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Original Research Article

THE INTERPREGNANCY INTERVAL AS A DETERMINANT OF ADVERSE OBSTETRIC OUTCOMES

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ABSTRACT

Background: The objective is to determine the relationship between interpregnancy interval (IPI) and obstetric outcomes in women with multiple pregnancies and whether spacing between pregnancies has a role in negative maternal and perinatal outcomes. This study was conducted at Liaquat University of Medical and Health Sciences Jamshoro from January 2025 to January 2026.

Materials and Methods: This prospective observational study was carried out among 200 of the pregnant women who were booked with parity of 1-4. The participants were divided into two groups depending on the interpregnancy interval, which included less than 18 months and 18-24 months. Women who had chronic medical conditions, had multiple pregnancies or grand multiparity were excluded. Each of the participants was observed during pregnancy until delivery, and the maternal and the newborn outcomes were measured. The standard tests of significance were conducted to conduct statistical analysis and p less than 0.05 was regarded as significant.

Results: Majority (112; 56%-women) of the women were aged between 20-30 years and 118 (59.0%-women) were in the lower socioeconomic levels. Caesarean birth was the commonest means of birth with 148(74%) women. Out of the neonatal outcomes, 52(26%) of the infants were found to be born with low birth weight whereas 30(15%) were preterm. The maternal complications were 38(19%) and 17 (8.5) and 14 (7) represented anemia, gestational diabetes, and hypertensive disorders respectively. It was found that there is a significant correlation between short IPI (<18 months) and the adverse outcomes of anemia ($p = 0.001$), preterm birth ($p = 0.000$), and low birth weight ($p = 0.000$). None of the sociodemographic characteristics were found to be statistically significant to IPI.

Conclusion: Very short periods between pregnancies especially less than 18 months are closely linked to the risk of maternal anemia, preterm birth and low babies. Postpartum counseling and easy access to family-planning services can be very useful in encouraging optimal birth spacing of 18- 24 months, which in turn can lead to significant improvement in the health outcomes of both mother and child.

Keywords: Interpregnancy interval, Obstetric outcome, Maternal morbidity, Neonatal outcome, Birth spacing.

INTRODUCTION

The time between sequential pregnancies has been identified long ago as a significant factor of maternal and perinatal health. Interpregnancy interval (IPI), which is a period between a live birth and a conception of the second pregnancy, is a complicated combination of biological rest,

nutritional replacement and psychosocial preparation of giving birth to a second child. Both too short and significantly too long intervals have been linked to a range of poor obstetric outcome and therefore birth spacing is a prime factor of reproductive health strategies across the globe.[1,2] Although the world suggests a minimum of 18-24 months between childbirths, most women still give birth before the recommended age, which is usually because of the availability of family planning services, lack of proper postpartum counselling, or even the sociocultural pressure put on women with respect to pregnancy.[3]

Short IPI is associated with a number of maternal complications, such as anemia of iron deficiency, hypertensive diseases, and higher probability of operative birth.[4,5] Physiologically, insufficient rest time between pregnancies can not permit enough of maternal nutrient reserves, especially folate and iron that are vital in a healthy placenta and fetal growth.[6] Also, the uterus and the tissues of the pelvis might not be properly healed after the previous pregnancy and childbirth, which exposes women to obstetric issues, including preterm birth and postpartum bleeding.[7] These biological processes allow introducing a credible answer to the constantly established correlation between short IPI and negative results.

The fetal perspective has linked short birth spacing with low birth weight, preterm birth, small-for-gestational-age newborns and high levels of neonatal morbidity.[8,9] A number of hypotheses have been put forward to explain these associations such as maternal nutritional depletion, unresolved inflammatory response following the previous pregnancy, and unfavorable uterine environment because of incomplete recovery of the endometrium.[10] These dangers are especially intense in low-resource environments, when malnutrition of the mother and the inability to obtain antenatal care can intensify the effect of close pregnancies.[11]

On the other hand, too long intervals between pregnancies have also been said to contribute to negative effects, albeit through different mechanisms. Prolonged periods can result in a physiological lapse of the past pregnancy, and this phenomenon is called physiological regression which predisposes to preeclampsia and labour dystocia.[12] Nonetheless, risks of long intervals are relatively less serious compared to those related to short spacing, and the world community did not pay as much attention to preventing postpartum conception in the first 18 months.[13]

