POSTPARTUM PERIOD- A WINDOW OF OPPORTUNITY FOR ANAEMIA CORRECTION

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ABSTRACT

BACKGROUND

The aim of the study is to determine the prevalence of anaemia after delivery and highlight the need for postpartum anaemia services in India.

MATERIALS AND METHODS

Women were recruited at admission for delivery; excluded were mothers with non-iron-deficiency anaemia, haematological disease or who had preterm deliveries. Hb levels were measured at admission for delivery and 24-hours postpartum. An estimate of the number of women with Hb less than 10 g/dL that would qualify for parenteral iron therapy was made.
Design- Multicenter study.
Setting- Obstetric departments of semi-urban, rural and urban hospitals in India.
Population- Women ≥18 years old irrespective of date of admission and mode of delivery.

RESULTS

221 (67.03%) women had vaginal births, while 466 (32.96%) women had C-sections. The prevalence of severe anaemia, moderate anaemia and mild anaemia increased between the two study points from 0.43% to 1.74% (McNemar=0.021), 8.01% to 11.21% (McNemar=0.0021) and 60.12% to 69.58% (McNemar <0.001), respectively. The proportion of women who did not have anaemia decreased from 31.44% to 17.47% (McNemar <0.001). Hb levels at 24 hours postpartum were lower in 553 women (80.49%).

CONCLUSION

We showed that the prevalence of mild, moderate and severe anaemia increase after delivery. Furthermore, vaginal birth and C-section are associated with decreases in Hb. The study highlights the need to institutionalise postpartum anaemia correction services in India to reduce postpartum anaemia prevalence and improve the quality of maternal care.
Tweetable abstract- The prevalence of mild, moderate and severe anaemia increase after vaginal birth or C-section.

KEYWORDS

Postpartum Anaemia, Parenteral Iron, Haemoglobin, Institutional Delivery.

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BACKGROUND

Iron deficiency is one of the most prevalent nutritional deficiencies in the world[1] affecting an estimated two billion people.[2] Although, it disproportionately affects young children, pregnant women and postpartum women. Iron deficiency is endemic in regions where poor diets and/or infections associated with blood loss are prevalent.[3,4] Iron deficiency is the most significant contributing factor of anaemia accounting for at least half of all reported cases.[3,4]

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Among pregnant women, the global incidence of anaemia is 38% with pregnant women in South-East Asia, the Eastern Mediterranean and Africa having the highest anaemia burden.[4] In India, the prevalence of anaemia among pregnant women falls between 37-67%[5] with Iron-Deficiency Anaemia (IDA) being the most common form.[6]

Anaemia during pregnancy is defined as a haemoglobin concentration of less than 11.0 g/dL in the first and third trimesters and a haemoglobin concentration of less than 10.5 g/dL in the second trimester.[7] It is correlated with premature birth and low birth weight of the newborn.[8,9] Furthermore, it is one of the strongest predictors of postpartum anaemia,[7] which is conservatively defined as a haemoglobin concentration of less than 11 g/dL at childbirth and during the subsequent 6 weeks.[3,10] Postpartum anaemia can impair maternal functioning and health, affecting physical performance, mood, cognition and the immune response.[11-14] These symptoms may, in turn, interfere with

the mother-child interactions, negatively affecting infant development and behaviour.[13,15]

Iron supplementation with oral iron therapies has been indicated for the treatment and prevention of maternal anaemia (WHO, 2015).[16] In India, this has been achieved through initiatives such as Janani Suraksha Yojana[17] and Janani Shishu Suraksha[18] that have improved access to antenatal care including anaemia screening and treatment. These programs, however, focus on iron deficiency during the antenatal period; postpartum estimation of haemoglobin levels and postpartum iron deficiency correction are not routine practice.

In order to inform anaemia eradication programs in India that are targeted at pregnant and lactating women, the goal of this present study was to determine and compare the prevalence of mild, moderate and severe anaemia in women attending rural, urban and semi-urban hospitals in India in postpartum periods and prior to delivery. Furthermore, by comparing the changes in haemoglobin levels of women within each of the categories and determining the effect that vaginal and Lower Uterine Segment Caesarean Section (LSCS) deliveries have on haemoglobin concentration, this study hopes to draw attention to the need for correction of postpartum anaemia before women are discharged, which would result in women leaving the medical facilities with the required amount of elemental iron in their systems.

