Original Article

Comparison of the Fetomaternal Outcome in Women with < 18 Months versus 18-24 Months of Inter Pregnancy Birth Interval

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Abstract

Objective: To compare the fetomaternal outcome in women with < 18 months versus 18~24 months of interpregnancy birth interval.
Methodology: This prospective cohort study was conducted in Obstetrics & Gynecology, PNS SHIFA Hospital, Karachi September 2016 to March 2017. A total of 82 women with singleton pregnancy and gestational age > 28 weeks were included. Patients with multiple pregnancy, diabetes mellitus, hypertension and uterine rupture were excluded. Two groups (A& B) were formed and the patients according to their inter-pregnancy interval i.e. < 18 months and 18-24 months were distributed in A & B respectively. The fetomaternal outcome i.e. caesarean section, post-partum hemorrhage.pre-eclampsia, preterm delivery, small for gestational age infants and apgar· score <7 at 5 minutes (yes/no)was recorded by following the patients till delivery.
Results: Age range in this study was from 18 to 40 years with mean age of29.78 ± 5.95 years. The maternal outcomes i.e. caesarean section was recorded in 39.02% in group A patients while 9.76% in group B women, preeclampsia was recorded in 26.83% versus 9.76% respectively and postpartum hemorrhage in 29.27% versus 14.63% respectively. Fetal outcome between groups A versus group B as follows; preterm. Delivery in 34.15% versus 12.20%, small [or gestational age infants as 29.27% versus 14.63% and apgar score <7 at 5 minutes in 31.71 % versus 19.51 % respectively with p-value of <0.05.
Conclusion: Our study concluded that short inter pregnancy interval (<18 months) was associated with adverse fetomaternal outcome compared to long interpregnancy interval (18-24 months).
Keywords: Interpregnancy interval, cesarean delivery, preterm delivery, apgar score, low birth weight

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Introduction

Interpregnancy interval (IPI) is the time between the end of one pregnancy and the beginning of another. Interpregnancy intervals that are either too short or too long also contribute to adverse maternal and prenatal outcomes.[1] birth interval is an important determinant of the rates of population growth and socioeconomic status of communities. It offers a great potential in protecting the health status [the mothers, and improving outcome of subsequent pregnancy.[1,2]Short inter- pregnancy interval leaving the women under the compromise insufficient nutrients storage capacity for the subsequent pregnancies as the result become the major cause of the obstetric complications and foetal morbidity and mortality in developing countries.[3]

A birth interpregnancy interval of less than 18 months among the women in developing countries still remaining the major routine practice and remaining the leading risk factor associated with increased risk for maternal and neonatal mortality.[4] Normal intervals can be achieved through use of contraception methods but avoidance of long intervals is more problematic since a desired pregnancy may be precluded by sub fertility, availability

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of a partner, economic issues, or illness.' Apart from the understanding and promotion of facilitating care among women.[4]

Still maternal} and fetal adverse outcomes are reported to be poor III pregnant. Women with short inter pregnant interval.[6] Since 1920 many researchers have investigated the relationship between pregnancy spacing (time laps between two consecutive pregnancies) and various birth outcomes including low birth weight, preterm birth small size for gestational age an infant mortality' Low birth weight and preterm birth are second leading cause of death for all US infants and leading cause of death for African-American infants.[9] Women with short and very long Inter-pregnancy interval arc at increased risk for delivering preterm, low birth weight & small for gestational age infants. Lit is proved that females who were conceived between 18 1"0 23 months after previous live birth have the lowest risk of adverse prenatal outcome such as low. birth weight and 'preterm b~rth.[11] The pregnant woman and child spacing less than one year have significantly higher prevalence of iron deficiency anemia which is important risk factor of preterm and subsequent low birth weight.[11] Thus both short and long Inter-pregnancy interval has been associated with increased risk of adverse per natal outcome.[12]

