

The Relationship of the Inter-pregnancy Interval with Adverse Birth Outcomes

علاقة فترة ما بين الحملين مع النتائج السلبية للولادة

Dr. Salwa Hazim Al Mukhtar, Assistant Professor/PhD, MCHN, College of Nursing, University of Mosul

almukhtar_salwahazim@yahoo.com

الخلاصة

خلفية البحث: الفترة ما بين الحملين هي الفترة ما بين انتهاء الحمل السابق والحمل الحالي، وتعرف أيضاً باسم المباشرة ما بين الولادات **أهدافه:** الدراسة تهدف إلى تقييم علاقة ما بين الحملين مع النتائج السلبية للولادة.

منهجية البحث: صممت دراسة وصفية وتم اختيار (200) امرأة كعينة غرضية. تم جمع البيانات خلال فترة من 10 تشرين الثاني - 2013 إلى 13 نيسان - 2014، وقد أجريت الدراسة في مستشفيات مدينة الموصل (مستشفى الخنساء التعليمي) و (مستشفى البتول التعليمي)، وقد تم جمع البيانات باستخدام استبيان منظم. وهذا الاستبيان يتكون من أربعة أجزاء: يتضمن الجزء الأول خصائص المرأة ويشتمل على (العمر و مستوى التعليمي و المسكن و المهنة و عمر الحمل و زيارات الأم لمراكز الرعاية الصحية الأولية و الأمراض التي صاحبت الأم أثناء فترة الحمل) و يتضمن الجزء الثاني الفترة بين الحملين والتي تقسم إلى أشهر، و يتضمن الجزء الثالث أسباب عدم استخدام موانع الحمل خلال هذه الفترة، و يتضمن الجزء الرابع النتائج السلبية للولادة الأكثر شيوعاً التي تحدث للأمهات وأطفالهم بعد الولادة. وقد تم اختبار صدق الأداة من خلال عرضها على (10) خبراء، وكان قياس ثبات الاستمارة باستخدام معامل الارتباط ألفا كرونباخ (0.82) وحللت البيانات بواسطة الإحصاء الوصفي والاستنتاجي.

النتائج: إن قلة وزن الأطفال حديثي الولادة كانن الأخطر والأعلى نسبة بين الأمهات الذين لديهن قصر الفترة ما بين الحملين بنسبة (27%)، وكانت خصائص الأمهات للعينة تبين طبقاً للعمر النسبة المئوية الأعلى من الفئة العمرية (21-25) سنة وكانت النسبة (37%)، وحوالي (62%) من سكان الريف، وأكثر من نصف العينات (59.5%) لن يزرن مراكز الرعاية الصحية الأولية المتخصصة أثناء فترة الحمل، وفيما يتعلق بالأمراض التي صاحبت الأم أثناء فترة الحمل وكانت أعلى نسبة من مرض فقر الدم (42%)، وكانت الأسباب الرئيسة لعدم استخدام موانع الحمل خلال هذه الفترة بين الأمهات أنهم ظنوا لم يحصل الحمل في هذا الوقت (49%).

الاستنتاجات: استنتجت الدراسة أن قصر الفترة ما بين الحملين (ثلاثة إلى ست أشهر) ارتبطت بزيادة مخاطر الأم بفقر الدم و ارتفاع ضغط الدم خلال فترة الحمل و قلة وزن المولود عند الولادة و ولادة مبكرة و الصغر بالنسبة لعمر عند الحمل.

التوصيات: أوصى الباحثون بضرورة مواصلة الجهود لمنع تكرار حالات الحمل بين المراهقين وتداخل بتقليل المباشرة بين الولادات القصيرة بين الأمهات الشابات والبالغات والتي تستحق الأولوية العالية. وينبغي على النساء النجاح في التأثير في المباشرة بين الولادات المثالية على الأقل من (18 - 24) شهراً

الكلمات الرئيسية: الفترة بين الحملين، الصغر بالنسبة لعمر الحمل، انخفاض الوزن عن الولادة،

Abstract

Background: The inter-pregnancy interval is the time between the last delivery and conception of the current pregnancy. Also, known as birth spacing.

Aim: The study aimed to assess the relationship between inter-pregnancy interval and adverse birth outcomes.

