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Original Research Article

Interpregnancy Interval and Perinatal Outcome

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Abstract

Aims: To study the impact of inter pregnancy interval on perinatal outcome.

Materials and Methods: In the Prospective observational study 100 antenatal women who were second gravida whose previous pregnancy ended in a live birth at term were studied in accordance to varying inter pregnancy intervals whose maternal and perinatal outcomes were observed.

Results: Severe anaemia was seen more in short interpregnancy interval.26.6% cases in short interpregnancy interval had severe anaemia. Overt diabetes mellitus (6.6%) was seen in long interpregnancy interval. GDM is not statistically associated with any of the interval groups. In this study, majority of Preterm, very and extremely preterm deliveries were in short interpregnancy interval is significant. Most of the cases in all intervals delivered vaginally. In long interpregnancy intervals 30% delivered by LSCS.IUD and Still births were 6.6% and 6.6% in short and long interpregnancy interval respectively. There was low APGAR babies seen in both short(6.6%) and long(6.6%) interpregnancy interval. 13.3%, 17.5%, 10% moderately low APGAR seen in short, normal and long interpregnancy intervals respectively. 36.6% and 20% women delivered low birth weight and very low birth weights respectively in short interpregnancy interval group, 30% LBW and 10% VLBW in long interpregnancy interval. There was one congenital anomaly in long interpregnancy interval which was meningomyelocele. 36.6% NICU admissions were in short interpregnancy interval and 30% NICU admissions in long interpregnancy interval. 10% and 13.3% neonatal deaths were there in short and long interpregnancy intervals respectively.

Conclusions: The risks for maternal and perinatal morbidity associated with short inter pregnancy intervals underscore the importance of birth spacing to promote safe motherhood and achieve better pregnancy outcomes.

Keywords: Interpregnancy interval, NICU admissions, Still births, preterm deliveries.

Introduction

Interpregnancy interval is considered as the time elapsed between the pregnancies and is calculated as the number of months between the date of the last child birth and the date of last menstrual period of the index pregnancy.Pregnancy is recognized as a window to future health because complications during pregnancy, such as gestational diabetes mellitus, gestational hypertension, preeclampsia, and foetal growth restriction are associated with risk of health complications later in life.

Both short and long interpregnancy intervals are associated with increased risks of preterm birth, low birth weight, small-for-gestational-age birth, and neonatal intensive care unit admission. Longer interpregnancy intervals have also been associated with increased risk of preeclampsia.Short interpregnancy interval is defined as conception after less than 18 months and long interpregnancy conception after more than 36 months. An interval of 18 to 23 months is considered the optimal interpregnancy interval.Women should be advised to avoid interpregnancy intervals shorter than 6 months and should be counselled about the risks and benefits of repeat pregnancy sooner than 18 months. [1,2,3,4]

Interpregnancy intervals of greater than 5–10 years also associated with increased risk of adverse outcomes. The World Health Organization currently recommends that the interval between a woman's previous delivery and her subsequent

conception (the interpregnancy interval) should be a minimum of 2 years. It is important to determine whether interpregnancy interval is truly a significant independent biological risk factor for adverse pregnancy outcomes and associated maternal and perinatal morbidity and mortality.[5,6] It helps the medical practitioners, nurse and midwife to advice women about planning of next pregnancy. So this study has been undertaken to identify complications associated with short and long interpregnancy interval on perinatal outcome in second gravida women.

Materials and Methods

It is a Prospective observational study in100 patients who were second gravida were randomly selected from the first antenatal visit and followed up till the discharge of the mother and the neonatefrom November 2019-June 2021. Data was collected on reproductive history, maternal characteristics, antenatal care, labour management, maternal complications during pregnancy, delivery, puerperium and neonatal outcomes. The study was conducted in 100 antenatal women admitted in theObstetrics and Gynaecology department, Gandhi hospital during the period of November 2019 to June 2021.

Inclusion Criteria

Age between 20 to 35 years with only second gravida booked cases women delivering singleton infants and whose previous pregnancy ended in live birth at term were included in the study.

