



**RELATIONSHIP BETWEEN INTERPREGNANCY INTERVAL AND  
NEONATO-MATERNAL OUTCOMES**

**Dr. Negin Rezavand<sup>1</sup>, Mastaneh Kamravamanesh<sup>2\*</sup>, Dr. Maryam Zangeneh<sup>3</sup>,  
Dr. Firozeh Vaisi<sup>1</sup>, Dr. Mansour Rezaei<sup>4</sup>, Dr. Ali Reza Hayati<sup>5</sup>, Dr. Mitra Bakhtiari<sup>6</sup>**

<sup>1</sup>Associate Professor, Department of Obstetrics and Gynecology, Faculty of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran.

<sup>2</sup>Instructor of Nursing and Midwifery, Kermanshah University of Medical Sciences, Kermanshah, Iran. PhD student of Reproductive Health Isfahan University of Medical Sciences Isfahan, Iran.

<sup>3</sup>Assistant Professor, Department of Obstetrics and Gynecology, Faculty of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran.

<sup>4</sup>Associate Professor, Department of Biostatistics and Epidemiology, Faculty of Health, Kermanshah University of Medical Sciences, Kermanshah, Iran.

<sup>5</sup>General Practitioner, Faculty of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran.

<sup>6</sup>Assistant Professor, Department of Anatomical Sciences, Faculty of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran.

Article Received on 02/07/2015

Article Revised on 22/07/2015

Article Accepted on 15/08/2015

**\*Correspondence for**

**Author**

**Kamravamanesh**

**Mastaneh**

Instructor of Nursing and

Midwifery, Kermanshah

University of Medical

Sciences, Kermanshah,

Iran.

**ABSTRACT**

**Background and objective:** The suitable spacing between births is one of factors affecting health of mothers and children. The interval between one pregnancy and next pregnancy may affect risk of pregnancy complication. As specialists often face with questions related to suitable interval between pregnancies, so this research was done to study association between interpregnancy interval with maternal and neonatal outcomes in referred women to labor ward of

Imam Reza educational – therapeutic hospital of Kermanshah city in 2012. **Material and**

**Methods:** This prospective study was carried out on 605 singleton pregnant women with gestational age above 24 weeks who referred to labor ward of Imam Reza educational-therapeutic hospital of Kermanshah, Iran during 2012. Sampling method was available. The data collection instrument was a made – researcher questionnaire that after agreement of subjects through interview was completed. Then, information was classified using software

SPSS and was analyzed by descriptive and analytical statistical tests. **Results:** There is meaningful association between pregnancy interval variable and maternal age in time of birth ( $P=0.00$ ), maternal age in first pregnancy ( $P=0.001$ ), number of parturition ( $P=0.00$ ), birth weight ( $P=0.004$ ), circumference of head in time of birth of infant ( $P=0.00$ ), method of prevention of pregnancy ( $P=0.009$ ), method of parturition ( $P=0.00$ ), preeclampsia in recent pregnancy ( $P=0.001$ ), diabetes in recent pregnancy ( $P=0.005$ ), wanted or unwanted pregnancy ( $P=0.00$ ) and duration of lactation ( $P=0.00$ ). **Conclusion:** In this study, special complication was not found in terms of short pregnancy interval that is perhaps due to perinatal cares and regimen of mother and use of supplements and pregnancy interval in terms tolerance of pregnancy and physical pressure for mother is important.

**KEYWORDS:** Pregnancy interval, maternal outcomes, Neonatal outcomes.

## INTRODUCTION

Interval between one pregnancy and next pregnancy may affect risk of pregnancy complication. The short and long interval between pregnancies can be related to undesirable outcomes. But most undesirable effects are related to short intervals. As suitable spacing between pregnancies that lead to decrease in undesirable outcomes of pregnancy is controlled by women to a great part, so considering interpregnancy interval variable as an independent biological risk factor is important to create undesirable events of pregnancy. The prevention of short interval between pregnancies can be possible through contraception devices providing after parturition, while success of an arbitrary pregnancy with long intervals between pregnancies due to infertility, accessibility of sexual partner, economic problems or diseases is more difficult.<sup>[1]</sup> The short interval and also long interval between pregnancies is related to increase in risk of preterm labor, perinatal death, and low birth weight (LBW) and small for gestational age (SGA). But there are different views on significance of risk factor. For example, some researchers have argued that short intervals between pregnancies merely determine that currently women are in higher risk in terms of fertility or this is due to economic and social status or factors related to life style.<sup>[2]</sup> The short intervals are also related to some undesirable outcomes including risk of preterm labor, low birth weight and preeclampsia for mother and infant. The prevention of short intervals between pregnancies is a priority in USA. The decrease 10% of pregnancies that have occurred in intervals between 6-18 months of previous pregnancy in 2020 is the goal of healthy people. About one - third intervals between pregnancies in USA is less than 18 months. The potential relationship

