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Original Research Article

Effect of Interpregnancy Interval on Maternal Anemia in Current Pregnancy and its Obstetric Outcome

Zoya Kausar[1], Varuna Pathak[2], Padma Bhatia[3], Priti Verma[4], Syed Misbah Ali[5], Payal Tiwari[6]

[1,6]Post Graduate Student
[2]Professor
[3]Associate Professor
[4]Assistant Professor, Department of Obstetrics and Gynaecology, Sultania Zanana Hospital Gandhi Medical College, Bhopal, MP
[5]Junior Resident, Shyam Shah Medical College, Rewa, MP

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Corresponding author: Dr Priti Verma
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Abstract

Background: The interpregnancy interval is defined as the period between the date of the previous delivery and the first day of last menstrual period for the index pregnancy. The IPI is considered to be an important determinant of adverse pregnancy outcome.

Aims and Objectives: To determine the effect of short interpregnancy interval on maternal hemoglobin levels in current pregnancy and on its obstetric outcome.

Material and Methods: The study design was prospective cohort study which was conducted at Obstetrics and Gynaecology Department, Sultania Zanana Hospital GMC Bhopal, MP between January 2020 to December 2020. 400 (A sample size of 384 which was rounded to 400 was calculated at 50% prevalence as per NFHS 4)Anemic pregnant women were selected by systemic random sampling. Primigravidae and multiple births were excluded from the study.

Result: Out of 400 study participants in 359 patients with IPI of ≤2 244 (68%) had moderate anemia (Hb-7.1-9) whereas 115(32%) patients had severe anemia (hb ≤7). In Remaining 41 patients with IPI >2 14(34%) had severe anemia and 27 (66%) had moderate anemia. In 271 moderately anemic 193(71%) delivered vaginally and 78(29%) delivered by cesaerian section. all neonates of moderately anemic mother (100%) had apgar score >8. In severely anemic patients 95(74%) delivered vaginally and 34(26%) had cesaerian delivery. Of the 129 severely anemic deliveries there were 31(24%) NICU admissions , 4(3.1%) still birth and 22(17%) LBW newborns which was statistically significant (p<.05)

Conclusion: Anemia is a major public health problem in the study area.The study findings highlights the urgency of nutritional and family planning counselling to combat with IFA deficiency anemia. Thus helps to correlate an important risk factor i.e. interpregnancy interval with maternal anemia and its effect on fetal outcome.

Keywords: Low Birth Weight (LBW), Inter Pregnancy Interval (IPI), World Health Organization (WHO)

Introduction

Anemia is a medical disorder in which there is decrease in number and size of red blood cells or in the concentration of hemoglobin, below the critical cut off values. The interpregnancy interval is defined as the period between the date of the previous delivery and the first day of last menstrual period for the index pregnancy. The IPI is one of the most important and determinant of adverse pregnancy outcome [1]. Poorly timed pregnancies increase health risks for both mother and infant while optimal interpregnancy interval (IPI) is an important determinant of maternal health and pregnancy outcomes. The effect of interpregnancy interval on maternal morbidity and mortality has received less attention.

Pregnancies which short interpregnancy interval lacks sufficient time to get back to the normal pre-pregnancy metabolic state before the next pregnancy may not allow physiological recovery for the healing of the reproductive tract or for hormonal changes [2]. studies also found that the risk of maternal obesity increases with each IPI of less than 12 months. [3]

Short IPI of less than 18 months are found to be associated with adverse fetal and neonatal outcomes such as low birth weight (LBW), preterm birth, small in size for gestational age, stillbirth, and newborn or infant mortality. Also adverse maternal outcomes have been associated with short IPIs as maternal mortality, miscarriage, and induced abortion. [4,5] A number of systematic reviews have evaluated the evidence for a causal linkage between short IPI and maternal and child health outcomes (e.g. Conde-Agudelo 2006 [6] and 2007 [7] , Hogue 2011 [8], Dewey 2007 [9]). Many have concluded that short intervals, variously defined, may increase preterm birth risk and other child health outcomes. [9,6,8]

Materials and Methods

The study participants were pregnant women in third trimester who were admitted at Sultania Zanana hospital, Bhopal from July 2020 to June 2021. Gestational age was assessed from date of the last menstrual period having haemoglobin level <9gm/dl ie those belonging in categories of moderate and severe anemia. According to **WHO**, during pregnancy, anemia is identified by hemoglobin levels less than 11.0g/dL and may be divided into three levels of severity: Mild anemia (Hb levels 9 to 10.9g/dL), moderate anemia (Hb levels 7 to 8.9g/dL), and severe anemia (Hb levels less than 7g/dL). [10]

