

## Study of Correlation of Maternal and Perinatal Outcome with Interpregnancy Interval at a Tertiary Care Centre

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### Abstract:

**Background:** Interpregnancy interval (IPI) or birth to pregnancy interval is defined as time interval between live birth and beginning of following pregnancy. Interpregnancy interval has been shown to be an important prognostic marker for perinatal outcome. According to WHO at least 24 months of interpregnancy interval is optimal. This study was planned to correlate maternal and perinatal outcome with interpregnancy interval at SKMCH, Muzaffarpur, Bihar.

**Methods:** This cross sectional observational study was conducted in department of obstetrics and gynecology, SKMCH, Muzaffarpur, Bihar. All pregnant women beyond period of viability, delivering at our centre, irrespective of live or stillborn were included in the study. Maternal and perinatal outcome of all the patients was observed.

**Results:** 212 women were assessed in terms of interpregnancy interval and its correlation with maternal and perinatal outcome. Of these 212 women interval less than or equal to 24 months, 125 had interpregnancy interval >24 months. Proper antenatal registration (4 visits at least) was more in IPI more than 24 months group. Severe anemia and non-severe preeclampsia was found to be more in group with IPI ≤24 months than group IPI > 24 months. Perinatal outcome was found to be far better in group IPI > 24 months as compared to group with IPI ≤24 months in terms of perinatal mortality, preterm births, low birth weight and admission to neonatal unit /neonatal ICU.

**Conclusion:** Our study concludes that there is a significant impact of interpregnancy interval on maternal and perinatal outcome which also signifies the importance of spacing and contraception. However this study being a small pilot study, further larger studies are required on this topic in future to consolidate the results.

**Keywords:** Pregnancy interval, maternal outcome, perinatal outcome.

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### Introduction

Interpregnancy interval (IPI) or birth to pregnancy interval is defined as time interval between live birth and beginning of following pregnancy. Interpregnancy interval has been shown to be an important prognostic marker for maternal and perinatal outcome. Mechanisms proposed for these outcomes include maternal folate deficiency, postpartum nutritional status and postpartum hormonal imbalance [1-3].

According to World Health Organization (WHO) women should wait for a minimum of 24 months between live birth and conception of the next child. This optimized interval will reduce adverse maternal and perinatal outcomes 4. However, WHO recommendation is based on outcomes of low resource countries. However breast feeding, nutrition, age at first birth, parity differ in low

resource countries and United States. American College of Obstetricians and Gynaecologists recommend that women should be advised not to plan pregnancy with interpregnancy interval of less than 6 months [4]. Bell et al did a retrospective cohort study on Australian women to evaluate relationship between IPI and adverse birth outcomes. In this study they matched two intervals per woman so that each woman became her own control. With this model they didn't find any causal effect of short IPI on adverse birth outcomes [5].

A systemic review which included 67 observational studies (11091659 pregnancies) and a meta-analysis of 26 cohort and cross sectional studies have shown the relationship was J shape, i.e. both short and long interpregnancy intervals associated

with preterm birth, low birth weight, small for gestation age, fetal death and early neonatal death [6]. However in very few cases in our country we observe long interpregnancy interval.

### Materials and Methods

This cross sectional observational study was conducted in department of obstetrics and gynecology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar from June 2021 to May 2023. All pregnant women beyond period of viability i.e. 20 weeks, delivering at our centre, irrespective of live or stillborn were included in the study. Maternal and perinatal outcome of all the patients was observed.

Statistical analysis was done using SPSS 20.0 software version and Microsoft Excel - 2007 software. Chi square test was used to assess the associates among different categorical variables. Odds ratio and 95% confidence intervals were calculated. A p value less than 0.05 was considered as statistically significant.

### Results

Total 455 patients were evaluated. Out of these 455 women, 178 women were primigravida. 4 multiple pregnancies were also excluded. 273 women were multigravida, singleton pregnancies. Out of these 273 women, in 51 women last pregnancy ended up in miscarriage. So 212 multigravida singleton pregnant women, whose previous pregnancy was viable, delivered at our centre. These 212 women were assessed in terms of interpregnancy interval and its correlation with maternal and perinatal outcome. Of 273 multigravida singleton women, 51 women had previous miscarriage, 212 women had

last viable pregnancy. Of these 212 women 87 women had interpregnancy interval less than or equal to 24 months, 125 had interpregnancy interval >24 months.