Material and Methods: A descriptive study design was consist of (200) women selected by purposive sampling technique. Data collected during the period from 10th of November- 2013 to 13th of April-2014. The setting of the study was carried out in hospitals of Mosul city (AL-Khansa Teaching and AL-Batool Teaching). Data were collected with a structured questionnaire. This questionnaire consist of four parts, part one included demographic data and characteristics of the women included (Age, Educational level, Resident, Occupation, Gestational age, Prenatal care visits and Maternal illness during pregnancy), part two included intervals of inter-pregnancy that divided into months, part three included the reasons for not using family planning, part four included the most common adverse birth outcomes that occur for women and their babies after delivery. The validity of the questionnaire was examined by (10) experts and reliability of the questionnaire was (0.82). Data were analyzed by descriptive statistics inferential statistical.

Results: The newborn with low birth weight, the risk was higher among mothers with a short inter-pregnancy interval (27%), the maternal characteristics of the sample demonstrates that according to age, the highest percentage was of the study age group (21-25) year that was (37%), As regard the resident, about (62%) of the sample was rural, And more than half of the samples (59.5%) were not visited a specialized maternal health care during their pregnancy period. With regard the maternal illness during pregnancy and the highest percentage was (42 %) in anemia., the main reasons for not using birth control at the time of conception among mothers was they thought will not get to have a pregnancy at this time (49%).

Conclusion: short inter-pregnancy intervals (three to six) months are associated with increased risks of maternal: anemia, gestational hypertension, low birth weight, preterm delivery and small for gestation age.

Recommendations: The researchers recommended that should be continued efforts to prevent repeat pregnancies among teenagers and interventions to lower short birth spacing among young adult mothers deserve high priority. The women should be succeeding in influencing and achieving an optimal birth spacing of at least eighteen to twenty four months.

Keywords: Inter-pregnancy interval, Low birth weight, small for gestational age.

INTRODUCTION :

The interpregnancy interval is the time between the last delivery and conception of the current pregnancy. Also known as birth spacing⁽¹⁾. The interpregnancy interval is defined as the interval between the last live birth and the conception of the reported birth and is computed as the interval between two consecutive deliveries minus the gestational age of the second infant. The interval was calculated in weeks and was converted to months (13 weeks=3 months). Interpregnancy interval of less than 12 months is considered a short interpregnancy interval⁽²⁾. Inter-pregnancy intervals were divided into three categories: short (less than 18 months), optimal (18 to less than 24 months), and long (24 months or more) The “optimal” interpregnancy interval is the time between pregnancies that has been associated with previous research with the lowest risk of negative outcomes for both mother and infant ⁽³⁾. In as compared to a 36-41 month birth interval, a birth interval of less than 18 months is associated with increased risk of neonatal mortality- 3.17 times, infant mortality-3.16 time, under-five mortality- 2.81 times, underweight- 1.46 times, third trimester bleeding- 1.7 times, Premature rupture of membranes- 1.7 times, Anemia-1.3 times, puerperal endometritis-1.3 times. (Demographic and Health Survey (DHS) and the Latin American Centre for Perinatology and Human Development (CLAP), 2002) ⁽⁴⁾. Closely spaced pregnancies are commonly defined using either of two indicators: short interpregnancy interval (birth to conception interval), or short birth interval (the interval between the previous and sampled births). Mothers with closely spaced pregnancies have little time to recover from the physiologic and nutritional demands of the previous pregnancy. If such women are also breastfeeding, any negative effects of lactation on maternal nutritional status may further increase the risks of adverse outcomes of pregnancy, such as prematurity or fetal growth restriction, this may occur because both the last portion of pregnancy and full lactation are periods of potential nutritional depletion for the mother. Becoming pregnant soon after the end of this period of depletion allows the mother little or no time for nutritional repletion. In studies using multivariate analysis, an interpregnancy interval of 3 months (or a comparable birth interval of 12 months) is reported to increase the risk of delivering an infant born preterm and with low birth weight, delivering an infant small for gestational age (SGA), and neonatal death⁽⁵⁾. Numerous investigators have found an association between short interpregnancy interval and a number of adverse perinatal outcomes, including preterm birth, low birth weight, and stillbirth. The definition of short interpregnancy interval varies widely across studies; the most common definition is less than or equal to 6 months. ⁽⁶⁾

Aim of the study:

To assess the relationship between interpregnancy interval and adverse birth outcomes.

