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STUDY OF SOCIO-DEMOGRAPHIC AND CLINICAL PROFILE OF PREGNANT WOMEN WITH FETOMATERNAL OUTCOME IN WOMEN WITH SEVERE ANAEMIA IN SOUTH GUJARAT-INDIA

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Abstract

Anaemia among pregnant women is a major public health problem. Anaemia is considered as a leading cause of maternal and perinatal morbidity. Anaemia contributes to 20-40% of direct and indirect maternal deaths due to its association with cardiac failure, sepsis, preeclampsia and antepartum haemorrhage.

Objective: To study the socio-demographic and obstetric profile of pregnant women of south Gujarat and documented the feto-maternal outcome.

Material and Methods: This prospective observational study was conducted at the Obstetrics and Gynaecology department of tertiary care hospital of South Gujarat in 100 women with severe anaemia in labour and pregnancy beyond 28 weeks gestation. Data related to socio-demographic factors, clinical conditions, maternal and foetal outcomes were collected from the mothers' medical records. Women with 4-7 gm Hb were classified as Severe anaemic and <4 gm Hb were classified as very severe anaemic.

Results: Current study found majority of women were 19-29 years old (73%), Illiterates (68%), housewife (85%), from lower socio-economic class (50%), with poor nutrition conditions (44%). Obstetric history found majority were multigravida (69%), Preterm (66%), LBW babies (57.8%). More than One-thirds (39%) has not taken treatment for anaemia. Further, 47 women has intrapartum, 30 women has post-partum complication, and 24 women require ICU admissions and oxygen requirements. Among 100 new-borns, 40% were preterm, 6% were still born.

Conclusion: Anaemia significantly impacts both maternal and perinatal outcomes, leading to increased morbidity and mortality. Early identification and management of mild to moderate cases of anaemia during pregnancy and labour are crucial in preventing complications.

Keywords: Severe anaemia, Pregnant, feto-maternal outcomes

1. Introduction

Pregnant women are highly susceptible to anaemia, making it a significant global health challenge. It is widely recognized as the most prevalent hematologic disorder encountered during pregnancy. Anaemia is a leading cause of maternal and perinatal morbidity. Studies indicate that its prevalence during pregnancy is 18% in developed countries and rises to 56% in developing nations(1). The World Health Organization (WHO) has reported that the global prevalence of anaemia during pregnancy is 36.5% (95%UI 34–39.1%), while among non-pregnant women prevalence was 29.6% (95%UI 26.6–32.5%) during 2019(2). In India, studies have indicated that approximately 40% to 90% of pregnant women suffer from anaemia. Notably, India accounts for approximately 80% of maternal deaths attributed to anaemia in the South Asian region(3). As per NFHS 4 data, there has been a slight decline in the prevalence of anaemia among pregnant women in India, from 58% in NFHS-3 (National Family Health Survey 2005-06) to 50% in NFHS-4 surveys (2015-16). This decrease is attributed to the improvement and strengthening of health services(4).

Anaemia contributes to 20-40% of direct and indirect maternal deaths due to its association with cardiac failure, sepsis, preeclampsia, antepartum haemorrhage, and thrombocytopenia. Furthermore, anaemic pregnant women are at increased risk of preterm delivery, low birth weight (LBW), prematurity, intrauterine growth retardation (IUGR), intrauterine death (IUD), and birth asphyxia, which elevate perinatal morbidity and mortality rates. The impact of anaemia extends beyond

health outcomes and affects the social and economic status of both states and nations. Therefore, early diagnosis and appropriate treatment are crucial to mitigate these risks and improve clinical and reproductive outcomes(3–5). During pregnancy, women require a higher intake of iron compared to when they are not pregnant. Iron deficiency anaemia is predominantly caused by inadequate iron intake and poor iron bioavailability, accounting for over 90% of cases. While the government has implemented numerous programs aimed at promoting safe motherhood, maternal anaemia persists as a significant concern. The diverse array of religions, cultures, languages, food habits, and traditions further complicates government policy on management strategies(6).

