

ORIGINAL RESEARCH

A Study on Maternal and Fetal Outcome in Women with Severe Anaemia in Labour

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ABSTRACT

Background: In pregnancy, anaemia has a significant impact on the health of fetus as well as that of mother. It is one of the leading causes responsible for maternal and perinatal morbidity and mortality. The objectives of the study are to find out the effect of severe anaemia on women in labour affecting maternal and fetal outcome.

Materials and Methods: This a prospective case control study undertaken in the Department of Obstetrics and Gynaecology, Govt Maternity Hospital, Petlaburz attached to Osmania Medical College, Hyderabad. The period of study was from 1st December 2019 to 31st December 2021. There were a total of 160 study subjects, 80 cases of severe anaemia (Hb < 7 gm %) and 80 non anaemic controls (Hb ≥ 11 gm %).

Results: Low socio economic status (86.25%), inadequate antenatal care (38.75%), multiparity (71.25%) and no iron supplementation (52.5%) were associated with severe anaemia cases. Microcytic hypochromic anaemia was more prevalent (76.25%), suggesting nutritional inadequacies as a cause of anaemia. It was seen that the incidence of preterm labour (22.5%), atonic PPH (2.5%), sub involution of the uterus (2.5%), CCF (1.25%), abruptio placentae (1.25%) and maternal mortality (1.25%) was more in cases of severe anaemia than in the control group. Adverse fetal outcome in the form of preterm birth (22.5%), low birth weight babies (41.25%), IUGR (13.75%), birth asphyxia (11.25%), and perinatal mortality (11.25%) was more in the anaemic group than the controls.

Conclusion: Anaemia in pregnancy has adverse effects on the mother and fetus. So it is important to diagnose and treat anaemia in pregnancy to ensure optimal health of mother and newborn.

Keywords: Pregnancy; severe anaemia; microcytic hypochromic; maternal outcome; fetal outcome.

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INTRODUCTION

Anemia in pregnancy is a common problem in low-income countries. It substantially contributes to poor outcome in both mother and child. Its effect on maternal health include reduction of immuneresponse, danger of heart failure, and aggravation of the risks of childbirth. Maternal anemia during pregnancy may lead to poor fetal outcome through growth retardation or perinatal death, while the risks of infant morbidity and mortality are also increased. However, it is not yet clearly known to what extent these maternal and fetal risks are affected by anemia in pregnancy in low-income countries. Similarly, little knowledge is available on the relation between pregnancy outcome and severity of anemia,

gestational age at onset or duration of anemia, although anemia in early pregnancy seems to be associated with an increased risk of low birth-weight or preterm birth.

Anaemia is a major public health problem especially among the poorer segments of the population in developing countries like India and it is one of the major challenges an obstetrician faces in his / her carrier. In India, it is frequently severe and contributes to maternal mortality and reproductive health morbidity. It deserves more attention than its currently receiving. Recently lot of programmes have been focussed on safe motherhood but maternal anaemia remains a problem of great concern. Gender discrimination is another important factor in India as the girl child, right from youth, is denied proper food and education.

Anaemia in pregnancy accounts for 25 percent of deaths due to associated causes and 11.5% of all maternal deaths. Anaemia contributes to 10-15% of direct maternal deaths in India. An estimated 60% of all pregnant women in developing countries have anaemia. Anaemia either directly or indirectly contributes to about 20% of maternal deaths in third world countries.

Prevention is better than cure. This study could guide us as to the levels at which we need to direct our preventive measures to check the progress of anaemia in antenatal women and improve our outreach services thereby identifying anaemia in the adolescent stage.

Objectives of the study

- To study the effect of severe anaemia on women in labour affecting maternal outcome such as congestive cardiac failure, abruptio placenta, retained placenta, post-partum haemorrhage, puerperal sepsis, maternal death.
- To study the fetal outcome in pregnancy with severe anaemia such as intra- uterine fetal demise, preterm delivery, low birth weight, low Apgar scores, perinatal death.

