The Associations between Inter-Pregnancy Interval and Maternal and Neonatal Outcomes in Chennai

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Abstract

Background:

Worldwide maternal and perinatal mortality have continued to remain unchanged over the past 20 years, and strategies are being sought to decrease the same. An important determinant of the maternal and neonatal mortality is the health of the mother and the care that she receives it during the antenatal period. The maternal and neonatal outcomes are influenced by inter pregnancy interval. It has been demonstrated that interpregnancy interval plays a key role determining the health status of the mother.

Aim of the study :

We conducted a study to evaluate the possible association between inter-pregnancy interval and the occurrence of adverse maternal and perinatal outcomes in our hospital

Methods:

We conducted a retrospective study where the obstetrical and perinatal records in a hospitals obstetrics and neonatal database between 2017 and 2018 were studied. A total of 244 records of women who delivered singleton infants at Saveetha medical college hospital, a tertiary care teaching hospital were included in the study. Gestational outcomes in mother and child according to inter-pregnancy interval were studied.

Results:

During the period of the study, 68.5% of records referred to women with an inter-pregnancy interval <18 months. After the adjustment performed for confounding factors and assuming an inter-pregnancy interval of 18–23 months as reference, short intervals (<6 months) were observed to be associated with a greater risk of jaundice and respiratory distress.

Conclusions:

Short inter-pregnancy intervals are associated with a higher risk of anaemia and abortion in mother while jaundice and respiratory distress being main association in children.

Keywords: Birth spacing, Inter-pregnancy interval, Familyplanning, neonatal respiratory distress, Jaundice, anaemia, abortion.

Introduction

Birth spacing is a family planning intervention that consists of spacing pregnancies, although it has long been known as an effective measure for improving maternal and perinatal morbidity and mortality, it is still seldom used especially in developing countries like India [1].

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Since the first half of the 20th century, the interval between deliveries or between pregnancies has been evaluated with respect to its possible association with maternal and peri- natal outcomes, but the mechanisms of such association have not been completely understood. Many of the studies carried out so far contain some methodological limitations, such as lack of control of potentially confounding factors, arbitrary classification of the interval in question, and the use of the inter-delivery interval instead of the inter-pregnancy interval for analysis [2, 3]. With respect specifically to the use of the inter-delivery interval as an independent variable, it has been shown that this tends to overestimate adverse perinatal results for the shorter intervals, since the effect of preterm birth is incorporated into the evaluation of the inter-delivery interval.

Another point of discussion which needs to be studied is the extent to which the inter-pregnancy interval contributes independently to the outcome and by what mechanisms [4–6].A recent systematic review of birth spacing and peri- natal outcome revealed that inter-pregnancy intervals<18 months and >59 months are significantly associated with an increased risk of adverse perinatal outcome, such as preterm birth, low birth weight and birth of small-for-gestational-age infants. Despite, this review which included a meta-analysis of studies totalling approximately eleven million pregnancies, the association between inter- pregnancy interval and some adverse perinatal outcomes continues to remain unclear [6].

Further only few studies have been carried out on the association between inter-pregnancy interval and adverse maternal outcome (maternal morbidity and mortality) and results have been more heterogeneous [4, 7]. The largest of these studies evaluated the data contained in the Latin American and Caribbean system of perinatal information, and found an increased risk of adverse maternal outcome (i.e., pre-eclampsia and eclampsia) in pregnancies with an inter-pregnancy interval <6 months and >59 months [7].

Considering the lack of knowledge available regarding birth spacing and the potential of the application of this intervention in facing maternal and perinatal morbidity and mortality, the present study was carried out to evaluate the association between inter-pregnancy interval and the occurrence of adverse maternal and perinatal outcomes.

Methods

A cross-sectional study was carried out using a database obtained from the obstetrical and neonatal information in Saveetha Medical College and Hospital, a referral maternity hospital for the region in Kancheepuram, Tamil Nadu. Obstetrical and Neonatal information system records all data collected during hospitalisation in SMCH and this database contains information from the beginning of ante-natal care through the postpartum period, including demographical information, reproductive history, characteristics of pre- natal care, management of delivery, maternal complications during delivery, delivery and puerperium, as well as neonatal information.

In the present study, records were obtained for all non nulliparous women who delivered between 2017 and 2018, and included data from women who delivered a single foetus, those whose previous pregnancy ended after more than 22 weeks or when the weight of the conceptus was >500 g. The original database did not contain information regarding pregnancies terminated as miscarriages or abortions. The index pregnancy was considered the unit of analysis, not the woman herself. Then, women with more than one delivery in Saveetha medical college and hospital were considered twice or more times accordingly, once the outcomes for each pregnancy could be different.

