ASSOCIATION OF SHORT INTER-PREGNANCY INTERVAL WITH ADVERSE PERINATAL OUTCOME

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ABSTRACT

Background: The time interval in between pregnancies is viewed as an important and modifiable risk factor for adverse birth outcome. Short interpregnancy interval is associated with a number of adverse outcome for both mother and child, including increased risk of preterm labour, low birth weight baby, and preeclampsia .

Objective: To determine the association between adverse perinatal outcome and short inter-pregnancy interval in women presenting in labour

Material and Methods: This cohort study was conducted at department of Obstetrics and Gynaecology, unit 1, Lahore General Hospital Lahore for 6 months (from July 12, 2015 to Jan 12, 2016). It was non-probability purposive sampling. Informed consent was obtained. Demographics were noted. Then females were divided into 2 groups, 160 patients in each group, group I with short inter-pregnancy interval (<18 months) and group II with normal inter-pregnancy interval(≥18 months).Then antenatal record was assessed to measure the gestational age at time of delivery and preterm delivery was labeled if female delivered before 37 completed weeks of gestation. After delivery, baby was assessed for low birth weight i.e<2.5kg. All collected data was entered and analyzed in SPSS version 17.0. Relative Risk was calculated to measure the association between short inter-pregnancy interval and adverse perinatal outcome. RR>1 was considered as significant risk.

Results: In my study the mean age of the patients was 29.23±6.24 years and the mean gestational age of the patients was 38.47±2.38 weeks.In this study the preterm deliveries were observed in 67 cases (20.9%) in which 46 (68%) were from short IPI group and 21 (31.3%) were from normal IPI group. Statistically a significant risk of preterm delivery was noted in short IPI group as compared to normal IPI group. i.e RR=2.67. In my study the LBW babies were observed in 46 cases in which all the 46 (100%) were from short IPI group. Statistically a significant risk of LBW babies was noted in short IPI group as compared to normal IPI i.e. RR=2.404.

Conclusion: There has been statistically significant risk of adverse perinatal outcome (preterm birth and LBW) in patients with short IPI as compared to patients with normal interpregnancy interval.

Keywords: Short Inter-Pregnancy Interval, Preterm, Low Birth Weight, Adverse perinatal outcome

INTRODUCTION

The time interval between pregnancies is viewed as an important and modifiable risk factor for adverse birth outcome. The causal effect of inter-pregnancy interval (IPI) on birth outcome have been vigorously debated.[1-3] Obstetricians are often presented with questions regarding the optimal IPI.[1]

Short IPIs are associated with a number of adverse outcomes for both mother and child, including increased risk of preterm birth, low birth weight, and preeclampsia, making prevention of short IPIs a public health priority in the United States.[4]

The risk of low birth weight increases in women having low body mass index (BMI) due to repeated pregnancies and short inter-pregnancy interval.[5, 6]

The timing between one pregnancy and the next may affect the risk of pregnancy complications. Both short and long IPIs have been associated with adverse outcome, but the bulk of adverse effects have been associated with short intervals.[5, 6]

It has been reported that the risk of delivery <39 weeks was higher following short IPI <12 months, 53.3% of women delivered before the term in short IPI compared with 37.5% of women with normal IPI, P <0.001.[7]There is 22.8% chance of low birth weight in short IPI as compared normal IPI (12.1%, P<0.05).[8]

One study has reported that short IPI has 8.2% chance of preterm birth and 5.1% low birth weight while in normal IPI duration, preterm birth rate was 5.4% and low birth weight was 3.9%. The difference was significant (P<0.05).[9]

It has been suggested that to achieve optimal birth spacing and ultimately to improve birth outcomes, attention should be given to contraceptive counseling and access to contraceptive methods in the postpartum period.[10]

Rationale of this study is to find the association between short inter-pregnancy interval with adverse perinatal outcome in females presenting in labour. As local data on this study is deficient so this study will highlight this important issue and thus helping the patient in proper birth spacing in next pregnancy and safe motherhood too.

