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Original Research Article

The impact of interpregnancy interval on occurance of preterm births in the present pregnancy

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ABSTRACT

Background: The pregnancy outcomes are influenced by the inter pregnancy intervals. Both short and long inter pregnancy intervals are known to adversely affect the mother and the baby. The main aim of birth spacing was to achieve ideal inter pregnancy intervals and thus to decrease maternal, neonatal morbidity and mortality.
Methods: It is a prospective observational study. In this study, about 500 gravida 2 women who has delivered vaginally in the index pregnancy, with gestational age more than 28 weeks of gestation and with known interpregnancy interval were included in the study. They followed up to to delivery and occurance of preterm births in relation to maternal characteristics and interpregnancy interval were analysed.
Results: Our study showed that Inter pregnancy intervals of 18-24 months were found to have the least number of preterm births when compared to intervals <18 months and >24 months. This association was found to be statistically significant (p value, Pearson chi square 0.0008). This relationship between inter pregnancy intervals and preterm births persisted when stratified according to maternal age, education, residence and BMI.A previous preterm birth was associated with increased risk of recurrent preterm birth (p value -0.034) and was statistically significant. The history of PROM in present pregnancy associated with preterm birth (p value -0.001) and association was statistically significant.
Conclusions: From this study it was found that the 18-24 months birth to pregnancy interval is associated with the least incidence of preterm births.

Keywords: Interpregnancy interval, Preterm births, Maternal characteristics

INTRODUCTION

Inter pregnancy interval is defined as the time period from the birth of the previous baby to the conception of the current pregnancy. Numerous studies have shown that pregnancy outcomes are influenced by the inter pregnancy intervals. Both short and long inter pregnancy intervals are known to adversely affect the mother and the baby. By estimating the optimal inter pregnancy interval which is associated with the least risk to the mother and child from epidemiological studies, steps to promote appropriate birth spacing can be undertaken. The main aim of birth spacing was to achieve ideal inter pregnancy intervals and thus to decrease maternal, neonatal morbidity and mortality. Birth spacing is a very cost effective measure to decrease morbidity and mortality rates. When a baby is born before 37 weeks of pregnancy are completed, it is called a preterm birth (WHO).[1] World over, prematurity is the leading cause of under-five mortality. The number of preterm births is on the rise. India leads the list with the highest number of preterm births in the world. Short term consequences of

being born prematurely include neonatal complications like intra ventricular haemorrhage, periventricular leucomalacia, necrotising enterocolitis, respiratory distress syndrome, broncho pulmonary dysplasia and retinopathy of prematurity to name a few. In the long run, there occur neurological sequelae like cerebral palsy, hearing impairment and blindness in children who had preterm births. Premature babies require special care in neonatal intensive care units and the hospital expenditure for this sector is also increased.[2] While the WHO advocates antenatal corticosteroids, antibiotics and neuro protective magnesium sulphate for reducing the complications of preterm births, it also places emphasis on the importance of adequate pre pregnancy care and postnatal contraception to ensure optimal inter pregnancy intervals and bring down the number of preterm births. Spacing pregnancies to allow optimal inter pregnancy intervals is a cost effective way to reduce the morbidity and mortality due to low birth weight and preterm births. The women with shorter interpregnancy intervals are at increased risk of preterm birth. However, whether this association is confounded by other risk factors, including maternal age, education, BMI, various aspects of socioeconomic status, ethnicity, demographics and lifestyle has to be studied.[3]

METHODS

Our study was a hospital based observational study conducted at the institute of obstetrics and gynaecology, Chennai, India. The study period was one year with a sample size of 500 cases. The sample population was selected with inclusion criteria women with obstetric score of gravida 2 para one delivered vaginally in the index pregnancy, singleton gestation >28 weeks delivering in IOG, known inter pregnancy intervals, there should be no history of abortion, spontaneous or induced, between the index pregnancy and the previous one. In such cases the inter pregnancy interval actually starts from the date of the abortion to the conception of the present pregnancy. However most participants were unable to recollect the exact date of the abortion. Hence such participants were excluded from the study. The exclusion criteria were women with unknown inter pregnancy intervals, primi gravid women, medical disorders complicating pregnancies, multiparous with more than one vaginal delivery and multiple gestation in any of the pregnancies. Higher order pregnancies and multiple pregnancies per se is a risk factor for low birth weight and preterm births irrespective of the inter pregnancy interval and having a multiple pregnancy in a previous gestation will have several unexplained effects on breast feeding and child rearing practices and will influence the birth spacing behaviour of the couple. The maternal characteristics, demographic data, the details of antenatal booking and check-up prior to 28 weeks were collected from detailed history taking and antenatal records. The study population were followed until delivery. The inter pregnancy interval was calculated by subtracting the gestational age at the time of the index birth in day from the number of days between the index birth and the preceding birth .The resulting number was converted to months and inter pregnancy intervals were categorized into three groups as less than 18 months, 18-24 months and more than 24 months.

The number of preterm births in each group was calculated. The software used for statistical analysis was IBM statistical package for the social sciences SPSS-20. Chi-square test was used to investigate whether distribution of categorical variables differ from one another and p value less than or equal to 0.05 was considered significant.

