

## INTERRELATION OF RAMADAN FASTING AND BIRTH WEIGHT

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*SUMMARY: Muslim pregnant women desire to fast in Ramadan month. On the other hand, they worry about fetal health. Obstetricians do not have a clear idea about this issue. A cross-sectional study was done to determine fasting in pregnancy and birth weight interrelationship in term delivered pregnant women in Hamadan province.*

*Four thousand three hundred and forty three appropriate pregnant women took part in the study, in 4 groups, according to the number of fasting days. Non-fasting group (28.9%) did not keep fast in Ramadan at all. Other women kept fast for 1–9 days (group A), 10–19 days (group B), and more than 20 days (group C).*

*Mean birth weights of 4 groups were statistically significant according to variance analysis ( $p=0.0006$ ).*

*Newman-keuls procedure revealed that mean birth weight was higher in group C (3198.2 grams) in comparison to non-fasting group (3142 grams) and group A (3137.1 grams). Four groups were similar regarding low birth weight.*

*Ramadan fasting did not affect mean of birth weight regardless of pregnancy trimester. Low birth weight (LBW) among newborns of second trimester fasting women showed an increase although it was not significant ( $p=0.09$ ).*

*In conclusion, in the present study Ramadan fasting in pregnancy did not affect birth weight of term infants.*

*Key Words: Ramadan fasting, birth weight.*

### INTRODUCTION

Muslim pregnant women are interested in taking part in Ramadan fasting, however they are worried about fetal health. One of the main concerns in prolonged fasting is birth weight decrease.

Poor nutrition and poor weight gain in pregnancy are reported to play a prominent role in low birth weight (1). Physicians, especially obstetricians, are always asked

about Ramadan fasting in pregnancy. In an informal group discussion at the department of obstetrics, Hamadan University, faculty members could not reach to a common conclusion (2).

Non-homogenous opinions could be a scientific reflection of insufficient scientific research on the issue. According to the Islamic teaching pregnant women are allowed to fast during Ramadan month if it is not harmful to them. Even if there is any probability of harm, they are free to break their fast. A study was done in Birmingham, on

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13351 full term infants of Asian Muslim women, in comparison with two homogenous aged controlled non-Muslim groups. The study revealed that fasting did not affect mean birth weight in any trimester of pregnancy. Low birth weight (LBW) incidence in second trimester fasting showed a non-significant increase in comparison to controlled groups (3).

In another study in Malaysia, 477 out of 605 pregnant women had a history of fasting in their pregnancy, after control of confounders, non-fasting group and fasting groups showed non-significant difference regarding pregnancy weight gain and birth weight (4).

The present study was planned to determine interrelationship of fasting in pregnancy and birth weight in full term deliveries of Hamadan province.

MATERIALS AND METHODS

It was a cross sectional study in full term pregnant women delivering in one of the Hamadan City Hospitals, or delivery facility centers of Hamadan province which started just after the month of Ramadan in 1999 and continued for up to 9 months.

Excluding criteria were twins or multiple pregnancy, premature labor, pregnancy induced hypertension, coexisting systemic disease such as diabetes, hypertension, epilepsy and so forth.

Four thousand three hundred and forty three pregnant women took part in the study and were asked about fasting and the numbers of fasting days. They were divided into 4 groups based on the number of fasting days: non-fasting group, group A (1-9 days), group B (10-19 days), and group C (more than 20 days).

Gestational age while fasting was calculated based on last menstrual period and thus women were put into 3 groups of first, second, and third trimesters.

Heights and weights of mothers were measured to determine their body mass index (BMI). In order to find out pregnancy BMI, the number of 10 (estimated average weight gain of pregnancy) was subtracted from the number of the mother's weight. BMIs of the women were classified in 3 groups: under weight (BMI<18.5), average (BMI=18.5-24.9), and overweight (BMI>25).

Other necessary demographic and obstetric information were filled in the questionnaire. Birth weight was measured by gram and newborns weighing less than 2500 grams were described to

be low birth weight. Data input and analysis were done by EPI Info 6 and SPSS.