The inter-pregnancy interval was defined as the time elapsed between the woman's last delivery and the beginning of the next pregnancy. The inter-pregnancy interval was calculated by subtracting the duration of the current pregnancy from the interval between the delivery of the index pregnancy and that immediately preceding it. The duration of the index pregnancy was calculated from the physical evaluation of the new-born infant using the New Ballard method (10, 11)of gestational age assessment. When the information regarding physical evaluation was not available or when the evaluation had not been carried out, time of amenorrhea was used, calculated from the date of the woman's last menstrual period, as provided by the woman herself.

Those records in which it was not possible to calculate the inter- pregnancy interval were excluded.

Based on previous studies, the inter-pregnancy interval was classified as: <6 months, 6–11 months, 12–17 months, 18–23 months, 24–59 months and >59 months [6, 7].

The outcomes analysed were:

Socio-demographic and obstetrical characteristics were determined for each interval, as well as the rates of adverse events in each inter-pregnancy interval category.

Non-adjusted odd ratio estimates were calculated with 95% confidence intervals for a preliminary evaluation of the associations between each category of inter-pregnancy interval and the measurements of outcome considered. The interval of 18–23 months was chosen as a reference because it had been similarly used in previous studies [5, 6, 8,9].

Results

A total of 244 records of non-nulliparous women, who gave birth to live, single infants at Saveetha medical college hospital, were identified and their data were compiled from the obstetrical and neonatal information system into the database of the present study.

Table1. Interpregnancy interval

Interpregnancy interval	No of mothers (n =244)
<6 months	**54(22.12%)**
6 months to 11 months	**75(30.73%)**
12 to 17 months	**38(15.57%)**
18 to 23 months	**22(9.08%)**
24 to 59 months	**33(13.52%)**
>59 months	**22(9.08%)**

The median inter-pregnancy interval was 21 months. Short intervals (<6 months) and long intervals (>59 months) were found in 22.12% and 9.8% of the records studied, respectively. A total of 68.5% of the deliveries occurred after inter-pregnancy intervals of <18 months.

The characteristics of the mothers are presented in Table 2. It was found that history of previous preterm births and previous stillbirths was more frequent in the group of women who had an inter-pregnancy interval <6 months. The perinatal outcomes are presented in Table 3.

Maternal factors:

Table 2. Interpregnancy interval and maternal outcomes

Maternal Parameters	Interpregnancy interval					
	<6 month (n=54)	**6–11 months (n =75)**	**12–17 months (n =38)**	**18–23 months (n =22)**	**24–59 months (n =33)**	**>59 months (n =22)**
Presentation (other than vertex) (n=9)	3(33.33%)	2(22.22%)	2(22.22%)	1(11.11%)	1(11.11%)	0
Abortion (n=54)	22(40.74%)	10(18.51%)	8(14.81%)	7(12.96%)	5(9.25%)	2(3.7%)
Anaemia (n=90)	36(40%)	19(21.11%)	16(17.77%)	8(8.88%)	8(8.88%)	5(5.55%)
Pregnancy induced hypertension (n=14)	5(35.71%)	3(21.48%)	2(14.28%)	1(7.14%)	2(14.28%)	1(7.14%)
Thyroid disorders (n=36)	10(27.77%)	3(8.33%)	3(8.33%)	5(13.88%)	6(16.66%)	9(25%)
Gestational diabetes mellitus (n=10)	1(10%)	2(20%)	2(20%)	3(30%)	1(10%)	1(10%)
Preterm birth (n=51)	16(31.37%)	11(21.57%)	4(7.8%)	3(5.88%)	4(7.8%)	1(1,96%)
Foul smelling vaginal discharge (n=34)	14(41.17%)	10(29.41%)	5(14.70%)	4(11.76%)	1(2.94%)	0
Leaking per vagina (n=38)	13(34.21%)	11(28.94%)	7(18.4%)	3(7.89%)	2(5.26%)	2(5.26%)
Oligohydramnios (n=18)	4(28.57%)	4(28.57%)	3(21.42%)	3(21.42%)	2(14.28%)	2(14.28%)

Foetal factors:

