Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

ORIGINAL RESEARCH ARTICLE

Study on inter-delivery interval and pregnancy outcome

Dr Nupur Ghosh[1], Dr Kajal Kumar Patra[2*], Dr Rumpa Das[3], Dr Kishore P Madhwani[4]

1. SR, Dept of Gynae and Obstetrics, Burdwan Medical College and Hospital, West Bengal, India
2. Professor and Head, Dept of Gynae and Obstetrics, Gouri Devi Institute of Medical Science, Durgapur, West Bengal, India
3. SR, Dept of Gynae and Obstetrics, Burdwan Medical College and Hospital, West Bengal, India
4. Senior Medical Consultant, Mumbai, Maharashtra, India

Author for correspondence:
Dr Kajal Kumar Patra
Professor and Head, Dept of Gynae and Obstetrics
Gouri Devi Institute of Medical Science
GT Road, National Highway 2, Rajbandh,
Durgapur, West Bengal 713212, India
Mobile : +91 9830212433
Email: drmch2000@gmail.com

Running Title: Interdelivery interval and pregnancy outcome

ABSTRACT

Background: Spacing of birth is an important parameter affecting maternal and foetal health. Optimal birth spacing provides multiple benefits for both mother and her child. Both short and long inter-delivery interval (IDI) is associated with multiple adverse perinatal outcomes. Therefore, inter-delivery interval is viewed as a potential modifiable risk factor for adverse foetal-maternal outcome. The objective of the study was to study the association of inter-delivery interval and pregnancy outcome in a tertiary care hospital, West Bengal, India.
Methods: This Prospective hospital based study was done in Dept of Gynae and Obstetrics, Burdwan Medical College and Hospital, West Bengal, India for a period of 18 months from February 2021 to July 2022. All multigravida women with atleast three antenatal check-ups were included in the study. The data were statistically analysed using Microsoft Excel and SPSS software.
Results: Most common age group of the mother was found 20-25 years 64 (64%), followed by 26-30 years 24 (24%). Maximum mothers were parity 3 i.e. 48 (48%), followed by parity 2, 40 (40%). Ectopic was present in 12 (12%) of mothers. Preterm <32 weeks was present in 12 (12%), preterm <36 weeks was present in 20 (20%), induction of labour (IOL) was present in 16 (16%) and cesarean delivery (CS) was observed in 24 (24%) of mothers. Normal birth weight babies delivered were 76 (76%%) and low birth babies delivered were 24 (24%). Maximum interval from last miscarriage was 6-12 months i.e. 32 (320%), followed by 19-24

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

months 24 (24%) and 13-18 months 20 (20%). Miscarriage was observed in 20 (20%) mothers and still birth was 4 (4%). Anaemia was present in 34 (34%) mothers. **Conclusions:** Lack of contraceptive use significantly increases the risk of short IDI which increases the risk of preterm delivery, maternal anaemia PPH and scar rupture in post-CS pregnancy.
Keywords: Birth spacing, Contraceptive use, Preterm delivery

INTRODUCTION

Maternal and child health are considered as parameters of quality of healthcare of any nation. Birth spacing or IPI is an important affecting factor as both short and long IPI are associated with multiple adverse perinatal outcomes. World Health Organisation (WHO) recommends that birth spacing should be a minimum of two years. Recent studies by United States Agency for International Development (USAID) have suggested a birth spacing of 3-5 years might be more advantageous.[1] Globally around 25% birth still occurs at an interval of less than 24 months. Most cases were seen in Central Asia (33%) and Sub-Saharan Africa (20%).[2] It is estimated that, if all IPI were fixed at a minimum of three years around 6 million of under five deaths could be averted annually.[3] Both short (<18 months) and long (>59 months) IPIs are associated with increased risks of adverse perinatal outcomes such as preterm birth, low birth weight, small for gestational age and need for NICU admission.[4] Conversely, the effect on maternal complications during pregnancy has received less attention. Some studies had shown that short IPI is associated with Premature Rupture of Membrane (PROM), placental abruption, placenta praevia, Gestational Diabetes Mellitus (GDM) and increased risk of scar rupture in postcaesarean mothers. Similarly, long IPIs have long been related to increased risk of pre-eclampsia and labour dystocia.[5] A study also found that birth spacing is also related to long term cognitive development in children.[6] Besides the health implications, closely spaced birth intervals accelerate the population growth, and prevent women from contributing to society. According to WHO's Global Health Observatory, birth spacing is the option of individual or couples and it can be modified by making them aware of modern contraceptive methods and technologies. The importance of birth spacing has been a primary focus for researchers and policy makers.