METHODOLOGY:

Prior to data collection, formal administrative approval was obtained to conduct the study from the Ministry of Health. Consent of the women to participate questionnaire was obtained to conduct the study. A descriptive study design as a quantitative approach was adopted to achieve the aim of the present study during the period (from 10th of November - 2013 to the 13th of April - 2014). The study was conducted during two months, extending from (December 10th, 2013 to February 10th, 2014). The data collected from two hospitals in Mosul city (AL-Khansa Teaching Hospital located in the left side and AL-Batul Teaching Hospital located in the right side) the center of Nineveh Governorate. The study was carried out in the following units (postnatal ward, premature ward and intensive care unit for neonatal babies). The sample of the study was convinces sample and consist of (200) woman, (88) woman in AL-Khansa Teaching Hospital and (112) woman in AL-Btul Teaching Hospital. Data were collected depending on a questionnaire. The questionnaire was composed of:

1. **Part One:-** This part included (7) items which focus on the Maternal Characteristics of the women included (Age, Educational level, Resident, Occupation, Gestational age, Prenatal care visits and Maternal illness during pregnancy).
2. **Part Two:-** this part included intervals of inter-pregnancy that divided into months.
3. **Part Three:-** this part included the reasons for not using birth control at the time of conception as questions.
4. **Part Four:-** this part included the most common adverse birth outcomes that occur in women and their babies after delivery.

To ensure the validity of the scale, method and procedure were proposed to be carried out during the study. Ten experts of different specialties related to the field of the present study were chosen to review face and content validity. They were asked to review the scale format for clarity and adequacy in order to achieve the present study objectives. These experts were (3) faculty members from the College of Nursing/University of Baghdad, (2) faculty members from the College of Medicine/ University of Mosul, (2) faculty members from the College of Nursing/University of Mosul, (1) faculty members from the College of Nursing/University of Babel, (1) member from the AL- Khansa Teaching Hospital/ Nineveh, and 1 member of the AL-Batul Teaching Hospital/ Nineveh. Their opinions, suggestions, and recommendations were taken into consideration in the final draft of the tool in this study. To describe and analyze the findings of the study, the SPSS version (16) program was used to analyze the data.

RESULTS:

Table (1) distribution of the study subject according to demographic data and Maternal Characteristics. Subjects (N = 200)

Variables		No.	%
Age	<16	4	2.0
	16-20	27	13.0
	21-25	74	37.0
	26-30	49	24.5
	31-35	34	17.0
	36-40	9	4.5
	>40	3	1.5
	Total	200	100%
Education level	illiterates	95	47.5
	Primary school education	73	36.5
	Secondary school education	23	11.5
	College and above	9	4.5
	Total	200	100%
Resident	Rural	124	62.0
	Urban	76	38.0
	Total	200	100%
Occupation	Housewife	179	89.5
	Employment	21	10.0
	Total	200	100%
Gestational age	<37 weeks	90	45.0
	>37 weeks	110	55.0
	Total	200	100%
Prenatal care visits	Yes	81	40.5
	No	119	59.5
	Total	200	100%
Maternal illness during pregnancy	Diabetes	11	5.5
	Hypertension	47	23.5
	Anemia	84	42.0
	Other diseases	26	13
	*UTI	*17	*8.5
	*Hypothyroidism	*9	*4.5
	Non	32	16
	Total	200	100%

Table (1) shows that most of the women were at age (21-25) years and constitutes (37%), (47.5) of them were illiterate, (62%) lived in rural, (89.5%) housewife, (42%) of them had anemia.