between decision for pregnancy and interpregnancy intervals is one of special appeals. The strategy to decrease unwanted pregnancy may affect indirectly prevalence of short intervals between pregnancies and particularly decreases mistimed pregnancies and increases intervals between pregnancies.<sup>[3]</sup> Traditionally, spacing between pregnancies has known as a family planning intervention and an effective action to improve maternal and perinatal mortality and morbidity, but it seems that this is less considered. In first half of century 20, interpregnancy interval with respect to its potential relationship with maternal and perinatal outcomes has evaluated, but mechanisms of such relationship have not known yet. A recent systematic review on study of interval of birth and perinatal outcomes showed that interpregnancy intervals less than 18 months and more than 59 months are related to increase in risk of undesirable perinatal outcomes like preterm labor, low birth weight and small for gestational age.<sup>[4]</sup> The suitable spacing between births is one of factors affecting health of mothers and children. So a study was done on multiparous mothers in labor wards of Babol city (2007) and factors related to spacing between births were evaluated. One of the important factors affecting mortality of fetus and children under one year is birth of premature newborns and low birth weight.<sup>[5]</sup> The results of a research on pregnant women in educational hospitals of Ahvaz indicated that pregnancy interval more than 60 months is related to risk of low birth weight.<sup>[6]</sup> The finding of other study (2012) as known as relationship between interpregnancy interval and birth defects in Washington State Showed that Compared with mothers with an interpregnancy interval between 11 to 23 months, those with an interpregnancy interval <6 months or  $\geq 60$  months had elevated risks of delivering an infant with a birth defect.<sup>[7]</sup> In a study that in 2000-2007 was done in Netherlands and the relationship between high ages of mother, interpregnancy short interval and perinatal outcome was evaluated. It was shown that interpregnancy short interval (less than 6 month) is related to preterm labor and low birth weight and but there is no relation with small for gestational age. Also this study showed that relation of interpregnancy short interval with preterm labor in old women is weaker than young women and there is not association between interpregnancy short interval and maternal age and low birth weight or small for gestational age.<sup>[8]</sup> Given results of done studies in this regard that has reported different results on suitable interval between pregnancies and also as specialists often face with questions on suitable interval between pregnancies, so this research was done to study relation between interpregnancy interval and maternal and neonatal outcomes in pregnant women who referred to labor ward of Imam Reza educational-therapeutic hospital of Kermanshah, Iran during 2012.

## MATERIALS AND METHODS

This prospective study was carried out on 605 singleton pregnant women with gestational age above 24 weeks who referred to labor ward of Imam Reza educational- therapeutic hospital of Kermanshah, Iran during 2012. Sampling method was available. In this study, according to interpregnancy interval, pregnant women were divided into two groups with interpregnancy interval 24 months and less (244 subjects) with 40% of samples and interpregnancy interval 25 months and more (361 subjects) with 60% of samples. The addict and smoker women and also women having systemic disease or women who use special drug were excluded. The data collection instrument was a made – researcher questionnaire that after agreement of subjects, was completed through interview. Also to obtain other required information on mothers and infants, records of samples were studied. Then information were classified by software SPSS and were analyzed by descriptive and analytical statistical tests.

## RESULTS

The number of pregnant women in this research was 605 that 244 subjects ( 40%) had interpregnancy interval 24 months and less and 361 subjects (60%) had interpregnancy interval 25 months and more. The age mean of women in two groups was 31.7 years with standard deviation 5.66 and in group of 24 months and less was 30.34 years and in group of 25 months and more was 32.07 years. There was meaningful association between maternal age and interpregnancy interval ( $P=0.00$ ), and there was a positive correlation between two variables; that is, by increasing maternal age, interpregnancy interval has increased. The age mean of women in first pregnancy in two groups was 21.6 years with standard deviation 4.09 years and in group with interpregnancy interval 24 months and less was 22.03 years and in group with 25 months and more was 21.31 years. There is meaningful association between maternal age in first pregnancy and interpregnancy interval. ( $P=0.001$ ) .Also there is negative correlation between two variables, that is, by increasing maternal age in first pregnancy, interpregnancy interval has decreased (Table 1). There is meaningful association and negative correlation between two variables, number of parturitions and interpregnancy interval ( $P=0.00$ ); that is, by increasing number of parturitions, interpregnancy interval has decreased.

