ORIGINAL ARTICLE

Relationship of Short Inter-pregnancy Interval with Occurrence of Preterm Labour on Subsequent Pregnancy

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Abstract

Introduction: Inter-pregnancy interval (IPI) was calculated as the interval between the delivery date of the preceding live birth and the conception date of the index birth, with short inter-pregnancy intervals less than 18 months. Our aim was to evaluate relationship of short Inter-pregnancy interval with occurrence of preterm labour on subsequent pregnancy.

Methods: This observational study was conducted at the department of Obstetrics & Gynecology, Dhaka Medical College Hospital, and Dhaka from August 2017 to January 2018. A total of 100 participants were included for the study. Among them 50 participants were enrolled case group and 50 participants were enrolled control group. Purposive sampling method was used. The IPI was computed as the time period between the first and second deliveries, as only the month and year of the births were available, the day was assumed to be the fifteenth day of the month in both cases for all records. Statistical analysis was done by a statistical software SPSS 20. Before the commencement of the study, the protocol for the study was approved by Ethical review committee (ERC) of DMCH.

Results: The mean age of study subjects was 24.59±4.75 years, ranging from 18 years to 35 years. Majority of the pregnant mother was aged between 21 to 25 years (58%). Mean age of preterm group (25.84±5.57 years) was significantly higher than the subjects who had term pregnancy (23.34±3.38 years). Illiteracy were more prevalent among pregnant mother with pre-term labour (40%). Most of the study subjects had 1st para and 2nd Gravida (69%). Subjects with pre-term labour had significantly higher proportion of short IPI (72% among pre-term labour) than subjects with term labour (14% among term labour, p<0.001). Maternal and neonatal complications were more common in patients with short IPI among preterm and term pregnancies.

Conclusion: Mother's age at first birth, mother's education status and parity had impact on gestational age at delivery and short IPI is significantly associated with pre-term labour and adverse perinatal outcomes.

Keywords: Inter-pregnacy inverval, Preterm Labour, Prematurity

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Introduction:

Inter-pregnancy interval was calculated as the interval between the delivery date of the preceding live birth and the conception date of the index birth, with short inter-pregnancy intervals less than 18 months.[1] Every year, an estimated 15 million babies are born preterm (before 37 completed weeks of gestation), and this number is rising.[2] Among the 10 countries with the greatest number of preterm births Bangladesh is 7th about 424100 per years.[2] Preterm birth complications are the leading cause of infant death among children under 5 years of age, responsible for nearly 1 million deaths in 2015.[3] Across 184 countries, the rate of preterm birth ranges from 5% to 18% of babies born[3]. Globally, prematurity is the leading cause of death in children under the age of 5. And in almost all countries with reliable data, preterm birth rates are increasing.[4] Preterm birth occurs for a variety of reasons.[5] Most preterm births happen spontaneously, but some are due to early induction of labour

or caesarean birth, whether for medical or non-medical reasons.[6] Common causes of preterm birth include multiple pregnancies, infections and chronic conditions such as diabetes and high blood pressure; however, often no cause is identified. There could also be a genetic influence.[7] A specific association between a short inter-pregnancy interval and preterm birth is biologically plausible. The control of parturition is thought to be mediated by a two-step process of activation and stimulation. Activation is defined as the up regulation of expression of a range of contraction associated proteins, such as G protein coupled receptors, in the weeks leading up to term. Stimulation is defined as the process by which synthesis and release of natural agonists for these receptors, such as prostaglandins, initiates uterine contraction. Failure to allow expression of contraction associated proteins to return to pregnancy levels may be the mechanism by which a short inter pregnancy interval predisposes to preterm birth.[8] More than 60% of preterm births occur in Africa and South Asia, but preterm birth is truly a global problem. In the lower-income countries, on average, 12% of babies are born too early compared with 9% in higher-income countries. Within countries, poorer families are at higher risk. As paucity of the literature regarding these topics, therefore, the study was designed to estimate the effects of the duration of the preceding short IPI on occurrence of pre-term labour. There is very limited research work available for the condition pre-term birth and short inter-pregnancy interval. For this we selected this topic, "Relationship of Short Inter pregnancy interval with occurrence of preterm labour on subsequent pregnancy". Objectives of this study were to find out the relationship of short Inter-pregnancy interval with occurrence of preterm labour on subsequent pregnancy, to find out the prevalence of short inter-pregnancy interval, to find out the prevalence of pre-term labour and to establish the relationship of short inter-pregnancy interval with pre-term labour.

This study will help medical practitioners to give advice to women about how long they should wait after one pregnancy before trying to become pregnant again.

