

Maternal and Neonatal Outcomes of Fasting and Non-Fasting during Pregnancy

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ABSTRACT

Introduction: Gynecologists and pediatrics traditionally recommend non-fasting state in the second and third trimesters since the neonate's growth in this period is rapid, but there is no obvious scientific data based on this rationale. This study was conducted to compare maternal and neonatal outcomes arising from fasting in three trimesters and also to compare it with non-fasting mothers and their neonates. **Methods:** This cross-sectional study covered 1000 mothers who had delivered at Mashhad Ghaem Hospital between 2009 and 2013. Samples were divided into two groups of case and control based on fasting or non-fasting history during pregnancy. There were 614 and 386 in the case and control group respectively. The maternal [age, weight before pregnancy, pregnancy complications, urinary tract infection (UTI) and neonatal characteristics (birth height and weight, abnormality, Apgar score)] in each trimester of pregnancy were compared between the two groups. **Results:** Significant differences were obtained between the cases and control groups for (i) UTI in the 1st and 2nd trimesters; (ii) number of preterm labour in the 1st and 3rd trimesters; (iii) Apgar score in the 1st and 5th minute during the 1st trimester. **Conclusion:** Fasting appeared to exert no negative effects on maternal and neonatal outcomes except for UTI. Therefore, control of UTI during the prenatal period would be helpful.

Key words: Fasting, maternal outcomes, neonatal problems, pregnancy, trimesters

INTRODUCTION

Muslims fast from the morning azan till sunset in the ninth lunar month (holy month of Ramadan). This means they abstain from eating and drinking. Depending on the exact time of sunrise and sunset,

fasting time period differs and ranges from 13 to 18 hours a day (Kavehmanesh & Abolghasemi, 2004). Fasting in Islam is obligatory for every mature Muslim except for travelers and the sick. Some individuals with restrictions including physical

disabilities, mental disorders, and the old have become exempt of this obligatory deed (Emlayi & Abed Saeidi, 2002).

Pregnant women worry about potential fasting outcomes on their foetus and their own health. Most Muslim pregnant women and especially their gynecologists are faced with having to make a choice on this matter (Rahbar, Ghorbani & Khazraie2005). No research was found in the United States about the religious obligation of fasting during pregnancy. Also some studies have indicated the negative effects of fasting. In some studies, for instance, it has been shown that fasting increases the risk of preterm labour (Hobel & Culhane, 2003, Siega-Riz *et al.*, 2001). Herrmann *et al* (2001) report that the probability of preterm labour for women who fast 13 hours or more is 3 times for non fasting pregnant woman (Herrmann *et al.*, 2001). Evidence regarding the safety of fasting in the prenatal period is insufficient and most of the existing studies are limited or have methodological problems (Robinson & Raisler, 2005).

Ziaee *et al* (2010) evaluated the effect of fasting on neonatal outcomes in trimesters of pregnancy. They reported that Ramadan fasting has no inappropriate effect on intrauterine growth (Ziaee *et al.*, 2010).

Van Ewijk, Painter & Roseboom (2011) report that pregnant women exposed to Ramadan fasting have a poorer general health than others. This effect is common among older people especially with coronary heart problems and type 2 diabetes. Gynecologists and pediatrics traditionally recommend a non-fasting state in the second and third trimesters since neonate's growth in this period is rapid, but there is no obvious scientific data for this recommendation. Therefore, this study was conducted to compare maternal and neonatal outcomes arising from fasting in three trimesters; the outcomes were also compared with non-fasting mothers and their neonates.

METHODS

This study is a case-control study during which 1000 mothers hospitalised in the obstetrics ward of Ghaem Hospital of Mashhad during the years 2009-2013 were examined after delivery. Ghaem Hospital is a tertiary referral hospital in which approximately 2000 childbirths occur annually. This hospital is equipped with neonatal intensive care unit (NICU) (with 12 beds), a maternity care department (Level 1 care , 50 beds and Level 2 care, 12 beds).

This study was approved by the Research Ethics committee of Mashhad University of Medical Sciences (MUMS), and informed consent was obtained from every pregnant women before participating in the study.

The sample size in the case group was 614 while it was 386 in the control group. Sampling was done using convenience sampling method. According to the formula $n = (s1^2 + s2^2) (z1-\alpha/2 + z1-\beta)^2 / (X1-X2)^2$, which is based on the Birmingham study in England ($\alpha = 0.05$, $\beta = 0.2$, $p1 = 0.08$, $p2 = 0.045$), the sample size in each group is determined (=384).

Subjects of this study were divided into case and control groups based on fasting and non-fasting history for at least 10 days. Subsequently, fasting and non-fasting subjects were divided into three groups of first, second, and third trimesters based on fasting on each pregnancy trimester. Maternal and neonatal outcomes were also compared among these three groups.

