

PROFILE OF IRON STATUS IN PREGNANCY AND ITS CORRELATION WITH INTRANATAL EVENTS AND PERINATAL OUTCOME

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ABSTRACT

BACKGROUND

Worldwide, pathologic anaemia is the most common medical disorder of pregnancy. Not merely the enormity of the problem but even the diverse aetiology of the condition makes its management a challenge. It is estimated that 1,200 million people are anaemic globally.

Aims and Objectives- The purpose was to evaluate the antenatal maternal haemoglobin at term pregnancy and find its impact on perinatal and maternal outcome.

MATERIALS AND METHODS

This is a descriptive study. 80 term pregnant women were studied from 31st May 2014 to 31st August 2015. Of these, 58 were anaemic. Intranatal, postnatal and perinatal period of both mother and baby were meticulously observed and their outcomes were analysed according to the serum iron status of the mothers. Sociodemographic and obstetric characteristics and outcomes were also analysed.

RESULTS

There is no significant association between birth weight and Hb level of mothers. There is no significant difference ($p>0.05$) between PPH and the level of haemoglobin of mothers. It is shown that there is no significant association between low birth weight, early neonatal death, low Apgar score at 1 min., low Apgar score at 5 min and IUD with maternal haemoglobin level.

CONCLUSION

The result showed there is statistically non-significant but direct relationship between IDA in pregnancy with increased risk of perinatal mortality and morbidity in terms of LBW, IUD, low APGAR score at 1 & 5 min.

KEY WORDS

Iron Status in Pregnancy, Intranatal Events, Perinatal Outcome.

HOW TO CITE THIS ARTICLE: Dutta M, Sarkar G. Profile of iron status in pregnancy and its correlation with intranatal events and perinatal outcome. J. Evolution Med. Dent. Sci. 2018;7(48):5188-5191, DOI: 10.14260/jemds/2018/1151

BACKGROUND

Worldwide, pathologic anaemia is the most common medical disorder of pregnancy.¹ Not merely the enormity of the problem but even the diverse aetiology of the condition makes its management a challenge of its own kind.² It is estimated that 1, 200 million people are anaemic globally.³ Recently WHO analysis it is shown that iron deficiency anaemia was an underlying risk factor for maternal and perinatal mortality and morbidity and was estimated to be associated with 115, 000 of the 510, 000 maternal deaths (22%) and 591, 000 of the 2, 464, 000 perinatal deaths (24%) occurring annually around the world. The prevalence of anaemia depends upon socio economic status lifestyle, parity, associated medical problems and regular antenatal care. Maternal anaemia in pregnancy is commonly considered as risk factor for poor pregnancy outcome and can threaten the life of mother and foetus.⁴

However, the extent to which the maternal haemoglobin concentration affects the foetal weight and foetal outcome is still uncertain.⁵ Some studies have shown a strong association between low haemoglobin before delivery and adverse outcome⁶ while other studies have not found a significant association.⁷ Thus our aim of our present study was to evaluate the antenatal maternal haemoglobin at term pregnancy and find its impact on perinatal and maternal outcome.

MATERIALS AND METHODS

The Descriptive study was carried out from 31st May 2014 to 31st August 2015 at Calcutta National Medical College & Hospital, Kolkata-14, West Bengal which is a tertiary care center. During this period 80 term pregnant women admitted in labour ward were recruited. Inclusion criteria was all normal term pregnancy. All complicated pregnancies like malpresentation, post caesarean section pregnancy, repeat caesarean section, BOH were taken because these complications did not affect the iron status of the mother nor the birth weight of neonate. Pregnancies with another medical disorders like. PIH, diabetes etc. which would have adverse effect on neonatal outcome were excluded from the study. After taking proper history and clinical examinations some haematological investigations were carried out. Following usual aseptic precaution 5 ml of blood was drawn and was divided as 2.5 ml clotted blood for serum ferritin and

'Financial or Other Competing Interest': None.
Submission 12-10-2018, Peer Review 07-11-2018,
Acceptance 15-11-2018, Published 26-11-2018.

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DOI: 10.14260/jemds/2018/1151



as 2.5 ml EDTA blood for the RBC indices. Initially these were kept in refrigerator at 4°C and then sent to laboratory. All intranatal events were recorded. Babies birth weight and APGAR scores at 1 min. and 5 min also recorded. All cases were followed up to the time of discharge from the hospital. All intranatal and postnatal and perinatal period of both mother and baby were meticulously observed and their outcomes were analysed according to the serum iron status of the mothers. Socio-demographic and obstetric characteristics and outcomes were also analysed. Data was analysed using software Epi Info version 3.2. Chi square (χ^2) test was used to compare the association of haemoglobin level with sampling units (hospitals) and different trimesters. p value < 0.05 was considered as statistically significant.