Inclusion Criteria:-

- All pregnant women in third trimester having haemoglobin level <9gm/dl ie those belonging in categories of moderate and severe anemia admitted in parent institute , Sultania Zanana hospital , GMC Bhopal.
- Antenatal mothers who consented to participate in the study and were able to respond.
- Participants who can understand and communicate in Hindi or English

Exclusion Criteria:-

- admitted cases of mild anemia (Since services of Sultania Zanana hospital are utilized by population belonging to Low or low middle socioeconomic status so most antenatal are anemic.)
- Cases who were subjected to blood transfusion in last three months and/or had history of some diseases that may affect the pregnancy outcome such as liver diseases, renal diseases etc were excluded.

Ethical Consideration: The study was approved by the Institutional ethical committee of Gandhi Medical College. A

written consent was obtained from the participants after they had been informed with the objectives, benefit and expected outcome of the study. The participants were assured that the collected information will be kept confidential and will not be used for any other purpose than this study.

Observation Chart

Table 1: Comparing inter pregnancy interval (ipi) of study participants‟ with hemoglobin level

IPI (Inter Pregnancy Interval) In Years	Hemoglobin (gm/dl)				Total	P value
	≤7		7.1-9			
	N	%	N	%		
Less than 1	52	40.3	93	34.31	145	0.01 1
1 to <1.5	44	34.10	106	39.11	150	
1.5 to < 2	19	14.7	45	16.60	64	
2 to < 2.5	6	4.6	19	7.01	25	
2.5 or above	8	6.20	8	2.95	16	
Grand Total	129	100.0 0	271	100.0 0	400	

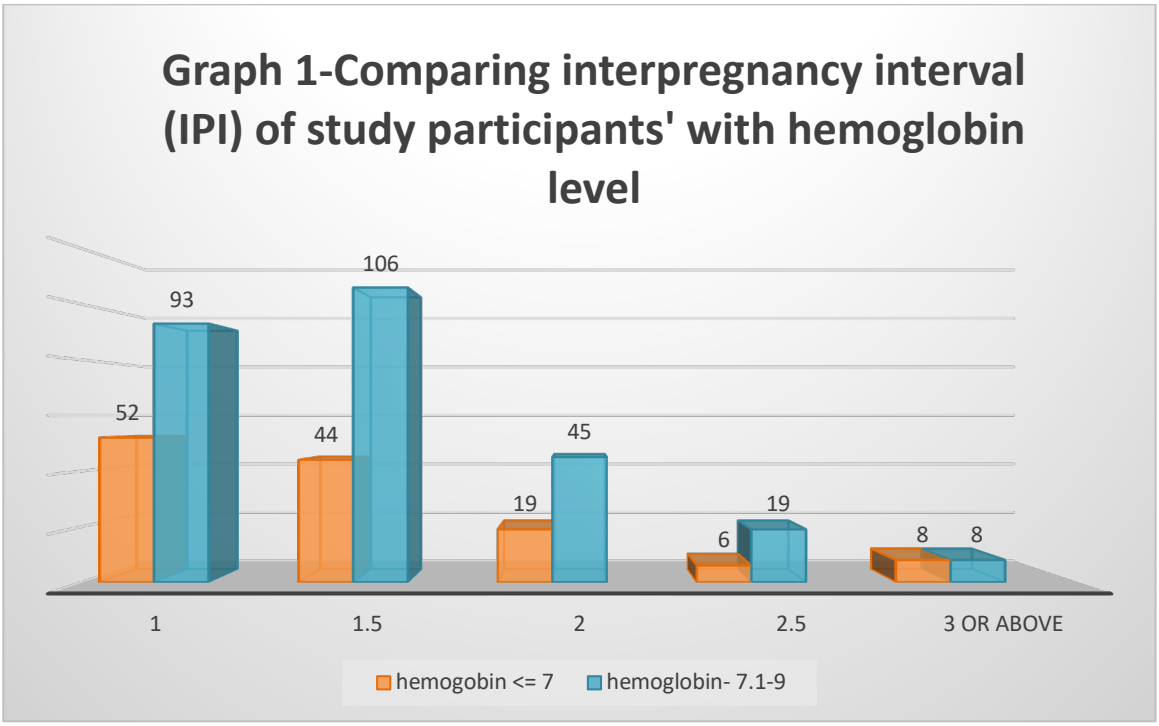


Table 2: Comparing inter pregnancy interval with hemoglobin level

IPI	Hemoglobin (gm/dl)				Total	P value
	≤7		7.1-9			
	N	%	N	%		
≤2	115	89.01	244	87.23	359	0.011
>2	14	10.99	27	12.77	41	

Out of 245 patients with IPI of ≤2 66.9% had moderate anemia whereas 81 patients had severe anemia, Out of 34 patients who had IPI of >2, 10.99% patients had severe anemia .