Exclusion Criteria

Multiplepregnancies, Previous LSCS, Previous preterm delivery, Previous history of preeclampsia, Multigravida.

Maternal age was defined as completed years at the time ofconception. Maternal height and weight were recorded at thepatient's 1st antenatal visit and BMI wascalculated. It was categorized as underweight (<18.5), normal (18.5-24.9), overweight (25.0-29.9) and obese (>30).

Gestational age was estimated from the date of LMP and amended by means of ultrasound. Interpregnancy interval was defined as the timeelapsed between the date of the last child birth and the date of LMP of the index pregnancy. Interpregnancy intervals were categorized as short interpregnancy interval(<18 months), normal interpregnancy interval(19-35 months), long interpregnancy interval(>36 months).[5]

Adverse maternal outcomes were classified according to the ICD-10(international classification of diseases). The adverse outcomes included were anaemia, pre eclampsia, gestational and overt diabetes mellitus.

Results

In our study of 100 cases 30% cases were in short interpregnancy interval,40%in normal interpregnancy interval and 30% in long interpregnancy interval.

Table 1: Demographic Distribution

Age intervals	Short	Normal	Long
20-25 years	17(56.6%)	14(35%)	6(18%)
26-30 years	8(26.6 %)	18(45%)	8(20%)
31-35 years	5(16.6 %)	8(20%)	13(43.3 %)
BMI			
18.5 (underweight)	3(10%)	3(7.5%)	2(6.6%)
18.6-24.9 (normal)	16(53.3%)	18(45%)	8(26.6%)
25-29.9 (overweight)	8(26.6%)	13(32.5%)	15(50%)
>30 (obese)	3(10%)	6(15%)	5(16.6%)
Antenatal Care Onset			
1st trimester	3(10%)	25(62.5%)	20(66.6%)(30%)
2nd trimester	19(63.3%)	12(30%)	8(26.6%)
3rd trimester	8(26.6%)	3(7.5%)	2(6.6%)
Antenatal Visits			
a(<4 visits)	22(73.3%)	10(25%)	8(26.6%)
b(>4visits)	8(26.6%)	30(75%)	22(73.35)

Majority of younger age group were in short interpregnancy interval with p value 0.007 which is statistically significant and majority of 31-35 age group were in long interpregnancy interval with p value 0.009(statistically significant). The mean age in the present study is 27 years. Majority of obese and overweight BMI were in long interpregnancy interval than other interval groups, and majority of underweight and normal BMI were in normal and short interpregnancy interval group. In short interpregnancy interval, majority of cases had their first antenatal visit in 2nd trimester, and in normal

and long interpregnancy interval majority of the cases had their first antenatal visit in 1st trimester. In short interpregnancy interval, majority of the cases had <4 antenatal visits and in normal and long interpregnancy intervals majority of the cases had >4 antenatal visits.

Table 2: Pregnancy complications in study

Variable	Number of cases	%	p valve
severe anaemia			
Short	8	26.6%	0.01
Normal	3	7.5%	0.1
Long	3	10%	0.4
PIH			
Short	2	6.6%	0.2
Normal	4	10%	0.6
Long	6	20%	0.1
GDM			
Short	2	6.6%	0.9
Normal	3	7.5%	0.8
Long	2	6.6%	0.9
OVERT DM			
Short			
Normal			
Long	2	6.6%	0.02

Majority of severelyanaemic cases with p value 0.01 which is significant were in short interpregnancy interval. Majority(20%) of PIH cases were there in long interpregnancy interval. In this study PIH is not significantly associated with any of the intervals with p value of >0.05. GDM is not significantly associated with any of the intervals, but Overt DM is associated with long interpregnancy interval with p value 0.02 which is significant.