OBJECTIVE

To determine the association between adverse perinatal outcome and short inter-pregnancy interval in women presenting in labour.

OPERATIONAL DEFINITIONS

Inter-pregnancy interval

It was labeled as short if the interval between two consecutive pregnancies were<18 months while it was labeled as normal if interval between two consecutive pregnancies were ≥18 months.

Adverse perinatal outcome

It was measured as follows: (Association was assessed separately for both variables)

- **Preterm delivery**

If baby delivered before 37 weeks of gestation as assessed on LMP.

- **Low birth weight**

If weight of baby <2.5kg after delivery

Hypothesis:

There is an association between short inter-pregnancy interval and adverse perinatal outcome (preterm delivery and LBW).

MATERIALS & METHODS

Study design

Cohort study

Setting

Department of Obstetrics and Gynaecology unit-1, Lahore General Hospital Lahore

Duration of study

6months after approval of synopsis

Sample Size

Sample size of 320 cases; 160 cases in each group was calculated with 80% power of test, 5% level of significance and taking expected percentage of low birth weight i.e. 22.8% in short IPI and 12.1% in normal IPI in females presenting in labour.

Sampling Technique

Non-probability, purposive sampling.

Inclusion Criteria

Females with age 18-40 years with parity <6, presenting in labour i.e painful uterine contractions with cervical dilatation >1cm.

Group 1:- women with inter-pregnancy interval <18 months.

Group 2:- women with inter-pregnancy interval ≥18 months

Exclusion criteria

1 Multiple pregnancy (on ultrasound)
2 Females having placenta previa (on USG)
3 Gestational or chronic diabetes (BSR>186mg/dl),
4 Gestational hypertension (BP≥140/90mmHg),
5 Preeclampsia (BP≥140/90mmHg with proteinuria +1 on dipstick method) or eclampsia (convulsions with BP≥140/90mmHg)
6 Females with PPROM (Speculum examination).

Data Collection Procedure

320 females fulfilling our selection criteria were selected from Department of Obstetrics and Gynaecology, Lahore General Hospital Lahore. Informed consent was obtained from each case. Demographics (name, age, parity, gestational age and contact) were noted. Then females were divided into 2 groups as group I with short inter-pregnancy interval and group II with normal inter-pregnancy interval. Then antenatal record was assessed to measure the gestational age at time of delivery and preterm delivery was labeled if female delivered before 37 completed weeks of gestation. After delivery, weight of baby checked and if <2.5kg, then low birth weight was labeled (as per operational definition). All this information was recorded in proforma (attached).

Data Analysis Procedure

Data was entered and analyzed in SPSS version 17.0. Quantitative data like age and gestational age was presented in the form of mean and standard deviation. Qualitative data like parity, preterm delivery and low birth weight was presented in the form of frequency and percentage. Relative Risk was calculated to measure the

association between short inter-pregnancy interval and adverse perinatal outcome. RR>1 was considered as significant risk taking p value ≤ 0.05 was considered as significant. Data was stratified for age, parity, BMI, history of previous preterm delivery to address the effect modifiers. Post stratification relative risk was calculated with RR>1 was considered significant. Frequency was calculated for parity.

RESULTS

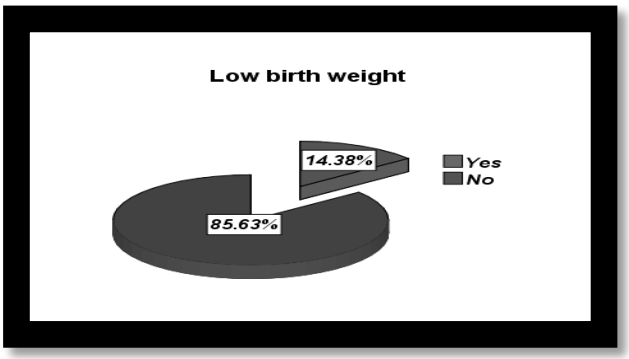
In this present study total 320 cases participated. The mean age of the patients was 29.23±6.24 years with minimum and maximum ages of 20 & 40 years respectively.

