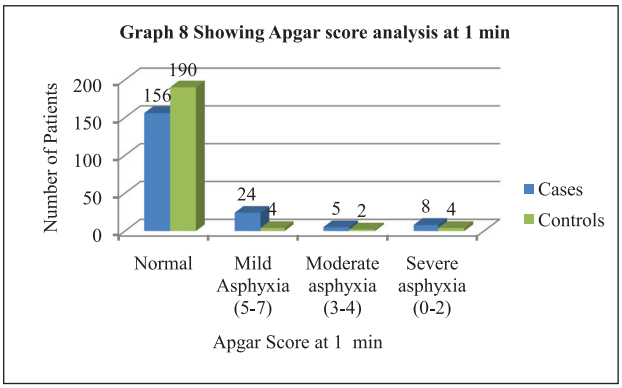


Table – 9: Table showing analysis of Apgar score at 1 min

Apgar score at 1 min.	Cases (N*=193)				Controls	
	Moderate	Severe	Total	%	N=200	%
Normal	117	39	156	80.8	190	95
Mild Asphyxia (5-7)	13	11	24	12.4	4	2
Moderate asphyxia (3-4)	3	2	5	2.6	2	1
Severe asphyxia (0-2)	2	6	8	4.2	4	2
Total	135	58	193	100	200	100

CC = 0.307; P < 0.001 (HS)

N* = Number of babies born live in the cases.



95% of babies in the non anaemic group had normal Apgar score at birth and only 5% had birth asphyxia while 19.2% of babies in the anaemic group showed evidence of birth asphyxia – 12.4% mildly asphyxiated, 2.6% moderately asphyxiated and 4.2% severely asphyxiated.

Thus, anaemia in pregnancy is associated with lower Apgar score at birth.

Table – 10: Table showing NICU admissions in the babies

	Cases		Controls	
	N*= 193	%	N = 200	%
No admission	138	71.5	180	90
Admission to NICU	55	28.5	20	10
Total	193	100	200	100

CC = 0.318; P < 0.001 (HS)

N* = Number of babies born live in the cases

28.5% of babies in the anaemic group had NICU admissions as against only 10% in the control group.

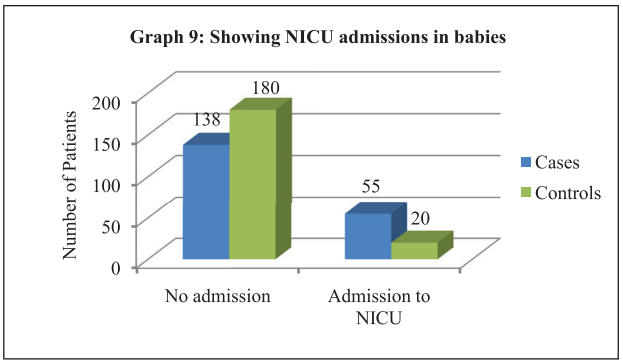
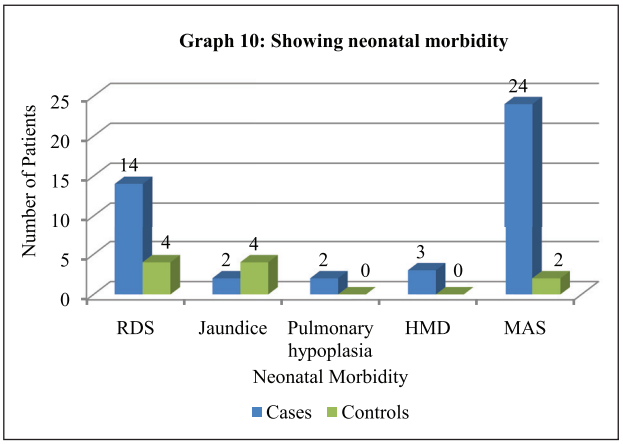


Table – 11: Table showing the neonatal morbidity in the study subjects

	Cases (N* = 193)		Controls (N = 200)	
	No. of cases	%	No. of cases	%
RDS	14	7.3	4	2
Jaundice	2	1	4	2
Pulmonary hypoplasia	2	1	0	0
HMD	3	1.6	0	0
MAS	24	12.4	2	1
Total	45	23.3	10	5