Table (2) multivariate logistic regression for risk factors of inter-pregnancy interval

Variable	Unadjusted Odds Ratio	95% CI	P
Age 19 years	9.74	2.66-22.32	0.001*
Rural/urban	2.66	0.90-7.87	0.076
Intervals	7.75	2.45-24.89	0.001
ANC visit	0.43	0.05-3..85	0.454

Table (2) shows that age 19 years is a significant correlated with inter-pregnancy intervals

Table (3) distribution percentage of the study, according to proportion of not using birth control at the time of conception among women

Variables		No.	%
Reasons for Not Using Birth Control at Time of Conception	Thought "I Couldn't Get Pregnant at That Time"	98	49.0
	Didn't Mind if I Got Pregnant	71	35.5
	Husband/Partner Didn't Want to Use Family Planning	6	3.0
	Side Effects from Method of Using Contraception	25	12.5
	Total	200	100%

Table (3) reveals that a thought "I Couldn't Get Pregnant at That Time" is a major reason for not using birth control.

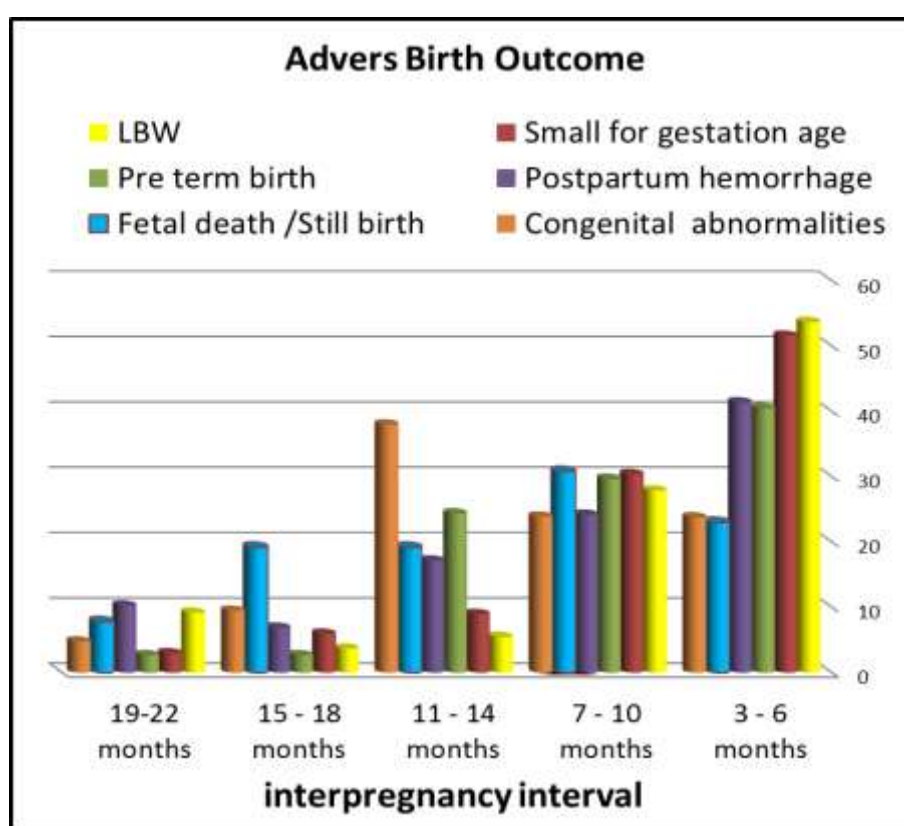


Figure (1) Association between adverse birth outcomes and inter-pregnancy intervals

Figure (1) shows that most adverse birth outcome occurred in 3-6 months interval

DISCUSSION:-

The aim of this study was to assess the relationship of the interpregnancy interval with adverse birth outcomes. Our study showed that the majority of mothers amongst the age group of 21-25 yr (37.0%) with the mean age of mothers were 22.9 +3.50 years. Proving an inverse relationship between the age of the mother and the risk of low birth weight, and we found that adolescent mothers (Age < 19 years) had a