Table 3: Maternal outcome in present study

Gestational Age	Short	Normal	Long
>37 wks	16(53.3%)	34(85%)	24(80%)
32-36wks (preterm)	11(36.6%)	5(12.5%)	5(16.6%)
<31 wks (very and extremely preterm)	3(10%)	1(2.5%)	1(3.3%)
Mode of delivery			
Vaginal Delivery	24(80%)	30(75%)	21(70%)
Caesarean Section	6(20%)	10(25%)	9(30%)

Majority of Preterm, very and extremely preterm deliveries were in short interpregnancy interval with p value 0.004 which is significant. In this study majority of cases delivered vaginally in all interval groups.

Table 4: Neonatal outcome in present study

Baby Status	Short	Normal	Long
Live	28(93.3%)	39(97.5%)	28(93.3%)
Dead	2(6.6%)	1(2.5%)	2(6.6%)
APGAR			
A(7-10)	22(73.3%)	33(82.5%)	23(76.6%)
B(4-6)	4(13.3%)	6(15%)	3(10%)
C(<3)	2(6.6%)	-	2(6.6%)
Birth Weight			
>2.5	13(43.3%)	25(62.5%)	18(60%)
1.6-2.4 (LBW)	11(36.3%)	13(32.5%)	9(30%)
<1.5 (VLBW)	6(20%)	2(5%)	3(10%)

IUD/Still births were more in both short and long interpregnancy interval than normal interpregnancy interval. Babies with APGAR <3 were 6.6% in both short and long interpregnancy interval, babies

with moderately low APGAR were 13.3%, 15%, 10% in short, normal and long interpregnancy intervals respectively.

Majority(56.6%) of low and very low birth weight babies were in short interpregnancy interval with p value-0.09(not significant). 40% of the low and very low birth weight babies were in long interpregnancy interval with p value-0.5(not significant).

There was one congenital anomaly (meningomyelocele) in long interpregnancy interval, may be due to overt diabetes mellitus.

Table 5:NICU Admissions and Neonatal Deaths

NICU Admissions	Number of cases	Percentages	P- Value
Short	11	36.6%	0.2
Normal	8	20%	0.1
Long	9	30%	0.7
Neonatal Deaths			
Short	3	10%	0.8
Normal	2	5%	0.2
Long	4	13.3%	0.3

In short inter pregnancy interval 11 neonates(36.6%) required NICU admission majority due to prematurity and low birth weight In normal interpregnancy interval 8 neonates(20%) required NICU admission majority due to Respiratory distress In long interpregnancy interval 9 neonates(30%) required NICU admission majority due to Meconium aspiration syndrome and Respiratory distress syndrome. In short interpregnancy interval there were 3(10%) neonatal deaths. causes of death- 1.prematurity, VLBW2. ELBW3. Prematurity with severe birth asphyxia.

In normal interpregnancy interval there were 2(5%) neonatal deaths. Causes of deaths-prematurity, VLBW, moderate birth asphyxia, Early onset sepsis with shock. In long interpregnancy interval there were 4(13.3%) neonatal deaths. Causes of death Prematurity, VLBW, Severe birth asphyxia.Severe IUGR with perinatal asphyxia. Meconium aspiration syndrome, primary pulmonary hypertension. 4.Meconium aspiration syndrome.

Discussion

In the present study 100 antenatal women who were second gravida whose previous pregnancy ended in a live birth at term were studied in accordance to varying interpregnancy intervals whose maternal and perinatal outcomes were analysed. In this study 30% of cases were in short interpregnancy interval, 40% of the cases were in normal interpregnancy interval and 30% of the cases were in long interpregnancy interval.

Women with shorter IPIs were more likely to be young and women with long IPIs were more likely to have high maternal age. In this study, 56.6% of cases in short interpregnancy interval were in the age group of 20-25 years with p value-0.007 which is statistically significant and 43.3% of cases in long interpregnancy interval were in the age group of 30-35 years with p value 0.009 which is statistically significant. This is consistent with northern Tanzania study [7] and USA study that showed younger mothers had a shorter IPI and older women a longer IPI [8]

In this study there were 26.6% severely anaemic cases in short interpregnancy interval with p value 0.01 which is statistically significant. Pregnant women with short IPI are three times more likely to develop anaemia than their counterparts with normal IPI. The reason for this observation is unclear but may be related to the already described “maternal depletion hypothesis.”There appears to be insufficient time to restore nutritional reserves needed to support foetal growth and development in subsequent pregnancy. This is because repletion of stores often takes several months.

