Open Access | Original Article

Fetal and Neonatal Impact of a Short Interpregnancy Interval in Moroccan Pregnant Women: A Retrospective Study

Kawtar Chafik[1,2]*, Fatima Aslaou[1,2], Amina Barkat[1]

1. Research Team on Health and Nutrition of Mother and Child, Faculty of Medicine and Pharmacy, Mohammed V University in Rabat, Morocco
2. Higher Institute of Nursing Professions and Health Techniques, Rabat, Morocco

ABSTRACT

Background: The short interpregnancy interval is a frequent clinical situation with adverse fetal, neonatal, and infantile outcomes. The present study aimed to assess the fetal and neonatal consequences of closely spaced pregnancies.

Methods: This retrospective study was conducted on 162 mothers, 81 of whom had an inter-pregnancy interval of fewer than 18 months, and 81 cases had an inter-pregnancy interval of more than 18 months. These participants had given birth at the Souissi Maternity Hospital in Rabat during the last 12 months. The socio-economic data, obstetrical history, as well as fetal and neonatal data, were extracted from medical records via a pre-established questionnaire. Statistical analysis was performed in SPSS software (version 20.0).

Results: The mean scores of the inter-pregnancy interval were reported as 11.83±3.08 and 29.83±9.83 in the groups of closely spaced pregnancies and inter-pregnancy intervals of more than 18 months (P=0.03). The number of illiterate women was significantly higher in the group with a short interpregnancy interval, compared to that in the group with an interpregnancy interval over 18 months (46.9% versus 9.9; P<0.001). Almost one-third of women with a short interpregnancy interval had a premature birth. Other adverse fetal outcomes, including low birth weight and respiratory distress, were detected with prevalence rates of 21% (p<0.001) and 9.9%, respectively (P=0.04).

Conclusion: As evidenced by the results of this study, it is essential to inform families and mothers about the fact that a reasonable delay (> 18 months) between pregnancies reduces the risks for both mother and child.

Keywords: Close pregnancy, Interpregnancy interval, Perinatal complications, Short interpregnancy interval

Introduction

The short inter-pregnancy interval is a universal public health problem defined as pregnancy occurring less than 18 months after the birth of a child (1). It is associated with an increased risk of adverse fetal, neonatal, and infantile outcomes, such as low birth weight, perinatal death, premature delivery, small for gestational age, admission to a neonatal intensive care unit, and under-5 mortality (2-7). In addition to the aforementioned adverse effects, malnutrition in its various forms (underweight, wasting, and stunting) is ubiquitous, thereby imposing a heavy burden on the health system (7-

8). In a similar vein, a systematic review of available literature on the effects of birth spacing on maternal, perinatal, and child health highlighted the presence of causal mechanisms of association between the short birth interval and its predictors (9).

To reduce these risks of adverse perinatal and infant outcomes, the World Health Organization consultation meeting on pregnancy intervals recommended an interval of at least 18 months before planning a new pregnancy and at least six months after miscarriage or induced abortion (10). In addition, research recommends waiting

* *Corresponding author*: Kawtar Chafik, Kawtar Chafik, Mother and Child Health and Nutrition Research Team, Faculty of Medicine and Pharmacy; Mohamed V University, Rabat; High Institute of Nursing Professions and Health Techniques, Rabat, Morocco. Tel: 00212666526904; Email: kawtarchafik@yahoo.fr

at least 24 months before attempting pregnancy following a live birth (10). This was based on evidence and studies mostly conducted in low- and middle-income countries. The associations between inter-pregnancy interval and increased rates of preterm births, as well as other adverse outcomes, including fetal death, low birth weight, neonatal mortality, and labor complications, were demonstrated (11).

According to Jansa et al. (4), the interval between pregnancies is one of the numerous recognized risk factors; nonetheless, this problem is frequently encountered in our Moroccan context, even if no study has been published on this subject and its national prevalence. In light of the aforementioned issues, the present study aimed to assess the fetal and neonatal consequences of close pregnancies in the Moroccan context.