MATERIALS & METHODS

This study was conducted in the Department of Obstetrics and Gynaecology, Govt Maternity Hospital, Petlaburz attached to Osmania Medical College, Hyderabad. The period of study was from 1stDecember 2019 to 31stDecember 2021.

Source of data: All women in labour and having severe anaemia (Hb<7 gm%) were studied. Controls were selected from every third woman, admitted in labour matched for age, parity and gestational age and who is non-anaemic (Hb \geq 11 gm%).

Study design: Case Control study.

Study period: 1stDecember 2019 to 31stDecember 2021.

Study setting: Department of Obstetrics and Gynaecology, Govt Maternity Hospital, Petlaburz attached to Osmania Medical College, Hyderabad

Statistical parameters: Data will be analysed with chi square test.

Method of Collection of Data: The selected patients are subjected to detailed history, general physical and systemic examination followed by obstetric examination. The required investigations are then carried out in the hospital which includes complete hemogram to assess the severity and type of anaemia, and then the maternal and fetal outcome studied.

Inclusion Criteria

Pregnant women in labour, of any parity, with Hb <7 gm% were included as cases.

Controls were selected from every third woman admitted in labour and having matching criteria of age, parity, and period of gestation and whose haemoglobin level is \geq 11 gm %.

Exclusion Criteria

- Pregnant women with mild to moderate anaemia (Hb 7-10.9 gm%).

- Pregnant women with Hb <7 gm% with other associated conditions like diabetes mellitus, pregnancy induced hypertension, antepartum haemorrhage, cardiac disorders, thalassemia, sickle cell anaemia, and other medical illness.

Does the study requires any investigations or interventions to be conducted on patients or other humans or animals? If so please describe briefly.

Yes, in our study the following investigations are conducted in each patient. All the patients included in the study are investigated thoroughly with

1. Hematological investigations-

- Haemoglobin concentration.
- Complete hemogram (including MCV, MCH, MCHC, PCV, TLC, DLC).
- Peripheral smear.
- Blood grouping and Rh typing.

2. Urine- albumin, sugar, microscopy.

- HIV, HBsAg.
- Obstetric Ultrasonography.

RESULTS

The study subjects were divided into two groups:

Cases	Hb < 7 gm% (severe anaemia)	80
Controls	Hb ≥ 11 gm%	80

Table 1: Distribution based on age group

Age group	Cases(Hb%<7)	Controls(Hb%≥11)	Total
Up to 20 years	13 (16.25%)	23 (28.75%)	36 (22.5%)
21 – 25 years	42 (52.5%)	51 (63.75%)	93 (58.12%)
26 – 30 years	21 (26.25%)	05 (6.25%)	26 (16.25%)
More than 30 years	04 (5%)	01 (1.25%)	05 (3.12%)
Total	80 (100%)	80 (100%)	160 (100%)

Chi square value – 16.01 df-3 p value – 0.001

- In our study, majority of the subjects belonged to the age group of 21- 25 years, i.e., 52.5% in cases and 63.75% in the controls.
- 16.25% of the cases and 28.75% of the controls belonged to the age group of ≤ 20 years.
- 26.25% of the cases and 6.25% of the controls belonged to the age group of 26- 30 years.
- 5% of the cases and 1.25% of the controls belonged to the age group of > 30 years.
- Since the p value is 0.001, this difference is significant.

Table 2: Distribution based on Socio- economic status

SES	Cases(Hb%<7)	Controls(Hb%≥11)	Total
Lower	69 (86.25%)	66 (82.5%)	135 (84.3%)
Middle	11 (13.75%)	14 (17.5%)	25 (15.6%)
Total	80 (100%)	80 (100%)	160 (100%)

Chi square value – 2.04 df-1 p value – 0.12

All the study subjects were categorized as per modified Kuppaswamy's socio economic classification.