Anaemia poses a significant medical risk, particularly in obstetrics. Obstetricians often face critical situations when dealing with pregnant women in labour, especially those with severe anaemia. Many of these women are poorly educated or uneducated, belonging to low socioeconomic backgrounds and residing in areas with limited access to proper medical services. Consequently, they present in labour with severe anaemia, presenting a challenge for obstetricians to manage labour timely and achieve favourable feto-maternal outcomes. Prevention of anaemia is crucial in routine care to ensure the birth of a healthy baby from a healthy mother, contributing to the development of a healthy nation. Studying cases of severe anaemia in labour can help refine our policies for evaluating and managing such patients at our center. This study aimed to investigate the impact of severe anaemia on maternal and foetal outcomes, focusing on morbidity and mortality along with feto-maternal complications associated with severe anaemia.

2. Material and Methods

This prospective observational study was conducted at the Obstetrics and Gynaecology department of a tertiary healthcare center in South Gujarat over a one-year period, following ethical approval from the Human Research Ethics Committee (HREC). Women with severe anaemia in labour and pregnancy beyond 28 weeks gestation, who provided written informed consent, were included in the study. Those with pregnancies less than 28 weeks gestation, as well as women with mild or moderate anaemia and those, who did not consent, were excluded.

Prior to enrolment, all participants were thoroughly informed about the study, and it was emphasized that participation was voluntary, with the option to withdraw at any time. Data pertaining to socio-demographic factors, clinical profile, associated conditions, maternal and foetal outcomes were collected from the mothers' medical records using a pre-designed semi-structured proforma. Postnatal management followed department protocols, and all participants were monitored until discharge from the hospital.

Through purposive sampling, we recruited 100 women from the Obstetrics and Gynaecology department of a tertiary healthcare center in South Gujarat over a one-year period, following approval from the Ethics Committee. These women were enrolled in the study after providing written informed consent, adhering to the specified inclusion criteria.

Upon admission to the labour room, high-risk factors associated with severe anaemia, such as pregnancy-induced hypertension (PIH), eclampsia, preterm labour, intrauterine growth restriction (IUGR), and intrauterine foetal demise (IUFD), were assessed. Comprehensive investigations, including complete blood count (CBC), blood grouping, coagulation profile, liver function tests (LFTs), renal function tests (RFTs), sickle cell test, and haemoglobin (Hb) electrophoresis, were conducted for all patients. Blood transfusions were administered with consent and based on the availability of packed cell volume (PCV) and other necessary blood components. Labour progression was monitored, and intrapartum management followed established guidelines and departmental protocols. Active management of the third stage of labour was implemented to prevent postpartum haemorrhage (PPH) and minimize blood loss. Oxygen, diuretics, antibiotics, and other medications were administered as needed.

Following delivery, new-borns were assessed and managed by paediatricians, while mothers were evaluated for postpartum complications. Obstetric ICU admission was considered for ventilator support and further management if necessary. Non-complicated patients were managed according to departmental protocols. All women were monitored until discharge from the hospital.

3. Result

Socio-demographic profile

In this cross-sectional study conducted in 100 severely anaemic women within the reproductive age group. The majority of participants fell within the 19 – 29 years age bracket (73%), with 22% aged over 30 years, and 5% under 19 years old. The mean age of the participants was determined to be 24 years. Regarding socioeconomic status, the study population predominantly belonged to lower socioeconomic classes (50%) followed by lower-middle class (30%), as per the Modified Kuppuswami classification. Educationally, the majority of participants were found to be illiterate (68%), followed by those with primary education (28%), and primary occupation of most women was homemaking (85%), with 15% engaged in labour. In terms of religious affiliation, Hinduism was the most prevalent among participants (85%), followed by Muslim (11%), Christian (2%), Parsi (1%), and Sikh (1%). Dietary habits found that 54% were eating vegetarian diet and 46% consuming a mixed diet. The majority (56%) had a normal range Body Mass Index (BMI), while 23% were classified as underweight and 21% as overweight. Of the total, 36% of patients arrived as emergencies, 34% were referrals from various healthcare facilities, and the remaining 30% were initially registered at the hospital.