RESULTS

Table-1 shows that 36.25% patients belong to 20-24 years age group, 21.25% patients belong to 25-30 years age group and 42.5% patients at and below 19 years age group. So most of the patients are in teenage group. Our hospital record shows that percentage of teenage pregnancy is 17%. Our study shows 42.5%. It may be due to small sample size. Most of the cases (37.5%) are nulliparous, 17.5% cases were P₃ or more, 20% patients were primiparous and 25% women were P₂₊₀. Majority of the cases 20 (25%) were in illiterate/ just literate group. A significant percentage 18 (22.5%) patients had completed Secondary education. Seven (8.75%) patients were in below primary level, 9 (11.25%) were in primary level, 16 (20%) were within middle class, 18 (22.5%) had completed secondary education and 9 (11%) had completed higher secondary education. Only 1 (1%) patient reached above higher secondary class. Most of the patients 60 (75%) were booked in antenatal period in this hospital. Twenty (25%) patients were unbooked. Among 80 patients, 58(72.5%) were anaemic but 22 (27.5%) mothers were non-anaemic.

Age-wise distribution of the women according to their haemoglobin levels and age group (n=80) were shown in Table-2. Among the anaemic mothers, 36 (62%) had mid anaemia and 22 (37.9%) were suffered from moderate anaemia. In our study no patient was found in the severe anaemic group (Hb% = <7 g/dl). So, the column of severe anaemia is omitted. In our study 55.5% anaemic mothers had teenage pregnancy. Among the mothers (Hb: 10-10.9 g/dl), 20 (55.5%) were within teenage group. Statistical analysis of this table was found significant 9(P=.0009). During statistical analysis the age group is divided between below and above 19 years. Haemoglobin values distributed in these two age groups. Therefore, it was found that teenage mothers were more anaemic than the higher age group mothers.

The table-3 shows that among the live born babies (78) total 9 (11%) were <2 kg, 17 (21.79%) were of 2 - <2.5 kg and 52 (66.6%) were of normal birth weight. According to haemoglobin level, women with Hb $\geq$ 11 gm/dl 18 (81.8%) babies were normal birth weight, whereas women with mild and moderate anaemic group 72.2% and 36.31% babies had normal birth weight respectively. There were 2 IUD babies among the mother belonging to 7 - 9.9 gm/dl haemoglobin level. They were detected as IUD antenatally. During statistical analysis mild and moderate group of women are

clubbed together (p> 0.05). So, there is no significant association between birth weight and Hb level of mothers.

Complications of the women during and after delivery were shown in table-4 and table-5. Among the 80 women 6 (7.5%) had PPH, 8 (10%) needed blood transfusion, 10 (12.5%) had puerperal pyrexia, 3 (3.75%) had sub-involution and 53 (66.25%) had no complication. The above table shows that among the mother who developed PPH, one (16%) had Hb level $\geq$ 11 gm/dl, two women (33%) had Hb level within 10-10.9 gm/dl and three women (50%) had Hb level 7-9.9 gm/dl. There is no significant difference (p>0.05) between PPH and the level of haemoglobin of mothers.

The perinatal outcomes among anaemic and non-anaemic group of mothers were analysed in table-6. Among the anaemic mothers, 22 (39.2%) babies had low birth weight and 34 (60.7%) babies had normal birth weight. Five (8.9%) babies died in the neonatal period. Thirteen (23.2%) babies had low APGAR Score at 1 min. Four (7.14%) babies had low Apgar score at 5 min. Two (3.4%) babies had IUD. Among the non-anaemic mothers, 4 (18.1%) babies had low birth weight, 18 (81.8%) babies had normal birth weight, 1 (4.5%) baby died in the neonatal period, 4 (18.1%) babies had low Apgar score at 1 min. No baby was born with low Apgar score at 5 min. There was no IUD. It was shown that there is no significant association between low birth weight, early neonatal death, low Apgar score at 1 min., low Apgar score at 5 min and IUD with maternal haemoglobin level.