Table 3. Interpregnancy interval and Foetal outcomes

Foetal factors:	Interpregnancy interval					
	<6 month (n=54)	**6–11 months (n =75)**	**12–17 months (n =38)**	**18–23 months (n =22)**	**24–59 months (n =33)**	**>59 months (n =22)**
Heart rate (<110beats/min) in Cardio topography recording (n=3)	1(33.33%)	1(33.33%)	1(33.33%)	0	0	0
Foetal distress in Cardio topography (n=4)	2(50%)	1(25%)	1(25%)	0	0	0
Hypothermia (n=5)	2(40%)	1(20%)	1(20%)	0	1(20%)	0
Resuscitation required at birth (n=8)	3(37.5%)	2(25%)	1(12.5%)	1(12.5%)	1(12.5%)	0
Jaundice requiring treatment (n=94)	29(30.85%)	20(21.27%)	12(12.76%)	11(11.70%)	13(13.82%)	9(9.57%)
Respiratory distress (Respiratory rate >60 / min) (n=40)	14(35%)	11(27.5%)	5(12.5%)	3(7.5%)	3(7.5%)	4(10%)
Head circumference (<33cm) (n=12)	3(25%)	2(16.66%)	3(25%)	1(8.33%)	2(16.66%)	1(8.33%)
Birth weight (<2500 grams (n=24))	12(50%)	6(25%)	2(8.33%)	2(8.33%)	1(4.16%)	1(4.16%)
Neonatal Deaths (n=13)	7(53.84%)	3(23.07%)	1(7.69%)	1(7.69%)	1(7.69%)	0

Discussion

The results of the present study show that inter-pregnancy intervals of <6 months are associated with an increased risk for low birth weight infants, as well as for the birth of preterm infants and neonatal deaths. Some outcomes that have already been associated with inter-pregnancy interval in other studies (e.g. some maternal morbidities and the birth of small- for-gestational-age infants) showed no such association in this study.

The sample studied may be considered representative of the population from which it originates; however, it is possible that it may have been insufficient to demonstrate some weaker associations that may exist between inter- pregnancy interval and some of the maternal and perinatal outcomes studied. The increased risk of low birth weight infants is believed to be theresult of the birth of preterm infants and, in part, of small- for-gestational-age infants[6]. In the present study significant association was observed between inter-pregnancy interval and maternal outcomes like greater risk for the occurrence ofPremature rupture of membranes among cases with lesser intervals. The mechanism by which the inter-pregnancy interval may interfere with maternal and perinatal outcome has not yet been clarified. Our study also demonstrates that short inter- pregnancy interval is associated with increased abortion rates, increased incidence of anaemia, foul smelling liquor whereas there was a higher incidence of thyroid illness and oligohydramnios among mothers with greater interpregnancy interval.

These adverse maternal outcomes may be explained by the fact that greater interpregnancy interval permits recovery of maternal nutritional status following gestation and lactation for the subsequent gestation (the maternal nutritional depletion hypothesis [12]) and , more specifically, a depletion of folate may be involved in the occurrence of adverse perinatal events (folate depletion hypothesis [13]); however, further studies are required to validate either one of these hypotheses.

On the other hand, it has been suggested that the ideal inter-pregnancy interval is around 20 months, since the interval of 18–23 months has been associated with a lower occurrence of adverse maternal and perinatal events in other studies. In this respect, three large studies carried out recently in the United states identified a median inter- pregnancy interval of around 20 months, which may be indicative of the existence of a possible adaptive advantage associated with this inter-pregnancy interval [5, 14–16].

Despite the evidence of the independent association of birth spacing with some perinatal outcomes, there are still doubts with respect to its association with certain maternal and perinatal outcomes. There is also a scarcity of information regarding possible associations of inter-pregnancy interval and long-term childhood outcomes, which suggests the need for further studies.

A study based on relatively large hospital databases of data systematically collected may always deal with some limitations. This is mainly due to the fact that such a study will invariably be a secondary analysis of the data. In this current study, for instance, we had no information on possible induced or spontaneous abortion between deliveries. This could be a problem because ignoring abortions would increase the inter-pregnancy interval and early pregnancy loss is also a risk factor for adverse pregnancy outcomes. Unfortunately, the database did not contain such data. Similarly, it was not possible to assess the potentialrole of breastfeeding on the inter-pregnancy interval. It would be also necessary to note that we were not able to know how complete our ascertainment was of maternal outcomes and other perinatal adverse events. The SMCH's database contains only information on maternal and peri- natal events occurred at the maternity period stay.

Conclusion

The results of the present study show that short inter-pregnancy intervals are associated with poorer peri-natal outcome. The scientific evidence available would appear to suggest that the short and also the long inter- pregnancy intervals are associated with increased maternal and perinatal risk. This evidence points to critical moments at which gestation should be avoided and an optimal moment when conception, if desired, should be stimulated. The health professionals, mainly those involved with reproductive, child and family health, may use this information as motivation in puerperal and reproductive Maternal Child Healthcounselling, as well as to support women in their decisions with respect to family planning

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