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Association of Interpregnancy Interval and Maternal Outcomes: A Retrospective Hospital Based Study

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Abstract

The interpregnancy interval (IPI) refers to the time between the birth of one child and the conception of the next pregnancy. Both short and long IPIs have been linked to adverse maternal outcomes. However, there is a lack of research on this topic in the Indian context. This cross-sectional study was carried out at an Indian medical college and hospital. Women with a history of previous abortions, stillbirth, nulliparity, or multiple pregnancies were excluded. A standardized form was used to collect demographic information. IPI was divided into four categories: less than 6 months, 6 months to <2 years, 2 years to <5 years and 5 years or more. Maternal outcomes were assessed and odds ratios were calculated. During the study period, there were 546 deliveries. A total of 490 women met the inclusion criteria after applying the exclusion criteria. Among these, 14 women (2.86%) had an IPI of less than 6 months, 340 women (69.39%) had an IPI of 6 to <2 years, 117 women (23.88%) had an IPI of 2 years to <5 years and 19 women (3.88%) had an IPI of 5 years or more. Women with a short IPI of <6 months had a significantly higher risk of fetal malposition, fetal growth restriction and hypertension. On the other hand, women with a longer IPI of 5 years or more had increased chances of preterm labor, oligoamnios, gestational diabetes and anemia. A majority of women in this study had an IPI of <2 years, which is below the minimum interval recommended by the World Health Organization (WHO). This highlights the need for increased awareness and accessibility of contraceptive options for postpartum women to ensure adequate spacing between pregnancies.

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Key Words
Interpregnancy interval, maternal outcomes, contraception

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INTRODUCTION

India ranks as the second most populous nation globally, with a burgeoning population that strains existing infrastructure. Despite governmental efforts to promote contraceptive use for birth spacing, there remains a gap in understanding, attitudes, and practices. Data from NFHS-4 indicates an 18-20% unmet need for family spacing, highlighting the significance of birth spacing to safeguard maternal health. Among various intervals between pregnancies, the interpregnancy interval (IPI)-delineated as the gap from live birth to a new pregnancy-is crucial. The World Health Organization recommends a minimum IPI of 2 years[1-3].

IPI significantly impacts pregnancy outcomes, as evidenced in literature and supported by theories such as the maternal depletion hypothesis. This theory posits that inadequate replenishment of maternal nutrients, notably folate, between closely spaced pregnancies, particularly among breast-feeding mothers, may lead to adverse outcomes. A notable prospective study in the Netherlands observed a negative correlation between short IPI and fetal growth, especially in women not supplementing with folic acid. The continuum of an infectious process from birth to subsequent pregnancy may also contribute to adverse outcomes in women with short IPI[4,5].

Conversely, the physiologic regression hypothesis links long IPI with adverse outcomes. A longer interval post-pregnancy can mimic the state of a first-time mother, yet longer IPIs have been associated with increased preeclampsia risk, particularly when exceeding 10 years. Socioeconomic factors, lifestyle, and access to contraception can influence feto-maternal outcomes related to IPI. Strategies like postpartum contraception provision can mitigate short IPIs, but controlling long IPIs is challenging, given factors like subfertility and partner availability[6].

Research on the impact of IPI on maternal outcomes remains inconclusive, especially in low-income nations[7]. Limited data exist on the Asian ethnicity's IPI impact, prompting this study in a populous Indian state's tertiary center. Understanding demographic factors and IPI's association with maternal outcomes is crucial, particularly in rural areas where primary physicians are pivotal in advocating for adequate pregnancy intervals.

MATERIAL AND METHODS

This research was conducted within the Department of Obstetrics and Gynecology an Indian medical college and hospital. The study followed a cross-sectional design, enrolling all postpartum women with previous live births who delivered at the hospital's postpartum ward. Excluded were women with prior abortions, previous stillbirths, nulliparous individuals, or those with multiple pregnancies. Written informed consent was obtained upon enrollment and participants who declined were not included in the study. A pre-structured form was utilized to collect demographic data such as age, residential area, educational level, and occupation.

The primary variable of interest was the IPI, defined as the duration between a live birth and the onset of a subsequent pregnancy, measured in months. The IPI categories were <6 months, 6 months to less than 2 years, 2 years to <5 years and 5 years or more. Following the World Health Organization's (WHO) recommendation of a minimum interval of 2 years after a live birth, the 2 years to <5 years range was considered as the reference interval for comparison of maternal outcomes.