higher risk of delivery of a low birth weight baby compared to older mothers on multivariate regression analysis [OR 9.74 (95% CI 2.66- 22.32), $p = 0.001$]. The inverse relationship between maternal age and low birth weight has also been reported by other authors. ⁽⁷⁾ Showed that maternal age less than 20 years was a significant risk factor for LBW (OR 3.96, 95%CI (1.25-12.62). Bisai et al in a cross sectional retrospective study performed in a hospital in Kolkata found that mothers aged less than 19 years had 2.9 times higher risk of an LBW delivery (95%CI, 1.53-5.65, $p < 0.001$) compared to mothers aged 19-28 yr 28. ⁽⁸⁾ Kramer proposed that the effect of age may be indirect rather than direct. Age is closely related to parity and adolescents are also likely to have a lower weight for height than older ⁽⁹⁾. In Iraqi societies, early marriage of the girl child is more common in families belonging to lower socio economic status. It is possible that many of the young mothers, who delivered LBW babies, were from poorer families and as a result had a poorer nutritional status at the time of conception than those women who had grown up in more affluent families. The mother's current socioeconomic status may or may not have been the same as the socioeconomic conditions of the family in which she was raised; a factor which may have an important bearing on her nutritional status at the time of conception and consequently, on her risk of delivering a LBW baby. In Pakistan Badshaah et al found that teenage mothers were independently associated with low maternal weight and had a lower family income as compared to older mothers. (OR 2.3, $p < 0.01$). ⁽¹⁰⁾ Teenage pregnancy was also independently associated with SGA compared to middle aged and older mothers [OR 8.35, (95 % CI 4.36-15.98)]. Sharma et al. studying adolescent pregnancies in Eastern Nepal, highlighted the differences in behavior between teenage and older mothers. He found that teenage mothers were less likely to get their pregnancy registered in the first trimester also had a fewer number of antenatal checkups compared to older women ⁽¹¹⁾. In our study, 62.0 % of cases belonged to rural areas compared to 38.0 % of urban areas. The difference observed was statistically significant ($X^2 = 8.06$, $p < 0.005$). Women living in rural areas had a higher risk for LBW than women living in urban areas on univariate regression analysis (OR 2.66 (95% CI 0.90-7.87. $p < 0.076$). Singh et al studying the utilization of antenatal care by pregnant women in India, found that 63.7 % of women with low birth weight in their study resided in rural areas, and the remaining 36.3% resided in an urban area. ⁽¹²⁾ Bhargava et al also found that mothers who lived in rural areas and urban slums had a higher prevalence of LBW. In their study, there was a higher prevalence of LBW in the urban slum cohort (41.4%) compared to the rural cohort (38.1%). ⁽¹³⁾ Regarding educational level, 47.5 % of the participants were illiterate. This finding disagreement with Navneetham and Dharmalingam has found that, in Karnataka, illiterates were less likely to utilize ANC services. They also found that mothers who had studied beyond high school were much more likely to have a hospital delivery (OR 1.71, $p < 0.05$) than less educated mothers. ⁽¹⁴⁾

Amongst the study participants, 89.5% were housewives, and 10.5 % were employed. A woman's work status may have an influence on her utilization of antenatal care services, and in her degree of autonomy. Navneetham and Dharmalingam ⁽¹⁴⁾ reported that non-working women in Andhra Pradesh were about 82 per cent more

