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Fetomaternal Outcomes in Short Interpregnancy Interval

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ABSTRACT

Objective: To determine the maternal and fetal outcomes associated with short interpregnancy intervals.

Methodology: A descriptive cross-sectional study was conducted over six months at the Department of Obstetrics and Gynaecology, Ayub Teaching Hospital, Abbottabad. Eighty-four pregnant women aged 18–45 years, with interpregnancy intervals <24 months and at least one prior live birth, were included. Maternal (anemia, placental abruption, preterm labour, preeclampsia) and fetal outcomes (low birth weight, prematurity, small for gestational age, early neonatal death) were documented. Data were analyzed using SPSS v23; $p \leq 0.05$ was considered statistically significant.

Results: The mean age was 31.2 ± 4.1 years and mean weight 54.4 ± 5.7 kg; 95.2% were multigravida. Cesarean section was performed in 57.1%. Preterm labour (36.9%) and preeclampsia (31.0%) were the most frequent maternal complications; 2.4% had none. Fetal complications included low birth weight (26.2%), prematurity (25.0%), early neonatal death (13.1%), and small for gestational age (4.8%). Maternal weight and mode of delivery were significantly associated with maternal complications ($p = 0.043$ and $p = 0.021$, respectively); no significant associations were found for fetal outcomes.

Conclusion: Short interpregnancy intervals are associated with increased maternal complications, particularly preterm labour and preeclampsia, and adverse fetal outcomes such as low birth weight and prematurity.

Keywords: Short interpregnancy interval, maternal outcomes, fetal outcomes, preterm labour, low birth weight, preeclampsia, neonatal mortality.

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Introduction

The interpregnancy interval (IPI) is the duration of time between two consecutive pregnancies. An elevated risk of adverse pregnancy and perinatal outcomes is linked to both brief and extended interpregnancy intervals. An interval of less than 24 months between two consecutive live deliveries is referred to as a short interpregnancy interval. In an optimal scenario, pregnancy should be postponed for a minimum of 24 months, but no more than 59 months, according to research.[1 2]

Annually, over 2.5 million perinatal fatalities occur worldwide, with 95% of these deaths occurring in developing countries. Short interpregnancy intervals are independently associated with a high risk of adverse perinatal outcomes.[2] An elevated risk of low birth weight (LBW), small for gestational age (SGA), preterm birth, and maternal morbidity and mortality has been associated with short interpregnancy intervals. LBW and preterm birth are the primary causes of early neonatal mortality, which accounts for the majority of perinatal fatalities.[3] Preterm birth, low birth weight, and perinatal mortality were recorded at 12.5%, 17.9%, and 4.1%, respectively, among women with brief interpregnancy intervals, according to a study conducted in Tanzania.[3]

In mothers who become pregnant again soon after their last pregnancy, the physiological changes that occur during pregnancy do not return to baseline before the subsequent conception. As women become pregnant again while their bodies and nutritional reserves are still

depleted, the risk of maternal anemia, hypertensive disorders of pregnancy, preeclampsia, antepartum hemorrhage, placental abruption, premature labor, and even maternal mortality is higher. The likelihood of fetal complications also increases.[3–7] Studies show that 77% of women who had an interpregnancy interval of less than 18 months had anemia (n = 77), 3% had placental abruption (n = 3), 2% had preeclampsia (n = 2), and 15% had preterm labor (n = 15).[8]

In low-income nations, short interpregnancy intervals occur in 19.4% to 55.9% of pregnancies.[3 9] Women in underdeveloped nations, where literacy rates are low, experience more pregnancy-related complications. The use of contraception is strongly associated with longer birth intervals. Women who have never used contraception are more likely to have shorter interpregnancy intervals and may also miss opportunities for medical care. Despite the proven benefits of contraceptive methods, their use remains insufficient in developing countries like Pakistan, where the frequency of short interpregnancy intervals has increased.

The *Pakistan Demographic and Health Survey* (2012–2013) reports that Pakistan is the fifth most populous nation in the world. About 20% of married women of childbearing age in Pakistan require contraception but cannot access it. The country's contraceptive prevalence rate is barely 30%.[10]

This study was designed to explore the complications associated with short interpregnancy intervals. Relatively little attention has been directed toward investigating the impact of interpregnancy intervals on pregnancy complications, particularly within our local setting. To date, no study has been conducted on this topic in our region.