Table 1: Distributions of patients based on socio-demographic profiles

Socio-demographic profiles		Number of patients	Percent
Age (years)	< 19	5	5.0
	19 – 29	73	73.0
	>30	22	22.0
Booking status of Pregnancy	Registered	30	30.0
	Referred	34	34.0
	Emergency	36	36.0
Socioeconomic status (Modified Kuppuswa	Upper middle class	4	4.0
	Lower middle class	30	30.0

my classification)	Upper lower class	16	16.0
	Lower class	50	50.0
Religion	Hindu	85	85.0
	Muslims	11	11.0
	Others	4	4.0
Educations	Illiterate	68	68.0
	Primary education	28	28.0
	Graduates	4	4.0
Occupations	Housewife	85	85.0
	Labourer	15	15.0
Dietary habit	Vegetarian	54	54.0
	Mix-vegetarian	46	46.0
BMI (kg/m^2)	Underweight	23	23.0
	Normal weight	56	56.0
	Overweight	21	21.0

Obstetric and clinical profile

The most common symptoms related to anaemia were experienced by 79% of women, where majority reported weakness or lethargy (53%), followed by pedal oedema (11%), sickle cell crisis (body ache, leg pain; 9%), and breathlessness (8%). The current study identified severe anaemia (Hb 4-7 gm/dl) in 75% of cases and very severe anaemia (Hb <4 gm/dl) in 25% of cases. Among these, the majority of women were multiparous (69%), with primiparous women accounting for 31%. Among the 25 patients with very severe anaemia, 40% were between 37-40 weeks of gestational age, 28% were between 34-37 weeks, and only 4% were beyond 40 weeks of gestational age. Among the 75 patients diagnosed with severe anaemia, 42.7% were between 34-37 weeks of gestational age, while 24% were between 37-40 weeks of gestational age. In both the severe and very severe anaemia groups, the highest number of deliveries occurred during the early and late preterm phases. Out of the 69 multiparous patients, the majority (73.91%) had birth spacing intervals of less than 2 years, which is a commonly observed causative factor for the development of anaemia. The remaining 26.7% had birth spacing intervals exceeding 2 years.

Table 2: Cross-tabulations of patients based on Anaemia classifications and obstetric history

		Severe anaemia (Hb 4–7 gm/dl) No of patient (%)	Very Severe anaemia (Hb <4 gm/dl) No of patient (%)	Total No of patient (%)
Parity (n= 100)	Primipara	26 (34.7)	5 (20.0)	31 (31.0)
	2nd para	26 (34.7)	8 (32.0)	34 (34.0)
	3rd para	12 (16.0)	4 (16.0)	16 (16.0)
	> 3rd para	11 (14.7)	8 (32.0)	19 (19.0)
	Total	75 (100.0)	25 (100.0)	100 (100.0)
Gestational age (weeks) (n= 100)	28 – 34	20 (26.7)	7 (28.0)	27 (27.0)
	34 – 37	32 (42.7)	7 (28.0)	39 (39.0)
	37 – 40	18 (24.0)	10 (40.0)	28 (28.0)
	> 40	5 (6.7)	1 (4.0)	6 (6.0)
	Total	75 (100.0)	25 (100.0)	100 (100.0)