likely to go for antenatal check-up compared to earning women. Shah and Ohlsson found that the evidence from epidemiological studies on work, type of work, shift work and control at workplace indicates that physically demanding work increases the risk of SGA/LBW/preterm birth.⁽¹⁵⁾ In our study, a higher proportion of LBW babies (55.0%) were born at a gestational age of >37 weeks at the lower spectrum of the definition of Term LBW. As expected, fewer deliveries took place at the gestational ages of 41 and 42 weeks. The present study found that those mothers who received less than 3 ANC visits were a significant risk factor for LBW on multivariate regression analysis [OR 0.43 (95% CI 0.05 – 3.85), $p = 0.454$]. In our study, 40 % of women were registered in the first trimester of pregnancy. This finding is in accordance with that of NFHS -3 Data which showed that 51% of women in Karnataka registered their pregnancy in the first trimester. Women who registered their pregnancy after the first trimester were at a higher risk for LBW on multivariate regression analysis (OR 1.17 (95% CI 0.60-2.26), $p = 0.637$). Kramer also found that the number of ANC visits a woman received was not a significant risk factor for delivery of a low birth weight baby⁽⁹⁾. A number of studies from have reported the beneficial effect that adequate and regular ANCs have on lowering the risk of LBW. It is probable that women who have regular ANC visits are also more likely to be diagnosed with complications during pregnancy and are thus referred to the hospital for an institutional delivery. This may have had an effect on the findings. The table 1 shows that the number of women who gave a history of major medical illness during pregnancy. The types of illnesses included anemia (42.0%) Hypertension (excluding pregnancy induced hypertension) (23.0%) , Diabetes (excluding gestational diabetes) (11.5%), urinary tract Infection (8.5%), and hypothyroidism (4.6%). Shah and Ohlsson found that certain types of medical illness during pregnancy may influence the pregnancy outcome. Gestational diabetes usually results in large for date infants. If the mother has previous glucose intolerance, superimposed gestational diabetes can lead to growth restriction Maternal thrombophilic conditions can also affect the development of the placenta and lead to IUGR.⁽¹⁵⁾ In addition, maternal infection with rubella, cytomegalovirus, malaria, syphilis, varicella, herpes, and Listeria, Epstein - Barr virus and Chagas disease can cause fetal growth restriction. Urinary tract infection is common during pregnancy and It can lead to preterm labor and preterm rupture of the membranes. Brocklehurst et al, studying pregnancy outcomes in HIV + pregnant women found that they were at an increased risk of preterm births (OR 1.83, 95% CI 1.63, 2.06), LBW [OR 2.09 (95% CI 1.86, 2.35)] and IUGR (OR 1.7 (95% CI 1.43, 2.02)]⁽¹⁶⁾. According to Kramer⁽⁹⁾ common episodic illnesses and symptoms, such as upper respiratory infections, fever, nausea, vomiting, diarrhea, headache, and anorexia, could also affect intrauterine growth or gestational duration. In rural developing countries, such illness may be associated with an impaired fetal growth, on average, of 45 g per birth. However, whether such an association represents a causal effect of maternal illness on fetal growth, or merely a marker for problem pregnancies, is not clear at present. Maternal malaria could be a major determinant of intrauterine growth or gestational duration in countries where it is endemic. Pregnancy interval was found to be a significant risk factor for LBW in the present study. We found that women with a pregnancy interval of less than 12 months were at a significantly higher risk for LBW, on multivariate regression analysis [OR

7.75 (95% CI 2.45- 24.89), $p < 0.001$]. This finding was in accordance with other studies. Negi et al ⁽¹⁷⁾, in their study performed in a rural area near Dehradun found that an interpregnancy interval of less than 12 months was associated with a higher risk of LBW (OR 2.58, $p < 0.05$). Deshmukh et al (20) 2008) in their longitudinal study in an urban area of Nagpur reported a similar finding (OR 3.84 (95% CI 2.10-6.46)]. A short pregnancy interval may lead to LBW because of nutritional depletion or inadequate physiological recovery. Kramer found that there was insufficient epidemiological evidence to show that birth interval was a significant risk factor for LBW ⁽⁹⁾. However, Shah and Ohlsson ⁽¹⁵⁾ found that several epidemiological data sources in the US indicated that both short (<18m) and long (>60m) intervals are associated with LBW births. Also, the majority of study samples (49%) was answered that they thought they couldn't get pregnant at this time, which expressed their reason for not using birth control at the time of conception. This result was similar to Askew et al. ⁽¹⁸⁾ study, which found that the majority of the woman were having wrong thought about the time course of pregnancy.

CONCLUSION :

Mothers with short interpregnancy intervals were more likely under twenty five years, illiterate, rural, housewife and receiving inadequate or no prenatal care. The main reasons for not using birth control at the time of conception were women thought they will not become pregnant at this period.

RECOMMENDATIONS :

Depending on the findings of the study, the researchers recommended that:

1. Continued efforts to prevent repeat pregnancies among teenagers and interventions to lower short birth spacing among young adult mothers deserve high priority.
2. The women should succeed in influencing and achieving an optimal birth spacing of at least eighteen to twenty four months, they need the conviction and support of their significant family members (husbands and mothers).
3. Health messages, disseminated at healthcare clinics and through the mass media, should target husbands and mothers especially those of younger women, since the former are the main decision makers with regards to timing of pregnancy.
4. The risks associated with frequent pregnancies with a short interpregnancy interval that may affect the mother, fetus and/or neonate, should be described using scientific documentation and disseminated to wives, husbands and mothers. Intensified promotion of postpartum contraception and increased emphasis on counseling should better support women in achieving their desired spacing optimal birth Spacing.

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