In my study the mean value of the BMI of the patients was 22.36±1.99 kg/m2 with minimum and maximum BMI values of 19.1 & 26 kg/m2 respectively.

The study results revealed that the 146(45.63%) patients presented with parity one, 150(46.88%) patients presented with parity two and 24(7.50%) patients presented with parity three.

In this study the previous history of preterm birth was found in 130(40.6%) patients.

In this study the preterm birth was noted in 67(20.9%) patients.



Frequency distribution of low birth weight

Comparison of LBW with study groups

		Study Groups		Total	RR
		Short IPI	Normal IPI		
LBW	Yes	46	0	46	2.404
	No	114	160	274	
Total		160	160	320	

Chi value=53.72
p-value=0.0001(Significant)

The study results revealed that the mean gestational age of the patients was 38.47±2.38 weeks with minimum and maximum gestational ages of 32 & 41 weeks respectively.

The study results revealed that the mean value of birth weight of the baby was 2625.63± 584.54 grams with minimum and maximum birth weight values of 1500 and 3600 grams respectively.

In my study low birth weight was observed in 14.38% cases and all were from short IPI group.

The preterm deliveries were observed in 67 cases(20.9%) in which 46 (68%) were from short IPI group and 21(31.3%) were from normal IPI group. Statistically a significant risk of preterm delivery was noted in short IPI group as compared to normal IPI group. i.e RR=2.67 as shown in the table as shown below.

The LBW babies were observed in 46 cases in which all the 46 (100%) were from short IPI group. Statistically a significant risk of LBW babies was noted in short IPI group as compared to normal IPI group. i.e RR=2.404.

The study results revealed that in patients below 30 years, preterm birth was noted in 48 cases in which 34 were from short IPI group and 14 were from normal IPI group, similarly in patients of age 30 years and above, preterm birth was noted in 19 cases in which 12 were from short IPI group and 7 were from normal IPI group. Statistically significant greater risk of preterm delivery was found in short IPI group as compared to normal IPI group stratifying by age. i. e RR= 3.803 & 1.57 respectively as shown in the table below.

The study results revealed that in patients below 30 years, LBW was noted in 34 cases and all the 34 cases were from short IPI group, similarly in patients of age 30 years and above, LBW was noted in 12 cases and all 12 cases were from short IPI group. Statistically significant greater risk of LBW was found in short IPI group as compared to normal IPI group stratified by age. i. e RR= 2.83 & 2.033 respectively.

The study results revealed that in patients of normal BMI, preterm birth was noted in 60 cases in which 40 were from short IPI group and 20 were from normal IPI group, similarly in overweight or obese patients, preterm birth was noted in 6 cases and all 6 were from short IPI group. Statistically significant greater risk of preterm delivery was found in short IPI group as compared to normal IPI group stratified by BMI. i. e RR= 2.45 & 2.12 respectively.

The study results revealed that in patients of normal BMI, LBW was noted in 40 and all 40 cases were from short IPI group, similarly in overweight or obese patients, LBW was noted in 6 cases and all 6 were from short IPI group. Statistically significant greater risk of LBW was found in short IPI group as

compared to normal IPI group stratified by BMI. i. e RR= 2.43 & 2.12 respectively.

In patients with parity one, preterm delivery was found in 39 cases in which 30 were from short IPI group, in parity two patients, preterm labour was found in 23 cases in which 12 were from short IPI group, similarly in patients with parity three, preterm labour was found in 7cases in which 6 were from short IPI group and 1 was from normal IPI group. Statistically significantly greater risk of preterm delivery was found in short IPI group as compared to normal IPI group stratified by parity i.e RR=1.75, 1.25 & 2.08.

In patients with parity one, LBW was found in 30 cases and all 30 were from short IPI group, in parity two patients, LBW was found in 12 cases and all 12 were from short IPI group, similarly in patients with parity three, LBW was found in 4 cases and all 4 were from short IPI group . Statistically significantly greater risk of LBW was found in short IPI group as compared to normal IPI group stratified by parity. i.e RR=2.48, 2.60 & 2.40.

