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Association between maternal anemia and poor pregnancy outcome in selected hospitals of Ujjain districts of the central part of India

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Abstract

Background: Anaemia is one of the most important factors influencing maternal morbidity and mortality and also the health of the newborn. It is a global health issue affecting nearly half of pregnant women. This study aimed to assess the association of maternal anemia with poor pregnancy outcomes.

Methods: It was a cross-sectional study that included 2 study centers. As per inclusion/exclusion criteria, this study included 650 post-partum mothers. Using Stratified random sampling study participants were enrolled. Data were collected and analyzed in SPSS 23. Using statistical tests i.e., Chi-square, t-test, etc data was analyzed.

Results: Anaemic mothers had a statistically significant association with low birth weight (χ^2 -9.099, p -0.003) and babies born dead (χ^2 -8.045, p -0.005). Using the student t-test, there was a significant mean birth weight difference of 114 gms of newborns among anemic and non-anemic mothers (p-0.003).

Conclusions: Improving anemic status during pregnancy can reduce the burden of poor pregnancy outcomes.

Keywords: Maternal Anaemia, poor pregnancy outcome, low birth weight, small gestational age, born dead

Introduction

Anemia is one of the most important factors influencing maternal morbidity and mortality and also the health of the newborn [1]. It is a global health issue affecting nearly half of pregnant women [2].

The prevalence of anemia during pregnancy is highest in South Asia and central and west Africa [3]. In India, acc, to NHFS 5 survey, the percentage of pregnant women having hemoglobin level below 11 g/dl were found to be 52.2% with the urban and rural percentage of 45.7% and 54.3% respectively [4]. Acc to NHFS 5 survey, in Madhya Pradesh, 52.9% of pregnant women were having hemoglobin levels below 11g/dl. Out of the total percentage, 54.9% of pregnant women from the rural parts of Madhya Pradesh were having anemia. Only 23.5% of pregnant women consumed iron and folic acid supplements for 100 or more days [4].

There are many causative factors responsible for anemia disorder in pregnant women. Some of the factors responsible for the development of anemia in pregnancy are physiologic factors and pathological factors. Pathological factors are excess blood loss, decreased hemoglobin production, genetic disorder, systemic diseases, or certain medication. (6) Maternal mortality ratio and infant mortality ratio are the key indicators of maternal and child health and development, although their ratio is declining in developing countries still it is high.

This study systematically assesses the relationship between maternal anemia with poor pregnancy outcomes in the study geographic area. The term “pregnancy outcome” included only the outcome of the fetus immediately after termination of pregnancy. The outcome of pregnancy in terms of the health status of mothers after the termination of pregnancy was not considered.

Method

This study was conducted among women who delivered in two hospitals Chandrikaben Rashmikant Gardi Hospital (CRGH) and Charak hospital (District Mother and Child Hospital), Ujjain. MP during the data collection period.

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Charak hospital is a 450 bedded hospital and about 800-900 deliveries are being conducted in a month and CRGH is 820 bedded tertiary care hospital and about 150-200 deliveries are being conducted in a month.

Study design and study population

The study was conducted using a cross-sectional design. The study population included women who delivered in these two hospitals during the data collection period. Those admitted in ICU or those not present on the bed at the time of visit or with incomplete information were excluded from the study.

Sample size and sampling technique: A sample of 629 was calculated using the sample size formula for a single proportion. A total of 650 postpartum mothers were enrolled. Stratified random sampling was used for the selection of participants from 2 centers along with simple random sampling.

Data collection: Data was collected after getting permission from the institute's ethical committee. The duration of the study was one and a half years. A pre-designed pre-tested questionnaire was used to collect data from postpartum mothers. Written consent was obtained after explaining the need and importance of the study to the participant. Most of the details were obtained by interview, however, some of the details like investigation etc were taken from mother and child protection card (MCP card)/ inpatient file.

Statistical analysis: Data were analyzed using IBM statistical package for the social sciences (SPSS) version 23 for Windows10. For Analysis descriptive statistics were calculated to summarize the sample characteristics. A Chi-square test was applied to all variables to see the association with all four poor pregnancy outcomes (born dead(stillbirth), LBW, preterm, and IUGR) and mode of delivery. Logistic regression was applied for predicting poor pregnancy outcomes. Student T-test was applied for comparing two or more groups' means. A p values of less than 0.05 was considered to be statistically significant.

Ethical consideration: Ethical approval was obtained from the institutional ethical committee of R. D. Gardi medical college, Ujjain. Confidentiality and data security were assured.

Participation was made voluntary as each participant was at liberty to opt out at any point in the study.

Result

Frequency distribution of sociodemographic factors of study participants

Mothers' age ranges from 17 years to 40 years with a Mean age was 25.38 years. Only 31.2% of post-partum mothers had education more than high school. Only 19.1% of post-partum mothers belong to the socioeconomic class above III (i.e., class I & II of modified BG Prasad). It was observed that 64% of post-partum mothers belong to below poverty line (BPL) families. About 57.3% of post-partum mothers reside in rural areas. Parity distribution of postpartum mothers was 59.8% were multipara. About 70.8% of mothers were married before 20 years of age. It was found that 63.4% of post-partum mothers live in a joint or 3 generations family about 42.5% live in Kutcha houses. It was observed that 27.5% of study participants do not have access to toilet facilities at their homes. Similarly, 27.4% of study participants do not use toilet facility, rather they

practice open field defecation as shown in table 1.