The findings of this study will contribute to the existing body of knowledge by generating local evidence. The results will also assist hospital administration in policy formulation and raise awareness among healthcare professionals regarding the significance of optimal interpregnancy intervals in preventing maternal and fetal complications.

Methodology

This descriptive study was conducted in the Department of Obstetrics and Gynaecology at Ayub Teaching Hospital, Abbottabad, from 17 November 2023 to 17 May 2024 following approval of the synopsis by the institutional ethical committee. A total of 84 pregnant women were enrolled using a non- probability consecutive sampling technique. The sample size was calculated using the WHO software, based on an anticipated population proportion of preeclampsia in women with short interpregnancy intervals (2%), an absolute precision of 3%, and a 95% confidence interval.[8]

Inclusion criteria comprised women aged between 18 and 45 years of any parity with a short interpregnancy interval, defined as less than 24 months between the latest consecutive live births. Nulliparous women, those with known medical disorders, and those who refused to give informed consent were excluded from the study.

Operational definitions were established as follows: interpregnancy interval refers to the time elapsed between a previous birth and the conception of the next pregnancy. A short interpregnancy interval was defined as less than 24 months between two consecutive live births. Fetal outcomes assessed included early neonatal death (death occurring within seven days of birth), low birth weight (birth weight less than 2500 grams irrespective of gestational age), small for gestational age (defined sonographically as abdominal circumference or estimated fetal weight below the 10th percentile), and preterm birth (live birth before 37 completed weeks of gestation). Maternal outcomes included placental abruption (clinically and ultrasonographically confirmed premature separation of a normally implanted placenta), anemia (hemoglobin level below 11 g/dL), preterm labour (onset of regular uterine contractions with cervical changes between viability and 37 weeks gestation), and preeclampsia (new-onset hypertension ≥140/90 mmHg on two occasions at least four hours apart, with ≥300 mg proteinuria in 24-hour urine collection, occurring after 20 weeks of gestation in previously normotensive women and resolving by the sixth postpartum week).

Data collection was initiated after obtaining informed consent from eligible participants. Patients were recruited from the indoor department of Obstetrics and Gynaecology, Ayub Teaching Hospital. Each participant was informed about the purpose, risks, and benefits of the study. Baseline demographic data including age, parity, and weight were recorded using a pre-designed proforma. Participants were followed until delivery, and fetomaternal outcomes including placental abruption, anemia, preterm labour, preeclampsia, early neonatal death, low birth weight, small for gestational age, and preterm birth were documented in accordance with operational definitions. All pregnancies were managed in accordance with the departmental protocol.

Data were entered and analyzed using IBM SPSS Statistics version 23. Quantitative variables such as age, weight, and parity were expressed as mean ± standard deviation. Categorical variables including maternal and fetal outcomes were described using frequencies and percentages. Stratification was performed by age, weight, and parity, followed by application of the Chi- square test. A p-value ≤ 0.05 was considered statistically significant.

Results

The study included 84 participants, with the mean age of 31.23 ± 4.13 years and mean weight of 54.44 ± 5.67 kg and with multigravida comprising the majority 80 (95.2%) compared to primigravida 4 (4.8%). Cesarean section was the predominant mode of delivery 48 (57.1%) versus normal vaginal delivery 36 (42.9%). Preterm labor was the most common maternal complication 31 (36.9%), followed by preeclampsia 26 (31.0%), anemia 16 (19.0%), and placental abruption 9 (10.7%), with only 2 (2.4%) experiencing no complications. Among fetal outcomes, 26 (31.0%) infants were healthy, while complications included low birth weight 22 (26.2%), prematurity 21 (25.0%), early neonatal death 11 (13.1%), and small for gestational age 4 (4.8%). Overall fetal survival was 73 (86.9%) with neonatal mortality at 11 (13.1%) Table I

Table I: Frequency Distribution of Categorical Variables. (N = 84)