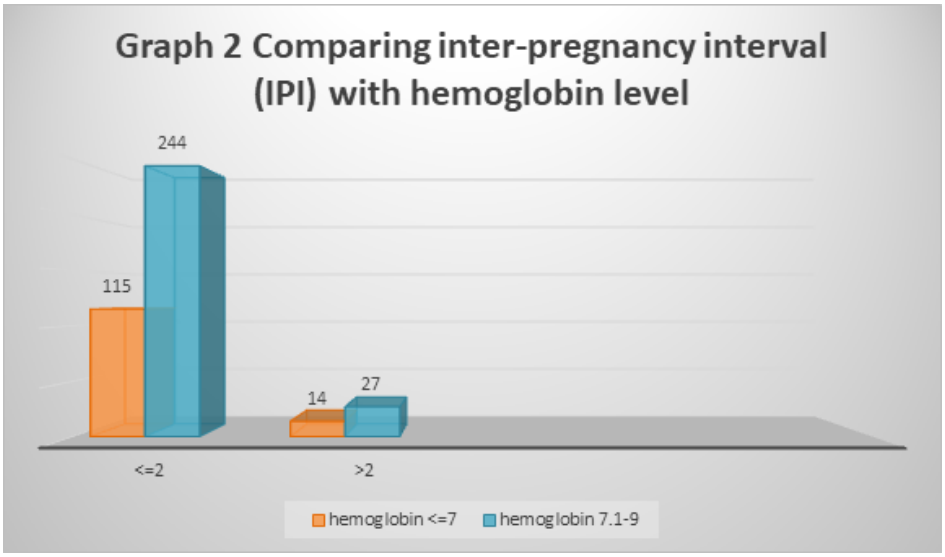


Table 3: Comparing mode of delivery with hemoglobin level

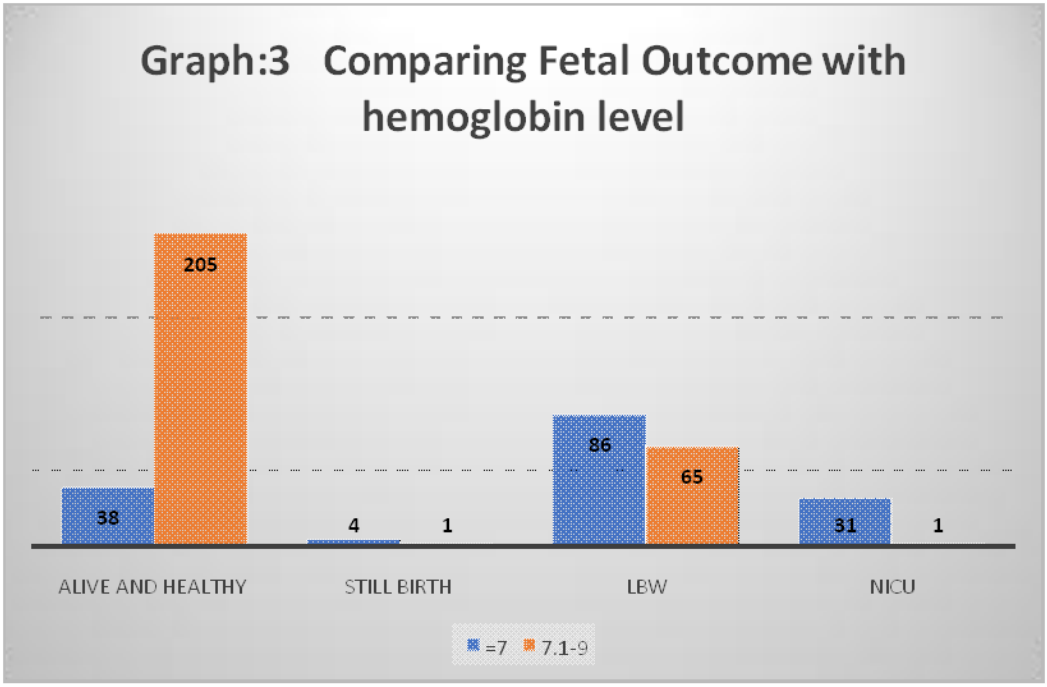
MOD	Hemoglobin (gm/dl)				Total	P value
	≤7		7.1-9			
	N	%	N	%		
Assisted Breech	2	1.55	4	1.48	6	0.103
LSCS	34	26.36	78	28.78	112	
NVD	92	71.32	187	69.00	279	
VBAC	1	0.78	2	0.74	3	
Grand Total	129	100.00	271	100.00	400	

NVD- normal vaginal delivery LSCS- lower segment cesaerian section VBAC- vaginal Birth After Cesaerian. We compared the mode of delivery with Hb level. Majority of the patients were having Normal Vaginal delivery (69.75%) followed by LSCS (28%). In severe anemia group 26.36% patients underwent LSCS.