Maternal outcome

Among all, 65 patients underwent vaginal delivery, (55 had spontaneous, 9 had induced labour and 1 had instrumental), while 35 patients underwent emergency lower segment caesarean section (LSCS) and 1 patient required laparotomy due to scarred or ruptured uterus. Among the emergency LSCS cases, commonest indications were previous LSCS (33.3%), foetal distress (19.4%), meconium-stained liquor (13.9%), abnormal presentation in the latent phase of labour (8.3%), and others. Intrapartum complications observed in 47 patients, where foetal distress (26.7%), hypertensive disorder of pregnancy (24.4%), meconium-stained liquor (17.8%), pulmonary oedema (8.9%), abruptio placenta (8.9%), were commonest. Commonest postpartum complications observed in 32 patients, where commonest were Atonic PPH (21.9%), Sepsis/puerperal fever (21.9%), wound infection (18.8%), pulmonary oedema (12.5%) and others.

Table 3: Distributions of patients based on Investigation and management of pregnancy.

Investigation and management		Number of patients	Percent
Mode of Delivery	Vaginal	65	65.0
	➢ Spontaneous	55	84.6
	➢ Induction	9	13.8
	➢ Instrumental	1	1.6
	LSCS	31	31.0
	Laparotomy	4	4.0
Intra-partum complications (n =47)	Foetal distress	12	26.7
	Hypertensive disorder of pregnancy	11	24.4
	Meconium stained labour	8	17.8
	Abruptio placenta	4	8.9
	Cardiac failure with pulmonary oedema	4	8.9
	Eclampsia	2	4.4
	Placenta previa	1	2.2
	Precipitated labour	1	2.2
	Pulmonary embolism	1	2.2
Postpartum complication (n = 30)	Atonic PPH	7	21.9
	Sepsis / Puerperal fever	7	21.9
	Wound infection	6	18.8
	Cardiac failure with pulmonary oedema	4	12.5
	Traumatic PPH	3	9.4
	DIC	2	6.2
	Episiotomy site Hematoma	1	3.1
	Delayed lactation	1	3.1
	Pulmonary oedema	1	3.1

Foetal Outcome

In current study, total 100 new-borns were born, where 96 babies (94.1%) were born alive, while 6 babies (5.9%) were stillbirths. Out of the total 100 neonates, 58% were born with low birth weight and 42 % born with normal birth weight. Additionally, 28 new-borns require NICU admission, where commonest indications were Prematurity (50%), extreme prematurity with RDS (33.3%), meconium aspirations (16.7%) and others.

Table 5: Distributions of patients based on Neonatal outcomes

Neonatal outcomes		Number of patients	Percent
Neonatal maturity	Full term	58	58
	Pre term	40	40

(n = 100)	Full term (IUGR)	2	2
Foetal outcome (n = 100)	Live birth	94	94
	Still birth	6	6
NICU outcome (n = 28)	Survivor	20	71.4
	Early neonatal death	8	28.6
	Weight	Severe anaemia(n)	Very severe anaemia(n)
Birth weight of baby (n= 100)	< 1.5 kg	16	3
	1.5–2.5 kg	31	9
	2.5–3.5 kg	29	13
	> 3.5 kg	1	0
	Total	75	25

4. Discussion

Findings of present study provide valuable insights into the demographic and socioeconomic characteristics of severely anaemic women within the reproductive age group. The predominance of participants aged between 19 to 29 years underscores the vulnerability of this age group to severe anaemia. Similarly age distribution found in Bansal and Singhal(1) study. Maternal anaemia is prevalent in South Asian countries, leading to an elevated risk of adverse maternal obstetric and birth outcomes. This situation poses a challenge to achieving the targets outlined in the Sustainable Development Goals (SDG) aimed at reducing maternal and under-five deaths by 2030.

Additionally, majority of participants belonged to lower socioeconomic classes, highlighting the association between socioeconomic status and anaemia risk and with high proportion of illiteracy raises concerns about access to health education and awareness programs targeting anaemia prevention and management. The prevalence of homemakers among the participants suggests potential challenges in accessing healthcare due to economic dependence and household responsibilities. Majority of patients were also belongs to lower socioeconomic group and illiterate in Bansal and Singhal(1) study. However, study conducted by Talin et al.(7) indicated that anaemia affects approximately 50% of pregnant women in India. Furthermore, they found significant associations between anaemia and factors such as geographical location, level of education, and wealth index.