- 86.25% of the cases and 82.5% of the controls belonged to low socio-economic class.

- 13.75% of the cases and 17.5% of the controls belonged to the middle socio-economic class.
- This difference is not statistically significant.

Table 3: Distribution based on ANC booking

ANC booking	Cases(Hb%<7)	Controls(Hb%≥ 11)	Total
Booked	49 (61.25%)	77(96.25%)	126 (78.75%)
Un booked	31 (38.75%)	03 (3.75%)	34 (21.25%)
Total	80 (100%)	80 (100%)	160 (100%)

Chi square value – 24.13 df-1 p value – 0.001

- It was observed that 61.25% of the cases and 96.25% of the controls were booked subjects.
- 38.75% of the cases were unbooked while only 3.75% of the control group were unbooked. This difference is statistically significant.

Table 4: Distribution based on obstetric score

Obstetric score	Cases (Hb%<7)	Controls (Hb%≥ 11)	Total
Primi	18 (22.5%)	30 (37.5%)	48 (30%)
Multi	57 (71.25%)	50 (62.5%)	107 (66.8%)
Grandmulti	05 (6.25%)	00	05 (3.1%)
Total	80 (100%)	80 (100%)	160 (100%)

Chi square value – 4.25 df-2 p value – 0.11

- 22.5% of the severely anaemic cases were primigravidae vs 37.5% of the non anaemic controls.
- 71.25% of the cases were multigravidae compared to 62.5% of the control group.
- 6.25% of the severely anaemic cases were grandmulti whereas none of the controls belonged to this group.
- This difference is not statistically significant.

Table 5: Distribution based on period of gestation

Gestation	Cases(Hb%<7)	Controls(Hb%≥ 11)	Total
28 – 32 weeks	08 (10%)	01(1.25%)	09 (5.6%)
33 – 37 weeks	24 (30%)	09 (11.25%)	33 (20.62%)
≥ 38 weeks	48 (60%)	70 (87.5%)	118 (73.75%)
Total	80 (100%)	80 (100%)	160 (100%)

Chi square value – 13.1 df-2 p value – 0.001

- 10% of the cases belonged to 28- 32 weeks gestational age group, compared to only 1.25% of the control group.
- 30% of the cases belonged to 33- 37 weeks gestational age group, compared to 11.25% of the control group.
- Majority of the study subjects belonged to ≥ 38 weeks gestational age group, i.e., 60% of the case group and 87.5% of the control group. This difference is statistically significant.

Table 6: Distribution based on birth spacing in multiparous patients

Birth spacing	Cases(Hb%<7)	Controls(Hb%≥ 11)	Total	P value*
<2 years	06 (3.75%)	05 (3.12%)	11 (6.87%)	0.68

≥2 years	50 (31.25%)	44 (55%)	94 (58.7%)	0.17
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*Chi square test

- 3.75% of the cases had a birth spacing interval of < 2 years whereas it is 3.12% of the controls.
- 31.25% of the cases had birth spacing interval of ≥ 2 years whereas it is 55% of the controls. This difference is not statistically significant.

Table 7: Distribution based on Iron supplementation

Fe supplementation	Cases (Hb%<7)	Controls (Hb%≥ 11)	Total
Yes	38 (47.5%)	74 (92.5%)	112 (70%)
No	42 (52.5%)	06 (7.5%)	48 (30%)
Total	80 (100%)	80 (100%)	160 (100%)

Chi square value – 35.41 df-1 p value – 0.001

- 47.5% of the cases had prophylactic iron intake while 92.5% of the controls belonged to this group.
- 52.5% of the cases had no haematinic intake while only 7.5% of the controls belonged to this group.
- This difference is statistically significant

Table 8: Distribution based on Peripheral blood smear

PBS	Cases(Hb%<7)	Controls(Hb%≥ 11)	Total
Normocytic	01 (1.25%)	75 (93.75%)	76 (47.5%)
Microcytic	61 (76.25%)	04 (5%)	65 (40.62%)
Macrocytic	01 (1.25%)	00	01 (0.625%)
Dimorphic	17 (21.25%)	01 (1.25%)	18 (22.5%)
Total	80 (100%)	80 (100%)	160 (100%)