Table 4: Comparing fetal outcome with hemoglobin level

Fetal Outcome	Hemoglobin (gm/dl)				Total	P value
	≤7		7.1-9			
	N	%	N	%		
Alive and healthy	39	30.2	205	75.65	244	0.001
Still birth	4	3.10	1	0.37	5	
IUGR	17	13.1%	2	0.7%	19	
LBW	86	66.67	65	23.99	151	
NICU	31	24.03	1	0.37	32	

LBW- low Birth Weight NICU- Neonatal Intensive care Unit
Total no of newborns= alive and healthy + still birth + LBW
Alive and Healthy- newborns of weight ≥ 2.5kg having APGAR score >6 at 1min and 5min.



Results

In the present study, In moderately anemic group, 73.43% patients were having IPI <1.5yrs, while in severely anemic group 74.44% patients were having IPI <1.5yrs. Out of 400 only (41) 10.25% had IPI ≥2.5yrs . This difference was statistically significant as revealed by p value of 0.011. In this study, on comparing fetal outcome with Hb level, it was found that in severely anemic patients , 24.03% newborns required NICU immediately after birth whereas 66.67% were born with LBW and 4 (3.1%) were still born.

Majority of the severely anemic patients were having IPI of<1.5 years 78.2% (n=71). In severely anemic group cesearian section rate was high. (26.36% severely anemic pregnant women underwent LSCS in this study) In present study out of 129 cases, 4 neonatal mortality was reported in patients with severe anemia and adverse foetal outcome in the form of preterm (53.49%), IUGR (13.1%), NICU admissions (24.03%)

Whereas NICU admissions were less (n=1) in moderately anemic group, and also had significantly lower LBW cases (23.99%) compared to those with having severe anemia. In moderate anemia group, 75.65% newborns were alive and healthy while in severe anemia group only 29.46% were born alive and healthy. The comparison was highly significant with p value of 0.001.

Statistical Analysis:

The data obtained was subjected to statistical analysis with the consult of a statistician. The data so obtained was compiled systematically. A master table was prepared and the total data was subdivided and distributed meaningfully and presented as individual tables along with graphs using MS EXCEL Statistical procedures were carried out in 2 steps:

1 Data compilation and presentation

2 Statistical analysis

Statistical analysis was done using free version of EPI- Info by WHO. Data comparison was done by applying specific statistical tests to find out the statistical significance of the comparisons. Quantitative variables were compared using mean values and qualitative variables using proportions Significance level was fixed at P< 0.05.

Discussion

Mean spacing between births has an impact on the hemoglobin status of women. In present study, majority (73.75%) of the women had IPI of 1.5 years or lower (n=295 out of 400), only 105 women had IPI more than 1.5 years. Those with severe anemia majority had IPI<2 yrs(89.14%). In line with this a previous study by Upadhyay et al. [11] reported spacing between pregnancy of <2 years was 61.2% and >2 years in 38.8%. It was comparable with Khandait DW et al [12], 55.9% and 44.1% in <2 years and >2 years respectively. Severity of anemia is positively associated with <2 years of spacing between two pregnancies with p=0.370 [12] which is in line with present study findings where majority of the patients with severe anemia had IPI ≤2 (81 out of 129).

In the present study, on comparing IPI distribution with Hb level, it was found that majority (37.5%) of the patients were having IPI of 1.5yrs (150) followed by 1 year (145). In moderate anemia group, 199 patients were having IPI of 1.5yrs or less than that (73.43%), while in severe anemia group 96 patients were having IPI of 1.5yrs or less than that (74.4%) out of total of each group. This difference was statistically significant as revealed by p value of 0.011.Positive effects of increasing birth intervals on health outcomes of children and their mothers have been noticed in several studies. [13,14] Rutstein et.al. suggest that the optimal birth interval lies between 36–60 months. [14] On comparing mode of delivery with Hb level it was found 28% patients in the study underwent LSCS suggesting increase rate of LSCS.

In line with present study findings, Stephen G at al [15] study reported that there was low occurrence of negative pregnancy outcomes such as LBW (3.6%), preterm births (0.5%), and stillbirth (2.3%). The occurrence of negative birth outcomes was low compared to national prevalence of 13% for LBW and 12.7% for preterm birth. [16] This may be due to lower sample size and crosssectional nature of present study.