Variable	Category	n %)
Parity	Primigravida	4 (4.8%)
	Multigravida	80 (95.2%)
Mode of Delivery	Normal Vaginal Delivery	36 (42.9%)
	C-Section	48 (57.1%)
Maternal Complications	None	2 (2.4%)
	Anemia	16 (19.0%)
	Placental Abruption	9 (10.7%)
	Preterm Labour	31 (36.9%)
	Preeclampsia	26 (31.0%)
Fetal Complications	Early Neonatal Death	11 (13.1%)
	Small for Gestational Age	4 (4.8%)
	Low Birth Weight	22 (26.2%)
	Healthy	26 (31.0%)
Fetal Mortality	Prematurity	21 (25.0%)
	Neonatal Death	11 (13.1%)
	Alive	73 (86.9%)

According to table II maternal age showed no significant association with complications (p=0.386), though preterm labor predominated in both age groups: 18-30 years 14 (34.1%) and 31-40 years 17 (39.5%). Maternal weight demonstrated significant association with complications (p=0.043), with underweight participants (<50kg) showing higher preeclampsia rates 12 (52.2%) compared to normal weight participants. Parity showed no significant relationship with complications (p=0.874). Mode of delivery was significantly associated with maternal complications (p=0.021), with cesarean sections showing higher rates of anemia 16 (25.0%) and preterm labor 24 (37.5%) compared to vaginal deliveries.

According to table 3, no significant associations were found between fetal complications and demographic or clinical variables. NICU admissions were consistently the most frequent fetal complication across all groups, ranging from 39.1% to 46.5%. Preterm births occurred in approximately 20-32% of cases across different categories. Age, weight, parity, and mode of delivery showed similar complication patterns without statistical significance (all p- values >0.05), indicating these variables did not significantly influence fetal outcomes in this study population.

Discussion

This study examined maternal and fetal complications in 84 participants with a mean age of 31.23 ± 4.13 years. The findings reveal significant associations between certain maternal factors and pregnancy outcomes, while highlighting the complex interplay between demographic variables and perinatal complications.

Our results demonstrate that preterm labor was the most prevalent maternal complication (36.9%), followed by preeclampsia (31.0%). This finding correlates with previous research by Von Dadelszenet al., who reported similar prevalence rates of preterm labor in high-risk pregnancies. The substantial occurrence of preeclampsia in our study aligns with global trends, as preeclampsia affects approximately 3-5% of pregnancies worldwide and remains a leading cause of maternal and perinatal mortality .[11]

The significant association between maternal weight and complications (p=0.043) is particularly noteworthy. Our findings revealed that underweight mothers (<50kg) had a markedly higher rate of preeclampsia (52.2%) compared to normal weight participants. This observation contrasts with some studies by Gong et al., which primarily focused on obesity as a risk factor for preeclampsia.[12] However, our results are consistent with research by Mao et al., who demonstrated that both underweight and overweight conditions predispose to pregnancy complications, albeit through different pathophysiological mechanisms.[13]

The association between mode of delivery and maternal complications (p=0.021) warrants discussion. Cesarean sections were significantly more common (57.1%) and

Table II: Crosstabulation of Maternal Complications with Demographic and Clinical Variables (n = 84)							
Variables	**Variable**	**None n (%)**	**Anemia n (%)**	**Abrupt ion n (%)**	**Preterm Labour n (%)**	**Preeclampsia n (%)**	**p-value**
Age	**Age (18–30 yrs)**	2(4.9%)	5(12.2%)	6(14.6%	14(34.1%)	14(34.1%)	0.386
	Age (31–40 yrs)	0(0.0%)	11(25.6%)	3(7.0%)	17(39.5%)	12(27.9%)	
Weight	**Weight (<50 kg)**	1(4.3%)	1(4.3%)	3(13.0%)	6(26.1%)	12(52.2%)	0.043*
	Weight (≥50 kg)	1(1.8%)	15(26.8%)	6(10.7%)	25(44.6%)	9 (16.1%)	
Parity	**Parity (Nulliparous)**	0(0.0%)	3(10.3%)	4(13.8%)	13(44.8%)	9 (31.0%)	0.874
	Parity (Multiparous)	2(3.8%)	13(24.5%)	5(9.4%)	18(34.0%)	15(28.3%)	
Mode of Delivery	**Mode (SVD)**	2(13.3%)	0(0.0%)	1(6.7%)	7(46.7%)	5 (33.3%)	0.021*
	Mode (LSCS)	0(0.0%)	16(25.0%)	8(12.5%)	24(37.5%)	16(25.0%)	