Maternal outcomes assessed included hypertensive disorders of pregnancy, gestational diabetes mellitus (GDM), anemia, fetal growth restriction, amniotic fluid disorders, congenital anomalies, placental abnormalities, preterm labor, operative interventions and postpartum hemorrhage [8-10]. Additionally, labor complications like labor dystocia and mode of delivery were documented.

Statistical analyses encompassed descriptive statistics, frequency distributions (as applicable), Chi-square tests for associations and correlations between outcome variables and covariates and calculation of odds ratios for maternal complications relative to the reference interval. SPSS software version 19 was used for statistical analyses.

RESULTS AND DISCUSSIONS

During the study period, there were a total of 546 deliveries observed. After applying the inclusion and exclusion criteria, 490 women were enrolled for analysis. The demographic characteristics of these enrolled women were examined, with a focus on the IPI, calculated as the duration in months between the last live birth and the current pregnancy's initiation.

Among the 490 women, the majority had an IPI ranging from 6 months to <2 years, followed by 2 years to <5 years. (Table 1) presents the detailed demographic profile of the study participants. Statistical analysis revealed a significant difference in age distribution concerning different IPI categories. Notably, around three-quarters of young women (aged <20 years) had an IPI of <2 years. Conversely, among women over 35 years old, only 8.82% had an IPI exceeding 2 years. Primiparous women tended to have shorter IPIs compared to those with higher parity ($p< 0.05$). While there was no notable difference in IPI based on women's education levels, longer IPIs were observed among women whose male partners had higher education levels ($p<0.05$). Similarly, women from upper-middle or upper socioeconomic classes tended to have longer IPIs ($p<0.05$). Additionally, there was a significant association between antenatal visits

Table 1: Sociodemographic profile of study participants

Characteristics		Interpregnancy interval										
		<6 months		6 months-2 years		2 years-<5 years		≥5 years		Total		p-value
		n	%	n	%	n	%	n	%	n	%	
	Total	14	2.86	340	69.39	117	23.88	19	3.88	490	100.00	
Age	<20 years	0	0	1	0.20	0	0	0	0	1	0.20	<0.05
	20-35 years	13	2.65	317	64.69	107	21.84	17	3.47	454	92.65	
	>35 years	1	0.20	22	4.49	10	2.04	2	0.41	35	7.14	
	Mean age, years	29.2±4.9		28.8±5.1		29.3±4.8		31.1±5.1				
Residence	Rural	6	1.22	150	30.61	56	11.43	8	1.63	220	44.90	0.13
	Urban	8	1.63	190	38.78	61	12.45	11	2.24	270	55.10	
Parity	1	2	0.41	18	3.67	2	0.41	2	0.41	24	4.90	<0.05
	2	6	1.22	149	30.41	58	11.84	7	1.43	220	44.90	
	3	4	0.82	110	22.45	32	6.53	5	1.02	151	30.82	
	≥4	2	0.41	63	12.86	25	5.10	5	1.02	95	19.39	
Mother's Education	<8th grade	10	2.04	215	43.88	70	14.29	10	2.04	305	62.24	0.07
	9-12th grade	3	0.61	97	19.80	38	7.76	7	1.43	145	29.59	
	Graduate	1	0.20	27	5.51	9	1.84	2	0.41	39	7.96	
	Postgraduate	0	0.00	1	0.20	0	0.00	0	0.00	1	0.20	
Husband's Education	<8th grade	8	1.63	150	30.61	44	8.98	6	1.22	208	42.45	<0.05
	9-12th grade	4	0.82	136	27.76	51	10.41	10	2.04	201	41.02	
	Graduate	2	0.41	52	10.61	20	4.08	3	0.61	77	15.71	
	Postgraduate	0	0.00	2	0.41	2	0.41	0	0.00	4	0.82	
Socioeconomic status	Lower class	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	<0.05
	Upper-lower class	11	2.24	234	47.76	74	15.10	12	2.45	331	67.55	
	Lower-middle class	3	0.61	104	21.22	40	8.16	7	1.43	154	31.43	
	Upper-middle class	0	0.00	1	0.20	2	0.41	0	0.00	3	0.61	
	Upper class	0	0.00	1	0.20	1	0.20	0	0.00	2	0.41	
No. of ANC visits	≤4	9	1.84	200	40.82	69	14.08	13	2.65	291	59.39	<0.05
	5-8	4	0.82	115	23.47	38	7.76	4	0.82	161	32.86	
	>8	1	0.20	25	5.10	10	2.04	2	0.41	38	7.76	