MATERIALS AND METHODS

Design

This was a multicenter study conducted with institutional review board approval over a period of 6 months from May 2016 to October 2016. 687 patients attending the obstetric departments of urban, semi-urban and rural hospitals in India took part in the study. The study participants were recruited from Divakars Specialty Hospital, Bangalore; Sunflower Medical Centre, Lucknow; Fatima Hospital, Lucknow; and Kanti Kuber Hospital, Bahraich.

Study Subjects

Women were recruited at admission for delivery at term and the details of the study were explained to each mother in English or the native language. Informed consent was obtained thereafter through a signature.

We included all pregnant women who were 18 years old or older, irrespective of whether they had been treated for IDA with oral/parenteral iron therapies or not. We excluded women who had anaemia that was the result of conditions other than iron deficiency (e.g. vitamin B12 or folate deficiency, infection, chronic bleeding or renal failure). Women with anaemia due to haemoglobinopathies or who had preterm deliveries were also excluded.

Haemoglobin concentration was estimated by collecting a blood sample via finger prick and applying it to a HemoCue (Hb analyser). For each study participant, measurements were obtained at two time points- at admission for delivery and 24-hours postpartum.

Statistics

All statistics were done using IBM SPSS (statistics version 22). The change in Hb, mean change in Hb and Standard Deviation (SD) were determined; percentages were computed for categorical values. The McNemar test was conducted to compare the prevalence of severe, mild and moderate anaemia at admission for delivery and 24 hours postpartum. $p<0.05$ was considered significant.

RESULTS

Six hundred and eighty seven women participated in the study. All women followed up and their demographics as well as baseline anaemia severity at the beginning of the study are shown in Table 1.

Baseline Characteristic	At term (n=687)
Age (y)	27.35 (±4.49)
Hg (g/dL)	10.52 (±1.38)
Hg category (g/dL, %)*	
>11.00 (Non-anaemic) 9.00-11.00 (Mild anaemia)	216 (31.44) 413 (60.12)
7.00-8.90 (Moderate anaemia)	55 (8.01)
<6.90 (Severe anaemia)	3 (0.43)

Table 1. Baseline Demographic Variables of Enrolled Participants

Values are mean (±SD) unless indicated otherwise.

Mean haemoglobin concentrations at admission for delivery and 24-hours postpartum were 10.52±1.38 g/dL and 10.15±3.93 g/dL, respectively. As shown in Table 2, the prevalence of severe anaemia increased between the two study points from 0.43% to 1.74% (McNemar=0.021), the prevalence of moderate anaemia increased from 8.01% to 11.21% (McNemar=0.0021) and the prevalence of mild anaemia increased from 60.12% to 69.58% (McNemar <0.001). Furthermore, the proportion of women who did not have anaemia decreased from 31.44% to 17.47% (McNemar <0.001).

Furthermore, between admission for delivery and 24-hours postpartum, 66.20% (143/216) of non-anaemic women became anaemic, 7.26% (30/413) of mildly anaemic women became moderately anaemic and 12.72% (7/55) of moderately anaemic women became severely anaemic (Table 3). The average drop in haemoglobin concentration for women who registered a change in anaemia category was 1.21±1.41 g/dL for non-anaemic women who became anaemic, 2.04±2.01 g/dL for mildly anaemic women who became moderately anaemic and 2.13±1.71 g/dL for moderately anaemic women who became severely anaemic (Table 3). Overall, the haemoglobin concentration at 24-hours postpartum dropped in 553 women (80.49%).

Overall, 221 (67.03%) women had a vaginal birth, while 466 (32.96%) women had LSCS. As shown in Table 3, of those women who experienced a change in anaemia category after giving birth, 119 women (67.039%) had LSCS, while 60 women (32.96%) had a normal delivery. Furthermore, the average drop in haemoglobin levels was 1.35±1.65 g/dL for women who had a vaginal delivery and 1.46±1.44 g/dL for women who had LSCS.

Hg Category (g/dL)	Admission for Delivery n (%)	24-hours Postpartum n (%)	P (McNemar Test)
>11.00	216 (31.44)	120 (17.47)	<0.001
9.00-11.00	413 (60.12)	478 (69.58)	<0.001
7.00-8.90	55 (8.01)	77 (11.21)	0.0012
<6.90	3 (0.43)	12 (1.74)	0.0201

Table 2. Prevalence of Anaemia in Study Participants at Admission for Delivery and 24-hours Postpartum

Change in Anaemia Category	n (%)	LSCS (n=119)	Vaginal Birth (n=60)	Mean Change, g/dL
Non-anaemic to anaemic	143 (66.20)	95	48	1.2±1.41
Mild anaemia to moderate/severe anaemia	29 (7.02)	20	9	2.04±2.01
Moderate anaemia to severe anaemia	7 (12.72)	4	3	2.13±1.71

Table 3. The Number of Women Who Registered a Change in Anaemia Category and the Associated Mean Change in Haemoglobin Concentration

Values are mean (±SD) unless indicated otherwise.