In present study out of 129 cases, 4 neonatal mortality was reported in patients with severe anemia and adverse foetal outcome in the form of IUGR (13.1%), NICU admissions (24.03%) immediately after birth and stillborn (3.10%), LBW (66.67%) were observed.

High incidence of adverse foetal outcome in the form of preterm (20%), IUGR (28%), NICU admission (25.5%) and IUD (3%) seen in Upadhyay et al study. [11] These were comparable with the observation of Awasthi A et al [17] PT (9.5%), IUGR (37.5%) and IUD (8%) and also comparable with Rangnekar et al[29] PT (73%), IUGR (4%) and IUD (16%). In the Upadhyay et al [11] study, incidence of preterm deliveries in unbooked cases (27.1%) and referred cases (40%) were high compared with booked cases (9.4%). High incidence of IUGR was seen in unbooked (37.3%) and referred (48.6%) cases compared with booked cases (16%). As anemia predisposes to birth asphyxia due to placental insufficiency, need for NICU admission were more. Among those unbooked (33.9%) and referred (37.1%) required more NICU admission compared to booked (17%) cases due to severe anemia. IUD was seen more in referred (11.4%) cases with severe anemia and associated risk factors were severe

preeclampsia, GDM and PROM. These all outcome were statistically significant. Incidence of low birth weight babies in the present study was 37.5% which was comparable with 66% observed by Rangnekar et al [18] and 69.1% by Khalida H et al [19].

One of the recent studies done in Muscat by Angelitta J [20] and all suggests that maternal age, parity and late prenatal visit were independently associated with maternal anemia, low birth weight and preterm birth. In 2010 one study done in India through a retrospective approach, 4,456 women's hospital record were reviewed and the result shows that 17.9% (798) of them were anemic, out of this 2.15% (96) of them were found to be severely anemic and six out of 96 women died due to severe anemia.

In this study, on comparing fetal outcome with Hb level, it was found that out of 129 patients with Hb ≤7g/dl, 31 went for NICU admission whereas 86 were delivered with LBW and 4 were still birth. Whereas NICU admission were less (n=1) with those having Hb 7.1-9g/dl, but had significantly lower LBW cases compared to those with Hb ≤7g/dl. In moderate anemia group, 205 newborns were alive and healthy while in severe anemia group 38 were born alive and healthy. The comparison was highly significant with p value of 0.001. Gonzales et al [21] noted that the risk of stillbirths at LA increased when Hb was below 11 g/dl, whereas the risks of preterms and SGA increased when Hb was below 9 g/dl. No cases with Hb >14.5 g/dl were observed for stillbirths and no cases with Hb >15.5 g/dl were observed for preterms and SGA at LA. Virtually no women at LA had very high hemoglobin levels. [21,22,23]

Conclusion

Anemia is a major public health problem in the study area. The study findings highlights the urgency of nutritional and family planning counselling to combat with IFA deficiency anemia. Thus helps to correlate an important risk factor i.e. interpregnancy interval with maternal anemia and its effect on fetal outcome.

Declarations: Funding: None

Availability of data and material: Department of Obstetrics and Gynaecology, Sultania Zanana Hospital, Gandhi Medical College Bhopal

Code availability: Not applicable

Consent to participate: Consent taken

Ethical Consideration: There are no ethical conflicts related to this study.

Consent for publication: Consent taken

Contribution by Different Authors

First author Dr Zoya Kausar Post graduate student in Department of Obstetrics and Gynaecology, Sultania Zanana Hospital, Gandhi Medical College Bhopal MP Data collection and statistical analysis

Second author Dr Varuna Pathak Professor in Department of Obstetrics and Gynaecology, Sultania Zanana Hospital, Gandhi Medical College Bhopal MP Concept and Guidance

Third author: Dr Padma Bhatia Department of Obstetrics and Gynaecology, Sultania Zanana Hospital, Gandhi Medical College Bhopal Data collection and statistical analysis

Fourth and Corresponding Author Dr. Priti Verma Assistant Professor in Department of Obstetrics and Gynaecology, Sultania Zanana Hospital, Gandhi Medical College Bhopal MP 462001 Concept and Guidance

Fifth author Dr Syed Misbah Ali. Junior Resident in Shyam Shah Medical College Rewa.MP References and Discussion

Sixth author Dr Payal Tiwari Post graduate student in Department of Obstetrics and Gynaecology, Sultania

Zanana Hospital, Gandhi Medical College Bhopal MP Data collection and statistical analysis

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