**Table 1: Mean of some characteristics of subjects and its relation with interpregnancy interval.**

Test results relation with pregnancy interval	Mean in two groups	interpregnancy interval 25 months and more	interpregnancy interval 24 months and less	interpregnancy interval characteristics
<b>P=0.00</b>	<b>5.66+31.7</b> years	<b>32.07</b> years	<b>30.34</b> years	<b>Maternal age in time of neonatal birth</b>
<b>P=0.001</b>	<b>4.09+21.6</b> years	<b>21.31</b> years	<b>22.03</b> years	<b>Maternal age in first pregnancy</b>

The mean of lactation was 19.72 months with standard deviation 8.47 and there is meaningful association and positive correlation between two variables; interpregnancy interval and lactation duration ( $P=0.00$ ) and by increasing lactation, interpregnancy interval has increased (Table 2). There was not meaningful association between two variables; interpregnancy interval and maternal employment status ( $P>0.05$ ). In study of contraception method variable, 178 pregnant women (29.4%) used IUD that among them, 94 women had interpregnancy interval 25 months and more and 84 women had interpregnancy interval 24 months and less.

There is meaningful association between method of contraception and interpregnancy interval ( $P=0.009$ ) (Table 1). The mean of gestational age in present research in two groups was 37.28 weeks with standard deviation 2.28, mean of gestational age in group with interpregnancy interval 24 months and less was 37.49 and in group with 25 months and more was 37.14 and there is not meaningful association between gestational age and interpregnancy interval ( $P=0.645$ ). The results of research showed that 39 pregnant women (6.4%) had experienced mortality of newborn already. There is not meaningful association between interpregnancy interval and neonatal mortality ( $P=0.149$ ). The mean of birth weight was 3096.94 gr. with standard deviation 661.58 and there is meaningful association and negative correlation between interpregnancy intervals and birth weight ( $P=0.004$ ); that is, by increasing interpregnancy interval, birth weight has decreased. Also, mean of birth height was 48.76 with standard deviation 3.75 and there is not meaningful association between interpregnancy interval and birth height ( $P=0.217$ ). The mean of circumference of neonate head was 34.33cm with standard deviation 2.11, and there is meaningful association and negative correlation between interpregnancy interval and birth circumference head ( $P=0.00$ ); that is, by increasing interpregnancy interval; circumference of neonates head has decreased (Table 2). According to results of present research, 123 pregnant women (20.3%) had history

of stillbirth. There is not meaningful association between interpregnancy interval and birth of dead newborn ( $P=0.053$ ).

**Table 2: Mean of some characteristics of subjects according to interpregnancy interval.**

Test results relation with pregnancy interval	Mean in two groups Interpregnancy interval 24 months and less and 25 months and more	Interpregnancy interval
		characteristics
P=0.00	19.72±8.47 months	Duration of lactation
P=0.004	3096.94±661.58 gr	Birth weight
P=0.00	34.33±2.11 cm	Birth head circumference

In study of method of delivery, 248 pregnant women (41%) had normal vaginal delivery. There is meaningful association between method of delivery and interpregnancy interval ( $P=0.00$ ) (table 1). In study of preeclampsia in recent pregnancy, 88 pregnant women (14.5%), had history of preeclampsia in recent pregnancy. There is meaningful association between interpregnancy interval and preeclampsia in recent pregnancy ( $P=0.001$ ) (table 3). In study conducted on neonatal malformation in current pregnancy, one pregnant woman had abnormal neonate. There is not meaningful association between abnormal neonate and interpregnancy interval ( $P=0.411$ ). In study conducted on PPRM in recent pregnancy, 44 pregnant women had PPRM in recent pregnancy and among them, 21 subjects had interpregnancy interval 25 months and more and 23 subjects had interpregnancy interval 24 months and less. There is not meaningful association between PPRM in recent pregnancy and interpregnancy interval ( $P=0.094$ ). There is meaningful association between interpregnancy interval and gestational diabetes ( $P=0.005$ ) (table 3). The results of study showed that is meaningful association between interpregnancy interval and wanted or unwanted pregnancy ( $P=0.00$ ) (table 3). According to results of research, there was not meaningful statistical association between interpregnancy interval and education level of mother, placenta abnormalities and current pregnancy outcome.