Chi square value – 131.02 df-3 p value – 0.001

- Majority of the cases had microcytic hypochromic blood picture, i.e., 76.25%, whereas only 4.9% of the control group belonged to this category.
- Only 1.25% of the cases had normocytic blood picture while 93.75% of the controls belonged to this group.
- 21.25% of the cases had dimorphic blood picture and 1.25% of the controls had the same.
- Macrocytic anaemia was seen in only one of the subjects in the case group, while control group had none.
- This difference is statistically significant.

Maternal Outcome

Table 9: Distribution based on outcome of Delivery

Delivery	Cases(Hb%<7)	Controls(Hb%≥ 11)	Oddsratio	95%CIoddsratio	P value*
Pre term	18 (22.5%)	04 (5%)	0.170	0.550 – 0.530	0.001
Term	60 (75%)	74 (92.5%)	4.38	1.65 – 11.63	0.002
Post term	02 (2.5%)	02 (2.5%)	0.940	0.130 – 6.91	0.950
Total	80 (100%)	80 (100%)	---	---	-----

*Chi square test

- Majority of the study subjects had a full-term delivery, i.e., 75.0% of the cases and 92.5% of the controls. This result is statistically significant.
- 22.5% of the cases had a preterm delivery while only 5% of the controls had preterm delivery. This difference is statistically significant.
- 2.5% and 2.5% of the cases and the controls had post term delivery respectively. This is not statistically significant.

Table 10: Distribution based on mode of delivery

Delivery	Cases(Hb%<7)	Controls(Hb%≥ 11)	Oddsratio	95%CIoddsratio	P value*
Vaginal	62 (77.5%)	60 (75%)	0.79	0.30 – 1.47	0.25
LSCS	09 (11.39%)	18 (22.5%)	0.63	0.45 – 0.69	0.01
Instrumental	08 (10.1%)	02 (02.5%)	0.38	0.45 – 1.53	0.23
LAP	01 (1.26%)	00	0.35	0.85 – 0.65	0.97
Total	79 (100%)	80 (100%)	--	---	---

*Chi square test

- Amongst the severely anaemic cases, 1 (1.26%) patient did not deliver.
- The patient had congestive cardiac failure during labour and succumbed to the same. Out of the remaining 79 cases, 77.5% had vaginal delivery, 9% underwent caesarean section, 10.1% had instrumental delivery while 1.26% underwent emergency laparotomy. The indication for emergency laparotomy was rupture uterus.
- Amongst the non anaemic controls, 75.0% had vaginal delivery, 22.5% underwent caesarean section, 2.5% had instrumental delivery. None of the subjects in the control group underwent laparotomy.

Table 11: Maternal outcome

Morbidity	Cases (Hb%<7)	Controls (Hb%≥ 11)	P value*
CCF	01 (01.25%)	00	0.30
Abruptio placentae	01 (01.25%)	00	0.30
Retained placenta	00	00	---
PPH	02 (02.5%)	00	0.14
Puerperal sepsis	00	00	---
Sub involution	02 (02.5%)	00	0.14
Wound dehiscence	00	00	---
Maternal mortality	01 (01.25%)	00	0.30

*Chi square test

- 1.25% of the cases had congestive cardiac failure while none of the controls had this complication.
- 1.25% of the cases had abruptio placentae while none of the controls had this complication.
- 2.5% of the cases had atonic postpartum haemorrhage while none of the controls had this complication.
- 2.5% of the cases had sub involution of the uterus while none of the controls had this complication.

- None of the study subjects in either of the groups had retained placenta, puerperal sepsis and wound dehiscence. 28 of the severely anaemic cases reported for follow- up after 6 weeks of delivery. None of them showed any signs of puerperal sepsis.
- 1 (1.25%) study subject in the severely anaemic case group died due to congestive cardiac failure during second stage of labour.