Table III: Crosstabulation of Fetal Complications with Demographic and Clinical Variables (n = 84)							
Variables	**Groups**	**None n (%)**	**IUGR n (%)**	**Prete rm n (%)**	**Still birth n (%)**	**NICU Admission n (%)**	**p- value**
Age	**Age (18–30 yrs)**	4(9.8%)	4(9.8%)	13(31.7%)	3(7.3%)	17(41.5%)	0.167
	Age (31–40 yrs)	2(4.7%)	8(18.6%)	8(18.6%)	5(11.6%)	20(46.5%)	
Weigh t	**Weight (<50 kg)**	2(8.7%)	4(17.4%)	6(26.1%)	2(8.7%)	9(39.1%)	0.519
	Weight(≥50 kg)	4(7.1%)	8(14.3%)	15(26.8%)	6(10.7%)	23(41.1%)	
Parity	**Parity (Nulliparous)**	3(10.3%)	5(17.2%)	6(20.7%)	2(6.9%)	13(44.8%)	0.959
	Parity (Multiparous)	3(5.7%)	7(13.2%)	15(28.3%)	6(11.3%)	19(35.8%)	
Mode of Delivery	**Mode (SVD)**	2(13.3%)	2(13.3%)	5(33.3%)	2(13.3%)	4(26.7%)	0.321
	Mode (LSCS)	4(6.3%)	10(15.6%)	16(25.0%)	6(9.4%)	28(43.8%)	

were associated with higher rates of anemia (25.0%) and preterm labor (37.5%). This finding correlates with Adam et al.'s observations that cesarean delivery is often performed as a therapeutic intervention for severe maternal complications rather than being a causative factor.[14] The higher anemia rates in cesarean deliveries may reflect the cumulative effect of antepartum complications and surgical blood loss.

Interestingly, maternal age showed no significant association with complications (p=0.386), which contrasts with established literature by Schummerset al. showing increased risks in advanced maternal age.[15] This discrepancy may be attributed to our relatively narrow age range and the predominance of multigravida participants (95.2%), which could have masked age-related effects.

The fetal complication profile revealed concerning outcomes, with only 31.0% of infants being healthy at birth. NICU admissions were consistently high across all demographic groups (39.1-46.5%), indicating the severity of complications in this population. This rate substantially exceeds the global average reported by Priyadarshene et al., suggesting a high-risk cohort requiring intensive perinatal care.[16]

The prevalence of low birth weight (26.2%) and prematurity (25.0%) in our study aligns with findings by Kannaujiya et al., who reported similar rates in

pregnancies complicated by maternal conditions. The neonatal mortality rate of 13.1% is notably higher than regional averages, reflecting the complexity of cases included in this study.[17]

Surprisingly, no significant associations were found between fetal complications and maternal demographic or clinical variables. This finding contrasts with extensive literature by Lewis et al. demonstrating clear relationships between maternal factors and fetal outcomes.[18] The lack of significance in our study may be attributed to the relatively small sample size or the multifactorial nature of fetal complications, where multiple risk factors interact in complex ways that may not be captured by simple statistical associations.

The high prevalence of cesarean sections (57.1%) compared to the WHO recommended rate of 10-15% suggests potential over-utilization or a concentration of high-risk cases requiring surgical intervention.

The study's cross-sectional design prevents establishing causal relationships between risk factors and outcomes. Additionally, case control studies should be conducted to find association between short interpregnancy interval and fetomaternal outcomes.

Our findings underscore the need for enhanced preconception counseling, particularly focusing on maternal weight optimization and early identification of high-risk pregnancies. The high rates of NICU admissions and neonatal complications suggest the need for improved antenatal surveillance and coordinated perinatal care protocols.

Further research with larger sample sizes and prospective designs would help clarify the relationships between

maternal factors and fetal outcomes, particularly in diverse populations with varying risk profiles. Additionally, investigating the long-term outcomes of infants born to mothers with multiple complications would provide valuable insights for clinical practice and family counseling.

The study highlights the critical importance of comprehensive prenatal care and multidisciplinary management in high-risk pregnancies, emphasizing the need for personalized approaches based on individual risk factors and clinical presentations.

Conclusion

Short interpregnancy intervals are associated with increased maternal complications, particularly preterm labour and preeclampsia, and adverse fetal outcomes such as low birth weight and prematurity

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