Methods

Type of study
This is a retrospective study carried out at the Souissi Ibn Sina Maternity Hospital in Rabat from January 01, 2020 to December 31, 2020.

Study population
This is a retrospective cohort study of 162 parturients, 81 cases with a close pregnancy (the interval between the onset of pregnancy and previous delivery is ≤ 18 months) and 81 parturients who delivered in the same study period with an interval between delivery of previous pregnancy and conception of the next pregnancy greater than 18 months. This study was carried out in Souissi Maternity Hospital Ibn Sina of Rabat from 01 January 2020 to 31 December 2020. Data were extracted from medical records. Two groups were compared in this study: A. parturients with a short interpregnancy interval (the interval between the onset of pregnancy and previous delivery is ≤ 18 months [n=81]) and B. parturients who delivered in the same study period with an interval between delivery of the first pregnancy and conception of the next pregnancy greater than 18 months [n=81]).

Inclusion criteria
- Single pregnancy (singleton)
- Live newborn, intrauterine fetal demise, or per-partum death
    Exclusion criteria
- Multiple pregnancies, both first and second

- Scarred uteri

Sampling mode
This was an exhaustive sampling (the all-comers) of pregnant women who met the inclusion criteria during the study period and presented for maternity hospital delivery.

Methods of data collection
Data collection was carried out through the use of files via a pre-established questionnaire. The investigation explored several aspects, including the following :
Demographic characteristics of the study population (age of mothers, education level, and number of children)
Obstetrical data (pregnancy follow-up, history of fetal loss, postpartum contraception, and breastfeeding)
Neonatal data: (in utero fetal death, neonatal death, intrauterine growth restriction (IUGR), preterm birth, neonatal distress, and respiratory distress)

Statistical analysis
The data were analyzed in SPSS software (version 20.0). A comparative analysis was performed on quantitative and qualitative data of women with close pregnancies (the interval between the date of pregnancy onset and the date of the previous delivery is ≤ 18 months) and those with an interval of more than 18 months between the delivery of the first pregnancy. Categorical variables were expressed as numbers and percentages, while quantitative variables were presented as mean and standard deviation at a 95% confidence interval based on the normality law. The means were compared using Student's t-test, and the Chi-square or Fisher's exact tests were used to compare the rates. A p-value of less than 0.05 was considered statistically significant.

Results
During the study period (1 January 2020-31-December 2020), 162 participants who met the inclusion criteria were selected, including 81 cases with closely spaced pregnancies (the interval between the date of pregnancy onset and the date of the previous delivery is ≤ 18 months) and 81 subjects with pregnancies more than 18 months apart.

A. Interval between the two pregnancies
In group A (close pregnancy), the average

interval between the two pregnancies was 11.83±3.08 months. In addition, the shortest interval of one month was found in more than half of the women (Table 1).

B. Characteristics of the study population

In the study population, the mean age scores were 29.64±5.78 and 30.46±4.75 years in the close pregnancy group and in the group of pregnancies spaced more than 18 months apart, respectively (P=0.03) (Table 1). Almost half (46.9%) of women with a short interval between pregnancies were illiterate, as compared to those with an interval of more than 18 months (P< 0.001).

C. Obstetric parameters

No significant differences were observed in parity and gestational age, the mean parities of the two groups were similar with mean scores of 2.9 ± 0.8 and 2.7±0.9 in the close pregnancy group and unexposed group (P= 0.76). Moreover, there was no significant difference between the two groups regarding pregnancy follow-up. The prevalence of a history of fetal loss (fetal death in utero and neonatal death) was 12.3% in the group of closely-spaced pregnancies, in comparison with 3.3% in

the group of pregnancies separated by more than 18 months (P=0.04). The prevalence of the use of postpartum contraception after the first pregnancy was 72.8% in the closely spaced pregnancy group versus 87.5% in the group of pregnancies separated by more than 18 months with a statistically significant difference (P=0.001). Nonetheless, the two groups did not significantly differ in terms of exclusive breastfeeding during the first six months (63% in the close pregnancy group versus 72.8% in the group of pregnancies separated by more than 18 months) (Table 1).