Objectives

With this background, the current study was undertaken to study the association of inter-delivery interval and pregnancy outcome in a tertiary care hospital, West Bengal, India

METHODS

It was a prospective observational study, done at the Department of Gynaecology and Obstetrics, Burdwan Medical College and Hospital a tertiary level hospital in Kolkata, West Bengal, India. The duration of the study was 18 months (February 2021 to July 2022). The study was approved by Institutional Ethics Committee of R.G. Kar Medical College and Hospital, Kolkata, (Memo no. BMC/495 DT 30/01/21). All multigravida women with singleton pregnancy admitted in the labour ward, during the study period were taken as the study population.

Sample size was determined by using the effect sizes from the previously published studies and with the help of following formula:

$$n = z^2 \frac{pq}{(me)^2}$$

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

me=0.0285 (margin of error)
Thus 100 mothers were included in the study based on the following inclusion and exclusion criteria.

Inclusion Criteria : All multigravida women carrying a singleton pregnancy having a reasonable information and records of previous and current pregnancy and having atleast three antenatal visits during the present pregnancy were included in the present study.

Exclusion Criteria : Primigravida, women with multiple gestation a past history of preterm delivery or abortion in between previous pregnancy and index pregnancy or with cervical incompetence and uterine anomalies were excluded from the study.

Data collection was started after getting approval from the institutional ethical committee. Selection of the study subjects were done according to the inclusion and exclusion criteria. All details of the study were explained to the mothers and consent was obtained from each of them. Proper history and clinical examination were done and assessed using a preformed questionnaire.

Data has been collected, recorded and compiled on Microsoft Excel data sheet. Statistical analysis was performed using SPSS software (version 19.0, SPSS Inc.). For continuous variables, data was presented as mean ± standard deviation or median with range. A p value <0.05 was considered as statistically significant.

Results

A hospital based prospective observational study was carried out in Department of Gynaecology and Obstetrics, Burdwan Medical College and Hospital, a tertiary level hospital in Kolkata, West Bengal, India. The duration of study wad 18 months (February 2021 to July 2022). Based on the inclusion and exclusion criteria 100 mothers were included in the study.

Table 1 : :Demographic profile of study participants (n=100)

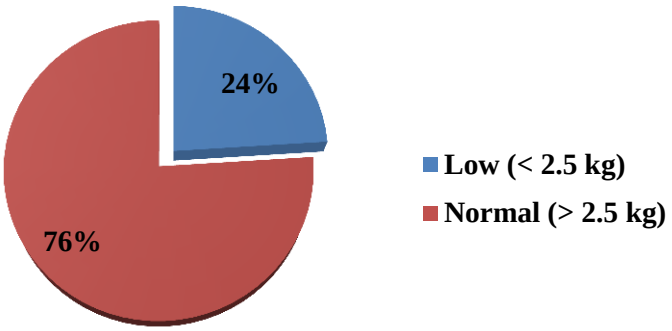
Parameters	Frequency (n)	Percentage (%)
Age of Mother		
< 20	8	8.0
20-25	64	64.0
26-30	24	24.0
> 30	4	4.0
Smoking		
Smoker	12	12.0
Non-Smoker	88	88.0
Parity		
2	40	40.0
3	48	48.0
4	12	12.0
Previous LSCS		
0	76	76.0
1	16	16.0
2	8	8.0
Previous VD		
0	56	56.0
1	40	40.0

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

2	4	4.0
Ectopic		
Yes	12	12.0
No	88	88.0
Preterm <32 weeks	12	12
Preterm <36 weeks	20	20
Induction of labour (IOL)	16	16.0
Cesarean delivery (CS)	24	24.0