**Table 3: Distribution of relative and absolute frequency relation of some characteristics and interpregnancy interval in subjects under study.**

P Value	total		25 months and more		24 months and less		Interpregnancy interval	
	percent	number	percent	number	percent	number	characteristics	
P=0.009	29.4	178	26	94	34.4	84	IUD	Contraception method
	49.4	299	49	177	50	122	Pill	
	21.2	128	24.9	90	15.6	38	None	
P=0.00	41	248	32.1	116	54.1	132	NVD	Mode of delivery
	59	357	67.9	245	45.9	112	caesarian Section	
P=0.001	14.5	88	18.6	67	8.6	21	Yes	History of preeclampsia in recent pregnancy
	85.5	517	81.4	294	91.4	223	No	
P=0.005	9.4	57	12.2	44	5.3	13	Yes	Gestational Diabetes
	90.6	548	87.8	317	94.7	231	No	
P=0.00	74.7	452	68.7	248	83.6	204	wanted	Wanted or unwanted pregnancy

## DISCUSSION

The short and long intervals between pregnancies are related to increase in risk of preterm labor, perinatal death, low birth weight and low gestational age. Also short interval between pregnancies leads to increase in risk and undesirable like: maternal death, third trimester bleeding, premature rupture of membrane, anemia and long interval between pregnancies leads to higher risk of premature rupture of membrane and low risk of caesarian.<sup>[4]</sup> These problems have caused that today's many countries including Iran accept suitable spacing between births strategies and include it in their health and national plan. Also researchers believe that absence of suitable interval between pregnancies is one of low birth weight factors and low birth weight is one of factors affecting mortality of fetus and children under one year. So use of results of studies on association between interpregnancy interval and complication after pregnancy can decrease complication after pregnancy by determining suitable spacing between pregnancies. This research showed that there is not meaningful association between interpregnancy interval and preterm labor that is inconsistent with findings of a study conducted in Dr. Shabihkhani center of Kashan in 1997-98 that showed:

interpregnancy interval less than 15 months plays role on parturition.<sup>[9]</sup> As well as the results of research between the years 1982-2004 in Brazil, Zimbabwe and the Philippines to cohort study on 19240 live births found: interpregnancy interval less than 18 months increases risk of preterm labor.<sup>[10]</sup> The reasons of this difference can be prior preterm labor, twin pregnancy and low social classes. In study conducted in Dr. shabihkhani center of Kashan in 1999-2000, it was shown that there is no relation between pregnancy with interval less than 15 months and birth height and weight, but there is meaningful association between pregnancy with interval less than 12 months and birth height and weight.<sup>[11]</sup> And in study in 1982-2004 indicated that interpregnancy interval less than 18 months and more than 60 months increases risk of low birth weight.<sup>[10]</sup> During the another study in scottish hospitals in 1981-2000 on 30937 women who had history of abortion in the first pregnancy and subsequently became pregnant, the role of interpregnancy interval on pregnancy outcomes after miscarriage was evaluated and was shown that women who became pregnant again during 6 months and had second pregnancy with birth of live newborn, had less possibility for infant with low birth weight.<sup>[12]</sup> Our research showed that there is meaningful association between birth weight and interpregnancy interval and by decreasing interpregnancy interval, birth weight has increased, but there wasn't meaningful association between interpregnancy interval and birth height. The findings of these studies are similar partly to our findings and reasons of increase in weight of infants by decreasing interpregnancy interval in our research can be use of supplements and nutritional regimen to decrease concern of low birth weight. During the study which was carried out in health centers in Bushehr in 2005, factors related to interpregnancy interval in women having more than one child were evaluated including: education level and occupation of parents, maternal age in time of marriage, maternal age in first pregnancy, maternal age in time of birth under study, number of children of family, gender of previous child, the previous mode of delivery, occupation of mother; maternal age in first pregnancy and maternal age in time of birth showed meaningful association with interval between births.<sup>[13]</sup> In other research on 500 multiparous women in public and private maternity hospitals and also multiparous women having child under 6 years old in Babol city in 2007, spacing in births and factors related to it in multiparous women in these centers was studied and findings showed that maternal age, number of parturitions, duration of lactation, stillbirth, infancy mortality, how are referred to family planning clinics and use of contraception new methods are related to spacing in births.<sup>[5]</sup> And in present research was shown that there is meaningful association between maternal age in first pregnancy, maternal age in time of birth, number of parturations, method of delivery, wanted or unwanted