D. Characteristics of the newborns born during the pregnancy studied

The number of neonates born alive was 97.5% in the close pregnancy group versus 98.7% in the group of pregnancies separated by more than 18 months. No significant difference was found regarding IUGR. The rate of prematurity <37 weeks was ten times higher in the closely spaced pregnancy group (30.9%) against 3.7% in the group of pregnancies separated by more than 18 months (P=0.001). As for respiratory distress, its prevalence was significantly higher in the closely

Table 1. Characteristics of the study population

| Demographic characteristic | Pregnant women; n=162 | | P-value |
	Group1 n=81	Group2 n=81	
Pregnancy interval in months*	11.83 ± 3.08	29.83± 9.83	<0.001α
Age (years) *	29.64±5.78	30.46±4.75	0.03 α
Age group(years) #			0.002β
<21	13 (16)	3 (3.7)	
21-34	53 (65.4)	62 (76.5)	
≥ 35	15 (18.5)	16 (19.8)	
Education level#			<0.001β
Illiterate	38 (46.9)	8 (9.9)	
Primary	27 (33.3)	27 (33.3)	
Secondary	12 (14.8)	28 (34.6)	
higher	4 (4.9)	18 (22.2)	
Pregnancy monitoring#			0.192 β
Yes	74 (91.4)	78 (96.3)	
No	7 (8.9)	3 (3.7)	
Gestational age (AW) *	37.69 ± 1.81	38.8±1.5	0.02 α
Number of living children*	2.9±0.8	2.7±0.9	0.76 α
Parity			0.7 ɣ
≥ 5#	7 (8.6)	8 (9.9)	
<5	74 (91.4)	73 (90.1)	
History of fetal Losses#			0.04 β
Yes	10(12.3)	3 (3.7)	
No	71 (96.3)	78 (96.3)	
Postpartum contraception#			0.001 ɣ
Yes	59 (72.8)	69 (87.5)	
No	22 (27.2)	12 (12.5)	
Breasfeeding#			0.001 ɣ
Yes	51(63)	59(72.2)	
No	30(37)	22(27.2)	

Note: *Values are expressed as mean and standard deviation. # Values are expressed as a number (percentage). AW (amenorrhea week). α Student test. β Fisher's test. ɣ Pearson chi-square test. P< 0.05 is considered to be significant.

Table 2. Distribution of study population according to fetal and neonatal consequences of the second pregnancy

Characteristic	Group1 n=81	Group2 n=81	P-value
living	78 (97.5)	79 (98.7)	
deceased	1	0	NS
fetal death in utero	1	1	NS
Intrauterine growth restriction (IUGR)	2	0	NS
premature <37 AW#	25 (30.9)	3 (3.7)	<0.001
Apgar<7 to 5 minutes#	7 (8.6)	3 (3.7)	NS
Respiratory distress#	8 (9.9)	2 (2.5)	0.04
Weight <2500g#	17 (21)	2 (2.5)	<0.001
Malformation	1	0	NS

Values are expressed as a number (percentage). AW (amenorrhea week). NS (Not Significant). p < 0.05 is considered to be significant

Table 3. Occurrence of fetal and neonatal complications according to the time interval between pregnancies

characteristic	Time interval between close pregnancies in months			
	<6 Month	6 to12 Months	12 to 18 Months	p
Premature <37AW#	9(36)	12(48)	4(16)	<0.001
Weight <2500g#	9(52.9)	7(41.2)	1(5.9)	<0.001
Respiratory distress#	3(37.5)	5(62.5)	0(0)	0.004

Values are expressed as a number (percentage). AW (amenorrhea week)
P< 0.05 is considered to be significant.

spaced pregnancy group, as compared to that in the group of pregnancies separated by more than 18 months (P= 0.04). The number of low birth weight births (<2500g) in the group of close pregnancies was 21% vs 2.5% in the group of spaced pregnancies (P<0.001). For malformations, no significant difference was detected between the two groups (Table 2).