In Table 1 demographic profile of the study participants were depicted. Most common age group of the mother was found 20-25 years 64 (64%), followed by 26-30 years 24 (24%), < 20 years 8 (8%) and > 30 years 4 (4%). History of smoking was resent in 12 (12%), maximum mothers were parity 3 i.e. 48 (48%), followed by parity 2, 40 (40%) and parity 4, 12 (12%). Previous history of LSCS was found in 24 (24%) of mothers. Previous history of vaginal delivery was found in 44 (44%) of mothers. Ectopic was present in 12 (12%) of mothers. Preterm <32 weeks was present in 12 (12%), preterm <36 weeks was present in 20 (20%), induction of labour (IOL) was present in 16 (16%) and cesarean delivery (CS) was observed in 24 (24%) of mothers. (Table 1)

Figure 1 : Distribution of mother according to low birth weight babies delivered the study (n=100)



Normal birth weight babies delivered were 76 (76%%) and low birth babies delivered were 24 (24%). (Figure 1)

Table 2 : Distribution of mothers according to interval from last delivery (n=100)

Interval from last delivery (Months)	Frequency (n)	Percentage (%)
< 6 months	12	12
6-12 months	32	32
12-18 months	20	20
18-24 months	24	24
> 24 months	12	12
Total	**100**	**100.0**

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

In Table 2 it was observed that maximum interval from last miscarriage was 6-12 months i.e. 32 (320%), followed by 18-24 months 24 (24%), 12-18 months 20 (20%), < 6 months 12 (12%), and 24 months 12 (12%).

Table 3 : Distribution of mother according to different complications in the study (n=100)

Placenta praevia	Frequency (n)	Percentage (%)	P value
Yes	16	16	0.296
No	84	84	
Placental abruption			
Yes	8	8	0.103
No	92	92	
Pregnancy induced hypertension (PIH)			
Yes	16	16	0.296
No	84	84	
Fetal growth restriction (FGR)			
Yes	12	12	0.146
No	88	88	
Anaemia	34	34	0.137

While observing different complications among the mother's placenta praevia was seen in 16 (16%) cases, placental abruption was present in 8 (8%) cases. Pregnancy induced hypertension was present in 16 (16%) mothers and Fetal growth restriction was present in 12 (12%) cases. Anaemia was present in 34 (34%) mothers. (Table 3)

Table 4 : Comparing the perinatal outcome between the five groups according to interval from last delivery.

Neonatal parameters		Group A < 6 months (n=12)	Group B 6-12 months (n=32)	Group C 12-18 months (n=20)	Group D 18-24 months (n=24)	Group E > 24 months (n=12)	p-value
Miscarriage	Yes	0 (%)	6 (6%)	5 (5%)	6 (6%)	3 (3%)	0.419
	No	12 (12%)	26 (26%)	15 (15%)	18 (18%)	3 (9%)	
Still birth	Yes	1 (1%)	0 (0%)	1 (1%)	3 (3%)	2 (2%)	0.248
	No	11 (11%)	32 (32%)	19 (19%)	21 (21%)	10 (10%)	
Preterm birth	Yes	1 (1%)	2 (2%)	3 (3%)	2 (2%)	3 (3%)	0.444

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

	No	11 (11%)	30 (30%)	17 (17%)	22 (22%)	9 (9%)	
Birth weight (in grams)	≥=2500	4 (4%)	8 (8%)	4 (4%)	4 (4%)	4 (4%)	0.727
	1500-2499	8 (8%)	24 (24%)	16 (16%)	20 (20%)	8 (8%)	
APGAR score (1 minute)	<7	4 (4%)	19 (19%)	6 (6%)	12 (12%)	6 (6%)	0.256
	>7	8 (8%)	13 (13%)	14 (14%)	12 (12%)	6 (6%)	
APGAR score (5 minute)	<7	9 (9%)	11 (11%)	8 (8%)	12 (12%)	(9%)	0.042
	>7	3 (3%)	21 (21%)	12 (12%)	12 (12%)	3 (3%)	
Pregnancy induced hypertension (PIH)	Yes	3 (3%)	7 (7%)	2 (2%)	3 (3%)	1 (1%)	0.588
	No	(9%)	25 (25%)	18 (18%)	21 (21%)	11 (11%)	
NICU/SNCU admission	Yes	4 (4%)	2 (2%)	2 (2%)	3 (3%)	3 (3%)	0.358
	No	8 (8%)	30 (30%)	18 (18%)	21 (21%)	(9%)	
Cesarean delivery (CS)	Yes	4 (4%)	4 (4%)	5 (5%)	8 (8%)	3 (3%)	0.398
	No	8 (8%)	28 (28%)	15 (15%)	16 (16%)	(9%)	
Fetal growth restriction (FGR)	Yes	3 (3%)	5 (5%)	1 (1%)	2 (2%)	1 (1%)	0.447
	No	(9%)	27 (27%)	19 (19%)	22 (22%)	11 (11%)	