		No. of Patients	%
Age (yrs.)	$\leq$ 19	34	42.5
	20-24	29	36.25
	25-30	17	21.25
	>30	Nil	0
Parity	Nulliparous	30	37.5
	P ₁	16	20%
	P ₂	20	25%
	P ₃ or more	14	17.5
Per Capita Income (Rs./Month)	<500	24	30
	500-1500	34	42.5
	>1500	22	27.5
Literacy	Illiterate/ Just Literate	20	25%
	Below Primary	7	8.75%
	Primary	9	11.25%
	Middle Class	16	20%
	Secondary	18	22.5%
	Higher Secondary	9	11%
	>Higher Secondary	1	1%
Booking Status	Booked	60	75%
	Unbooked	20	25%
Haemoglobin Level	<11 gm/dl	58	72.5%
	$\geq$ 11 gm/dl	22	27.5%

Table 1. Demographic Characteristics (Age, Parity, Booked. Socioeconomic Status)

Age of the Patient (yrs.)	Haemoglobin Levels			Total No. of Anaemic Patients (Hb <11 g/dl)
	11 g/dl	10-10.9 g/dl	7-9.9 g/dl	
≤19	2 (9.09%)	20 (55.5%)	12 (54.5%)	32 (55.5%)
20-24	10 (45.4%)	12 (33.3%)	7 (31.8%)	19 (32%)
25-30	10 (45.4%)	4 (11.1%)	3 (12%)	7 (12%)
Total	22 (27.54%)	36 (62%)	22 (37.9%)	58 (72.5%)

Table 2. Age-Wise Distribution of the Women according to their Haemoglobin Levels and Age Group (n=80)

Chi-Square = 13.87; Df = 2; p = 0.0009.

Birth Weight (Kg)	≥11 gm	10-10.9 gm	7-9.9 gm	Total	%
<2	Nil	3 (8.3%)	6 (30%)	9	11%
2-<2.5	4 (18.1%)	7 (19.4%)	6 (30%)	17	21.79%
Normal birth weight ≥2.5	18 (81.8%)	26 (72.2%)	8 (36.3%)	52	66.6%

Table 3. Distribution of Birth Weight (Living Baby) according to Haemoglobin Status (n = 78)

Yet's corrected Chi-Square = 4.77, df = 2, p = 0.091.

Complications	No. of Patients	Percentage
PPH (>500 ml)	6	7.5%
Need for Blood Transfusion	8	10%
Puerperal Pyrexia	10	12.5%
Sub-Involution	3	3.75%
No Complication	53	66.25%

Table 4. Complications of the Women During and After Delivery (n=80)

Haemoglobin Level	PPH	
	Number	Percentage
≥11 gm/ dl	1	16
10-10.9 gm/dl	2	33.3
7-9.9 gm/dl	3	50%

Table 5. Distribution of the Haemoglobin Levels among Mothers who had PPH (n=6)

Yet's corrected Chi-Square = 1.67. d.f. = 2, p = 0.434.

Variable		Anaemic Group Hb <11 gm/dl	Non-anaemic Group Hb >11 gm/dl	Statistical test	P value
LBW Babies	Yes	22 (39.2%)	4 (18.1%)	Yet's corrected Chi-Square = 2.29	p = 0.13
	No	34 (60.7%)	18 (81.8%)		
Early Neonatal Death	Yes	5 (8.9%)	1 (4.5%)	Yet's corrected Chi-Square = 0.03	p = 0.855
	No	5 (91%)	21 (95.4%)		
Low	Yes	13 (23.2%)	4 (18.1%)	Yet's	

APGAR SCORE at 1 min	No	43 (76.7%)	18 (81.8%)	corrected Chi-Square = 0.03	p = 0.857
Low APGAR SCORE at 5 min	Yes	4 (7.14%)	Nil (0%)	Yet's corrected Chi-Square = 0.51	p = 0.4736
	No	52 (92.8%)	22 (100%)		
IUD	Yes	2 (3.4%)	Nil (0%)	Yet's corrected Chi-Square = 0.01	p = 0.9360
	No	56 (96.5%)	22 (100%)		

Table 6. Analysis of the Perinatal Outcomes among Anaemic and Non-Anaemic Group of Mothers

DISCUSSION

Anaemia is one of the most prevalent nutritional deficiency problems afflicting pregnant women.⁸ It is the indirect contributory factor for maternal morbidity and mortality in a developing country like India. The extent of which maternal anaemia affects maternal and neonatal health is still uncertain. It has long been recognized that anaemia is a major public health problem especially among poorer segment of the population in developing country such as India (World Health Organization 1992). Anaemia that complicates pregnancy threatens the life of both the mother and the foetus. The world Health Organisation defines anaemia in pregnancy as haemoglobin levels of less than 11 gm/dl.⁸ Considering the white prevalence of anaemia in developing country a cut-off value of 10 gm/dl appears to be more realistic. Considering this cut-off value 37.9% women of our study were found to be anaemic in this hospital. There is a lot of variability due to socio-economic conditions, lifestyles and health seeking behaviours across the various cultures.

