

# Frequency of Short Inter-pregnancy Interval in Neonatal Morbidities

MADIHA JAMEEL, SABIKA IFTIKHAR\*, SADIA<sup>1</sup>, SUMBAL ABBAS, FOZIA SAEED RASUL, SUMERA ABDUL KARIM, MAHA ANWAR

*Department of Paediatric Oncology, Shaukat Khanum Hospital, Lahore-Pakistan.*

*\*Department of Neonatology, Hameed Latif Hospital, Lahore-Pakistan*

*Correspondence to Dr Madiha Jameel, E-mail: madihajameel1990@gmail.com, Tel+92-320-9449714*

## ABSTRACT

**Background:** The risk of unfavorable perinatal outcomes in the following pregnancy may increase if there has been a short time between the last live birth and the beginning of the current pregnancy. This elevated risk may be brought on by inadequate nutritional replenishment after the delivery of a live newborn, increased cervical insufficiency, or vertical infection transmission after a brief interpregnancy intervals.

**Aim:** To determine frequency of short interpregnancy interval in neonatal morbidities.

**Study design:** The cross-sectional study.

**Methodology:** The Ittefaq hospital's Neonatal ICU served as the study's location. Total 270 neonates, both sexes, 0 to 28 days old, with gestational ages between 37 and 42 weeks (based on a date scan) and birth weights between 2500 and 4000 g were included. Mothers or other witnesses of the included notates were questioned on the time between this pregnancy and the one before it. The term "short interpregnancy interval" (IPI) was used when the time between two successive pregnancies was less than 12 months. Data was analyzed in SPSS 25V.

**Results:** Neonates ranged in age from 13.88 to 7.66 days. Neonatal mortality was 119(44.07%) male and 151(55.93%) female. It took 39.19 weeks on average, plus or minus 1.43 weeks. The average weight at birth was 2720.61 271.56 g. There were 40 neonates (14.81%) with RDS, 58 (14.81%) with NEC, 56 (20.74%) with IVH, 23(8.52%) with ROP, and 93(34.44%) with Sepsis. 200 neonates (74.07%) had a typical inter-pregnancy interval, while 70 (25.93%) had a short inter-pregnancy period.

**Conclusion:** The study's findings indicated that 25.93% of the newborns had short inter-pregnancy intervals, which are frequently associated with neonatal morbidities. IPI is a controllable risk factor for newborn morbidity, hence it is important to urge families to choose the recommended birth spacing. Early identification of this high-risk group can help to prevent negative neonatal outcomes and identify deliveries that may require the attendance of a pediatrician.

**Keywords:** Birth spacing, interpregnancy interval, neonatal morbidity, RDS, NEC, IVH, ROP, Sepsis

## INTRODUCTION

Newborns are admitted to a neonatal intensive care unit (NICU) for a variety of conditions, even if they are full-term and had a normal birth weight. Every newborn brought into a NICU receives the highly specialized care that is offered there, but they are also exposed to the risks and significant costs that go along with it<sup>1,2</sup>.

There hasn't been a published study examining NICU admission rates across the entire range of newborn morbidity because the necessary data have, until recently, been unavailable or difficult to access, in spite of the research that has been published on treatments or care regimens for specific populations<sup>1</sup>. While preterm, maternal infections, respiratory failure, jaundice, neonatal infections, congenital malformations, and pregnancy intervals account for a significant portion of neonatal morbidity and NICU admissions<sup>3,4</sup>.

Short inter-pregnancy intervals (SIPI) have been linked to an increased risk of preterm birth, low birth weight, labour dystocia, and maternal morbidity and mortality<sup>5</sup>. Unfavourable newborn outcomes after SIPI are thought to be caused by poor recovery of low maternal folate levels prior to the second pregnancy. From empirical study, it is difficult to understand the relationship between physiological folate levels that are assessed and outcomes like short for gestational age and the physiological folate levels in pregnant women with SIPI<sup>6,7</sup>.