Maternal anemia associated with poor pregnancy outcomes

It was found that 42.6% of the newborns were born with weight less than 2.5 kg in mothers having anemia during pregnancy which was statistically significantly associated (χ^2 -9.099, pp-value0.003). Using multiple logistic regression, mothers with anemic during pregnancy were statistically significantly odds of having Low birth weight new-born (OR-0.609, p value-0.00395%). It was also found that a higher percentage of newborns were born dead (stillbirth) with anemia in mothers during pregnancy (χ^2 -8.045, p-value0.005). Odds of having a baby born dead in a mother's having anemia during pregnancy increased by 2 times (OR-2.905, p-value-0.006). However, no statistical association was found between anemia in mothers during pregnancy and preterm birth of newborn and intrauterine growth retardation of the newborn as shown in table 2.

Anemia and birth weight of newborn

It was found that the presence of anaemia in mothers during their pregnancy had a significant effect on the birth weight of newborns as seen in table 3, figure 1. Using the student t-test, there was a significant mean birth weight difference of newborns among anemic and non-anemic mothers (pp-value-0.003). There is a significant difference in mean birth weight of 114 gm among anemic and non-anemic mothers during their pregnancy.

Discussion

Anaemia is considered to be one of the commonest medical disorders during pregnancy. Thus, this study was performed to assess the relation of maternal anemia during pregnancy with pregnancy outcomes. The proportion of anemia among mothers during pregnancy in our study is unavoidable. This study confirms that the burden of anemia is very high: more than half of the pregnant women (53.1%) in the study population had anemia at some point during their pregnancy. Our study showed a statistically significant association between anemia in mothers during pregnancy and low birth weight newborn and stillbirth. There was no statistically significant association found between anemia during pregnancy with preterm and IUGR. In many studies, it has been found that anemia is associated with adverse pregnancy outcomes such as low birth weight, preterm, stillbirth, etc. [6-9]. Anemia, especially during the third trimester, is an important factor in determining birth weight. Rapid fetal growth occurs in the third trimester, increasing the iron and other micronutrient requirements. This pathophysiology explains the association of third trimester Hb levels with LBW and neonatal. Deaths [10, 11]. in our study, it was also found that babies born to anemic mothers had a mean birth weight difference of 114gm as compared to babies born to non-anemic mothers. A similar finding was found in a study that the mean birth weight difference between anemic and non-anemic mothers was 75 gms [12].

Limitations

This was a cross-sectional hospital-based study. Many of the data on the study variable was collected from hospital records. Due to the interference of family members during the interview details of many factors could not be obtained appropriately.

Table 1: Frequency distribution of sociodemographic factors of study participants

Factor	Category	Frequency	Percent	Factor	Category	Frequency	Percent
Mother's age group	<= 20 Years	66	10.2	Socio-economic class	Above class III	124	19.1
	21-30 years	499	76.8		Class III	147	22.6
	>30 years	85	13.1		Below class III	379	58.3
Place of Delivery	Ambulance	13	2.0	Housing	Kutcha	276	42.5
	Govt	480	73.8		Pucca	276	42.5
	Private	157	24.2		Kutcha-pucca	98	15.1
Mother's education	Illiterate	119	18.3	Father's education	Illiterate	70	10.8
	<High school	328	50.5		<high school	237	36.5
	>=High school	203	31.2		≤high school	343	52.8
Mother's occupation	Professional	10	1.5	Father's occupation	Professional	26	4.0
	Skilled	100	15.4		Skilled	309	47.5
	Semi-skilled	172	26.5		Semi-skilled	307	47.2
	Unemployed	368	56.6		Unemployed	8	1.2
Toilet facility at home	No	179	27.5	Use of Toilet During Pregnancy	No	178	27.4
	Yes	471	72.5		Yes	472	72.6
Religion	Christian	4	0.6	Caste	General	128	19.7
	Hindu	422	64.9		OBC	288	44.3
	Jain	15	2.3		SC	161	24.8
	Muslim	195	30.0		ST	65	10.0
	Sikh	14	2.2		Others	8	1.2
Married at the age of	≤20 year	460	70.8	Residence type	Rural	349	53.7
	>20 year	190	29.2		Urban	301	46.3
Marital period	≤5 year	339	52.2	No of rooms in the house	≤5	607	93.4
	6-10 year	248	38.2		6-10	35	5.4
	>10 year	63	9.7		>10	8	1.2
Cash incentive	Received	54	8.3	Poverty	BPL	416	64.0
	Not received	596	91.7		APRIL	234	36.0
Parity	Multipara	389	59.8	Type of Family	Nuclear	238	36.6
	Primipara	261	40.2		Joint+3 generation	412	63.4