According to the findings of this study, frequency distribution of week of pregnancy showed that 784 subjects (78%) of all the subjects studied were in the first trimester, 119 subjects (12%) in the second trimester and 96 subjects (10%) in the third trimester. In the first trimester, 483 subjects (62%) fasted while 301 subjects (38%) were non-fasting. In the second trimester, 93 subjects (78%) fasted while 26 subjects

Table 1. Comparison of average maternal and neonatal clinical parameters between case and control groups for each trimester

<i>Groups Variables</i>	<i>Case group (614 fasting mothers)</i>	<i>control group (386 non-fasting mothers)</i>	<i>P value*</i>
Maternal age (year)			
First trimester	27.06 ± 6.52	26.94±5.98	p= 0.81
Second trimester	28.68±6.22	28.20±5.19	p=0.72
Third trimester	25.86± 5.49	30.92±27.45	p=0.26
Weight before pregnancy (kilogram)			
First trimester	59.83± 12.40	58.60 ± 9.93	p= 0.15
Second trimester	61.73± 11.55	52.16±14.62	p=0.006
Third trimester	61.86± 15.71	61.22± 14.22	p= 0.84
Weight of mother in the last month of pregnancy (kilogram)			
First trimester	71.17 ± 12.58	70.69 ± 11.21	p= 0.59
Second trimester	72.21± 12.77	68.44 ± 11.21	p=0.18
Third trimester	71.92± 17.90	72.32± 15.69	p=0.91
Apgar score in the fifth minute			
First trimester	9.50 ± 1.12	9.18±0.77	p= 0.000
Second trimester	8.77± 1.01	8.80± 0.92	p=0.87
Third trimester	8.69± 1.41	8.84± 0.55	p=0.46
Birth height (centimeters)			
First trimester	48.72 ± 5.99	49.10 ± 3.38	p= 0.35
Second trimester	48.98± 3.09	48.75± 2.44	p=0.74
Third trimester	49.10 ± 3.46	47.89±7.02	p=0.34
Birth weight (kilogram)			
First trimester	3.21 ± 0.63	3.05±1.47	p= 0.08
Second trimester	2.86 ± 0.62	2.91± 0.65	p=0.72
Third trimester	2.87 ± 0.73	2.82± 0.87	p=0.75

The values are based on mean ± standard deviation.

(22%) were non-fasting. In the third trimester, 38 subjects (40%) fasted while 58 subjects (60%) were non-fasting.

The maternal characteristics including age, weight before pregnancy, maternal weight in the last month of pregnancy, pregnancy complications (diabetes, hypertension, PROM, vaginal bleeding, neonatal death), UTI , pregnancy age in labour, number of preterm labour, history of taking medications during pregnancy, receiving prenatal care and neonatal characteristics including birth height and weight, abnormality, Apgar score in the first and fifth minutes, taking traditional supplements based on the verbal accounts

from both groups of fasting and non-fasting subjects in each trimester were compared. The average fasting hours in this study was 14 hours a day. Data was analysed using Chi-square, T-test, SPSS software (version 19/5) and $P < 0.05$ was considered statistically significant.

RESULTS

The average maternal and neonatal clinical parameters between case group and control group in different trimesters were compared and data are shown in Table 1. There was congenital abnormality in 5 neonates in the case group and 5

Table 2. Frequency distribution of some maternal and neonatal clinical parameters in case group (fasting mothers) and control group (non-fasting mothers) during different trimesters

Variables	Groups		Test results
	Case Number (%)	Control Number (%)	
	614 (61.4)	386 (38.6)	
Urinary tract infection (UTI)			
First trimester	8 (1.30)	32 (8.29)	p = 0.000
Second trimester	23 (3.74)	2 (0.51)	p = 0.04
Third trimester	6 (0.97)	12 (3.10)	p = 0.70
Medicine taking history			
First trimester	34 (5.53)	32 (8.29)	p = 0.08
Second trimester	16 (2.60)	4 (1.03)	p = 0.95
Third trimester	4 (0.65)	15 (3.88)	p = 0.06
Prenatal care			
First trimester	463 (12.56)	289 (74.87)	p = 0.61
Second trimester	90 (14.65)	23 (5.95)	p = 0.58
Third trimester	35 (5.70)	58 (15.02)	-
Preterm labour			
First trimester	37 (6.02)	51 (13.21)	p = 0.000
Second trimester	16 (2.60)	5 (1.29)	p = 0.52
Third trimester	5 (0.81)	20 (5.18)	p = 0.02

neonates in the control group during the first trimester and 2 neonates in the case group and in no subjects in the control group during the second trimester. Also, there was no congenital abnormality in any subjects of this study in the third trimester. A congenital anomaly may be viewed as a physical or anatomic deviation from the normal pattern of development that is apparent at birth. Distribution of maternal and neonatal clinical parameters in case and control groups in different trimesters were compared and are shown in Table 2.