According to a recent study conducted in the USA, 20.5% of all multiparous births occurred within an interval of less than 12 months (short IPI). During this time, there were 7.2 baby deaths for every 1000 live births. Compared to births after long intervals of 12–24 months (5.6 per 1000), infant mortalities occurred more frequently for births after short intervals of 0–6 months (9.2 per 1000) and 6–12 months (7.1 per 1000) (P.001 and.001)<sup>8</sup>. According to a study, moms of 4825(22.63%) kids delivered with newborn morbidities had short interpregnancy intervals (IPI) of [12 months]<sup>9</sup>.

The goal of this study is to quantify the prevalence of newborn morbidities with regard to short interpregnancy intervals.

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There are no local statistics available, and the sole international study we could find focused on the "influence of SIPI on neonatal morbidity." We can learn how common SIPI is in newborns admitted to the NICU through this study since, like other regions, Pakistan places a lot of emphasis and money on family planning. IPI is a modifiable risk factor for newborn morbidity, and early detection of this high-risk population may help to minimise negative neonatal outcomes and identify deliveries that may require a pediatrician's presence.

Short inter-pregnancy interval in neonatal morbidities is a major concern today, this paper will help the researchers in early identification of such high risk group which may help to prevent adverse neonatal outcomes and recognize deliveries that may need the presence of a pediatrician.

## METHODOLOGY

This cross-sectional study was carried out from the Neonatal ICU Unit at Ittefaq Hospital in Lahore from July 8 to January 2020 after getting permission from Hospital Ethical Review Board. Using the frequency of short IPI, a sample size of 270 cases was calculated for neonatal morbidities<sup>4</sup>. We utilized a 95% confidence level and 5% absolute precision.

Neonates with gestational ages between 37 and 42 weeks (based on a date scan) and birth weights between 2500 and 4000 g who were admitted to the neonatal intensive care unit (NICU) for neonatal morbidity were included.

Several pregnancies, neonates admitted to the NICU for unexplained reasons, needing urgent surgery, Babies born to mothers who had been diagnosed with gestational diabetes mellitus, hypertension or complicated pregnancy (based on information available on the mother's medical record) were also eliminated. Neonates with severe congenital deformities were also evaluated through medical records.

Along with gender, age, and maternal age, a thorough gestational and birth history was recorded. Mothers or other witnesses of the included notates were questioned on the time between this pregnancy and the one before it. The calculated short interpregnancy interval. A researcher themselves entered all data using a premade proforma.

Input and analysis of the data were done with SPSS version 22. For quantitative data like age (days), gestational age, and birth weight, mean S.D. was applied. For qualitative variables including gender, the cause of newborn morbidity, and SIPI, frequency and % were used. To account for effect modifiers, data were stratified for neonatal age, gender, the cause of newborn illness, gestational age, birth weight, and socioeconomic status. Chi-square test after stratification was used and a p-value of was regarded as significant.

**RESULTS**

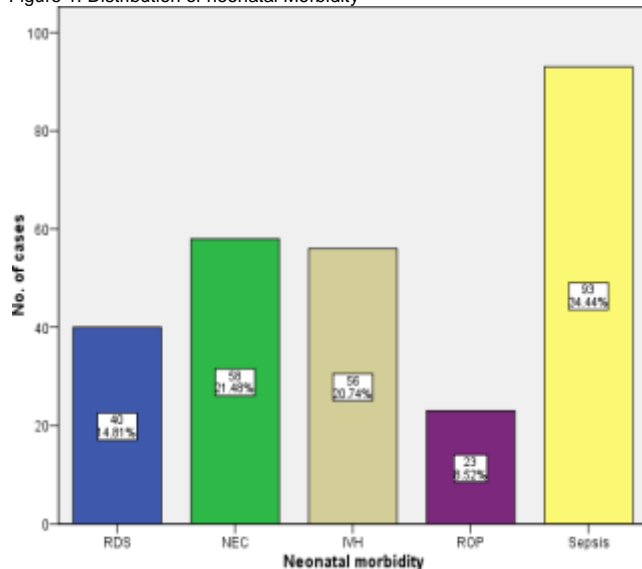
There were 270 patients total. The average age of the newborns was 13.88 days. Neonatal cases ranged in age from 1 to 28 days for 125 neonates (46.30%) and 145 cases (53.70%), respectively. There were 151 females and 119 (44.07%) males. The average gestational age was 39.19 weeks plus or minus 1.43. There were 122 neonates (45.19%) and 148 neonates 148(54.81%) with gestational ages between 37 and 39 weeks and 40 to 42 weeks, respectively. The average weight at birth was 2720.61 271.56 g. There were 196 neonates (72.59%) and 74(27.41%) with birth weights below 2500 g, respectively (Table 1).