Table 2: Correlation of maternal outcomes with IPI

	Interpregnancy interval								
Mode of delivery	<6 months		6 months-2 years		2 years-<5 years		>5 years		p-value
	n	%	n	%	n	%	n	%	
LSCS	8	1.63	186	37.96	65	13.27	8	1.63	<0.05
VD	6	1.22	154	31.43	52	10.61	11	2.24	
Total	14	2.86	340	69.39	117	23.88	19	3.88	

Table 3: Odds ratios of maternal complications with relation to IPI

IPI months	<6 months	6 months-2 years	2 years-<5 years	≥5 years
Factor	**Odd's Ratios**			
Preterm	0.65	0.9	Reference	3.65*
Anemia	0.91	0.86	Reference	1.36*
APH	0.12	0.81	Reference	0.29*
FGR	1.98*	0.74	Reference	1.1
GDM	1.23	0.99	Reference	2.06*
Hypertension	1.74*	1.32*	Reference	0.99
Malposition	4.12*	0.57	Reference	0.51
Oligo	0.48	0.89	Reference	2.39*
PPROM	1.18	1.04	Reference	1.35

*Statistically Significant

and IPI, with longer intervals linked to more antenatal visits (p<0.05).

(Table 2) illustrates the distribution of mode of delivery across different IPI categories. Notably, although a similar number of women in the 6 months to <2 years IPI group and the reference interval group underwent lower segment cesarean sections (LSCS), more women with shorter IPIs (<6 months) underwent LSCS procedures (p<0.05).

The odds ratios for obstetric complications were calculated using the reference interval of 2 years to <5 years (Table 3). Women with a short IPI of <6 months had a significantly higher risk of fetal malposition, fetal growth restriction and hypertension. On the other hand, women with a longer IPI of 5 years or more had increased chances of preterm labor, oligoamnios, gestational diabetes and anemia.

The IPI reflects couples' attitudes, awareness and desires regarding pregnancy planning. In this study, it was observed that 73% of women had an IPI less than the WHO-recommended minimum of 24 months, with 3% having a short IPI of <6 months[11]. Comparatively, a large study in Latin America found 46.2% of women with an IPI <24 months, of which 3% had an IPI <6 months and 20% had an IPI exceeding 60 months[10]. Similarly, a study in the Netherlands noted 49% of women with an IPI <24 months, with 3.8% having a short IPI (<6 months)[12]. This study's higher percentage of women with shorter IPI suggests significant gaps in contraceptive practices.

Among the participants, majority belonged to the lower socioeconomic class, with three-fourths having an IPI less than 2 years. In contrast, among the upper-middle class, lesser patients had an IPI <2 years. Correspondingly, a Dutch study reported 70% of women from the low socioeconomic class, with 82% having an IPI less than 24 months[12]. Additionally, this study found that younger women with lower parity and poorer socioeconomic status tended to have shorter IPIs. The husband's educational background directly influenced IPI duration, highlighting their role in family planning decisions. Women with shorter IPIs had fewer antenatal visits, consistent with findings from developing countries where such women often had lower education levels, resided in rural areas and had poorer socioeconomic status[11].

Studies have shown a "J-shaped" relationship between IPI and obstetric outcomes, with the lowest risk observed at 18-23 months, increasing with longer IPIs[13,14]. Short IPIs (<6 months) were associated with a higher risk of fetal malposition, fetal growth restriction, hypertension and cesarean sections. Conversely, longer IPIs (>60 months) were linked to preterm labor, anemia and gestational diabetes mellitus[15]. However, some studies have refuted the direct association of short IPIs with adverse birth outcomes, attributing previous findings to confounding factors like illiteracy and socioeconomic status[16-17].

While this study provides valuable insights into IPI's impact on maternal outcomes in India, its limitations include focusing solely on maternal outcomes, excluding life-threatening morbidity cases, and not examining perinatal outcomes. Further community-level studies are planned to better understand IPI's relation to both maternal and perinatal outcomes across health facilities.