In current study, dietary habits revealed a mixed pattern, with approximately half of the participants consuming a vegetarian diet. BMI distribution highlighted a substantial proportion of underweight individuals, indicating potential nutritional deficiencies and contributing factors to anaemia. Moreover, the prevalence of overweight individuals emphasizes the complex interplay between malnutrition and obesity in anaemia epidemiology. Furthermore, prevalence of symptoms related to anaemia, such as weakness or lethargy, pedal oedema, sickle cell crisis, and breathlessness, underscores the diverse clinical presentation of the condition.

In the prospective observational study conducted by Savaliya et al.(8), it was observed that 64.3% of women belonged to a lower socio-economic status, 67.1% were illiterate, 52.9% resided in rural areas, 30% were unbooked cases, and 71% were consuming a mixed diet.

In present study, majority of women with very severe anaemia were observed to be in the late stages of gestation, particularly between 37-40 weeks, indicating potential complications in the final trimester. While demographic profile of anaemic women, particularly multiparity and short birth spacing intervals, underscores the multifactorial nature of anaemia aetiology. However, in Bansal and Singhal(1) study, more than three-fifths patients were Term pregnancy (64%) and multigravida (68%). Further, Savaliya et al(8) had concluded that multigravida women in the third trimester, with insufficient time to replenish iron and vitamin stores, may lead to significant maternal and perinatal mortality and morbidity.

Obstetric outcomes varied among patients, with the majority undergoing vaginal delivery and a smaller proportion requiring emergency LSCS or laparotomy due to obstetric complications. The administration of blood transfusions during labour highlights the critical role of timely intervention in managing severe anaemia and preventing maternal and perinatal morbidity and mortality. Commonest mode of delivery of pregnant with severe anaemia in Bansal and Singhal(1) were vaginal delivery (80%). Though in Sav Aliya et al(8) study, more than half patients (53.8%) were delivered by vaginal, while 43.6% pregnancy were delivered by LSCS.

According to various sources, most predominant cause of anaemia is iron deficiency. Oral haematinics were the most common form of treatment, administered either alone or in combination with Albendazole to address potential parasitic infections, while substantial proportion of patients required blood transfusions, highlighting the severity of anaemia and the need for immediate intervention to prevent adverse maternal and foetal outcomes. Previous study also noted that Iron deficiency anaemia remains the most prevalent cause of anaemia in pregnancy in India. The prevalence of iron deficiency in pregnant Indian women is among the highest globally(9). Similar to current study, research conducted by Kanwar et al(10) had revealed that among pregnant women, the most prevalent type of anaemia was iron deficiency anaemia (69.7%), followed by sickle cell anaemia (15.4%).

The findings of present study highlight the significant burden of intrapartum and postpartum complications among anaemic pregnant women, as well as the impact on neonatal outcomes. Intrapartum complications, such as foetal distress, hypertensive disorders of pregnancy, and meconium-stained liquor and postpartum complications such as atonic PPH, sepsis/puerperal fever, and wound infections. In Bansal and Singhal(1) study, commonest maternal complications were preterm labour (46%), preeclampsia (24%), IUGR (18%), Post-operative fever (12%) and others. Further, Beckert et al(11) noted that mothers with anaemia were more prone to diagnoses such as hypertension, diabetes, placental abruption, or chorioamnionitis, as well as a higher likelihood of requiring a blood transfusion or admission to the intensive care unit. Study conducted by Kanwar et al(10) revealed that common maternal outcomes associated with anaemia included low birth weight (25.2%), followed by premature delivery (22.96%). The most frequent complication observed in severe anaemia pregnancy in study conducted by Savaliya et al(8) were preterm labours (40%), sepsis (25.7%), postpartum haemorrhage (18.6%) and pre-eclampsia (15.7%).