Methods:

This observational study was conducted at the department of Obstetrics & Gynecology, Dhaka Medical College Hospital, and Dhaka from August 2017 to January 2018. A total of 100 participants were included for the study according to following inclusion and exclusion criteria. Among them 50 participants were enrolled case group and 50 participants were enrolled control group. Purposive sampling method was used. The IPI was computed as the time period between the first and second deliveries, as only the month and year of the births were available, the day was assumed to be the fifteenth day of the month in both cases for all records. Short IPIs were categorized when the interval was<18 months in two subsequent pregnancy. Births were categorized as 'late preterm' when gestational age in between 34-36 weeks, 'moderately preterm' when gestational age in between 32-34 weeks or 'very preterm' when the GA was below 32 weeks, and extremely preterm when gestational age <25 weeks, respectively. Births with a GA of 36 weeks or more were considered 'term'. Statistical analyze were done by a statistical software SPSS 20. In all cases, p value less than <.05 was considered statistically significant. Before the commencement of the study, the protocol for the following study was approved by Ethical review committee (ERC) of DMCH. This was a single center study. Sample size was small. So, the result of this study cannot reflect the whole scenario of Bangladesh.

Results:

In this study' total 50 subjects of pre-term pregnancy taken as case and another 50 subjects of term pregnancy were taken as control.

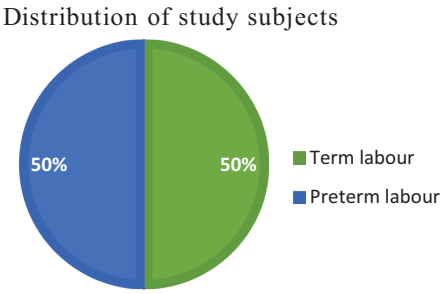

Fig.-1: *Distribution of study subjects according (n=100)*

Table I

Age Distribution of study population (n=100)

Variables	Pre-term labour n=50 (%)	Term labour n=50 (%)	Total n=100 (%)	P value*
Age Group in years				
≤	12(24)	11(22)	23(23)	0.001*
21-25	14(28)	29(58)	43(43)	
26-30	10(20)	9(18)	19(19)	
>30	14(28	1(2)	15(15)	
Mean ± SDIn years	25.84±5.57	23.34±3.38	24.59±4.75	0.008*
Min-Max in years	18-32	18-35	18-35	

*p determined by Chi-square test **p determined by student's t test

The mean age of all study subjects were24.59±4.75 years, ranging from 18 years to 35 years. Majority of the pregnant mother was aged between 21 to 25 years (58%) among preterm subjects (n=50), majority patients had two peak age 21- 25 years (28%) and >30 years (28%). Among term subjects, majority were aged between 21- 25 years. Pre-term pregnancy was significantly more frequent in older age group (p<0.05). Mean age of preterm group (25.84±5.57 years) was significantly higher than the subjects who had term pregnancy (23.34±3.38 years).

Table II

Educational Profile of study population (n=100)

Variables	Pre-term labour n=50 (%)	Term labour n=50 (%)	Total n=100 (%)	P value*
Education				
Illiterate	20(40)	3(6)	23(23)	<0.001
Primary	12(24)	14(28)	26(26)	
SSC	14(28)	14(28)	28(28)	
HSC	4(8)	11(22)	15(15)	
Graduate and Above	0	8(16)	8(16)	

*p determined by chi-Square test

Majority of the study subjects completed SSC (28%). Illiteracy were more prevalent among pregnant mother with pre-term labour (40%) and none was graduate among them. The difference in educational profile between two groups was significant (p<0.001).

Table III

Obstetric profile of study population (n=100)

Variables	Pre-term labour (n=50)	Term labour (n=50)	Total (n=100)	P value *
Para				
1	32(64)	37(74)	69(69)	0.52*
2	16(32)	11(22)	27(27)	
3	2(4)	2(4)	4(4)	
Gravida				
2	32(64)	37(74)	69(69)	0.52*
3	16(32)	11(22)	27(27)	
4	2(4)	2(4)	4(4)	
Gestational age in Weeks Mean ± SD	33.08±3.62	38.28±1.01	35.68±3.71	<0.001*

*p determined by chi- square test
**p determined by Student t test

Most of the study subjects had 1st para and 2nd Gravida (69%). Mean gestational age of subjects with preterm labor was 33.08±3.62 weeks and of subjects with term pregnancy was 38.28±1.801 weeks. This difference was significant (p<0.001).

Table IV

Distribution of IPI with study population (n=100)

Labour Category	Pre-term labour (n=50)	Term labour (n=50)	Total (n=100)	P value *
Short IPI	36(72)	7(14)	43(43)	<0.001
Normal IPI	14(28)	43(86)	57(57)	

Subjects with pre-term labour had significantly higher proportion of short IPI (72% among pre-term labour) than subjects with term labour (14% among term labour, p<0.001).

Table V

Pregnancy outcome of study population (n=100)

Outcome	Pre-term labour (n=50)	Term labour (n=50)	Total (n=100)	P value*
Alive	46(92)	50(100)	96(96)	0.04
Normal	38(82.6)	50(100)	88(91.7)	
Needed NICU support	8(17.4)	0	8(8.3)	
Dead	4(8)	0	4(4)	
Still born	2(50)	0	2(50)	
Early perinatal death	2(50)	0	2(50)	0.03

Total 96 babies (96%) were born alive. Among them 8(8.3%) needed NICU support. Two babies was stillborn and two babies died perinataly. All of the dead babies were born to subject with pre-term labour. This difference in pregnancy outcome between pre-term and term pregnancy was significantly (p<0.05).

