

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 atleast 24 months of interpregnancy interval is optimal. **Objective:** This study was planned to correlate maternal and perinatal outcome with interpregnancy interval at a tertiary care centre in northern India. **Materials and methods:** The study was a cross sectional observational study. It was conducted in department of obstetrics and gynecology, KGMU Lucknow. 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 atleast) was more in IPI more than 24 months group. Severe anemia and non severe preeclampsia was found to be more in group 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. **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.

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 imbalance¹⁻³.

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 outcomes⁴. 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 months⁴.

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 found any causal effect of short IPI on adverse birth outcomes⁵.

A systemic review which included 67 observational

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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 death⁶. However in very few cases in our country we observe long interpregnancy interval.

However research has been done on effect of interpregnancy interval on maternal and perinatal outcome but there is limited data regarding effects of interpregnancy interval on perinatal outcome in Asian ethnicity especially Indian scenario. So this study was planned to correlate maternal and perinatal outcome with interpregnancy interval at a tertiary care centre in Northern India. By this study if we find IPI independently affects maternal and perinatal outcome, importance of spacing between pregnancies will be reemphasized. For this purpose family planning methods especially postpartum contraception would be more and more strengthened.

Materials and methods

The study was a cross sectional observational study. It was a pilot study conducted in department of obstetrics and gynecology, KGMU, Lucknow. The study was done during the period of December 2017 to may 2018. The patients delivering at department of Obstetrics and Gynaecology every Friday were enrolled in the study. All pregnant women beyond period of viability ie 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

Table 1: Demographic characteristics of study women

Variables	≤24 months (n=87)	>24 months (n=125)	OR	95% CI	χ ²	'p'
Age						
≤19 years	7(8.04%)	8(6.4%)	Ref.		0.439	0.803
20-34 years	69(79.3%)	98(78.4%)	0.805	0.279-2.323		
≥35 years	11(12.64%)	19(15.2%)	0.662	0.188-2.323		
Education						
<12 th standard	75(86.2%)	108(86.4%)	Ref.		0.016	0.968
≥12 th standard	12(13.79%)	17(13.6%)	1.017	0.459-2.252		
Parity						
1	12(13.79%)	23(18.4%)	Ref.		1.85	0.396
2	54(62.06%)	66(52.8%)	1.568	0.715-3.439		
≥3	21(24.13%)	36(28.8%)	1.118	0.463-2.699		
Number of ANC visits						
<4	66 (75.86%)	78 (62.4%)	Ref.		4.27	0.039
≥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		
Normal (18.5- 24.9)	33(37.93%)	42(33.6%)	Ref.		6.56	0.087
Overweight (25- 29.9)	17(19.54%)	47(37.6%)	0.463	0.225-0.944		
Obese (≥30)	2(2.29%)	6(4.8%)	0.424	0.080-2.240		
Socioeconomic status (according to Kuppaswamy classification)						
Upper	none	none				
Upper middle	5	8				
Lower middle	9	13				
Upper lower	41	65				
Lower	32	39				

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 ≤24 months and >24 months) were of

Table 2: Associated maternal complications in study women

Complications	≤24 months (n=87)	>24 months (n=125)	OR	95% CI	χ ²	'p'
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%)				

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

Table 3: Perinatal outcome of study women

Outcomes	≤24 months (n=87)	>24 months (n=125)	OR	95% CI	χ ²	'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
NUU/NICU admissions	20(23%)	14 (11.2%)	2.367	1.121-5.000	5.29	0.021

(86.2% in ≤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 ≤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 (≥4 visits) was more in the group IPI >24 months as compared to group of IPI ≤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 ≤ 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 ≤24 months IPI.

Both groups were compared in terms of maternal complications like maternal mortality, severe anemia, non-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 ≤24 months than group IPI> 24 months (19.54% vs 6.4%) (table 2). It was found that maternal mortality was more in group ≤24 months IPI than group >24 months IPI (8% vs 3.2%). Severely anemic women were found to be more in group

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

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 atleast 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 counseled 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 death⁴. 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 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 preeclampsia⁹.

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 death¹⁰. Similarly a retrospective cohort study was done by Hanley et al¹¹. 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. We have to strengthen the contraception and family planning services especially post partum contraception, in order to reduce maternal and perinatal mortality and morbidity. There is limited data on effect of interpregnancy interval on adverse pregnancy outcome in Indian scenario. However this study being a small pilot study, further larger studies are required on this topic in future and awareness regarding postpartum contraception should be increased in public by various means.

Conflict of interest: None. **Disclaimer:** Nil.

References

1. Haight SC, Hogue CJ, Raskind-Hood CL, Ahrens KA. Short interpregnancy intervals and adverse pregnancy outcomes by maternal age in the United States. *Ann Epidemiol.* 2019 Mar; 31:38-44.
2. Hanley GE, Hutcheon JA, Kinniburgh BA, Lee L. Interpregnancy Interval and Adverse Pregnancy Outcomes: An Analysis of Successive Pregnancies. *Obstet Gynecol.* 2017 Mar;129(3): 408-415.
3. Winkvist A, Rasmussen KM, Habicht JP. A new definition of maternal depletion syndrome. *Am J Public Health.* 1992; 82(5): 691-4.
4. Ahrens KA, Nelson H, Stidd RL, Moskosky S, Hutcheon JA. Short interpregnancy intervals and adverse perinatal outcomes in high-resource settings: An updated systematic review. *Paediatr Perinat Epidemiol.* 2019 Jan; 33(1): 25-47.
5. Ball SJ, Pereira G, Jacoby P, De Clerk N, Stanely FJ. Re evaluation of link between interpregnancy interval and adverse birth outcome: retrospective cohort study matching two intervals per mother. *BMJ.* 2014; 349: 4333.
6. Conde-Agudelo A, Rosas-Bermudez A, Kafury-Goeta AC. Birth spacing and risk of adverse perinatal outcomes: a meta-analysis. *JAMA.* 2006; 295(15): 1809-23.
7. Marson C. Report of a WHO technical calculation on birth spacing. Geneva (Switzerland): World Health Organisation; 2005.
8. ACOG. Obstetric care consensus, No 8. Obstetrics & Gynecology. 2019; 133(1): e51-e72.
9. Kangatharan C, Labram S, Bhattacharya S. Interpregnancy Interval following miscarriage and adverse pregnancy outcome: systematic review and meta-analysis. *Hum Reprod Update.* 2017 Mar 1; 23(2): 221-31.

10. Mahande MJ, Obure J. Effect of interpregnancy interval on adverse pregnancy outcomes in northern Tanzania: A registry-based retrospective cohort study. *BMC Pregnancy and Childbirth*. 2016; 140(2016).
 11. William EK, Hossain MB, Sharma RK, Kumar V, Pandey CM, Baqui AH. Birth interval and risk of stillbirth or neonatal death: findings from rural north India. *J Trop Pediatr*. 2008 Oct, 54(5): 321-7.
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