CONCLUSION

The study underscores the concerning lack of family spacing awareness among couples. Social interventions, such as enhancing education levels and increasing access to contraceptives, can encourage optimal IPI, thereby enhancing maternal outcomes. Strengthening awareness campaigns about contraception and encouraging couples to adopt appropriate spacing practices, led by primary healthcare providers, can significantly contribute to achieving optimal maternal health. These research findings can guide policymakers in sensitizing healthcare professionals at all tiers to prioritize and promote the recommended IPI guidelines advocated by the WHO.

REFERENCES

1. WHO., 2007. Report of a WHO technical consultation on birth spacing: Geneva, Switzerland 13-15 June 2005. World Health Organization, Geneva, Switzerl and, https://www.who.int/publications/i/item/WHO-RHR-07.1.
2. NFHS., 2009. National family health survey, India. NFHS-4. National Family Health Survey, India., https://rchiips.org/nfhs/nfhs4.shtml.
3. Agrawal, S., M. Chaudhary, V. Das, A. Agarwal, A. Pandey, N. Kumar and S. Mishra, 2022. Association of long and short interpregnancy intervals with maternal outcomes. J. Family Med. Primary Care, 11: 2917-2922.
4. Himes, K.P. and H.N. Simhan, 2008. Risk of recurrent preterm birth and placental pathology. Obstet. Gynecol., 112: 121-126.
5. van Eijsden, M., L.J. Smits, M.F.V. Wal and G.J. Bonsel, 2008. Association between short interpregnancy intervals and term birth weight: The role of folate depletion. Am. J. Clin. Nutr., 88: 147-153.
6. NICE., 2019. Hypertension in adults: Diagnosis and management. The National Institute for Health and Care Excellence, UK., https://www.nice.org.uk/guidance/ng136.
7. Wendt, A., C.M. Gibbs, S. Peters and C.J. Hogue, 2012. Impact of increasing inter-pregnancy interval on maternal and infant health. Paediatr. Perinat. Epidemiol., 26: 239-258.
8. ACOG., 2013. Hypertension in pregnancy. Report of the American College of Obstetricians and Gynecologists' task force on hypertension in pregnancy. Obstet. Gynecol., 122: 1122-133.
9. Jain, R., V. Seshiah and Ministry of health and family welfare GOI, 2018. Diagnosis and management of gestational diabetes mellitus technical and operational guideline. Ministry of health and family welfare GOI, India, 10. 13140/RG. 2.2.11430.04166, https://www.researchgate.net/publication/351972456_Diagnosis_Management_of_Gestational_Diabetes_Mellitus_Technical_and_Operational_Guidelines.
10. 2011. Good clinical practice recommendations for iron deficiency anemia in pregnancy (IDA) in pregnancy in India. J. Obstet. Gynaecol. India, 61: 569-571.
11. Conde-Agudelo, A., J.M. Belizán, M.H. Norton and A. Rosas-Bermúdez, 2005. Effect of the interpregnancy interval on perinatal outcomes in latin America. Obstet. Gynecol., 106: 359-366.
12. De Weger, F.J., C.W. P.M. Hukkelhoven, J. Serroyen, E.R. te Velde and L.J.M. Smits, 2011. Advanced maternal age, short interpregnancy interval and perinatal outcome. Am. J. Obstet. Gynecol., 204: 4210-2147483647.
13. Zhu, B.P., 2004. Effect of interpregnancy interval on birth outcomes: Findings from three recent us studies. Int. J. Gynecol. Obstet., 89: 25-33.
14. Conde-Agudelo, A., A. Rosas-Bermúdez and A.C. Kafury-Goeta, 2006. Birth spacing and risk of adverse perinatal outcomes. JAMA, 295: 1809-1823.
15. Razzaque, A., J.D. Vanzo, M. Rahman, K. Gausia, L. Hale, M.A. Khan and A.H.M.G. Mustafa, 2005. Pregnancy spacing and maternal morbidity in matlab, Bangladesh. Int. J. Gynecol. Obstet., Vol. 89 .10.1016/j.ijgo.2005.01.003.
16. Hanley, G.E., J.A. Hutcheon, B.A. Kinniburgh and L. Lee, 2017. Interpregnancy interval and adverse pregnancy outcomes. Obstet. Gynecol., 129: 408-415.
17. Ball, S.J., G. Pereira, P. Jacoby, N. de Klerk and F.J. Stanley, 2014. Re-evaluation of link between interpregnancy interval and adverse birth outcomes: Retrospective cohort study matching two intervals per mother. BMJ, Vol. 349 .10.1136/bmj.g4333.