A meta-analysis of 67 studies conducted in 62 countries, as well as an additional study from Brazil, revealed that, poor maternal and per natal outcomes were associated with interpregnancy intervals between 6-18 months or longer than 59 months.[13] A study conducted by Lilungulu A et al[14] compared the maternal outcomes i.e. caesarean section was recorded in 29.3% in patients with < 18 months inter-birth interval while 2.0% in women with 18-24 months, preeclampsia was recorded in 18.0% versus 2.7% respectively and postpartum hemorrhage in 19.3% versus 3.3% respectively. The same author has .found the fetal outcome between <18 months versus 18-24 months inter-pregnancy interval as follows; preterm delivery in 29.3% versus 3.0%, small for gestational age infants as 23.3% versus 3.0% and apgar score <7 at 5 minutes in 25.6% versus 3.7% respectively. Although a meta-analysis is present but it is more than five years old, so there must be re-evaluation of the effect of inter-pregnancy interval on feto maternal outcome. The overall public health importance of short interpregnancy interval is determined not only by the risks for mortality and morbidity of the preceding child, subsequent child, and the mother, but also by the prevalence of short intervals in the population. Since most research in developed countries has focused on the association between short birth intervals and adverse per natal outcomes, different cutoff points for short birth interval~ have been used. The prevalence of short birth intervals range from 5 to 30%.[18,19] World Fertility Survey and later the Demographic and Health Survey (DHS) are nationally representative cross-sectional surveys, mainly carried OUl 111 developing countries, to study fertility and demographic changes. In these surveys, an interval less than 24 months is considered short. However, the prevalence of short inter birth intervals of less than 18 months, which is comparable to a birth-to-conception' interval of 9 months, also ranges from 6-24%[18]

A number of factors have been identified that are linked to a higher risk of a preterm birth: age at the upper and lower end of the reproductive years, be it more than 35 [65] or less than 18 years of age.[17] Maternal height and weight can also play a role. Further, in the US and the UK, black women have preterm birth rates of 15-18%, more than double, than that of the white population. This discrepancy is not seen in comparison to Asian or Hispanic immigrants and remains unexplained.[17] By considering the above mention facts, we had decided to conduct this study to compare the feto maternal outcome in women with <18 months versus 18-24 months of interpregnancy birth interval. The results of the study would be helpful for creating awareness in general population as guide to maintain proper inter- pregnancy interval for the avoidance of poor feto maternal outcome. Moreover, this study would also be helpful for the obstetrician to control the avoidable burden of patients by advising couples for ideal interpregnancy birth interval for achieving good fetomaternal outcome.

Methodology

A prospective cohort study conducted in Department of Obstetrics &Gynecology, PNS SHIFA Hospital, Karachi, with the duration of study was six months 9th Sep 2016 to 5th Mar 2017. Total 82 cases were included in the study with following WHO sample size calculation; Significance level: 5%, Power of test: 80%, Anticipated Population Proportion 29.3% and 3.3%.[14] Less than 18 months of Inter-pregnancy interval (Exposed group) was defined as < 18 months' time elapsed from the last delivery date to last menstrual period of the index pregnancy whereas 18-24 months of Inter-pregnancy interval (Unexposed group) was defined as 18-24 months' time elapsed from the last delivery date to last menstrual period of the index pregnancy. Pre-eclampsia

