

# Effect of Ramadan Fasting during Pregnancy on Neonatal Birth Weight

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## ABSTRACT

**Introduction:** Muslims fast from sunrise to sunset during Ramadan, the 9th lunar month. The duration of fasting varies from 13 to 18 hrs per day. Fasting individuals abstain from drinking liquids and eating foods. Many pregnant women and gynecologists are concerned about the possible complications associated with fasting and effects on fetal health. The aim of this study was to determine the effect of Ramadan fasting on neonatal birth weight.

**Method:** The current historical cohort study was performed on pregnant women attending maternity hospitals in Kashan in 2008. Two fasting and non-fasting groups were compared. Multiple pregnancies and gestational age less than 37 weeks were considered as the exclusion criteria. In fasting and non-fasting groups, age, parity, gestational age, body mass index (BMI), mother's occupation, prenatal care attendance and intended or unintended pregnancy were matched. For the statistical analysis of the data, covariance analysis and SPSS v16.0 were used.

**Results:** In this study, 293 cases were evaluated among whom 31.7% did notfast. In the two groups, the mean age, gestational age, parity and weight gain during pregnancy were not significantly different. The mean birth weight was 3338 g ( $\pm 498$  g) and 3343 g ( $\pm 339$  g) in fasting and non-fasting groups respectively. The results showed that the mean birth weight of the neonates in fasting and non-fasting groups was not significantly different ( $P=0.931$ )

**Conclusion:** The results of this study indicated that there is no significant relationship between the neonatal birth weight and maternal fasting during pregnancy. Therefore we declare that fasting for pregnant women who receive prenatal care has no effects on neonatal birth weight.

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## Introduction

Ramadan is a holy month in the Islamic calendar during which healthy adults abstain from eating and drinking during day-light hours from dawn to sunset (1). Annually, about 400 million out of 1 billion Muslims follow this religious principle.

Concurrence of fasting with pregnancy as a physiological condition introduces some controversies regarding the condition of the mother and the fetus (2). Pregnant women are exempt from fasting if it poses a risk to the fetus; however, many still fast while others are more cautious about its practice. Many pregnant show great interest in fasting and are able to perform this religious practice; however, they are

concerned about their fetus and inquire about the possible associated complications during pregnancy (3,4). According to the statics, in West Africa, 90% of pregnant women fasted during the month of Ramadan (5). The prolonged hunger presents itself as hypoglycemia or hyperketonuria, which may affect the neonatal weight, neonatal mortality and disability. (6,7). During fasting, pregnant and breastfeeding women experience changes in metabolism, sleep patterns and daily physical activity (8, 9).

The effects of Ramadan fasting during pregnancy on neonatal weight are still unclear (10). However, in some studies, there have been

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**Table 1.** Maternal characteristics in the studied groups

Maternal characteristic	Fasting group	Non-fasting groups	P-value
Age	28.242 ±5.123	27.048 ±5.638	0.174
BMI	26.455 ±4.428	26.053 ±4.483	0.601
<b>Education</b>			
-Elementary level	71 (28.2%)	14 (34.1%)	0.506
-High school level	44 (17.5%)	9 (22%)	
-High-school	83 (32.9%)	13 (31.7%)	
University level	54 (21.4%)	5(12.2%)	
<b>Intended pregnancy</b>			
Yes	199 (79.0%)	33 (80.5%)	0.824
No	53(21%)	8 (19.5%)	
<b>History of LBW</b>			
Primipara	106 (42.4%)	21 (51.2%)	0.368
Yes	22 (8.8%)	5 (12.2%)	
No	122 (48.8%)	15 (36.6%)	
<b>Pregnancy interval</b>			
Primipara	98 (39.7%)	35.4	0.336
<2 years	10 (3.6%)	27.9	
>2 years	139 (50.0%)	28.5	

no significant differences in birth time indices between fasting and non-fasting mothers. For instance, Azizi's study (2010) indicated no adverse effects of Ramadan fasting on heart, lung, liver, kidney, eyes, hematologic profile, endocrine, and neuropsychiatric functions of the pregnant mother and neonatal weight (11). Similarly, Shaghyby (2005) conducted a study in Sanandaj, Iran, which showed that maternal fasting in the third trimester of pregnancy has no significant effect on neonatal anthropometric measurements such as birth weight (12).

Moreover, the cohort study of Cross *et al* (1990) in Malaysia on 605 pregnant women, showed no significant differences between fasting and non-fasting subjects (13). On the other hand, some studies reported some differences regarding anthropometric parameters between the neonates from fasting and non-fasting mothers. For instance, Sherbaf *et al* (2005) showed that women with more than 20 days of fasting in the first trimester gave birth to low birth weight (LBW) infants (14). In another study conducted in Singapore in 2002 by Joseph, significant differences blood and urine biochemical parameters, and birth weight were observed (15). The present study was carried out to evaluate the effect of pregnant women's fasting during different trimesters on neonatal weight.