There was no maternal mortality in the control group.

Neonatal Outcome

Table 12: Neonatal outcome

Morbidity	Cases (Hb%<7)	Controls (Hb%≥ 11)	P value*
IUGR	11 (13.75%)	03 (03.75%)	0.03
IUFD	04 (5%)	01 (01.25%)	0.15
Stillborn	02 (2.5%)	00	0.14
APGAR score <7 at 5 mins	09 (11.25%)	03 (03.75%)	0.05
NICU admission	13 (16.25%)	03 (03.75%)	0.003
Perinatal mortality	09 (11.25%)	02 (02.5%)	0.02

*Chi square test

- 13.75% of the cases had IUGR while only 3.75% of the controls had IUGR. This difference is found to be statistically significant.
- 5% of the cases had intra uterine foetal demise as opposed to 1.25% of the controls. This difference is not statistically significant.
- 2.5% of the cases had stillbirths while none of the controls had stillbirths. This difference is not statistically significant.
- 11.25% of the babies born to severely anaemic mothers had an Apgar score of <7 at 5 minutes while only 3.7% of the controls belonged to this group. This result is statistically significant.
- 16.25% of the babies born to severely anaemic mothers were admitted to NICU while this was seen in only 3.75% of the non-anaemic mothers in the control group. This result is found to be statistically significant.
- The overall perinatal mortality was 11.25% in the case group while it was only 2.5% in the control group. This difference is statistically significant.

Table 15: Birth weight

Birth weight	Cases(Hb%<7)	Controls(Hb%≥ 11)	Total
<1.50 kg	09 (11.25%)	00	09 (5.6%)
1.50 – 1.99 kg	06 (07.5%)	02 (02.5%)	08 (05%)
2.00 – 2.49 kg	25 (31.25%)	14 (17.5%)	39 (24.37%)
2.50 – 2.99 kg	33 (41.25%)	47 (58.75%)	80 (50%)
>3.00 kg	07 (8.75%)	17 (21.25%)	24 (15%)
Total	80 (100%)	80 (100%)	160(100%)

Chi square value – 18.30 df-4 p value – 0.001

- 5.6% of the cases had very low birth weight babies as opposed to none in the control group.
- 31.25% of the cases had low birth weight babies as opposed to only 17.5% of the controls. This result is statistically significant.

DISCUSSION

In our study, majority of the study subjects belonged to the age group of 21-25 years, i.e., 52.5% of the case group and 63.75% of the controls. Also, 78.75% of the cases and 70% of the controls belonged to the age group of 21-30 years.^[1-3]

This is comparable to a study done by Alli et al,^[4] in which 40% of the patients belonged to the age group of 21-25 years. In a study by Khandait et al,^[5] 70% of the patients belonged to the age group of 21-30 years.

Low SES is a risk factor for anaemia, poor nutrition being the main cause. In the present study, 86.25% of the cases of severe anaemia belonged to low socio-economic class.

In a study by Thangaleela et al,^[6] 78.3% of the cases belonged to low socio-economic class. This suggests a close relationship between low SES and pregnancy anaemia probably because of poor nutrition and inadequate health care.

Regular antenatal check-ups and adequate antenatal care is the cornerstone for safe motherhood. 38.75% of the cases were unbooked as opposed to only 3.75% of the controls. The incidence of unbooked cases was higher in a study conducted by Jaleel et al,^[7] i.e., 62.7% in the severely anaemic cases vs 36.1% in the non-anaemic controls.

In the present study, anaemia was more common in multiparous women accounting for 71.25% of cases compared to 62.5% in the control group. These observations are confirmed by the studies conducted by Awasthi et al,^[8] where 60.5% of the cases were multiparous, and Khandait et al,^[5] where 53.8% of the cases were multiparous.