In this study in patients with history of previous preterm birth, preterm birth was noted in 48 cases in which 34 were from short IPI group and 14 were from normal IPI group, similarly in patients without previous preterm history, preterm birth was noted in 19 cases in which12 were from short IPI group and 7 were from normal IPI group. Statistically significant greater risk of preterm delivery was found in short IPI group as compared to normal IPI group in patients without preterm history. i. e RR=1.96.

In this study in patients with history of previous preterm birth, LBW was found in 34 cases and all 34 were from short IPI group, similarly in patients without preterm history,

LBW was noted in 12 cases in which all the 12 cases were from short IPI group.

Statistically significant greater risk of LBW was found in short IPI group as compared to normal IPI group stratified by history of previous preterm labour. i. e RR=1.62 & 3.23.

Comparison of preterm delivery with study groups

		Study Groups		Total	RR
		Short IPI	Normal IPI		
Preterm delivery	**Yes**	46	21	**67**	**2.67**
	No	114	139	**253**	
Total		**160**	**160**	**320**	

Chi value=11.79
p-value=0.001 (Significant)

DISCUSSION

Short Interpregnancy intervals (IPIs) are linked with increased risks of preterm birth, lower birth weight and small for gestational age (SGA)[21-23]. These adverse pregnancy outcomes are associated with perinatal and neonatal morbidity and mortality and can affect later development and health. Long-term effects have also been described , including increased risks of schizophrenia, menstrual disorders and subfecundity. Short interpregnancy interval is a potentially modifiable risk factor. If the reported association is causal, public health interventions, such as counseling the women to increase interpregnancy intervals, may reduce the prevalence of preterm deliveries and low birth weight babies.

Since the 1920s report by Woodbury,[21] numerous studies in developed and developing countries have shown both short and long IPI intervals to be associated with adverse birth outcomes.[17] The biological mechanism between short IPI and poor maternal and neonatal outcomes is hypothesized to be due to insufficient time for the mother to recover from the nutritional burden and stress of the previous pregnancy.[22]

Results of this study revealed that in younger females of age below 30 years, 70% of preterm births were from short interpregnancy interval group and in females of age 30 years and above, 63% of preterm births from short interpregnancy interval group. Similarly LBW babies were noted in all those cases which were from short interpregnancy interval group despite the age of the patients. There was insignificant difference observed between age of females and effect of short interpregnancy interval on poor perinatal outcome (P>0.05).The results of one study indicate that the association of short interpregnancy interval with preterm delivery attenuates with increasing maternal age.[23] Another study conducted to find the association between short IPI and preterm birth and it was observed that mothers of preterm infants and infants from a short interpregnancy interval tends to be younger (22.6 vs. 24.2 and 22.6 vs. 24.6, respectively; P< 0.0001). This revealed that young maternal age is also a risk factor for preterm birth in addition to short IPI.[24] In one more

study, a short interpregnancy interval of 6-12 months was more common among women of <25years (49.4%; p<0.001).[25]

In this study, among patients of normal BMI, 66% of preterm births were noted in short IPI group, and in overweight or obese patients, all preterm births were noted in short IPI group. Similarly all LBW babies were noted in short IPI group whether they were of normal BMI or overweight/obese. Results of one study also revealed a significant association between short interpregnancy interval and spontaneous early preterm delivery, both crude (OR=3.9; 95% CI: 1.91-8.10) and adjusted for maternal age, previous birth outcomes, body mass index and gestational weight gain (adj(OR)=3.6; 95% CI: 1.41-8.98).[26] But another study results are not explained by maternal BMI or change in BMI between pregnancies or by parental age.[27] One more study also revealed that obesity increase the chances of preterm birth in females with short IPI by three times as compared to females with normal BMI (odds ratio (OR)=3.030, 95% confidence interval (CI) 1.166–7.869).[28]