When demographic parameters were evaluated it was found that most women in both the groups (79.3% and 78.4% respectively in  $\leq 24$  months and  $> 24$  months) were of age groups 20-34 years. However both the groups were comparable in terms of age (table 1). Most women in both the groups were illiterate or education less than 12th standard (86.2% in  $\leq 24$  months group and 86.4% in  $> 24$  months group). Both the groups were found to be comparable in terms of education (table 1). 62% women in  $\leq 24$  months IPI group had parity of 2 as compared to 52% in group  $> 24$  months IPI. However statistically both groups were found to be comparable in terms of parity. Percentage of women attending ANC clinics ( $\geq 4$  visits) was more in the group IPI  $> 24$  months as compared to group of IPI  $\leq 24$  months. The difference was statistically significant. Both the groups were found to be comparable in terms of area of residence and socioeconomic status however rural population was more than urban in both the groups (table 1). While comparing both groups in terms of employment, percentage of housewives was more than working women in both the groups, however percentage of working women was more in group  $> 24$  months IPI as compared to group  $\leq 24$  months (22.4% vs 10.34%) and this difference was statistically significant also. While comparing the BMI of both the groups, overweight women were more in group  $> 24$  months IPI as compared to group  $\leq 24$  months IPI.

**Table 1: Demographic characteristics of study women**

Variables	$\leq 24$ months (n=87)	$> 24$ months (n=125)	OR	95%CI	Chi-square	p-value
Age (years)						
• $\leq 19$	7(8.04%)	8(6.4%)	Ref.		0.439	0.803
• 20-34	69(79.3%)	98(78.4%)	0.805	0.279-2.323		
• $\geq 35$	11(12.64%)	19(15.2%)	0.662	0.188-2.323		
Education						
• $< 12^{\text{th}}$	75(86.2%)	108(86.4%)	Ref.		0.016	0.968
• $\geq 12^{\text{th}}$	12(13.79%)	17(13.6%)	1.017	0.459-2.252		
Parity						
• 1	12(13.79%)	23(8.4%)	Ref.		1.85	0.396
• 2	54(62.06%)	66(52.8%)	1.568	0.715-3.439		
• $\geq 3$	21(24.13%)	36(28.8%)	1.118	0.463-2.699		
No. of ANC visit						
• $< 4$	66(75.86%)	78(62.4%)	Ref.		4.27	0.039
• $\geq 4$	21(24.13%)	47(37.6%)	0.528	0.287-0.972		
Area of residence						
• Rural	62(71.26%)	77(61.6%)	Ref.		2.12	0.145
• Urban	25(28.73%)	48(38.4%)	0.647	0.359-1.164		
Employment						
• Housewife	78(89.65%)	97(77.6%)	Ref.		5.17	0.023
• Working outside	9(10.34%)	28(22.4%)	0.400	0.178-0.897		

Distribution of women according to BMI						
• Underweight (<18.5)	25(28.73%)	30(24%)	1.061	0.527-2.135	6.56	0.087
• Normal (18.5-24.9)	33(37.93%)	42(33.6%)	Ref.			
• Overweight (25-29.9)	17(19.54%)	47(37.6%)	0.463	0.225-0.944		
• Obese ( $\geq 30$ )	2(2.29%)	6(4.8%)	0.424	0.080-2.240		
Socioeconomic status (according to Kuppuswamy classification)						
• Upper	-	-				
• Upper middle	5	8				
• Lower middle	9	13				
• Upper lower	41	65				
• Lower	31	39				

Both groups were compared in terms of maternal complications like maternal mortality, severe anemia, no severe preeclampsia, severe preeclampsia and eclampsia, antepartum haemorrhage, fetal growth restriction, preterm labor and mode of delivery. Incidence of non-severe preeclampsia was significantly more in group with IPI  $\leq 24$  months than group IPI  $> 24$  months (19.54% vs 6.4%) (Table 2). It was found that maternal mortality was more in group  $\leq 24$  months IPI than group  $> 24$  months IPI (8% vs 3.2%).

**Table 2: Associated maternal complications in study women**

Variables	$\leq 24$ months (n=87)	$> 24$ months (n=125)	OR	95%CI	Chi-square	p-value
Maternal mortality	7(8%)	4(3.2%)	2.645	0.750-9.336	2.45	0.118
Severe anemia	18(20.7%)	9(7.2%)	3.362	1.432-7.897	8.40	0.004
Non severe preeclampsia	17(19.54%)	8(6.4%)	3.552	1.457-8.658	8.52	0.004
Severe preeclampsia	7(8%)	5(4%)	2.100	0.644-6.848	1.57	0.210
Eclampsia	4(4.6%)	3(2.4%)	1.960	0.428-8.985	0.776	0.378
Antepartum haemorrhage	8(9.19%)	11(8.8%)				
Fetal growth retardation	8(9.19%)	5(4%)				
Preterm labor	21(24.13%)	13(10.4%)	2.741	1.288-5.836	7.19	0.007
Caesarean delivery	48(55.17%)	73(58.4%)				

Severely anemic women were found to be more in group with IPI  $\leq 24$  months than group IPI  $> 24$  months. (20.7% vs 7.2%) and this difference was found to be statistically significant.