would be considered when systolic blood pressure≥:140 mmHg, diastolic blood pressure ≥:90mmHg (two separate readings taken at least six hours) and proteinuria i.e. 300mg of protein in 24 hour urine sample was labeled as positive. Post-partum hemorrhage included blood loss after vaginal delivery> 500 mL or after cesarean section > 1000 mL that was measured by collection of immediate blood loss in the kidney tray having capacity of 500 ml and later on will be used 3 x 11 x 1 inches sized pads. Completely saturated pad holds 80 ml of blood and 50% saturated pad holds 25 ml blood was considered as PPH. After approval from the ethical review committee, total 82 women presenting in Department of Obstetrics & Gynecology, PNS SHIFA Hospital Karachi, fulfilling the inclusion and exclusion criteria were selected. Informed written consent was taken from the participants with the assurance of confidentiality to include their data in study. Two groups (A & 8) were formed and the patients according to' their inter-pregnancy interval i.e. (exposed group) < 18 months and (unexposed group) 18-24 months were distributed. Pregnancy interval i.e. (exposed group) < 18 months and (unexposed group) 18-24 months were distributed in A & B respectively. The fetomaternal outcome i.e. caesarean section, post-partum hemorrhage, pre-eclampsia, preterm delivery, small for gestational age infants and apgar score <7 at 5 minutes (yes/no) was recorded by following the patients till delivery. All this information was recorded by the researcher on a pre-designed proforma. Collected data was entered in SPSS version 20.0 and analyzed through its statistical package. Mean ± Standard deviation was calculated [or age, gestational age and parity. Place of residence (rural/ urban), socioeconomic status (poor/middle/ upper), education level (illiterate/ primary /middle/ matric/ graduate) and fetomaternal outcome in patients of both group i.e. caesarean section, post-partum hemorrhage, pre-eclampsia, preterm delivery, small for gestational age infants and apgar score <7 at 5 minutes (yes/no)were presented as frequency and percentage. Chi square test was applied to determine the significant in both groups and p value ≤0.05 was considered as significant. Relative risk was calculated and RR > 1 was taken as significant. Stratification for age, gestational age, parity, place of residence (rural/urban), socioeconomic status (poor/ middle/ upper). Education level (illiterate/ primary/ middle/ matric/ graduate) was done to control the effect modifiers and post-stratification chi square was applied to see the effect of these on outcome variables. P-value ≤0.05 was taken as significant. Relative risk was calculated and RR > 1 was taken as significant

Results

Age range in this study was from 18 to 40 years with mean age of 29.78 ± 5.95 years. The mean age of women in group A was 29.78 ± 5.85yearsand in group B was 29.18±6.12 years. Majority of the patients 53.66% were between 18 to 30 years of age as shown in Table I. Mean parity was 2.56±1.17 and mean gestational age in group A was 32.28 ± 4.62 weeks and in group B was 32.31 ± 4.58 weeks whereas percentage of patients

Table I Descriptive Statistics

		Group A	Group B	Total
		N (%)	N (%)	N (%)
Age (years)	18-30	23 (56.10)	21 (51.22)	44 (53.66)
	31-40	18 (43.90)	20 (48.78)	38 (46.34)
Mean±SD		29.78±5.85	29.18±6.12	29.78±5.95
Parity	0-2	19 (46.34)	18 (43.90)	37 (45.12)
	3-4	22 (53.66)	23 (56.10)	45 (54.88)
Mean±SD		2.51±1.16	2.61±1.18	2.56±1.17
Gestational age	28-34 wks	29 (70.73)	28 (68.29)	57 (69.51)
	35-41 wks	12 (29.27)	13 (31.71)	25 (30.49)
Mean±SD		32.28±4.62	32.31±4.58	32.36±4.57
Place of residence	rural	27 (65.85)	28 (68.29)	55 (67.07)
	Urban	14 (34.15)	13 (31.71)	27 (32.93)
Socio economic status	Poor	11 (26.83)	10 (24.39)	21 (25.61)
	Middle	17 (41.46)	19 (46.34)	36 (43.90)
	Rich	13 (31.71)	12 (29.27)	25 (30.49)
Education Status	Illiterate	7 (17.07)	6 (14.63)	13 (15.85)
	primary	9 (21.95)	8 (19.51)	17 (20.73)
	Middle	5 (12.20)	7 (17.07)	17 (20.73)
	Matric	10 (24.39)	9 (21.95)	19 (23.17)
	graduate	10 (24.39)	11 (26.83)	21 (25.61)

according to place of residence, socioeconomic status and education level.

Maternal outcomes i.e. caesarean section was recorded In 39.02% In group A, patients while 9.76% in group B women, preeclampsia was recorded In 26.83% versus 9.76% respectively and postpartum hemorrhage in 29.27% versus. 14.63% respectively. The fetal outcome between group A versus group B as follows; preterm delivery in 34.15% versus 12.20%, small for gestational age infants as 29.27% versus 14.63% and apgar score <7 at 5 minutes in 31.71% versus 19.51% respectively with p-value of <0.05 and relative risk > 1 which was statistically significant (Table II).