Comparisons of quantitative variables between groups were done by one-variable variance analysis and different means were distinguished by Newman-keuls procedure. The level of significance was  $\alpha=0.05$ .

RESULTS

Age of the pregnant women was in the 14-45 age range with a mean of  $24.6 \pm 5.5$  (S.D.). Mean of parity was  $2.1 \pm 1.5$  and range of 1-11. Mean birth weight was  $3167.4 \pm 499$  grams and range of 1500-5000 grams. LBW was seen in 6.35 and the newborns were male in 52.6% of cases.

Non-fasting group was 1257(28.9%). In fasting women, groups A, B, and C were 752(17.3%), 590 (13.6%), and 1744(40.2%). During in their pregnancy they kept fasting for (1-9), (10-19), and (more than 20) days respectively.

Range of fasting days was 1-45 days. Some women fasted during their first trimester (31%), some during their second trimester (39.1%), and others during their third trimester (29.9%) in Ramadan month (Table 1).

Frequency of fasting was significantly different according to gestational age in Ramadan month. That is, 77.4% of first trimester pregnant women kept on fasting while the percent decreased to 64.8% in third trimester ( $p<0.000001$ , Table 1).

Table 1: Frequency of fasting trend according to trimester of pregnancy in full term pregnant women in Hamadan Province.

	Fasting (n= 3086)	Non Fasting (n= 1257)
First trimester	957 (77.4)	280 (22.6)
Second trimester	1207 (71.7)	747 (28.3)
Third trimester	922 (64.8)	500 (35.2)

( $\chi^2$  test ,  $p < 0.00001$ )  
Numbers are presented as frequency (%).

Table 2: Comparison of 4 groups of term pregnant women characteristics based on fasting days.

	Non-fasting (n = 1257)	1-9 (A) (n = 752)	10-19 (B) (n = 590)	20 or more (C) (n = 1744)
Age (year)	24.8 ± 5.8	24.1 ± 5.2	23.9 ± 5.1	25 ± 5.4
Gestational age (month)	4.7 ± 2.2	5 ± 2.4	5.9 ± 2.3	5.7 ± 2.3
Parity	2.4 ± 1.6	2 ± 1.4	1.8 ± 1.2	2.1 ± 1.4
Birth weight (g)	3198.2 ± 486.7	3168.8 ± 513.5	3137.1 ± 522.6	3142 ± 492.8

Non-fasting, A, B, and C groups were significantly different regarding mean gestational age in Ramadan month, age, parity, and birth weight (Table 2).

Highest mean of gestational age belonged to group A (5.9 months) and lowest to group C (4.7 months).

The lowest mean maternal age was observed in group A (23.9 years) and the highest in non-fasting group (25 years).

Lowest mean parity was recorded in group A (1.8) and the highest in group C (2.4).

The lowest mean birth weight was seen in group A (3137.1 grams) and the highest in group C (3198.2 grams). The difference of mean birth weight was significant between non-fasting (3142 grams) and group C ( $p=0.002$ ) and it was significantly meaningful between groups A and C ( $p=0.005$ ), too.

Frequency of LBW in 4 groups, non-fasting, A, B and C, were 6.5%, 7.8%, 6.1% and 5.5%, respectively. Their differences were not statistically significant.

Frequency of BMI and newborns' sex were not statistically significant between 4 groups. Means of fasting days in first, second, and third trimester were 21.5, 20.1, and 16 days ( $p<0.0001$ ) and their mean birth weights were 3187.5, 3174.7, and 3171.2 grams with no significant differences. Frequency of LBW in fasting of first trimester (4.9%), second trimester (7.5%), and third trimester (5.9%) and non-fasting group (6.5%) was not significantly meaningful ( $p=0.09$ ), although worthy of attention (Table 3).