RESULTS

Among the study participants about 2% belonged age group 18-20 years, 43.8% aged 21-25 years, 39.8% aged 26-30 years, 12% aged 31-35 years and 2.4% aged 36-40 years. About 3.6% women were illiterate, 10.6% completed primary school, 49.2% completed high school, 18.6% completed higher secondary and 18% completed graduation. The study sample constituted about 62.6% of urban population and 37.4% of rural population. The duration of breast feeding after previous birth below 6 months were in 17% of the study participants, 7-12 months in 26.4%, 13-18 months in 27.4%, 19-24 months in 18.8% and above 24 months in 10.4% participants. About 85.5% of the participants had first antenatal visit at first trimester, 12.6% at second trimester and 1.6% at the third trimester. Only 21.2% of the study participants used contraception between the two births in this study. About 76% of study participants had normal delivery, 11% had instrumental delivery and 12% had instrumental delivery. Out of 500 deliveries 142 participants (28.4%) had preterm births of which 91.5% were live births and 8.5% stillbirths.

Table 1: Factors associated with preterm birth in the present pregnancy.

Risk factors		Count	% within preterm	P value
Previous still birth	Yes	12	8.5	0.0001
	No	130	91.5	
Previous birth	Full term	119	83.8	0.034
	Preterm	23	16.2	
PROM	Yes	39	27.5	0.001
	No	109	72.5	

The factors associated with preterm birth such as preterm birth in previous pregnancy, previous stillbirth and premature rupture of membranes were studied. About 23 women had previous preterm delivery, 12 women had previous still birth and 39 participants had history of PROM in this study and association of both with preterm birth were statistically significant (Table 1). The analysis of relationship between inter pregnancy intervals (IPI) and preterm births shows that the number of preterm

births is least (8.6%) within the 18-24 months IPI category. The association was also statistically significant (Table 2). The adverse pregnancy outcomes in women with longer IPIs may be due to the reduced fecundity which occurs with advancing age. In such cases appropriate analysis in different subgroups of age can only indicate whether the adverse outcome was due to the long inter pregnancy interval per se or due to the decreased fecundity, the number of preterm births is the least in the 18-24 months inter pregnancy interval category, irrespective of the age of the mother (Table 3). However, the relationship between inter pregnancy interval and preterm births get attenuated with increasing maternal age. The number of preterm births is least in the 18-24 months category despite adjusting for the education of the mother (Table 4).

Table 2: Relationship between IPI and preterm births.

			Preterm		Total
			Yes	No	
Inter pregnancy Interval in months	<18	Count	46	104	150
		% within preterm	32.4	29.1	30.0
	18-24	Count	7	74	81
		% within inter pregnancy interval in months	8.6	91.4	100.0
		% within preterm	4.9	20.7	16.2
	> 24	Count	89	180	269
		% within inter pregnancy intervalin months	33.1	66.9	100.0
		% within preterm	62.7	50.3	53.8
Total		Count	142	358	500
		% within interpregnancy interval in months	28.4	71.6	100.0
		%within preterm	100.0	100.0	100.0

Table 3: Frequency of preterm births according to IPI and maternal age.

Age group (in years)		Inter pregnancy interval in months (IPI)			Total
		<18	18-24	>24	
18-20	Count	2	1	2	5
	% within preterm	40	20	40	100
21-25	Count	19	2	22	43
	% within preterm	44.2	4.7	51.1	100.0
26-30	Count	18	3	41	62
	% within preterm	29	4.8	66.2	100.0
31-35	Count	2	1	19	22
	% within preterm	9.1	4.6	86.3	100.0
36-40	Count	1	4	5	10
	% within preterm	10	40	50	100.0

Table 4: Frequency of preterm births according to IPI and maternal education.

Education		Inter pregnancy interval in months (IPI)			Total
		<18	18-24	>24	
Illiterate	Count	2	0	2	4
	% within preterm	50	0	50	100
Primary	Count	2	0	12	14
	% within preterm	14.3	0	85.7	100.0
High school	Count	24	2	44	70
	% within preterm	34.3	2.9	62.9	100.0
Higher secondary	Count	7	3	16	26
	% within preterm	26.9	11.5	61.5	100.0
Graduate	Count	11	2	15	28
	% within preterm	39.3	7.1	53.6	100.0

Table 5: Frequency of preterm births according to IPI and residence.

Residence		Inter pregnancy interval in months (IPI)			Total
		<18	18-24	>24	
Urban	Count	28	4	66	98
	% within preterm	28.6	4.1	67.3	100
Rural	Count	18	3	23	44
	% within preterm	40.9	6.8	52.3	100.0

Table 6: Frequency of preterm births according to IPI and maternal BMI.