Comparison based on perinatal outcome between group A, B, C and D: Perinatal complications were compared in terms of Miscarriage, Still birth, Preterm birth, low birth weight (defined as birth weight <2500 grams), APGAR score at 1 and 5 minutes, Pregnancy induced hypertension, NICU/SNCU Admission, Cesarean delivery and Fetal growth restriction. (Table 4)

Discussion:

The present study aimed to study the association of inter-delivery interval and pregnancy outcome in a tertiary care hospital, West Bengal, India.

In our study most common age group of the mother was found 20-25 years 64 (64%), followed by 26-30 years 24 (24%), < 20 years 8 (8%) and > 30 years 4 (4%). History of smoking was resent in 12 (12%), maximum mothers were parity 3 i.e. 48 (48%), followed by parity 2, 40 (40%) and parity 4, 12 (12%). Previous history of LSCS was found in 24 (24%) of mothers. Previous history of vaginal delivery was found in 44 (44%) of mothers.

Understandably, the use of contraceptives was more in Group B. Women not using contraceptives were 4.42 times more likely to have a short IPI as reported by Tsegaye D et al.,.[7] Unplanned pregnancies were associated with a shorter IPI as documented by Kaharuza FM et al., in their study at Denmark in 2001.[8]

In present study Ectopic was present in 12 (12%) of mothers. Preterm <32 weeks was present in 12 (12%), preterm <36 weeks was present in 20 (20%), induction of labour (IOL) was present in 16 (16%) and cesarean delivery (CS) was observed in 24 (24%) of mothers.

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

Similar findings were reported in a study by Zhu BP et al.,.[9,10] Further studies by CC Onwuka et al., and by Riyanto DL et al., reported that there was a significant association between short IPI and preterm deliveries which is an independent risk factor for these mothers.[11,12]
In present study normal birth weight babies delivered were 76 (76%%) and low birth babies delivered were 24 (24%). maximum interval from last miscarriage was 6-12 months i.e. 32 (320%), followed by 19-24 months 24 (24%), 13-18 months 20 (20%), < 6 months 12 (12%), 25-36 months 8 (8%) and > 36 months 4 (4%). Miscarriage was observed in 20 (20%) mothers and still birth was 4 (4%). Similar results were shown in studies by Chen I et al., Zhu BP et al., Conde- Agudelo A et al.,.[9,10,13]
In our study while observing different complications among the mother's placenta praevia was seen in 16 (16%) cases, placental abruption was present in 8 (8%) cases. Pregnancy induced hypertension was present in 16 (16%) mothers and Fetal growth restriction was present in 12 (12%) cases. Anemia was present in 34 (34%) mothers.
Previous studies indicate that women with short intervals (<6 months) between pregnancies are at increased risk of maternal death, third trimester bleeding and premature rupture of membranes, puerperal endometritis, and anemia. Likewise, long intervals (>59 months) were associated with higher risks of pre-eclampsia and eclampsia. Overall, the evidence did not present a clear picture of any outcome that was included.[14] Also, a study conducted in Cairo revealed that the higher adverse effects on maternal health were associated with IPI of less than 6 months.[15] According to Mikolajczyk et al.[16], pregnant women with shorter IPI have a higher risk of maternal mortality and hypertensive disorders of pregnancy. The study done by Shahi and Kamjou[17] identified that the rates of pre-eclampsia and eclampsia were highest in the pregnant women with an interval of >60 months.
The present study was done in a single Institute. However, multicentric studies with large sample size would have better results. Some important confounders including data on fertility issues, pregnancy intention etc., were lacking. Further studies can be conducted in future by taking care of the confounding factors involved.