This is consistent with the study in Nigeria, the incidence of anaemia in pregnancy is very high, ranging from 32.5 to 64.1% [9], A total of 292 eligible participants were recruited for the study; however, 271 concluded the study. Of the 271 participants, 134 had normal IPI while 137 had short IPI. The mean haemoglobin concentration of participants with short IPI was 10.03 (2.3) (95% CI: 9.311.2) gm/dl, while that of the control was 11.4 (2.6) (95% CI: 9.712.3) gm/dl. The observed difference was statistically significant (mean difference: 1.4, 95% CI 0.791.97; $P < 0.001$). The incidence of maternal anaemia was significantly higher in women with short IPI than control (RR: 2.091; 95% CI: 1.4433.031; $P < 0.001$) This study is also consistent with thestudy carried out by Dr. Shreya Mor et al, estimated incidence of anaemia among pregnant women in India is 50%(National Family Health Survey 2015- 2016).In their study, incidence of anaemia was found to be 58.5% in women with normal interpregnancy interval which is significantly higher than the national average and 42.8% in women with long interpregnancy interval.[10]

In this study majority of pregnancy induced hypertension cases were associated with long interpregnancy interval with p- value 0.1(statistically not significant). This is consistent with a retrospective population-based cohort study which was conducted among 103 909 women who delivered three or more consecutive singleton births (n = 358 046) between 1980 and 2015 in Western Australia.The incidence of preeclampsia and gestational hypertension during their study period was 4%, and 2%, respectively. For the between-mother comparison, mothers with intervals of 6-11 months had lower risk of preeclampsia with adjusted relative risk (RR) 0.92 (95% confidence interval [CI] 0.85, 0.98) compared to reference category of 18-23 months. With the within-mother matched design, they estimated a larger effect of long IPI on risk of preeclampsia (RR 1.29, 95% CI 1.18, 1.42 for 60- 119 months; and RR 1.30, 95% CI 1.10, 1.53 for intervals ≥120 months) compared to 18-23 months. Short IPIs were not associated with hypertensive disorders of pregnancy.[11]

In this study, GDM cases were not statistically associated with any of the interval.6.6% cases of long interpregnancy interval had overt DM with p-value 0.02 which is statistically significant. This is consistent with Amanuel T. GebremedhinMPH et.,al [11] who conducted a retrospective cohort study using matched and unmatched approaches to examinethe association between IPI and risk of gestational diabetes for all mothers who gave birth between January 1st, 1980, and December 31st, 2015 in Western Australia (WA). There were 1716 (1.6%) mothers who had a diagnosis of gestational diabetes . For all births included in the cohort, the incidence of gestational diabetes during the study period was 4%. There were 16,548 (6%) births which occurred after an IPI of 0–5 months, 45,076 (18%) after 6–11 months, 50,528 (20%) after 12–17months; 37,352 (15%), after 18–23months; 78,909 (31%) after IPI of 24– 59 months, 21,780 (9%) births after 60–119 months and 3944 (1.6%) of births after 120 or more months. Gestational diabetes diagnosis were more common among mothers in the older age groups, and in mothers with longer IPIs. Moreover, mothers with shorter IPIs tended to be younger and non-Caucasian. Observation of longer IPIs was more prevalent late in their study period (1995 onwards).[11] This study is consistent with study done by pravinShrestha in 2020, there was only one case of overt diabetes mellitus which was in interpregnancy interval >59 months.[12]