CC = 0.248; P = 0.013 (HS)

N*= Number of babies born live in the cases



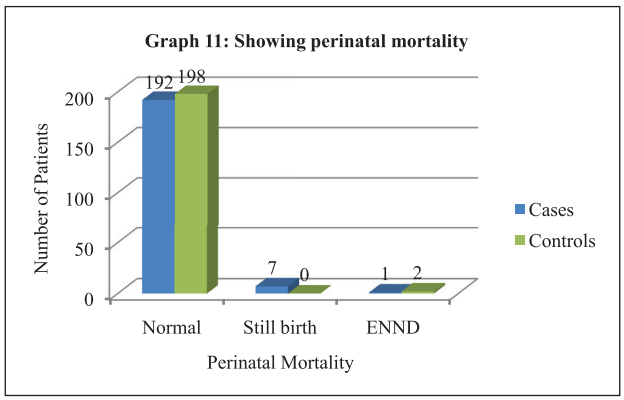
- The above table shows that neonatal morbidity was 23.3% in the anaemic group as against only 5% in the control group.
- The major causes of neonatal morbidity in the anaemic group were Meuconium Aspiration Syndrome (MAS) and Respiratory Distress Syndrome (RDS).

Thus, anaemia in pregnancy leads to increase in neonatal morbidity.

Table – 12: Table showing perinatal mortality in the study subjects

Perinatal mortality	Cases (N = 200)		Controls (N = 200)	
	No. of cases	%	No. of cases	%
Normal	192	96	198	99
Still birth	7	3.5	0	0
ENND	1	0.5	2	1
Total	200	100	200	100

CC = 0.189; P = 0.024 (S)



The overall perinatal mortality was 4% in the anaemic group and 1% in the control group. Thus, anaemia in pregnancy is associated with poor perinatal outcome.

Discussion

Majority of study subjects in the present study belonged to the age group of 20-29 years, 79% in cases and 82% in the controls group (table no-1). This is comparable to the study conducted by Khandait DW et al (2001)[15]; in which 70% of the cases belonged to 20-29 years age group.

Studies conducted by Malhotra P et al[5] and Sanha H et al[6] also concluded similar results. In the present study, 85% of anaemic women had symptoms suggestive of anaemia. The common symptoms were Weakness / Fatiguebility in 75%, Dyspnoea / Palpitations in 37%, Loss of Appetite in 28% and Pedal Edema in 20% cases. Malaria, fever, UTI, TB and visual blackouts were present in 1.5% cases. (table no-3)

Sharma JB[4] studied that anaemic patients complain of weakness, exhaustion and lassitude, indigestion and loss of appetite. Palpitation, dyspnoea, giddiness, edema and rarely anasarca and even congestive cardiac failure can occur in severe cases.

In the present study, (table no-4) the mean PCV, MCV, MCH, MCHC and S. Iron and S.TIBC are comparable that to that studied by Agarwal V.[24]

In the present study mean PCV was 27% in moderate

anaemia and 19.2% in severe anaemia. In the study conducted by Agarwal V, mean PCV was 21.6% in moderate and 14.9% in severe anaemia.

Blood parameters (Mean value)	Moderate (N = 140)	Severe (N = 60)
PCV (%)	27.0	19.2
MCV (fl)	76.0	61.8
MCH (pg)	22.37	17.91
MCHC (%)	27.4	25.1
S. Iron (mg/dl)	59.74	60.15
S. TIBC (mg/dl)	447.44	477.20

In the present study mean MCV was 76fl in moderate and 61.8fl in severe anaemia. Mean MCV was 83.5fl in moderate and 75.3fl in severe anaemia in study by Agarwal V.

In the present study mean MCH was 22.37pg in moderate and 17.91pg in severe anaemia. Mean MCH was 26.2pg in moderate and 22.6 pg in severe anaemia in study conducted by Agarwal V.

In the present study mean MCHC was 27.4% in moderate and 25.1% in severe anaemia. This is comparable to study by Agarwal V, in which mean MCHC was 26.4% in moderate and 24.4% in severe anaemia.

In the present study mean S.Iron was 59.74 mg/dl in moderate and 60.15 mg/dl in severe anaemia. In the study conducted by Agarwal V, mean S.Iron was 54.2 mg/dl in moderate and 28.19 mg/dl in severe anaemia.