Commonest indications for OB ICU admission in current study were sickle cell crisis, very severe anaemia, and pulmonary oedema with higher survival rate among OB ICU-admitted patients. Chinese study by Shi et al(12) had concluded that

severity of anaemia during pregnancy was linked to heightened risks of placental abruption, preterm birth, severe postpartum haemorrhage, and foetal malformation. In comparison to individuals without anaemia, moderate or severe anaemia demonstrated elevated risks of maternal shock, admission to the intensive care unit (ICU), maternal mortality, foetal growth restriction, and stillbirth. Study by Bone et al(13) found that notable correlation between the severity of anaemia and instances of haemorrhage (before or after childbirth) or sepsis. However, a U-shaped relationship was observed between the severity of anaemia and pregnancy-induced hypertension, including pre-eclampsia. The lowest risk was observed among individuals with mild or moderate anaemia.

In present study, neonatal outcomes were also affected by maternal anaemia, with notable proportion of LBW and stillbirths observed among new-borns and requirement for NICU admission due to prematurity, meconium aspiration, and other neonatal morbidities associated with anaemic pregnancies. Commonest neonatal complications in Bansal and Singhal(1) were prematurity (46%), LBW (28%), NICU admission (26%), birth asphyxia (10%) and perinatal death (4%). However, Beckert et al(11) found that babies born to anaemic mothers had a higher likelihood of being born preterm (8.9% versus 6.5%) but did not show an increased likelihood of experiencing morbidities associated with prematurity. Daru et al(14) conducted a multilevel analysis, which revealed that the adjusted odds ratio for maternal death in women with severe anaemia compared to those without severe anaemia was 2.36 (95%CI 1.6–3.5).

In Kanwar et al(10) study, commonest foetal outcomes among anaemic mothers were preterm birth (22.9%), Neonatal Intensive Care Unit admission (14.4%) and foetal growth restriction (8.6%). Further, 46.2% of new-borns born to severe anaemia pregnancy in Savaliya et al(8) were classified as LBW, while 41% new-borns were preterm, 51.3% new-borns requires NICU admissions and 10.3% were died intrauterine. Study conducted by Rahman et al(15) demonstrated that maternal anaemia was linked to a significantly increased risk of LBW (OR 1.9; $p<0.05$), preterm birth (OR 1.96; $p<0.05$), and perinatal mortality (OR 2.9; $p<0.05$). However, there were no significant associations observed with neonatal mortality (OR 1.8; $p>0.05$), miscarriage (OR 1.68; $p<0.05$), preeclampsia (OR 2.7; $p>0.05$), and caesarean delivery (OR 1.18; $p<0.05$). In the study by Harthi et al(16), it was found that children born to women with sickle cell disease had a 10.9% higher likelihood of being born with LBW ($p<0.05$). Additionally, factors such as haemoglobin level (ODs = 0.17, $p<0.05$), past medical history (OD = 7.9, $p<0.05$), past surgical history (ODs = 17.7, $p<0.05$), and preterm delivery (ODs = 9.5, $p<0.05$) were identified as predictors of adverse pregnancy, foetal, and neonatal outcomes among women with sickle cell disease.

5. Conclusion

Anaemia significantly impacts both maternal and perinatal outcomes, leading to increased morbidity and mortality. Emphasizing regular antenatal visits, early detection, and targeted treatment of anaemia can enhance maternal and perinatal survival rates in healthcare settings. Increased utilization of healthcare facilities by women in need, irrespective of rural or urban location, can improve obstetric and perinatal outcomes associated with maternal anaemia. Early identification and management of mild to moderate cases of anaemia during pregnancy and labour are crucial in preventing complications. These strategies collectively contribute to improving clinical and reproductive outcomes.

6. Ethical approval: This study was approved by institutional ethics committee.

7. Conflict of interest: None

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