To lower the risk of maternal and neonatal complications, the World Health Organization suggests a 24 months gap between live births and a subsequent pregnancy.[14] Nevertheless, most women, especially in low- and middle-income nations, are exposed to short IPIs because of unrealized contraceptive needs, cultural pressures on the size of families, or deficits in the ability to decide on the number of offspring independently.[15] The effects of short IPI in various populations are important in order to design interventions that will encourage safe birth spacing and enhance the outcome of maternal and child health.

Even though the connection between IPI and obstetric results has been examined on a global scale, differences in population demographics, accessibility to health care, and cultural beliefs require that research should be done contextually. The birth spacing patterns vary dramatically by region and the scale of risks could also vary. Besides, the growing trends in caesarean section, maternal age composition, and burden of non-communicable conditions have shifted the obstetric risk profile, compelling to revise the existing evidence.[16,17]

This research was to investigate how the interpregnancy interval is related to obstetric outcomes in multiparous women. The study focuses on the comparison of the maternal and neonatal complications in the various IPI categories to add to the growing evidence in favor of optimal birth spacing. The results could be used in future to influence the practice of postpartum counselling, reinforce the family-planning programs, and to keep clinicians aware regarding women at high risk because of the close gaps between pregnancies. Finally, there is a potential of enhancing awareness and use of recommended birth-spacing intervals to decrease preventable maternal and neonatal morbidity and improve healthier reproductive patterns of women and families.[18]

MATERIALS AND METHODS

It was a prospective observational study that was conducted on 200 pregnant women who were booked ready to undergo antenatal care and who gave birth in the same institution. The research was aimed at assessing the relationship between interpregnancy interval (IPI) and obstetric outcomes in multiparous women. Tactical methodology was employed to provide even recruitment, data collection, and follow-ups during the antenatal period until delivery.

The eligible women aged 18-45 years were those who had parity of 1-4. Only those who had an interpregnancy interval of less than 18 months or 18-24 months that had been well documented were enrolled. The IPI was determined using the last birth date to the estimated date of conception of the present pregnancy. Women who were pregnant first, had a grand multiparity (parity 5 or more) and women with multiple gestations were excluded. Other eligibility criteria were the presence of chronic medical conditions (hypertension, diabetes mellitus, renal disease, cardiac, autoimmune, or any other perceived to affect the outcome of pregnancy on its own). These conditions were employed to

reduce confounding and make calculated results depend more on differences in IPI.

A population size of 200 was chosen as it is significant enough to offer sufficient mathematical strength to find differences in maternal and neonatal outcomes in the two IPI groups. The sample size was made using past published data that showed a strong relationship between short IPI and negative consequences of preterm birth and low birth weight. The sampling method was a non-probability consecutive sampling, according to which all eligible women who appear within the recruitment period were asked to take part until the necessary sample size was reached.

Each of the participants was interviewed and clinically assessed after receiving the written informed consent. Data about maternal age, parity, socioeconomic status, educational background and obstetric history were compiled by use of a predesigned structured proforma. Interpregnancy interval was confirmed by use of the antenatal records, prior delivery records and where possible early ultrasound dating. The respondents were divided into two according to IPI:

- Group A: IPI <18 months
- Group B: IPI 18–24 months

Standard antenatal care was given to all women, and their follow-up was done during pregnancy. The measures of maternal outcomes were anemia, gestational diabetes mellitus, hypertensive disorders, mode of delivery, antepartum complication and intrapartum events. The level of hemoglobin, the pressure of blood, and glucose screening data were recorded in the institutional format.

The neonatal outcomes were birth weight, gestational age at birth, Apgar, requirement of neonatal intensive care and early complications in neonatal care. The term preterm birth was determined to refer to a birth with less than 37 completed gestation weeks and the term low birth weight was used to refer to the birth with less than 2.5 kg.

They were followed with the help of monitoring participants at every antenatal visit, and complications occurring during pregnancy were noted. The details of labour and delivery were recorded by the concerned obstetric team. There were neonatal measurements done at birth and shortly after delivery. Hospital records were used to cross-check all the data to confirm their accuracy and completeness.