In the present study, mean S.TIBC was 447.44 mg/dl in moderate and 477.20 mg/dl in severe anaemia (table no-12). In the study by Agarwal V, mean S.TIBC was 320.62 mg/dl in moderate and 419.34 mg/dl in severe anaemia.

Thus, iron stores decrease in iron deficiency anaemia and serum total iron binding capacity increases.

Peripheral smear examination tells us about the type of anaemia and is important in the management. The present study correlates with study conducted by Awasti et al.[25]

In the present study majority, 82.5% of subjects had microcytic hypochromic anaemia (table no-5) as compared to 17.5% subjects having dimorphic anaemia.This is comparable to study conducted by Awasthi et al, in which 22% subjects had dimorphic anaemia and 66.57% had microcytic hypochromic anaemia.

Awan MM et al[8] also found that 76% of the cases had microcytic hypochromic anaemia.

Similarly, in the study conducted by Rao P Srinivasa et al[7], it was concluded that, anaemia in 1st trimester of pregnancy was endemic and microcytic, hypochromic anaemia is most common.

There is a high incidence of adverse foetal outcome in the form of preterm birth, IUGR, stillbirths, early neonatal deaths in anaemic group compared to controls. The cause of early neonatal deaths was preterm birth and respiratory distress in the present study.

In the present study, 17% of the babies in anaemic subjects were preterm as against only 4% in the control group. 7.5% of babies in anaemic group and 5% in the control group had IUGR, 3.5 % of the babies were still born in anaemic group. 0.5% of babies in anaemic group and 1% in the control group had early neonatal death. (table no-7)

These findings are comparable with the observations of Awasthi A et al[25], Preterm 9.5%, and IUD 6.5%.

Similarly, Ali AA et al[18] concluded that there were 3.3% still births in anaemic group.

Sifakis S et al[9] studied that anaemia with haemoglobin levels less than 6 gm/dl was associated with poor pregnancy outcome. Prematurity, spontaneous abortions, low birth weight, and foetal deaths were complications of severe maternal anaemia.

Similarly, Sarin AR[10] also concluded that maternal anaemia was associated with poor foetal outcome.

Sangeeta VB et al[19] concluded that there was 1.7 times increased risk of premature birth among cases, 2 times increased risk of IUGR among cases, 1.8 times increased risk of IUD among cases.

Lone FW et al[22] concluded that there was a 3.7 and 4 times greater risk of intrauterine foetal death and preterm delivery and among the anaemic women than the non-anaemic women.

In the present study, that the incidence of low birth weight babies (< 2.5 kg) was 27.5% in anaemic subjects (table no-8) as against 17% in the non anaemic subjects. This is comparable to the study conducted by Toshina V[11], where 29.6% babies had low birth weight in anemic cases.

Similarly, in the study conducted by Meda N et al[21], incidence of low birth weight (< 2.5 kg) was 21%.

Sarin AR[10], El Guindi W et al[12] and Geelhoed Det al[13] also concluded that maternal anaemia leads to higher incidence of low birth weight babies.

Ali AA et al[14] concluded that, the risk of LBW was 2.5 times higher in women with mild/moderate anaemia and 8.0 times higher in women with severe anaemia.

Bondevik GT et al[16] studied that severe anaemia was associated with a significantly increased risk of low birth weight.

Sangeeta VB et al[19] concluded that there was 2.8 times increased risk of low birth weight among cases. Bakhtiar UJ et al[20] found that the risk of low birth weight was 1.8 times more in anaemic mothers. There was 2.2 times increased risk of intra uterine foetal death in anaemic mothers.

In the present study, 19.2% of babies in the anaemic group (table no-9) showed evidence of birth asphyxia (12.4% of babies were mildly asphyxiated, 2.6% moderately asphyxiated and 4.2% severely asphyxiated) as compared to 5% babies having birth asphyxia in the non anaemic controls. These findings are comparable to the study conducted by Agarwal P[83], where incidence of birth asphyxia was 21% in babies of anaemic women as compared to 3% in babies of non anaemic subjects.

Bondevik GT et al[16] studied that the risk of low Apgar score was significantly increased in women with severe anaemia in the first trimester.

Sangeeta VB et al[19] concluded that there was 1.6 times increased risk of birth asphyxia among cases.