CONCLUSION

Lack of knowledge about benefits of birth spacing and contraceptive use significantly increases the prevalence of short IDI. This issue is relevant to public health and clinical practice because as seen in the current study, short IDI is a risk factor for adverse outcomes. Therefore, interventions to prevent such outcomes need to be emphasised in a developing and populous country like India.

Acknowledgements : Authors would like to acknowledge the patients who participated in this research study.
Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

References :

1. Martson C. Report of a WHO technical consultation on birth spacing. Geneva (Switzerland): World Health Organization; 2005.
2. Ajayi AI, Somefun OD. (Baltimore). Patterns and determinants of short and long birth intervals among women in selected sub-Saharan African countries Published online 2020 May 8. doi: 10.1097/MD.0000000000020118

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

3. Rustein SO. Effects of preceding birth intervals on neonatal, infant and under-five years mortality and nutritional status in developing countries: evidence from the demographic and health surveys. IJGO. 2005;89:S7-24.
4. Conde-Agudelo A, Rosas-Bermúdez A, Kafury-Goeta AC. Effects of birth spacing on maternal health: a systematic review. Am J Obstet Gynecol. 2007;196:297-308.
5. Hanley EG, Hutcheon JA, Kinniburgh BA, Lee L. Interpregnancy Interval and Adverse Pregnancy outcomes. Obstet Gynaecol. 2017;129:408-15.
6. Teti DM, Bond LA, Gibbs ED. Sibling-created experiences: Relationships to birth-spacing and infant cognitive development. Infant Behavior and Development. 1986;9(1):27-42.
7. Tsegaye D, Shuremu M, Bidira K. Practice of child spacing and its associated factors among women of child bearing age (15-49 years) in Illubabour zone, South West Ethiopia. IJNM. 2017;9(7):102-08
8. Kaharuza FM, Sabroe S, Basso O. Choice and chance: determinants of short interpregnancy intervals in Denmark. Acta Obstet Gynecol Scand. 2001;80(6):532-38.
9. Chen I, Jhangri GS, Lacasse M, Kumar M, Chandra S. Relationship between interpregnancy interval and adverse perinatal and neonatal outcomes in northern Alberta. J Obstet Gynaecol. 2015;37:598-605.
10. Zhu BP, Rolfs RT, Nangle BE, Horan JM. Effect of the interval between pregnancies and perinatal outcomes. N Engl J Med. 1999;340:589-94.
11. CC Onwuka, E O Ugwu,S N Obi, C I Onwuka, C C Dim,G U Eleje et al, Effects of short interpregnancy interval on maternal and perinatal outcomes: A cohort study of pregnant women in a low income country; Niger J Clin Pract. 2020;23(7):928-933.
12. Riyanto DL, Herdian FS, Sugiarta GY, Panjaitan HPB, Naomi KA, Hanifi M, et al. Short interpregnancy interval as a risk factor for anaemia in pregnancy: A retrospective cohort study in Duren Sawit, Jakarta, 2014-2016. ASL. 2017;23(7):6828-30.
13. Conde-Agudelo A, Rosas-Bermudez A, Kafury-Goeta AC. Birth spacing and risk of adverse perinatal outcomes: A meta-analysis. JAMA. 2006;295:564 el-8.
14. Ministry of Health and Population [Egypt], El-Zanaty and Associates, and ICF International. 2015. 2014 Egypt Demographic and Health Survey. Cairo, Egypt and Rockville, Maryland, USA: Ministry of Health and Population and ICF International Available at https://dhsprogram.com/pubs/pdf/FR302/FR302.pdf
15. Abdel El-Hamid A, Gaafar H. Adverse effects of interpregnancy interval on maternal health among pregnant women attending delivery at El-Manial University Hospital-Cairo University. Med J Cairo Univ 2011; 79(2):31–41.
16. Mikolajczyk R, Zhang J, Ford J, Grewal J. Effects of inter-pregnancy interval on blood pressure in consecutive pregnancies. Am J Epidemiol 2008; 168(4):422–6; https://doi.org/10.1093/aje/kwn115.
17. Shahi A, Kamjou A. Interpregnancy interval and pregnancy outcomes in pregnant women who refer to maternal hospitals of Bandar Abbas, Iran, 2001–2002. Med J Hormozgan Univ 2005; 9(3):197–201.