In our study, majority(56.6%) of low and very low birth weight babies were in short interpregnancy interval with p value-0.09(not significant). 40% of the low and very low birth weight babies were in long interpregnancy interval with p value-0.5(not significant). This is consistent with the Study in Utah between January 1, 1989, and December 31, 1996. Of the 173,205 infants in their study population, 4.3 percent had a low birth weight, 5.7 percent were born prematurely, and 8.6 percent were small for their gestational age; 5.4 percent were conceived less than 6 months after the previous live birth, and 1.8 percent were conceived 120 months or longer after the previous live birth. The median interpregnancy interval was 23.8 months. In their study both short and long IPIs were associated with higher risks of preterm birth, and low birth weight. They found that infants born 18–36 months after the previous birth had the lowest risk of preterm birth and perinatal death as compared to those who were born after shorter or longer IPIs. In addition, short IPI was associated with an increased risk of perinatal death, but the risk of perinatal death decreased with an increase in IPI. They also noted that the risk of perinatal death goes up with long IPI. This study is also consistent with study by Adam and colleagues in Sudan who found that women who conceived after IPI of less than 18 months were more likely to have preterm birth and low birth weight infants compared with those who conceived after of 18–30 months.

In our study, the adverse perinatal outcomes were high in both short and long interpregnancy intervals than normal interpregnancy interval. There were 6.6% and 6.6% IUD/ still birth babies in both short and long interpregnancy intervals, whereas there were only 2.5% IUD/ Still birth babies in normal interpregnancy intervals. Babies with APGAR <3 were 6.6% each in both short and long interpregnancy interval, babies with moderately low APGAR were 13.3%, 15%, 10% in short, normal and long interpregnancy intervals respectively. This is consistent with the study done by Zhu et al.[13] The risk of adverse perinatal outcomes was high if the interpregnancy interval was less than three months. The respective risks declined rapidly as the interpregnancy interval increased and were the lowest for women with interpregnancy intervals of 18 to 23 months. The risks increased linearly for women with interpregnancy intervals longer than 23 months.[13]

In this study, majority of Preterm, very and extremely preterm deliveries were in short interpregnancy interval with p value 0.004 which is significant. There were 10% and 13.3% neonatal deaths in short interpregnancy and long interpregnancy interval respectively and 5% neonatal deaths were in normal interpregnancy interval. This is consistent with a retrospective cohort studyconducted in Scotland among 89143 women about association between interpregnancy interval and preterm birth and neonatal death. Interpregnancy interval of less than six months was associated with an increased risk (compared with

an interpregnancy interval of 18-23 months) of spontaneous preterm birth, preterm both 24-32 weeks (adjusted odds ratio 2.2, 95% confidence interval 1.2 to 4.1) and 33-36 weeks (1.6, 1.2 to 2.2). This study is consistent with the Nabukera SK et alstudy found the association between adverse perinatal outcomes with both short and long IPIs.[14] A study in Israeli by Grisaru-Granovsky and colleagues15also consistent with thisstudy,they found that women who conceived at either shorter (less than 6 months), or longer (60 months) IPIs had greater risk of preterm birth.

Limitations

Our study was limited to 2nd gravida women and only investigated only one interpregnancy interval. This study included age between 20-35 years, excluded women age under 20years and over 35 years as there are many confounding factors in teenager and elderly women.

This was a pilot study and there is a need for a larger population based study to evaluate the other pregnancy outcomes. It is possible with a larger population sample size.

Conclusion

Both short and long inter pregnancy intervals are associated with adverse maternal and perinatal outcomes. Women with short interpregnancy interval are at increased risk of anaemia and women with longer inter pregnancy interval are at increased risk of pre- eclampsia, GDM and overt diabetes. Both short and long intervals between the pregnancies increases the risk of preterm birth, low birth weight and growth restricted foetus. The risks for maternal and perinatal morbidity associated with short inter pregnancy intervals underscore the importance of birth spacing to promote safe motherhood and achieve better pregnancy outcomes. In addition, women should be warned about the potential harm to them and their infants of short and long intervals between the pregnancies. Encouraging child spacing by use of contraceptive methods that can lengthen the inter pregnancy interval shall be a good health policy.

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