Table VI

Maternal and neonatal complication in pre-term labour in relation to IPI (n=100)

Complication	Pre-term labour with short IPI (n=36)	Pre-term labour with normal IPI (n=14)	Total (n=100)	p-value*
Maternal complications	8(66.7)	4(33.3)	12(100)	
PPH	4(50)	4(100)	8(66.7)	0.04
Sepsis	4(50)	0	4(33.3)	
Neonatal complication	10(71.4)	4(28.6)	14(100)	
Birth asphyxia	2(20)	2(50)	4(28.6)	0.03
Jaundice	4(40)	2(50)	6(42.9)	
ARDS	4(40)	0	4(28.6)	

Maternal and neonatal complications were more common in patients with short IPI among preterm pregnancies.

Table VII

Maternal and neonatal complication in term labour in relation to IPI (n=50)

Complication	Term labour with short IPI (n=7)	Term labour with normal IPI (n=43)	Total (n=100)	p-value*
Maternal complications	1(33.3)	2(66.7)	3(100)	
PPH	1(100)	2(100)	3(100)	NA
Sepsis	0	0	0	
Neonatal complication	1(33.3)	2(66.7)	3(100)	
Birth asphyxia	0	2(100)	2(100)	0.08
Feeding problems	1(100)	0	0	

Maternal and neonatal complications were similar in subjects with term labour in relation to IPI.

Discussion:

Fifty patients of pre-term birth were taken as case and another 50 term deliveries were taken as control. Mean age of the group of subjects with pre-term birth was 25.84±5.57 years and it was higher than the subjects who had normal IPI (23.75±3.91 years), implying that women with increasing age were more likely to have pre-term birth. In a large rural Bangladesh cohort[9] it was found that increasing age of mother was associated with increased risk of pre-term delivery.[9] Study in Thailand found that both younger and older age was associated with higher risk of pre-term birth.[10] Similarly, in India found a slightly higher mean age of pre-term delivery cases.[11] Women with pre-term labour were more likely to be less educated and coming from lower economic class. Confirm this finding. Subjects with pre-term labour had similar parity and gravidity with subjects having term labour. This is also supported by the study of in Iran.[12] Short IPI was defined by less than 18-month interval between two consecutive pregnancies. Short IPI was found in 43% of subjects overall. Short IPI was seen in a significantly higher proportion in pre-term labour cases that term cases ($p<0.001$). This finding is concordant with that of studies from Sudan, UAE, USA.[13-18] Thoe studies showed that a very short birth interval less than 21 months (birth-to-pregnancy of less than 12 months when pregnancy is carried to term) is associated with an increased risk of adverse pregnancy outcomes, but intervals of 24-32 months (birth-to-pregnancy interval of 12-23 months when pregnancy is carried to term) and 33-44 months (birth-to pregnancy interval of 24-35 months) do not appear to be.[13-18] So they commented that World Health Organization's recommendation to wait two years after a live birth before attempting a next pregnancy, and the Government of Bangladesh's recommended birth-to-pregnancy interval of 3 years, may be overly cautious as far as perinatal outcomes are concerned. On the other hand, longer IPI was found to be associated with higher risks of preterm birth. Other studies found that infants conceived 18 to 23 months after a live birth had the lowest risks of low birth weight, preterm birth, and small size for gestational age. Several studies have shown that short IPI was associated with higher infant, neonatal and perinatal mortality, low birth weight and small size for gestational age.[19] Longer IPI was not considered in the present study. Further studies in the context of Bangladesh should be carried out the address long IPI alongside short IPI in the perinatal. The outcome for the recommendation of appropriate interval between pregnancies. Pre-term labour was associated with significantly higher neonatal mortality ($p<0.05$). Who showed a clear relationship between lower gestational age at delivery with higher neonatal mortality.[20] Besides, among pre-term delivery, very short birth-to-pregnancy interval of 18 months or less were also found to be associated with elevated risk of neonatal complications. On the other hand number of maternal and neonatal complications among term delivery patients had similar distribution suggesting that complications associated with short IPI is more likely to have link with pre-term birth and vice-versa.

Conclusion:

Short interpregnancy intervals may influence the incidence of premature births which was observed in several studies. To summarize, results of this study indicate that mother's age at first birth, mother's education status and parity had impact on gestational age at delivery and short IPI is significantly associated with pre-term labour and adverse perinatal outcomes. Our findings, in conjunction with those of other studies on the relationship between the inter-pregnancy interval and preterm birth, strongly suggest that a short inter-pregnancy interval is a causal factor for spontaneous preterm birth. This information could be used for raising awareness of the mother. Policy maker could use this as an evidence during program design and implementation of family planning methods. Further large cohort study is recommended.

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Conflict of interest: None declared

Approval: The study was approved by the Institutional Ethics Committee

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