In terms of the relation between UTI and subject's fasting state, there was a statistically significant relation between these two variables during the first trimester ($p=0.000$), that is, the incidence of UTI in the fasting group was higher than in the non-fasting group. But there was no statistically significant relation between

these two variables during the third trimester ($p=0.70$).

There was a preterm labour history in 37 mothers (7.4%) in the case group and 51 mothers (10.2%) in the control group during the first trimester ($p=0.000$); in 16 mothers (3.2%) in the case group and 5 mothers (1%) in the control group during the second trimester ($p=0.52$); and in 5 mothers (1%) in the case group and 20 mothers (4%) in the control group during the third trimester ($p=0.02$).

DISCUSSION

Results of this study showed that there was a higher number of preterm labour cases during the first and third trimesters in the non-fasting group. The number of preterm labour cases during the second trimester showed no statistically significant difference between the two

groups. Kouhboumi's study(2000) showed that fasting had no role in preterm labour. In a study which was conducted by Radnia, Arab & Nasr (2005), fasting did not cause an increase in the possibility of preterm labour. In most cases the reasons for preterm was unknown and multi factorial. It appears that a reduction in the prevalence of preterm labour in the fasting group is due to more spiritual calmness in mothers resulting from fasting and having communication with God and recourse to Him (Siega-Riz *et al.*, 2001, Herrmann *et al.*, 2001, Kouhboumi, 2000, Radnia *et al.*, 2005, Boskabadi & Mohebbi, 2014).

This study showed that the incidence of UTI was greater in the non-fasting group ($p=0.000$) than in the fasting group during the first trimester, and in the fasting group (0.04) during the second trimester. In a study which was conducted by Qurashi *et al.*(2012) there were no significant differences between fasters and non fasters regarding changes in urinary tract infection (Qurashi *et al.*, 2012). The reason for the incidence of UTI in the non-fasting group is unknown. Consequently, although pregnancy normally reduces immune response, fasting does not exacerbate it at least in the first trimester. Rather, it reinforces this response (Boskabadi & Mohebbi, 2014). The increase in the incidence of UTI during the second trimester may be due to the reduction of fluid intake along with the usual weakening of the immune system during pregnancy.

This study showed that fasting had no effect on maternal weight in the last month of pregnancy. Also, in a study conducted by Danesh (2004), no statistically significant difference was seen between the average amount of body mass index increase in fasting and non-fasting subjects during Ramadan compared to the basic body mass index; also there was no maternal weight reduction during the study (Danesh, 2004).

With regards to change in weight status during Ramadan, results from

various studies have not been consistent. An average weight reduction of 1.7- 3.8 has been reported in normal persons in Ramadan (Azizi, 2010). According to Naderi & Kamyabi (2004), there is no statistically significant difference in weight increase during pregnancy between fasting and non-fasting subjects. Also results of a study conducted by Sherbaf & Voldan(2000) showed that there was no statistically significant difference in weight increase between fasting and non-fasting groups .

Considering the fact that the results of most other studies are similar to our study, obviously, calorie intake and the total amount in pregnant women does not diminish and only the amount of food intake and not the total amount is reduced. In this study, the average neonatal weight in fasting mothers in the first trimester was better than those of non-fasting mothers, but there was no difference in the second and third trimesters. Also there were no significant differences between birth heights of these two groups of neonates in each trimester. The result of studies conducted by other researchers are also similar to those of our study (Kavehmanesh & Abolghasemi, 2004, Ziaee *et al.*, 2010).

The study by Almond & Mazaumder (2008) concluded that birth weight in pregnant Arab mothers' neonates in Ramadan is reduced remarkably compared to neonates in other months. These effects are more severe in summer when days are longer. Neonatal birth weight of mothers who fast during the first trimester in summer was 50 grams less. The statistical power to detect effect of size in this study is too low (Almond & Mazumder, 2008). Van Ewijk *et al.* (2013) showed that exposure to Ramadan fasting in pregnancy may decrease body size of the offspring (Van Ewijk *et al.*, 2013). On the one hand, lack of difference in maternal weight in two groups may be due to the fact that in Ramadan, meals are limited but not the total amount of food intake by mothers.

Based on the findings of this study, Apgar score in the first and fifth minutes during the first trimester was higher in the fasting group. Moreover, Malhorta *et al.*(1989) and Mirghani *et al.*(2006) showed that fasting, despite causing biochemical changes, had no effect on Apgar scores.

CONCLUSION

In the study on the relation between fasting and maternal and neonatal characteristics, fasting had no effect on maternal weight in the last month of pregnancy, taking medications during pregnancy, birth weight and birth height. There was a statistically significant difference in UTI, the first feeling of foetal movement, pregnancy complications, preterm labour occurrences, and Apgar score in the first and fifth minutes during the first trimester between fasting and non-fasting groups.

Based on the results of the present study, fasting has no negative effect on maternal and neonatal outcomes except for causing UTI. Therefore, control of urinary tract infection in the second trimester is recommended.

Conflict of interest

There is none to declare.

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