In my study, preterm delivery was found in majority of those cases which were from short IPI group, no matter what the parity of patient was. Similarly all LBW babies were found in short IPI group regardless of parity of the patient. In a study conducted by Naoko Kozuki, Nulliparous, (age <18 year women), compared with women who were with parity 1-2 and age 18-<35 years had the highest odds of SGA (pooled adjusted OR: 1.80), preterm (pooled aOR: 1.52), neonatal mortality (pooled aOR: 2.07), and infant mortality (pooled aOR: 1.49). Increased odds were also noted for SGA and neonatal mortality for nulliparous/age 18-<35 years, preterm, neonatal, and infant mortality for parity ≥3/age 18-<35 years, and preterm and neonatal mortality for parity ≥3/≥35 year.

Despite the abundance of existing literature on parity and maternal age as risk factors for adverse neonatal outcomes, methodological issues in many studies make it difficult to draw strong conclusions. Several studies have utilized cross-sectional data, often Demographic and Health Surveys (DHS).[30,31] Cross-sectional studies cannot assess causality easily. Studies have also failed to examine the potential confounding effects of other reproductive health-related variables, socioeconomic status, or maternal nutrition. One systematic review found an association between nulliparity and SGA, but not prematurity; however, it failed to limit the studies included in the meta-analysis to those that controlled for maternal age[32]. Furthermore, the studies that do control for these confounders often fail to indicate whether the adjustment may have altered the associations33, preventing us from understanding the biological or confounding mechanisms linking parity and maternal age to poor outcomes. Studies have also failed to examine the potential confounding effects of other reproductive health-related variables, socioeconomic status, or maternal nutrition.

Among patients with history of previous preterm birth, 70% of preterm birth was noted in short IPI group and in patients without previous preterm birth history, 63% of preterm birth was noted in short IPI group similarly all LBW babies were found in short IPI group regardless of previous history of preterm births. One study revealed that history of preterm birth increase the chances of preterm birth in females with short IPI by 20 times than in patients with no history of preterm birth (OR=20.888, 95%CI 2.519–173.218).[28]

In my study the preterm birth was noted in 67 patients, 68% were from short IPI group and 31.3% were from normal IPI group. This is also consistent with a study carried out by EA DeFranco34 which described that of 454 716 births, 87% followed a normal IPI ≥18 months, 10.7% had IPI 12–18 months and 2.2% with IPI <12 months. The risk of delivery <39 weeks was higher following short IPI <12 months, 53.3% of women delivered before the 39th week after IPI <12 months compared with 37.5% of women with normal IPI, P < 0.001 which is in accordance with my study.

In my study LBW was observed in all those cases who belonged to short IPI group. These results are consistent with a study by Innie Chen et al35 showed that significantly increased adjusted odds of SGA were seen for the intervals of 0 to 5 months (aOR 1.29; 95% CI 1.09 to 1.52), 24 to 35 months (aOR 1.15; 95% CI 1.01 to 1.31), and 36+ months (aOR 1.26; 95% CI 1.11 to 1.44), compared with the reference interval of 12 to 17 months. Significantly increased odds were also observed for the 36+ interval for very SGA (aOR 1.37; 95% CI 1.07 to 1.76).

In my stu study statistically a significant risk of preterm delivery and LBW babies was noted in short IPI group as compared to normal IPI group i.e. RR=2.67, 2.404 respectively. Several studies have reported greater risks of the adverse pregnancy outcomes low birth weight and small-for-gestational-age (SGA) after short IPI intervals which are consistent with my study results.[36]

In India, Deshmukh[37] observed that short birth interval is associated with increased risk of LBW.

CONCLUSION

Thus it has been concluded through results of this study that preterm delivery and low birth weight are significantly associated with short IPI and the risk of

low birth weight and preterm delivery are more than twice as compared to normal IPI i.e. ≥18 months and all these variables like maternal age, BMI, parity and previous history of preterm births have very little effect on association of short interpregnancy interval on poor perinatal outcome. Thus short IPI is a strong independent risk factor of preterm birth and low birth weight.

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