Incidence of severe preeclampsia and eclampsia was found to be more in with IPI  $\leq 24$  months than group IPI  $> 24$  months. Perinatal outcome was found

to be far better in group IPI  $> 24$  months as compared to group with IPI  $\leq 24$  months in terms of perinatal mortality, preterm births, low birth weight and admission to neonatal unit / neonatal ICU.

The difference was statistically significant in all neonatal parameters except perinatal mortality (table 3).

**Table 3: Perinatal outcome of study women**

Outcomes	$\leq 24$ months (n=87)	$> 24$ months (n=125)	OR	95% CI	Chi-square	'p'
Perinatal mortality	11(12.64%)	8(6.4%)	2.117	0.814-5.503	2.45	0.117
Congenital malformation incompatible with life	1(1.14%)	1(0.8%)				
Preterm births	21(24.13%)	13(10.4%)	2.741	1.288-5.836	7.19	0.007
Low birth weight	29(33.33%)	18(14.4%)	2.972	1.522-5.805	10.7	0.001
NNU/NICU admissions	20(23%)	14(11.2%)	2.367	1.121-5.000	5.29	0.021

## Discussion

WHO recommends that interval between a woman's previous live delivery and subsequent conception (IPI) should be a minimum of 2 years. WHO has organized an expert consultation in 2005

and made an inventory of available research on birth spacing. WHO has recommended an IPI of at least 6 months after miscarriage before attempting a new pregnancy in order to reduce maternal and perinatal, mortality and morbidity [7]. According to ACOG women should be counselled well regarding

risks and benefits of repeat pregnancy sooner than 18 months. Various studies from United States shown that risk of adverse outcome more in interpregnancy interval less than 18 months, risk is more significant when interpregnancy interval is less than 6 months [8].

We planned to compare maternal and perinatal outcome in interpregnancy interval taking the cutoff of 24 months keeping in mind poor nutritional status of Indian women.

Our study clearly defines the correlation of various maternal and perinatal complications with interpregnancy interval. We tried to study these correlation to find the answer whether maternal and perinatal complications be reduced if population is more aware about spacing the pregnancies.

However it is said that both short (less than 18 months) and long (>59 months) interpregnancy interval are associated with increased risk of preterm birth, low birth weight, small for gestational age and perinatal death 4. In our study the shortest IPI was 5 months and longest IPI was 48 months. So we correlated different comorbidities with short IPI only as none of case qualifies the criteria of long IPI.

According to our study, women with interpregnancy interval more than 24 months had significantly higher antenatal visits than women with interpregnancy interval less than 24 months. This shows the women who had insight for adequate birth spacing, have similarly more awareness about proper antenatal care. However appropriate antenatal care also confers better maternal and perinatal outcome. Also percentage of working women were significantly were more in IPI more than 24 month group. This means that working women appear to have more knowledge and awareness about benefit of spacing the childbirths.

In our study we found that women with severe anaemia and non-severe preeclampsia were found more in the group of IPI less than 24 months and the difference was statistically highly significant ( $p < 0.004$  for both). However it is said that risk of preeclampsia more with more interpregnancy interval. Also, in a meta-analysis of retrospective cohort studies to evaluate the association of interpregnancy interval with risk of recurrent preeclampsia and eclampsia it was found that longer interpregnancy interval appear to increase the risk of preeclampsia [9].

Our study states that perinatal outcome overall was found to be worse in short IPI (<24 months) as compared to IPI more than 24 months. Our study is supported by another study by Mahande et al which states that both short and long IPIs were associated with higher risks of preterm birth, and low birth

weight. It was found that infants born 24–36 months after the previous birth had the lowest risk of preterm birth, low birth and perinatal death as compared to those who were born after shorter or longer IPIs. Also, short IPI was associated with an increased risk of perinatal death [10].

Similarly a retrospective cohort study was done by Hanley et al [11]. They studied the correlation between interpregnancy interval and maternal neonatal outcome. They found risk of preterm birth, gestational diabetes and obesity found to be more with short interpregnancy interval.

None of our enrolled women had long interpregnancy interval i.e. more than 59 months. So effect of long interpregnancy interval on maternal and perinatal outcome could not be evaluated in our study.

### Conclusion

Our study concludes that there is a significant impact of interpregnancy interval on maternal and perinatal outcome which also signifies the importance of spacing and contraception.

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