Table 2: Maternal anemia associated with poor pregnancy outcomes

Anemia	Birth weight		Total	χ^2	p-value	Odd's Ratio
	< 2.5 kg	>= 2.5 kg				
yes	147	198	345	9.099	0.003	OR-0.609, p--0.003 95%CI (0.441-0.842)
	42.6%	57.4%	100.0%			
no	95	210	305			
	31.1%	68.9%	100.0%			
Total	242	408	650			
	37.2%	62.8%	100.0%			
Anemia	Gestational age		Total	χ^2	p-value	Odd's Ratio
	Appropriate gestational age	Small gestational age				
yes	255	90	345	0.485	0.486	OR-0.884, p-value- 0.486 95% CI (0.626-1.250)
	73.9%	26.1%	100.0%			
no	218	87	305			
	71.5%	28.5%	100.0%			
Total	473	177	650			
	72.8%	27.2%	100.0%			
Anemia	Pregnancy end results		Total	χ^2	p value-value	Odd's Ratio
	Born live	Born dead				
yes	317	28	345	8.045	0.005	OR-2.905 p value-0.006 95%CI (1.348-6.259)
	91.9%	8.1%	100.0%			
no	296	9	305			
	97.0%	3.0%	100.0%			
Total	613	37	650			
	94.3%	5.7%	100.0%			
Anemia	The outcome of delivery on basis of the term		Total	χ^2	p-value	Odd's Ratio
	Term	Preterm				
yes	229	116	345	0.051	0.821	OR-1.038 p value -0.821 95% CI (0.749-1.440)
	66.4%	33.6%	100.0%			
no	205	100	305			
	67.2%	32.8%	100.0%			
Total	434	216	650			
	66.8%	33.2%	100.0%			

* χ^2 - chi-square, OR -odd's ratio, CI- confidence interval

Table 3: Anaemia and birth weight of newborn

Anemia	N	Mean	Std. Deviation	t	P
yes	345	1.5739	0.49522	9.200	0.003
no	305	1.6885	0.46386		

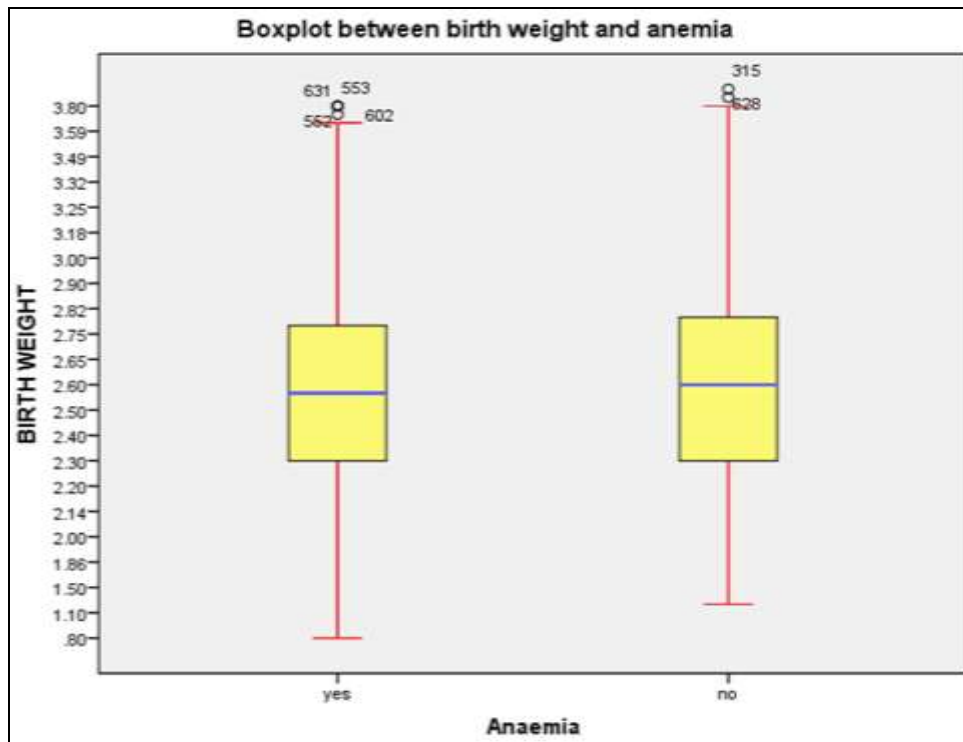


Fig 1: Box plot between birth weight and anemia

Conclusion

The study findings suggest a significant association between pregnancy outcome and anemia during pregnancy. These issues need to be resolved to reduce the burden of poor pregnancy outcomes. Improving anemic status through compliance with medication and nutrition will reduce this burden.

Recommendations

Since Anaemia is highly prevalent instead of so many government efforts. Compliance with IFA tablets needs to be assessed. Educating pregnant women and family members for availing antenatal care should be ensured. Adequate sleep and proper nutrition are to be pregnant women must be adhered to.

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