BMI		Inter pregnancy interval in months (IPI)			Total
		<18	18-24	>24	
Under weight	Count	4	0	10	14
	% within preterm	28.6	0	71.4	100
Normal	Count	24	5	41	70
	% within preterm	34.3	7.1	58.6	100.0
Obese	Count	18	2	38	58
	% within preterm	31	3.4	65.5	100.0

The majority of the study participants were from urban areas as the hospital is situated in the centre of the Chennai city. It is seen that 39.6% of the rural participants had IPIs of <18 months whereas it was only 24.3% for the urban participants. 61.7% of the urban mothers had intervals >24 months. Thus, closely spaced pregnancies appear to occur more commonly in the rural population (Table 5). The number of preterm births were least in the 18-24 months group despite adjusting for the maternal BMI (Table 6). Thus, we see that IPI >24 months and <18 months are associated with increased risk of preterm births when compared to the 18-24 months interval irrespective of the mother's age, education, residence and BMI.

DISCUSSION

In this study the incidence of preterm birth were 28.4%. However, this result was higher than the study done in Mexico (7.4%) and southern India (5.4%).[4,5] The short inter-pregnancy interval increases the occurrence of premature birth, which was similar with the study done in Pakistan.[6] The women with short inter-pregnancy interval could not recover from the biological stresses imposed by the preceding pregnancy resulting in diminution of macronutrient supplementation in maternal body, folate depletion, cervical insufficiency, vertical transmission of infections, incomplete healing of uterine scar and abnormal remodeling of endometrial blood vessels, anemia and increasing the risks of certain other factors achieving pregnancy outcomes.[7-9] This study showed that promoting and encouraging the recommended inter-pregnancy interval among couples will reduce the incidence of preterm birth. The number of ANC visit were another predictor of incidence of preterm birth which was also determined in the studies done Ethiopia.[10] The recommended antenatal check-up and follow up visits helps in the detection and early treatment of the problem or any complications. When antenatal women attends the health facility with any problem or complication that can lead to preterm birth, she might get early treatment so as to prevent the occurrences of preterm birth and other related adverse obstetric outcomes. Thus, antenatal women should have to follow the recommended antenatal check-up visits. Zhu et al published a paper in 2005 in the IJOG in which the relationship between inter pregnancy intervals and adverse birth outcomes namely low birth weight, small for gestational age and preterm birth were analysed in three separate studies carried out in three different populations in the United States using different study designs.[11] They obtained a J-shaped curve to demonstrate the relationship between inter pregnancy intervals and adverse pregnancy outcomes. The optimal interval was found to be 18-23 months in the above study. Nicolaides et al came up with the concept of inverting the pyramid of prenatal care.[12] In the present scenario, there is a high concentration of antenatal visits during the third trimester. The WHO as well as the government of India recommendation is to have one visit in the first trimester. There is hardly any emphasis on pre pregnancy counselling. However with recent innovations, many of the pregnancy complications which occur at a later gestational age can be predicted early in pregnancy or even before conception with detailed history, maternal characteristics, biophysical (including ultrasound) and biochemical markers.

Shachar BZ et al in their paper Inter pregnancy interval and obstetric complications published in the obstetrical and gynaecological survey in 2012 suggested lowering the current minimal inter pregnancy interval recommendation to 18 months when compared to the 24 months as suggested by the WHO.[13] They recommend

even shorter intervals for women of advanced age. The WHO recommends waiting for at least six months after a miscarriage or induced abortion to reduce the risk of adverse perinatal and maternal outcomes. This is based on the Latin American study which found that intervals <6 months were associated with significant increased risk of low birth weight, preterm delivery, anaemia and PROM. Da Vanzo et al in their study conducted in Bangladesh found that pregnancies conceived within 3 months after an abortion were less likely to result in a miscarriage and more likely to result in a live birth.[14] But these pregnancies are also associated with a significant risk of neonatal mortality. With so much evidence coming up, the WHO recommendation to wait for six months after a miscarriage may have to be reconsidered.

Da Vanzo et al studied the effects of inter pregnancy intervals on pregnancy outcomes in Bangladesh and found that after a preceding live birth induced abortion rates are the least for IPIs of 15 to 50 months.[14] This suggests that women in Bangladesh prefer to space their births 2-5 years apart. They also found that if a previous pregnancy ended in a miscarriage or stillbirth, there is an increased risk that the present pregnancy also will end with a similar outcome regardless of the inter pregnancy interval. This is in accordance with the death trap concept, where death of a child is followed by a shorter interval to the next birth, which in turn increases the mortality risk and morbidity for that particular child. The association between a previous preterm birth and recurrent preterm birth has been proven in this study too. Heinonen et al found that preterm birth and low birth weight rates following a still birth (resulting from causes other than maternal conditions and foetal abnormalities) is somewhat higher than in the general population.[15] They also found a significantly increased risk of abruption in the next pregnancy. In such high risk groups with prior preterm births and low birth weight babies, optimising the inter pregnancy intervals may reduce the risk of recurrence.

More studies are needed in this regard. Ultimately the causal relationship between inter pregnancy intervals and adverse pregnancy outcomes can be firmly established only by randomized control trials.

CONCLUSION

Birth spacing is a simple tool. This study shows that when this tool is handled properly to achieve the best inter pregnancy intervals, the two most important outcomes of any pregnancy, namely birth weight and gestational age at birth, improve. From this study it is found that the 18-24 months birth to pregnancy interval is associated with the least incidence of preterm births and low birth weight babies.

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