Table II: Analysis of Fetomaternal Outcomes.

		Group A N (%)	Group B N (%)	p-value	RR
C-section	Yes	16(39.02)	4 (9.76)	0.002	4.00
	No	25 (60.98)	37 90.24)		
PPH	Yes	12 (29.27)	6 (14.63)	0.109	2.00
	No	29 (70.73)	35 85.37)		
Pre-eclampsia	Yes	11 (26.83)	4 (9.76)	0.046	2.75
	No	30 (73.17)	37(90.24)		
Preterm Delivery	Yes	14 (34.15)	5 (12.20)	0.018	2.80
	No	27(65.85)	36(87.80)		
SGA	Yes	12(29.27)	6 (14.63)	0.109	2.00
	No	29(70.73)	35(85.37)		
Apgar Score < 7	Yes	13 (31.71)	8 (19.51)	0.206	1.62
	No	28 (68.29)	33(80.49)		

Discussion

For nearly a century, public health investigators have reported that the length of time between delivery and conception of the next pregnancy (inter- pregnancy interval or IPI) or birth of the next child (inter-birth interval) is associated with outcomes of the subsequent pregnancy.[17-18] Both short and long intervals have been associated with poor pregnancy outcomes, although along different hypothesized causal pathways. Long intervals are thought to be a consequence of infecundity and its associated poor pregnancy outcomes, while short intervals are thought to affect maternal, infant and child mortality through a 'maternal depletion syndrome',[19,20] when the mother does not have enough time between pregnancies to recover micro- and macronutrient stores. This recovery is additionally affected by breastfeeding practices. Especially for women who were undernourished before pregnancy, the energy needed to breastfeed increases time required to fully recover for the next conception.[20] Both very short and long intervals can also be associated with other factors such as socio-economic status (SES), which can cloud investigations of any independent physiological impact of pregnancy intervals.

Several studies have reported that short inter pregnancy intervals are associated with an increased risk of several adverse perinatal outcomes such as low birth weight (LBW), small for gestational age (SGA),and preterm birth.[21] In addition, short intervals between pregnancies have been implicated as a risk factor for perinatal death in some,[22] but not all.studies.[23] Fewer studies have shown that long inter pregnancy intervals are also associated with these risks.[21]However, whether inter pregnancy intervals an independent risk factor or whether· the association is due merely to confounding factors, such as maternal age, socioeconomic status, and reproductive history, is uncertain.[24] We have conducted the study to compare the fetomaternal outcome in women with <18 months versus 18-24 months of inter pregnancy birth interval. Age range in my study was from 18 to 40 years with mean age of 29.78±5.95 years. The mean age of women in group A was 29.78±5.85 years and in group B was 29.18±6.12 years. Majority of the patients 53.66% were between 18 to 30 years of age. The mean gestational age in group A was 32.28±4.62 weeks and in group B was 32.31±4.58 weeks. The maternal outcomes i.e. caesarean section was recorded in 39.02% in group A patients while 9.76% in group B women, preeclampsia was recorded in 26.83% versus 9.76% respectively and postpartum haemorrhage in 29.27% versus 14.63% respectively. The fetal outcome between group A versus group B as follows; preterm delivery in 34.15% versus 12.20%, small for gestational age infants as 29.27% versus 14.63% and apgar score <7 at 5 minutes in 31.71 % versus 19.51 % respectively. A meta-analysis of 67 studies conducted In 62 countries, as well as an additional study from Brazil, revealed that, poor maternal and perinatal outcomes were associated with inter pregnancy intervals between 6-18 months or longer than 59 months.13 A study conducted by Lilungulu. A et al[14] compared the maternal outcomes i.e. caesarean section was recorded in 29.3% in patients with < 18 months inter-birth interval while 2.0% in women with 18-24 months, preeclampsia was recorded in 18.0% versus 2.7% respectively and postpartum haemorrhage in 19.3%versus 3.3% respectively. The same author has found the fetal outcome between<18 months versus 18-24 months inter-pregnancy interval as follows; preterm delivery in 29.3% versus 3.0%, small for gestational age infants as 23.3% versus 3.0% and apgar score <7 at 5 minutes in 25.6% versus 3.7% respectively. The relationship between inter pregnancy interval and risk of