Close birth spacing has an impact on the haemoglobin status of women. But in the present study, 6.87% of the cases had a birth spacing interval of < 2 years. This finding is in contrast with other studies conducted by Khandait et al, Thangaleela et al.^[5,6]

In our study, 76.25% of the cases had microcytic hypochromic blood picture followed by 21.25% of the cases with dimorphic anaemia. Similar results were seen in the study conducted by Awasthi et al,^[8] in which 66.5% of the cases had microcytic hypochromic anaemia and 22% had dimorphic anaemia.

22.5% of the cases had a preterm delivery while only 5% of the controls had preterm delivery in the present study. In a study done by Patra et al,^[9] a similar incidence of preterm labour was reported amongst the anaemic cases, 24%. Our results also corroborate with the study conducted by Lone et al,^[10] where it was 25.2% in the case group vs 6.3% in the control group; and by Rohilla et al,^[11] where preterm labour was seen in 18.75% of the severe anaemia cases.

In the present study, 77.5% of the cases had vaginal deliveries as opposed to 75% of the controls, whereas the rate of LSCS was higher in the control group, i.e. 22.5% vs 11.39% in the anaemic cases. 10.1% of the cases had instrumental vaginal deliveries as opposed to 2.5% of the controls. In a study by Awasthi et al,^[8] 69.5% of the cases had vaginal delivery, 20.5% underwent LSCS and 6.5% had instrumental deliveries.

There is increased maternal morbidity in cases of severe anaemia. In our study, atonic postpartum haemorrhage (2.5%), sub involution of the uterus (2.5%), congestive cardiac failure (1.25%), abruptio placentae (1.25%) were seen. In a study conducted by Awasthi et al,^[8] similar results were reported, PPH in 2.5%, sub involution in 2%, CCF in 4.5%, abruptio placentae in 5.2%. The results of our study were also comparable to the study conducted by Jaleel et al,^[7] in which PPH was seen in 9.8% of the cases of severe anaemia, CCF in 1.9% and abruptio in 5.9%.

Maternal mortality was seen in 1.25% of the cases in our study. This is comparable to the studies conducted by Jaleel et al (1.9%),^[7] Ghimire et al (3%), Nisty et al (2%) and Nirmaladevi et al (1.06%).^[12-14]

There is a high incidence of adverse fetal outcome in the form of preterm birth, IUGR, low APGAR scores and NICU admissions.

In our study, low birth weight was seen in 41.25%, IUGR in 13.75%, APGAR score of <7 at 5 minutes in 11.25%, admission to NICU in 16.25%.

This is comparable to the study by Jaleel et al,^[7] where incidence of LBW was 29.6%, IUGR in 27.8%, low APGAR scores in 11.1%.

In a study conducted by Lone et al,^[10] IUGR was reported in 12.1% and birth asphyxia in 8.7%.

In the study by Awasthi et al,^[8] the incidence of birth asphyxia was 7.02%, but IUGR was seen in 37.5% of the cases.

A study by Alli et al,^[4] also reported the incidence of IUGR in cases of anaemia as 10%.

The perinatal mortality in our study was seen in 11.7% of the cases. Similar results were reported in the studies by Awasthi et al (11%), and Rohilla et al (20.7%).^[8,11]

CONCLUSION

In the present study, inadequate antenatal care, multiparity, younger age, and inadequate iron supplementation are associated with severe anaemia in pregnancy. Joint social and medical efforts are required for overall improvement of living status of women. Their awareness is to be increased about dietary habits, small family norms, birth interval, appropriate use of family planning methods and regular antenatal visits. Iron and folic acid deficiency anaemia was the most common type, therefore adequate iron and folic acid prophylaxis is a must in all antenatal women. Proper antenatal care is the basic requirement for prevention, early detection and treatment of anaemia. Maternal education needs an emphasis because it increases the awareness of mother regarding nutrition, contraception, birth spacing and compliance to medical advice.

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