The occurrence of such complications as prematurity, low birth weight<2500g, and respiratory distress increases with shortening the interval between the two pregnancies (Table 3).

Discussion

Currently, there is no consensus over the definition of the term "close pregnancies". The majority of published studies have defined an interpregnancy interval as the time between the delivery of the first pregnancy and the onset of the second. In this sense, the WHO in 2005 took into account the beginning of the first pregnancy and the beginning of the second and recommended a minimum period of 18 months before considering a new pregnancy in order to reduce risks to maternal, perinatal, and child health (10). Therefore, based on 2005 WHO, the present study aimed to investigate the fetal and neonatal consequences of short inter-pregnancy at the Souissi CHU Ibn Sina Maternity Hospital in Rabat, Morocco. The obtained results demonstrated that a low level of education may present a risk factor for having a short pregnancy interval, 46.9% in the group of close pregnancies against 9.9% in women with spaced pregnancies (P<0.001; Table 1). These results are in

agreement with those reported in the study conducted in Sudan advocating that poorly educated women are likely to have a short interval between pregnancies (12).

The results reported the risks of adverse neonatal morbidity outcomes with statistically significant rates of prematurity, low birth weight <2500g, and respiratory distress. These findings are aligned with the results of several studies (1,9,13-16). In fact, the data of our study pointed out that 30.9% of the newborns had prematurity (<37weeks) in the close pregnancy group, as compared to 3.7% in the group of pregnancies spaced more than 18 months apart, suggesting a statistically significant difference (P<0.001). These results were also in line with the remarks of Jansa and al, (4) who stated that women with short intervals between pregnancies were more likely to experience premature birth.

Therefore, prematurity complications, such as respiratory distress, were significantly more frequently observed (P=0.04) in the context of close pregnancies. This result is similar to those obtained in the study by Dedecker et al. who reported that prematurity (<37weeks) was 18.8% in the close pregnancy group versus 7.6% in the control group (P<0.001) (15). Conde's meta-analysis also estimated this risk of prematurity to be 1.4 in women with an interval between the two pregnancies of less than 6 months, as compared to those with pregnancies spaced 18-23 months apart (9). This increased rate of prematurity could be ascribed to the development of cervical insufficiency when two pregnancies are close together. This cervical insufficiency could be

correlated with a structural abnormality of the biochemical components of the cervical tissue impeding the latch or sphincter function of the cervix during pregnancy before spontaneous labor at term or before term (17). Nevertheless, for closely spaced pregnancies, further research seems essential to explain this phenomenon.

As for IUGR, the small sample in this study did not allow us to conclude the existence of a link between this parameter and closely spaced pregnancies. However, this risk was frequently found in the studies conducted by Zhu et al. (18) and Smith et al. (19) who found a 1.3 times higher risk of IUGR in the event of close pregnancy (OR=1.4, [1.3;1.6] and OR=1.3, [1.1;1.5], respectively). All these complications (prematurity as hypotrophies) could be explained by the psychological and physical impact of having a newborn while a second pregnancy is in progress.

Conclusion

Although the definition of "close pregnancy" is not clearly defined in the literature and its prevalence is not known, it is important not to ignore its associated complications. Primary prevention is also possible in order to reduce this morbidity, mainly fetal and neonatal, by implementing effective contraception and micronutrient supplementation from the postpartum of the first pregnancy, as well as raising awareness and informing families and mothers about the fact that a reasonable delay (> 18 months) after delivery for a new pregnancy can reduce the risks for mother and child.

Acknowledgments

We thank all participants for their contributions.

Conflicts of interest

The authors declare that they have no ties of interest.