preterm birth and low birth weight is well established. A study conducted by Agustin Conde-Agudelo and colleagues[25] compared the birth outcomes, preterm birth was recorded in 95% in patients with <6 months inter-birth interval while 56% in women with 12-17 months and low birth weight was recorded in 63% versus 51% respectively. In another study, same author concluded that shorter inter pregnancy intervals are significantly associated with increased. Risk of adverse perinatal outcomes i.e. pre-term birth, low birth weight, and small for gestational age, than longer inter pregnancy interval.[26]

In a retrospective cohort study in Uttar Pradesh, India, Williams found an OR for early neonatal death of 4.39 [3.97, 4.87] for an IPI of < 18 months. Lawoyin and Oyediran reported that in a retrospective study in Ibadan, Nigeria, the risk of having a low-birth weight baby was at its peak for IPIs< 3 years.[27] Dhar found the frequency of Jow birth weight to be higher with an IPJ < 18 months (X2 = 14.33, P < 0.005) in a hospital-based cross-sectional study in Srinagar, India.[27] KlermanL V et al[28] in his study found that in bivariate analysis, the percentage of preterm deliveries decreased as the inter pregnancy interval increased. In yet another study utilizing Utah data, Zhu BP et al[29] found that after controlling for confounders, the risk of adverse perinatal outcomes i.e. preterm birth, low birth weight babies and small for gestational age infants, was high if the inter pregnancy interval was < 3 months and that the risks declined rapidly as the inter pregnancy interval increased. The risk for preterm births nearly tripled when less than 12 months elapsed between pregnancies, according to a recent retrospective cohort study of more than 400,000 births done by De Franco EA et al.[30] He has found significant difference in preterm delivery rates following short inter pregnancy interval < 12 months compared with women with normal inter pregnancy interval (53.3% vs 37.5% respectively). Rutstein[31] reported that, compared with inter pregnancy intervals of 36-47 months, interpregnancy intervals shorter than 36 months were significantly associated with an increased risk of both stunting and underweight. Rutstein postulated that stunting and underweight (chronic and overall undernutrition) could be an additional pathway by which short intervals increase the risk of child mortality.[31] Some investigators have attributed the increased risk of adverse maternal, perinatal, infant, and child outcomes among women with short intervals to several factors associated with both short intervals and poor health outcomes, such as socioeconomic status, lifestyle, stress, arid adequacy of prenatal care.[32]

The evidence we examined suggests that adverse health outcomes associated with both short and long inter pregnancy intervals are not explained by sociodemographic, behavioral, or reproductive risk factors. In fact, large studies from developing and developed countries have reported that the association between short inter pregnancy intervals and adverse pregnancy and child outcomes persists after controlling for many potential confounders.[31,33] The reasons for the association between a short interval between pregnancies and adverse perinatal outcomes are unclear. A plausible explanation is the maternal nutritional depletion hypothesis,[34,35] including folate depletion[36] maternal stress produced by the new pregnancy,[37] postpartum hormonal imbalance continuing into the new pregnancy, and preovulatory aging of the oocyte due to an extended follicular phase of the first ovulatory cycle. Maternal nutritional depletion hypothesis states that a close succession of pregnancies and periods of lactation worsen the mother's nutritional status because there is not adequate time for the mother to recover from the physiological stresses of the preceding pregnancy before she is subjected.to the stresses of the next. This results in depletion of maternal nutrient stores, with the subsequent increased risk of, adverse perinatal outcomcs.[34] On the whole, it is concluded from my study that short inter pregnancy interval (<18 months) was associated with adverse fetomaternal outcome compared to long inter pregnancy interval (18-24 months).

Conclusion

This study concluded that short inter pregnancy interval (<18 months) was associated with adverse fetomaternal outcome compared to long inter pregnancy interval (18-24 months). So, we recommend that there should be health awareness programs on local and national levels for creating awareness in general population as guide to maintain proper inter-pregnancy interval for the avoidance of poor fetomaternal outcome.

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