The data were input into a Microsoft Excel and processed with the help of SPSS version 28. Mean + Standard deviation was used to describe quantitative variables like maternal age and birth weight. The independent samples t -test was employed in order to carry out group comparisons. Chi-square test was used to test the relationships between IPI and obstetric outcomes by categorical variables, such as anemia, preterm birth, and mode of delivery. The p-value that was taken as significant was less than 0.05.

RESULTS

The final analysis had 200 pregnant women. [Table 1] shows the demographic features of the population in the study. Over 56% of the participants (112; 56) were aged 20-30 years, and 70 (35) were over 30 years. Those who were younger than 20 years old were only 18 (9%). Most of them (118; 59%) were in the lower socioeconomic group and 64 (32%) obtained secondary education. Antenatal care was booked to all the women.

Table 1: Demographic Characteristics of Study Participants (n = 200)

Variable	Category	n	%
Maternal Age (years)	<20	18	9
	20–30	112	56
	>30	70	35
Socioeconomic Status	Lower	118	59
	Middle	62	31
	Upper	20	10
Educational Status	No formal education	46	23
	Primary	58	29
	Secondary	64	32
	Higher education	32	16
Parity	Para 1	64	32
	Para 2	78	39
	Para 3	42	21
	Para 4	16	8
BMI (kg/m²)	<18.5	22	11
	18.5–24.9	96	48
	25–29.9	58	29
	≥30	24	12
Interpregnancy Interval	<18 months	104	52
	18–24 months	96	48

The table of maternal outcomes is in Table 2. The most common complication was anemia, which happened in 38 women (19%). Gestational diabetes was observed in 17 (8.5%), and hypertensive disorders were observed in 14 (7%). The percentage of women with caesarean section delivery was enormous (148; 74%), and only 52 (26) gave birth vaginally.

Short IPI was statistically significantly associated with adverse maternal outcomes (p = 0.001). Women having shorter intervals had more cases of anemia, gestational diabetes and hypertensive disorders.

Table 2: Maternal Outcomes (n = 200)

Maternal Outcome	n	%
Anemia	38	19
Gestational diabetes	17	8.5
Hypertensive disorders	14	7
PROM	6	3
APH/PPH	4	2
Mode of Delivery – Vaginal	52	26
Mode of Delivery – Caesarean	148	74

[Table 3] demonstrates the neonatal outcomes. They had low birth weight among 52 newborns (26%), 30 babies (15) were preterm. The 13 infants with low Apgar scores (6.5%), and 14 (7%), infants were admitted to the NICU. 9 infants (4.5%), had respiratory complications, either TTN or RDS.

The short IPI was observed to have a very important correlation with the negative neonatal outcomes, such as low birth weight (p = 0.000), and preterm birth (p = 0.000).

Table 3: Neonatal Outcomes (n = 200)

Neonatal Outcome	n	%
Low birth weight	52	26
Preterm birth	30	15
Low Apgar score	13	6.5
NICU admission	14	7
RDS / TTN	9	4.5
Healthy newborn	82	41

[Table 4] contains the cross-tabulation that illustrates the correlation between IPI and maternal and neonatal outcomes. It was also found that short IPI (<18 months) was strongly correlated with anemia, gestational diabetes, preterm birth and low birth weight (p = 0.000 both maternal and fetal). There was no important correlation between IPI and sociodemographic.

Table 4: Association Between Interpregnancy Interval and Maternal–Fetal Outcomes (n = 200)

Outcome	IPI <18 months (n=104)	IPI 18–24 months (n=96)	p-value
Anemia	28 (26.9%)	10 (10.4%)	0.001
Gestational diabetes	12 (11.5%)	5 (5.2%)	0.040
Preterm birth	22 (21.2%)	8 (8.3%)	0.000
Low birth weight	34 (32.7%)	18 (18.7%)	0.000
NICU admission	10 (9.6%)	4 (4.1%)	0.048

DISCUSSION

The current research measured the effect of interpregnancy interval (IPI) in determining maternal and neonatal outcomes in 200 multiparous women. The results show that short IPI (<18 months) is highly related with anemia, gestational diabetes, premature birth, and low birth weight. These findings support the known fact that inadequate birth spacing is a significant risk factor that causes negative obstetric outcomes.