In our study the maximum number of mothers 42.5% fall in the teenage group. No mother belonged to above the age group 30. It is incidentally correct but statistically not significant. This is mainly due to socio-cultural effect, lack of knowledge between people, lack of education among the women, improper history told by the patients, different catchments areas. Age at marriage was also low. The women came from different socio-cultural part of the society and their socio-economic status also differs. So the literacy status among them also differs. The sample sizes also less. Most of the patients were illiterate, and most of the patients belonged to lower income group. But that did not influence on foetomaternal outcome adversely.

We followed the WHO defined criteria in relation booking status of our women. We instructed at least 4 visits. Majority of the women (75%) in the study population were booked. Twenty five percent patients had <4 visits antenatally and some patients were referred to this tertiary care center for better management from different catchments area. Among the moderately anaemic (Hb 7-9.9 g/dl) mothers, 54.5% were within teenage group. So, haemoglobin level is greatly varied according to age of the women. So, it can be concluded that due to lack of knowledge, ignorance, poverty, lack of female education and social negligence to the female child has great-impact on iron status of teenage mother. They have poor iron reserve. So, they become anaemic easily during pregnancy.

Among the 80 mothers 2 mothers were diagnosed as having IUD antenatally. Among non-anaemic group 81.8% babies were of normal birth weight. Among mildly anaemic group 72.2% babies were of normal birth weight and among moderately anaemic group 36.3% babies were of normal weight. Though statistically there is no correlation between birth weight and maternal haemoglobin level the table-3 shows the proportion of LBW is more among the anaemic mothers. So the birth weight is not affected by Hb level. In a several studies, a 'U' shaped association was observed between maternal Hb conc. and birth weight.⁹ They showed in their study that both low and higher haemoglobin levels associated with low birth weight and prematurity. But among their study population women with anaemia gave birth to premature new born more frequently than small-for-gestational-age newborns. Logowin, TO in 1997 in his study showed that there was no difference in Hb levels of mothers who had LBW babies at term and these with normal weight at term ($P = 0.72$).¹⁰

The table-4 shows the proportion of complications arise during parturition and after delivery. Most of (66.25%) the mothers had no complication. The reason behind that, it is a tertiary care center. So we have every facility to manage an anaemic mother who is in labour by rightly using oxytocics, fluid, etc. facilities of blood transfusion are also present. So majority group are suffered from no complication. 7.5% mother had PPH and they were managed abruptly. 12.5% mother had puerperal pyrexia that may develop in association with poor unhygienic condition of the postnatal ward and cross infection. But there was no maternal death, in our study. Six mothers developed postpartum haemorrhage (Table-5). Among them 50% were moderately anaemic and 33.33% were mildly anaemic group. But the result was not statistically significant ($p=0.434$).

The perinatal outcomes among anaemic and non-anaemic group of mothers were analysed in table-6. It was observed that number of low birth weight, early neonatal death, low APGAR Score at 1 min, low APGAR Score at 5 min and IUD all were more in anaemic group of mothers. But this is not statistically significant ($p>0.05$). There were 6 early neonatal deaths among which one baby from non-anaemic group. The baby died due to septicaemia. Among the other 5 babies 2 babies were severely asphyxiated and died, and one baby had intraventricular haemorrhage, one baby had septicaemia and one baby died due to low birth weight (1.5 kg). 2 IUD babies were from moderately anaemic group of mothers. U J Bakhtiar showed an association of maternal anaemia with increased prematurity, LBW, intra uterine deaths and low Apgar scores.⁵

CONCLUSION

In conclusion, the result showed the there is statistically non-significant but direct relationship between IDA in pregnancy with increased risk of perinatal mortality and morbidity in terms of LBW, IUD, low APGAR score at 1 & 5 min.

Despite many initiatives, Iron deficiency anaemia still poses a big problem in our society. Lack of female education, gender discriminations, marriage at early age, malnutrition, multiparity etc. are the main hindrance to reduce the load of problem.

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