Table 1: Distribution of Age, Gender, Gestational Age and Birth weight

		Frequency (%)
Age (days)	Mean±SD	13.8±7.66
	1-4	145(53.7%)
	15-28	125(46.3%)
Gender	Male	119(44.07%)
	Female	151(55.93%)
Gestational Age (Weeks)	Mean±SD	39.19±1.43
	37-39	148(54.81%)
	40-42	122(45.19%)
Birth Weight (g)	Mean±SD	2720.6±271.5
	<2500	74(27.41%)
	2500 or more	196(72.59%)

There were 40 neonates (14.81%) with RDS, 58 (14.81%) with NEC, 56(20.74%) with IVH, 23(8.52%) with ROP, and 93(34.44%) with Sepsis (Fig. 1).

Figure 1: Distribution of neonatal Morbidity



A total of 55 neonates (20.37%), 101 neonates (37.41%), and 114 neonates (42.22%) had high socioeconomic status. 200 neonates (74.07%) had normal interpregnancy intervals, while 70(25.93%) had short interpregnancy intervals. Neonatal infants aged 1 to 14 days had SIPI in 42(29%) and normal IPI in 103(71%) of them,

while infants aged 15 to 28 days had SIPI in 28(22.4%) and NIPI in 97(77.6%) of them. In both age groups, the frequency of SIPI was statistically similar, p-value > 0.05. In neonates who were male, 34 (28.5%) had SIPI and 85 (71.4%) had normal IPI, but in neonates who were female, 36 (23.8%) had SIPI and 115(76.2%) had NIPI. Both genders experienced the same statistically significant frequency of SIPI, p-value > 0.05. While 113(76.4%) of neonates born between 37 and 39 weeks had normal IPI, 35 (26.7%) of those born between 40 and 42 weeks had SIPI while 35(28.7%) had NIPI. No matter the gestational age, the frequency of SIPI was statistically the same (p-value > 0.05). Using SPI, gestational birth weights were shown in Table 2.

Table 2: Comparison of Short inter Pregnancy interval in age groups, gender, gestational age and birth weight

	Short Inter Pregnancy interval		P vale
	Yes	No	
<b>Age ( days)</b>			
1-4	42(29%)	103(71%)	0.22
15-28	28(22.4%)	97(77.6%)	
<b>Gender</b>			
Male	34(28.6%)	85(71.4%)	0.37
Female	36(23.8%)	115(76.2%)	
<b>Gestational Age (Weeks) Mean±SD</b>			
37-39	35(23.6%)	113(76.4%)	0.34
40-42	35(28.7%)	87(71.3%)	
<b>Gestational Age (Weeks) Mean±SD</b>			
<2500	15(20.3%)	59(79.7%)	0.19
2500 or more	55(28.1%)	141(71.9%)	

The frequency of SIPI was statistically same in cases who had RDS (20%), NEC (20.7%), IVH (30.4%), ROP (30.4%) and sepsis (28%), p-value > 0.05 (Table 3).

Table 3 Comparison of Short inter pregnancy interval in Neonatal morbidity

Neonatal Morbidity	Short inter pregnancy interval	
RDS	8(20%)	32(80%)
NEC	12(20.7%)	46(79.3%)
IVH	17(30.4%)	39(69.6%)
ROP	7(30.4%)	16(69.6%)
Sepsis	26(28.0%)	67(72.0%)

P value 0.63

**DISCUSSION**

Preterm birth (PTB) is a condition that affects "9.6%" of babies born alive, with Pakistan having a rate of "15.7%" while Australia has a rate of "6.6%". One of the major contributing factors to newborn morbidity and mortality is PTB<sup>10</sup>.