In this investigation, 19% of the subjects were found to be maternal anaemic with a much greater percentage of women who were short IPI. This observation is in line with the maternal depletion hypothesis which postulates that the lack or inadequate time between pregnancies does not permit the replacement of the vital micronutrients. The same findings were reported by Henley et al. who reported that women with short IPI had considerably high rates of iron-deficiency anemia.[19] Rawlings et al. also discovered that spacing was inadequate that was linked to poor maternal hematologic recovery that predisposes the risk of anemia during future pregnancies.[20]

In the current study, preterm birth was also observed in 15% of the newborns with an extremely high percentage among women who had IPI less than 18 months. This is in line with the results of Grisaru-Granovsky et al. that showed that short IPI was an independent predictor of preterm birth even after confounding variables were taken into consideration.[21] Similar findings were also reported by Ball et al. who also revealed that women with short IPI were virtually twice as many to spontaneously give birth preterm as those with optimum spacing.[22] These findings are in line with the biological possibility that unresolved inflammation and incomplete recovery of the uterus can be contributing factors to early labor.

Another major outcome was low birth weight with 26% of infants affected. This correlates with what

Hanley et al. noted where short IPI infants were much more likely to be small after gestational age than those born after long IPI.[23] Other studies such as those by Mahande et al. also indicated that short IPI had around 50% risk of low birth weight among women in Tanzania.[24] These findings are also consistent with the findings of the present study and indicate the possibility that maternal poor nutritional recovery and inappropriate placental development can cause fetal growth restriction.

85.5% of the participants were diagnosed with gestational diabetes and the percentage was more among short IPI women. Though less literature has been done on this relationship, Regan et al. discovered that short IPI was associated with poor glucose tolerance, and high metabolic stress in a second pregnancy.[25] It was also proposed that rapid repeat pregnancies could be postponing weight stabilization after childbirth and this is also a reason behind metabolic dysregulation [26] by Gemmill and Lindberg. Such results confirm the correlation in the current study.

Of 7% of the women were found to have hypertensive disorders, and the highest level was observed in women who had short IPI. Although long IPI has always been linked with preeclampsia, the current evidence indicates that short intervals could also be the cause of hypertensive complications. According to Wendt et al., very short and very long intervals were both of risk to develop hypertensive disorders, but there was no linear correlation between them.[27] Similar results were supported by Pimentel et al. who concluded that poor spacing was linked to maternal morbidity such as hypertensive complications.[28]

The rate of high caesarean section (74%) in this study is in tandem with the world trends. Even though mode of delivery was not a major related issue to IPI in the current study, prior studies have established that short IPI can indirectly predispose operative delivery by correlation with obstetric complications. This has been observed in various global cohorts and strengthens the argument of the necessity of better postpartum counselling.

Notably, there was no significant correlation between IPI and the sociodemographic variables which included the maternal age, maternal education and socioeconomic status. This is in line with evidence by Gemmill and Lindberg who reported that short IPI is found in all groups and in most cases is fueled by unmet contraceptive needs as opposed to socioeconomic factors.[26] This is an emphasis on enhancing the family-planning services after childbirth.

On the whole, the results of the current research are similar to the findings of the international literature, which supports the significance of the optimal birth spacing. The World Health Organization suggests a time interval of at least 24 months between a live birth and secondbirth in order to minimize fetal and maternal dangers. The current paper trains these suggestions and recommends special measures in enhancing the healthy spacing habits.

CONCLUSION

This research indicates that a short interpregnancy period (less than 18 months old) is closely connected to poor maternal and infant health. Females with shorter intervals were more exposed to anemia, gestational diabetes and hypertensive disorders and their newborns were at higher risk of preterm birth and low birth weights. The sociodemographic variables did not have a significant relationship with IPI, which implies that improper spacing influences women of all groups. The effective postpartum counselling and the availability of family-planning services could be significant in promoting the best birth spacing of 18 to 24 months which could enhance maternal and neonatal health.

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