% represents the proportion of women whose anaemia category changed following vaginal birth or LSCS.

DISCUSSION

The goal of the current study was to compare the prevalence of severe, moderate and mild anaemia before delivery and 24-hours postpartum among women attending rural, urban and semi-urban hospitals in India. Furthermore, we were interested in investigating the effect of vaginal birth and LSCS delivery on haemoglobin levels.

We found that the prevalences of severe, moderate and mild anaemia at 24-hours postpartum were significantly higher than those before delivery. Furthermore, the proportion of women who were non-anaemic reduced in the same time period dropping from 31.44% to 17.47%. Overall, we observed an anaemia prevalence of 68.56% before delivery and one of 82.53% following delivery. These values agree with the results of other studies that have placed the prevalence of anaemia among pregnant and lactating mothers in India between 37-67%.[5-6] Our values for the prevalence of severe anaemia are lower than those reported in other studies- A prevalence of 8.3% was reported among lactating and pregnant women in the slums of Hyderabad[19] and the National Family Health Survey 2 (NFHS-2) conducted during 1998-99 found an overall prevalence of 2.5%.[20] It is plausible that the low prevalence of severe anaemia in our study are due to having a study population that included women who were taking oral/parenteral iron therapies during their pregnancies. Nevertheless, the overall increased prevalence of anaemia post delivery highlights a significant group of women (80%) who would benefit from receiving corrective iron therapy.

Anaemia has been implicated in 36% of all maternal mortality in India.[21] Furthermore, India contributes almost 80% of all maternal deaths due to anaemia in South East Asia.[22] In order to correct anaemia in the antenatal periods, deworming, diet advice and oral iron and parenteral iron are recommended.[17-18] However, these efforts are limited by the lack of follow-up among low-income women who often have to travel long distances to access public health facilities[23-24] and the challenges associated with the use of oral and parenteral iron therapies. Oral iron therapies are plagued by non-compliance,[25] while conventional parenteral iron therapies, such as iron sucrose, often require women to make multiple trips to medical facilities.[26-27]

This study highlights not only the urgent need for anaemia screening and management during the antenatal period, but also underscores a need to extend postnatal care to women by providing services that will correct conditions like postpartum anaemia. Furthermore, it indicates that women who have vaginal births should not be overlooked- we found that, regardless of mode of delivery, a drop in haemoglobin levels was observed 24-hours postpartum and it was comparable between women who had a vaginal birth and those who had an LSCS delivery. Furthermore, in 179 women, it was enough to worsen anaemia status. Given the follow-up challenges among low-income women[28] and the challenges associated with oral and first and second generation parenteral iron therapies, Ferric Carboxymaltose (FCM), an effective intravenous iron therapy that can be delivered as a single dose over a period of 15 minutes should be considered.[25,29-30] In a separate study,[31] we found that a single dose of 500 mg FCM administered 24-hours postpartum was safe and effective in treating postpartum anaemia successfully increasing overall haemoglobin levels to 12.0 g/dL in 57% of study participants within 6 weeks. The current structure of maternal services in India presents an opportunity to manage postpartum anaemia as anaemic women can be given FCM to correct anaemia while they are still in the medical facility, which will ensure that they leave the medical facility with adequate iron in their systems.

Our study is not without limitations. The study was not powered to detect significant differences between vaginal delivery and LSCS and the HemoCue that was used to determine Hb concentrations has been known to overestimate haemoglobin values;[32-34] however, since the same HemoCue was used to measure Hb levels at admission and 24-hours postpartum, any errors were minimised. Furthermore, we did not record the number of women who might have had delivery complications that might have affected the Hb levels postpartum and the inclusion of women who were receiving oral/parenteral iron therapies might have reduced the prevalence we observed.

CONCLUSION

We showed that the prevalence of mild, moderate and severe anaemia increase after delivery. Furthermore, both vaginal birth and C-section are associated with decreases in haemoglobin levels. This study highlights the need to incorporate postpartum anaemia correction services as routine parts of antenatal counseling and postnatal services in India. Institutionalisation of the correction of postpartum anaemia in India with provision of parenteral iron provides

yet another opportunity to improve the quality of maternal and child health.

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