Frequency of overweight mothers in non-fasting group

(41.8%) and fasting groups in first, second, and third trimesters were 46.6%, 40.1% and 39.5%, respectively. The differences of BMI between groups were significant ( $p<0.005$ , Table 3). The difference of LBW frequency according to parity and BMI was significant add to maternal age, non-significant. LBW in primiparous, parity of 2–4, and parity of more than 5 were 7.8%, 5.3%, and 3.9%, respectively ( $p=0.001$ ).

Frequency of LBW in under weight, average, and overweight women were 11.3%, 7.3%, and 4.6%, respectively ( $p<0.0001$ ).

The frequency of LBW in 19 or less, 20–29, and 30 or more years were 7.8%, 6%, 5.7%, respectively.

The frequency of LBW in males was less than females (5.3% versus 6.6%). The difference was not significant in the level of  $\alpha=0.05$  ( $p=0.078$ ).

## DISCUSSION

In our study history of fasting in pregnancy was observed in 71% of women, highlighting a great desire of Muslim pregnant women to keep fasting in Ramadan, the holy month.

Range of fasting days was 1–45 days indicating recommended fasting in the month before Ramadan or wish to fulfill missed fasting days of years before.

The frequency of women's trend to fast was more in the first trimester and less in the third trimester. It might be due to not being aware of their pregnancy in the first trimester and so most of them kept fasting. On the other

Table 3 : Comparison of fasting and non-fasting term pregnant women based on the trimester of pregnancy.

		Non-fasting (n=1257)	First T. Fasting (n=957)	Second T. Fasting (n=1207)	Third T. Fasting (n=922)	Meaningful level ( $\chi^2$ test)
BMI*	Underweight	30(2.4)	26(2.7)	29(2.4)	21(2.3)	p<0.0005
	Average	701(55.8)	484(50.7)	694(57.5)	537(56.2)	
	Overweight	525(41.8)	445(46.6)	483(40.1)	364(39.5)	
LBW		82(6.5)	47(4.9)	90(7.5)	54(5.9)	NS (p=0.09)

\*BMI: Body Mass Index (in three cases were unknown)

Numbers are presented as frequency (%)

NS: Not significant

hand more overweight BMIs were observed in the first trimester fasting pregnant women.

Mean birth weight of non-fasting and fasting groups in the first, second, and third trimesters were not significantly different, indicating no interrelationship of fasting and birth weight in any trimester.

The frequency of LBW (if fasting) during the second trimester revealed an increase although not significant in comparison to the first and third trimesters and non-fasting group.

Most cases of LBW of fasting pregnant women were observed in the second trimester and the least in the first trimester. Regarding nearly similar mean fasting days in the first and second trimesters, the difference would be due to higher BMI of first trimester fasting women. As mentioned in the results, the frequency of LBW in overweight BMI was the least.

The study of Birmingham revealed no effect of fasting in pregnancy on mean birth weight in different stages of pregnancy. LBW frequency in fasting of the second trimester revealed a non-significant increase in comparison to the control groups (3).

A study in Yemen on 2561 parturients showed that 90.3% of women fasted in Ramadan month of their last pregnancy. There was no relation between number of fasting days and LBW (5).

In the present study mean birth weight based on fasting days was significantly different. The highest mean birth

weight was observed in the fasting group of 20 or more days and the lowest in the 1–9 days group. The maximum difference was 61 grams, and this was clinically non-significant. Four groups (non-fasting, A, B, and C) were compared according to maternal age and parity which could affect birth weight. Although the difference was statistically significant, it was not clinically worthy of attention. For instance, maximum mean difference was one year in age and 0.6 in parity. We can not be negligent to large sample size role in highlighting and asking minor meaningful differences. The frequency of other confounder variables such as newborn sex and before pregnancy BMI was not significantly different in 4 groups. The four groups did not revealed significant difference in LBW.

Our results are similar to the study of Malaysia. In the Malaysia study on 605 women controlled for confounding factors, birth weight was not significantly different for fasting and non-fasting groups (4).

In conclusion, fasting in pregnancy does not decrease mean birth weight and LBW is not related to the number of fasting days.

Fasting in the second trimester should be decided on, with regard to the BMI of the period before pregnancy.

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