Bakhtiar UJ et al[20] found that neonates of anaemic women had 1.7 times increased risk of low Apgar score at one minute.

Similarly, Lone FW et al[22] concluded that neonates of anaemic women had 1.8 times increased risk of low Apgar scores at 1 minute.

The major causes of neonatal morbidity in the anaemic group were Meuconium aspiration syndrome and Respiratory distress syndrome.

In the present study, neonatal morbidity was 23.3% in the anaemic group (table no-11) as against only 5% in the control group. This is comparable to study done by Agarwal P[23], in which neonatal morbidity was 21% in anaemic subjects as compared to 14% in the non anaemic subjects. Thus, anaemia in pregnancy leads to increase in neonatal morbidity.

Rohilla M et al[17] in their study concluded that Foetal distress was seen in 26% of the anaemic caes.

The overall perinatal mortality was 4% in the anaemic group (table no-12) and 1% in the control group. Thus, anaemia in pregnancy is associated with poor perinatal outcome. This is comparable to study by Rohilla M et al[17], which concluded that perinatal mortality was 4.16% in anaemic cases.

Similar results were also seen in study carried out by Sarin AR[10] with 7.9% perinatal deaths in the anaemic subjects.

Summary

In the present study, among various causes of anaemia, 90% were nutritional in origin. Iron deficiency was the commonest nutritional anaemia followed by folic acid deficiency.

Anaemia in pregnancy was found to be associated with adverse perinatal outcome like low birth weight babies and increased maternal morbidity, neonatal morbidity and mortality.

Anaemia was responsible for adverse foetal outcome in the form of low birth weight babies and intra uterine growth restriction. Maternal iron deficiency in pregnancy reduces foetal iron stores, putting them at risk for long term cognitive and neurodevelopment impairments in the neonate.

The present study was conducted in Department of Obstetrics and Gynaecology, MMIMSR, Mullana, Ambala. The study was carried out between the period of october 2012 to September 2014. A total of 200 cases of moderate and severe anaemia were included in the study on the basis of simple random sampling method and 200 cases of non anaemic subjects were included to serve as controls for the anaemic group, during the study period.

Cases were classified into mild (10 – 10.9gm/dl), moderate (7 – 9.9gm/dl) and severe (< 7gm/dl) anaemia according to WHO Criteria

Majority of study subjects were in the age group of 20-29 years – 79% in cases and 82% in controls. This is not statistically significant.

85% of the anaemic women had symptoms suggestive of anaemia. The common symptoms were easy fatiguability followed by dyspnoea and palpitations, loss of appetite and pedal edema. This is statistically highly significant.

Out of 200 cases of anaemia, 70% were moderately anaemic and 30% were severly anaemic.

The mean PCV, MCV, MCH, MCHC and RBC count are all reduced in anaemia patients indicating that iron deficiency is the commonest type of anaemia in pregnancy.

The mean S. Iron was 59.74 mg/dl in moderate anaemia and 60.15 mg/dl in the severely anaemic group. The mean S.TIBC was 447.44 mg/dl in moderate anaemia and 477.20 mg/dl in the severely anaemic group. This shows that as iron stores decrease in iron deficiency anaemia, serum total iron binding capacity increases.

Microcytic hypochromic anaemia was the commonest type of anaemia (82.5%).

The neonatal morbidity was 23.3% in the anaemic group and 5% in the control group with meconeum

aspiration as the leading cause. This is statistically highly significant.

The perinatal mortality was 4% in the cases and 1% in the control group.

Therefore, efforts need to be directed not only to correct anaemia but to prevent anaemia in the entire women folk of the country.

Proper antenatal care is the basic requirement for prevention, early detection and treatment of anaemia. Adequate Iron and folic acid supplementation during pregnancy in iron deficient mothers improves iron status during pregnancy and postpartum period, thus providing some protection against iron deficiency in the subsequent pregnancy. Ensuring maternal iron sufficiency during gestation is the most cost effective method of preventing perinatal iron deficiency and related morbidities.

Conclusion

From the present study under discussion, it is concluded that anaemic antenatal cases suffering from moderate and severe anaemia carried adverse effects on foetal outcome in the form of decreased birth weight, increased perinatal morbidity and mortality.

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