pregnancy, method of contraception and duration of lactation after prior parturition and interpregnancy interval and there isn't meaningful association between interpregnancy interval, occupation and education level of mother. A study in 1998-2008 in Washington indicated that women with interval 18-23 months showed increase in risk of birth of abnormal infants.<sup>[7]</sup> But in the present research there was not meaningful association between interpregnancy interval and birth of abnormal infant. The reason of this difference may be exclusion of women having systemic disease or using special drug and also smoker and addict women. In a study in California in 1997-1989, it was shown that short interval between pregnancies is related to increase in risk of PPROM recurrence.<sup>[14]</sup> And in research conducted, meaningful association between interpregnancy interval and PPROM was not found. In a research in 1982-2004 on 19240 live births it was indicated that interval less than 18 months increases risk of neonatal mortality<sup>[10]</sup> that is inconsistent with findings of our research which showed: there is not meaningful association between interpregnancy interval and neonatal mortality. The reason of this difference can be increased postpartum care of neonates and also small sample size of our research. There is meaningful association between interpregnancy interval and preeclampsia and by increasing interpregnancy interval; risk of preeclampsia in recent pregnancy has increased. There is meaningful association between gestational diabete and interpregnancy interval so that diabete in recent pregnancy increase by increasing interpregnancy interval.

## CONCLUSION

The suitable spacing between pregnancies can prevent undesirable maternal and perinatal outcomes that this by consultation on negative potential outcomes of short intervals between pregnancies and improvement of using contraceptive devices in order to decrease unwanted pregnancy lead to decrease in short interval pregnancies. But fortunately, in present study, special complication related to short interval pregnancy was not found that its reason may be perinatal care and use of supplements and nutritional regimen by mother considering and interpregnancy interval in terms of tolerance of pregnancy and physical pressure for mother will be very important.

## ACKNOWLEDGMENTS

This study in form of thesis of general doctorate was done. The authors of this paper thank all mothers who help us in this study.

## REFERENCES

1. Shachar, B.Z.; JLyell, D. Interpregnancy interval and obstetrical complication. Up To Date.com 2014.
2. Conde-Agudelo A, Rosas-Bermúdez A, Kafury-Goeta AC. Birth Spacing and Risk of Adverse Perinatal Outcomes a Meta-analysis. *JAMA*, 2006; 295:1809-1823.
3. Gemmill, A.; Duberstein L. Short Interpregnancy Intervals in the United States. *Obstet Gynecol*, 2013; 122: 64–71.
4. Cecatti, Jose G. et al. The Associations between Inter-Pregnancy Interval and maternal and neonatal Outcomes in Brazil. *Maternal Child Health J.*, 2008; 12: 275–281.
5. Hajian K.; Asnafi N.; Aliakbarnia-Omran F. Birth intervals and associated factors in multi-para women. *The journal of Mazandaran University of Medical Sciences*, 2008; 18(66): 63-70.
6. Seifi F.; Afshari P.; Borghei Z.; Seifi Z. The relationship of long interpregnancy interval to the risk of low birth weight. *Journal of Gorgan Bouyeh Faculty of Nursing and Midwifery*, 2009; 6(15): 31-38.
7. Kwon S. Lazo-Escalante M, Villaran MV, LiCI. Relationship between interpregnancy interval and birth defects in Washington State. *J Perinatol* 2012 Jan; 32 (1): 45-50. PMID: 2154641
8. De Weger FJ.; Hukkelhoven CW; Serroyen J.; Te Velde ER.; Smits LJ. Advanced maternal age, short interpregnancy interval, and perinatal outcome. *Am J Obstet Gynecol*, 2011 May; 204 (5): 421. PMID: 21288503
9. Sadat Z., Eslami A R. Saberi F., Sooki Z. Preterm labor and short interpregnancy intervals. *FEYZ, Journal of Kashan University of Medical Sciences*, 2000; 4(1): 69-74.
10. Naoko K. & etal. The associations of birth intervals with small for gestational age, preterm, and neonatal and infant mortality. *BMC Public Health*, 2013; 13(3): S3.
11. Sadat Z., Saberi F., Abedzadeh M. Prevalence of short-interval pregnancy and its association with birth height and weight. *FEYZ, Journal of Kashan University of Medical Sciences*, 2003; 6(4): 82-86.
12. Love ER; Bhattachaya S.; Smith NC. Effect of interpregnancy interval on outcomes of pregnancy after miscarriage. *BMJ.*, 2010; 5: 341. PMID: 20688842

13. Mohammadi Baghmollaei M. et al. Associated factors with interpregnancy interval in women. Dena, Quarterly Journal of Yasuj Faculty of Nursing and Midwifery, 2006; 1: 11-19.
14. Getahun D. et al. Recurrence of preterm premature rupture of membranes in relation to interval between pregnancies. Am J Obstet Gynecol, 2010; 202(6): 570.