Evidently, there is no widely accepted explanation for the elevated risk of an unfavourable pregnancy outcome following a brief IPI. In women who become pregnant quickly, there is a high risk of inadequate folate intake both at the time of conception and during pregnancy. As a result, their offspring are more likely to experience PTB, intrauterine growth retardation, and neural tube abnormalities<sup>11,12</sup>.

Approximately 30% of American women had a short IPI, which is defined as fewer than 18 months, according to a 2015 analysis from the Centres for Disease Control and Prevention, which included birth certificate data from 36 states. 20% of women had an IPI of more than 60 months, while the majority (50%) had an IPI of 18 to 59 months<sup>13</sup>.

In the current study, there were 40 newborns (14.81%) with RDS, 58 neonates (21.48%) with NEC, 56 neonates (20.74%) with IVH, 23 neonates (8.52%) with ROP, and 93 neonates (34.44%) with sepsis. 200 neonates (74.07%) had a typical inter-pregnancy interval, while 70 (25.93%) had a short inter-pregnancy period. In support of this, a study found that among 21317 newborn morbidities, 4825(22.63%) of the infants were born to moms who had short inter-pregnancy intervals (IPIs) of [12 months]<sup>14</sup>. In current study we also had higher rate of SIPI.

In a study, the impact of birth spacing on neonatal morbidity was evaluated stratified by gestational age at birth. The rate and risk of adverse newborn outcomes were evaluated between various IPI lengths in multiparous mothers. The frequency of neonatal intensive care unit admission or neonatal transport to a tertiary care facility was estimated and stratified by week of gestational age for deliveries occurring within the IPI lengths of 6.6 to 12.12 to 24.24 to 60 and > 60 months. Additionally, 4825 (22.63%) of the 21317 newborns with morbidities were born to mothers who had short interpregnancy intervals (IPIs) of less than 12 months<sup>15</sup>.

A study was done in Tanzania to find out how IPI affected unfavourable pregnancy outcomes. Between 2000 and 2010, 17,030 singlet newborns from singlet mothers were investigated in total. The IPI lasted, on average, 36 months. When compared to IPIs of 24-36 months (the reference group), short IPIs (24 months) were associated with premature delivery (OR 1 • 52; 95% CI 1.31-1.74), low birth weight (OR 1 • 61; 95% CI 1 • 34-1.72), and perinatal death (OR 1 • 63; 95% CI 1.22-1.91)<sup>16</sup>.

To ascertain the relationship between the interval between pregnancies and the newborn outcomes of low birth weight, premature birth, and specific neonatal morbidities, a study was conducted in Arizona. Less than 12 months between pregnancies were linked to preterm birth, low birth weight, and small for gestational age infants. Additionally, specific neonatal morbidities as transient infant tachypnea, periventricular leukomalacia, bronchopulmonary dysplasia, intraventricular hemorrhage, apnea bradycardia, respiratory distress syndrome, and suspected sepsis were connected to the shorter and longer IPI categories<sup>9,17</sup>.

In order to ascertain the relationship between a short interpregnancy interval and a poor perinatal outcome, Ilyas et al. undertook a study. In the study population, 41% of perinatal deaths were attributable to IPI 18 months, along with 21% of term low birth weight babies and 9.0% of preterm deliveries. These could be avoided by removing the IPI 18 months from the study group. IPI between 18 and 23 months had no impact on the three adverse perinatal outcomes<sup>18</sup>.

**Limitations:** Short duration with limited resources and financial constrains added to our limitations.

## CONCLUSION

The study's findings indicated that 25.93% of the neonates had newborn morbidities on average due to short interpregnancy intervals. IPI is a preventable risk factor for newborn morbidity, hence it's crucial to encourage parents to follow the advised birth spacing guidelines. Early detection of this high-risk population can reduce adverse neonatal outcomes and help identify deliveries that might need a pediatrician's presence.

**Authorship and contribution Declaration:** Each author of this article fulfilled following Criteria of Authorship:

MJ, SI & S: Overall supervision and Write up and literature review.

SA,FSR&SAK: Literature review help in write-up.

All authors agree to be responsible for all aspects of their research work.

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