References

1. Vandenbroucke L, Lavoué V, Voltzenlogel M-C, Le Guellec M, Lassel L, Isly H, et al. Risk factors and perinatal consequences of short interpregnancy interval: a retrospective case-control study. J Gynaecology Obstetrics Biol Reprod. 2012; 42(2):166-73.
2. Thapaliya R, Rai BK, Bhandari R, Rijal P, Gupta PP. The effect of birth interval on fetal outcomes. Health Renais. 2015;13(3):169–76.
3. Mahande MJ, Obure J. Effect of interpregnancy interval on adverse pregnancy outcomes in northern Tanzania: a registry-based retrospective cohort study. BMC Pregnancy Childbirth. 2016; 16(1):140.
4. Jansa V, Blickstein I, Lucovnik M, Fabjan-Vodusek V, Verdenik I, Tul N. The impact of inter-pregnancy interval on subsequent risk of preterm birth. J Matern Fetal Neonatal Med. 2018;31(5):621-624.
5. Ekin A, Gezer C, Taner CE, Ozeren M, Mat E, Solmaz U. Impact of interpregnancy interval on the subsequent risk of adverse perinatal outcomes. J Obstet Gynaecol Res. 2015; 41(11):1744–51.
6. Appareddy S, Pryor J, Bailey B. Inter-pregnancy interval and adverse outcomes: Evidence for an additional risk in h ealth disparate populations. J Matern Fetal Neonatal Med. 2017;30:2640–4.
7. Dadi A. A systematic review and meta-analysis of the effect of short birth interval on infant mortality in Ethiopia. PLoS One. 2015;10:e0126759.
8. Shahjada A, Sharma BK, Sharma S, Mahashabde P and Bachhotiya A. Effects of birth interval on nutritional status of under five children in periurban area of Madhya Pradesh, India. Int J Med Sci Public Health. 2014;3:723-726.
9. Conde-Agudelo A., Rosas-Bermudez A., Castaño Fabio and Norton Maureen H. Effects of Birth Spacing on Maternal, Perinatal, Infant, and Child Health: A Systematic Review of Causal Mechanisms. Stud Fam Plan. 2012;43:93–114.
10. WHO (2005). Report of a WHO Technical Consultation on Birth Spacing Geneva, Switzerland. June 13–15, 2005. WHO, Department of Making Pregnancy Safer and Department of Reproductive Health and Research. http://apps.who.int/iris/bitstream/handle/10665/69855/WHO_RHR_07.1_eng.pdf?sequence=1 Consulted on December 20, 2021
11. Ball SJ, Pereira G, Jacoby P, de Klerk N, Stanley FJ. Re-evaluation of link between inter-pregnancy interval and adverse birth outcomes: retrospective cohort study matching two intervals per mother. BMJ. 2014;349:g4333.
12. Ishag A, Moslim H I, Abubakr MN, Martin HP, LUC J. M. Low birth weight, preterm birth and close pregnancy interval in Sudan. J Matern.-Fetal Neonatal Med. 2009;22(11):1068–1071.
13. Zilberman B. Influence of a short interpregnancy interval on pregnancy outcome. Harefuah. 2007; 146(1):42-7.
14. Cecatti JG, Correa-Silva EP, Milanez H, Morais SS, Souza JP. The associations between interpregnancy interval and maternal and neonatal outcomes in Brazil. Matern Child Health J. 2008;12:275-81.
15. Dedecker F, Graesslin O, Ceccaldi PF, Baudelot E, Montilla F, Derniaux E, et al. Close pregnancies: risk factors and perinatal consequences. J Gynecol Obstet Biol Reprod. 2006; 35:28-34.
16. Smith G, Pel J, Dobbie R. Interpregnancy interval and risk of preterm birth and neonatal death: retrospective cohort study. BMJ .2003;327:313.
17. Marcellina L. Prévention de l'accouchement prématuré par cerclage du col de l'utérus. Journal de gynécologie Obstétrique et Bioligie de la

reproduction. 2016;45:1299-1323.
18. Zhu B-P, Rolf R, Nangle B, Horan J. Effect of the interval between pregnancies on perinatal outcomes. N Engl J Med. 1999;340(8):589-94.

19. Smith G, Pel J, Dobbie R. Interpregnancy interval and risk of preterm birth and neonatal death: retrospective cohort study. BMJ. 2003;327:313.