## Materials and Method

This historical cohort study was performed in 2008, in two hospitals of Kashan, Iran. The

women who met the following criteria were included in the study: 1) within the age range of 20-35 years, 2) child delivery in the two hospitals where the study was performed, and 3) fasting during one of the pregnancy trimesters. The exclusion criteria were as follows: 1) history of systemic disorders, 2) multiple pregnancies, 3) gestational age less than 37 weeks, 4) smoking narcotics or alcohol use, and 5) in appropriate gestational weight before the fasting period.

The cases were divided into fasting and non-fasting groups. According to the number of fasting days fasting group divided into, mild fasting (1-10 days of fasting), moderate fasting (11-20 days of fasting) and full fasting (21-30 days of fasting) groups. The groups were matched in terms of age, parity, gestational age, body mass index (BMI), maternal occupation, planned/unplanned pregnancy, and prenatal care attendance. In addition, fasting mothers were divided into two groups: cases consuming meals at dawn, and those avoiding it. Considering the standard deviation of neonatal weight in "fasting" and "non-fasting" groups, and the sample size of other cohort studies, the sample size was calculated as 240 participants.

In this study, a non-random sampling method was used, and a questionnaire was provided in order to collect the data. The questionnaire consisted of three sections: demographic data, obstetric-related data, and information about fasting. Neonatal weight within one hour after birth was measured and recorded using Japanese SECA scales; a thin

**Table 2.** Comparison of mean neonatal weight and the number of fasting days

Fasting days	Mean neonatal weight	Standard deviation	P-value
No fasting	3348.461	±339.949	0.145
1-10 days of fasting	3198.285	±584.5686	
11-20 days of fasting	3429.206	± 462.6372	
More than 20 days of fasting	3326.346	±483.4729	

coating was used to prevent infections.

### Statistical analysis

Data analysis was performed using SPSS v16.0, and non-parametric tests were used for group comparison; also,  $\chi^2$  test was used for assessing the nominal data. Data were expressed as mean±SEM, and a *P*-value less than 0.05 was considered statistically significant.

### Results

In the present study, 293 cases were evaluated. The mean number of fasting days was 16 days, and 31.7% of the participants avoided fasting. The fasting and non-fasting groups were similar in terms of age ( $P=0.174$ ), education ( $P=0.506$ ), planned/unplanned pregnancy ( $P=0.824$ ), previous delivery time ( $P=0.368$ ), and a history of LBW infants ( $P=0.336$ ). Most of the fasting group subjects were high school graduates, and the majority of the subjects in the non-fasting group had elementary level education (Table 1).

The results show that the mean neonatal weight was 3,338±498 g and 3,343±339 g in the fasting and non-fasting groups, respectively; there was no significant association between neonatal weight and fasting during Ramadan ( $P=0.931$ ). Comparison of neonatal weight indices in mothers with different numbers of fasting days shows that there was no significant relationship between these parameters and number of fasting days ( $P=0.145$ ) (Table 2).

Table 3 shows the association between neonatal weight and fasting during different

trimesters. As it is shown, there was also no significant association between the studied parameters related to neonatal weight and fasting in different trimesters ( $P=0.025$ ).

In addition, according to multiple linear regression, factors including maternal weight ( $P<0.0001$ ), fetal sex ( $P<0.0001$ ), history of LBW ( $P=0.01$ ), and maternal BMI ( $P=0.022$ ) affect neonatal birth weight.

### Discussion

The goal of this study was to assess the effect of pregnant mothers' fasting on neonatal birth weight. Although fasting is not obligatory for pregnant women, some women opt for it due to their religious beliefs.

In this study, 68.3% and 31.7% of the studied mothers were fasting and not fasting during their pregnancy period, respectively. In a similar study by Ziaeein in Tehran hospitals, 34.9% of the studied mothers were not fasting during their pregnancy (2), however, in another study in Singapore, only 13% of the mothers were not fasting, and 57% were fasting for more than 20 days (15). Therefore, it is essential for health professionals to reduce possible negative impacts of fasting.

Our results showed that in mothers with an appropriate BMI and no systemic or chronic disorders, Ramadan fasting did not have an effect on neonatal birth weight; similar results were also found in other studies (8, 12, 16, 17). In another study by Kavemanesh *et al*, it was shown that there is a significant difference between fasting and non-fasting women regarding birth weight (18), which may be due to the dissimilarity of studied cases regarding pre-pregnancy weight and more frequent early labor in non-fasting women.

In our study, there was also no significant association between neonatal birth weight and maternal fasting during different trimesters. A similar result was also found in Ziaee's study (2010), which showed no significant association between pregnancy outcomes and fasting in different trimesters (2); however, in a study by

**Table 3.** Comparison between the mean neonatal weight and fasting, regarding different pregnancy trimesters

Trimesters	Fasting	Non-fasting
First Trimester	3360.133 (±481.603)	3378.484 (±350.215)
Second Trimester	2976.923 (±698.991)	3050.000 (±241.522)
Third Trimester	3250.000 (±212.132)	3400.000 (±102.122)
P-value	0.025	0.194

Cross et al., the incidence of LBW was higher in the second trimester (13). In addition, Sherbaf showed that fasting during the first trimester could cause a significant reduction in birth weight (14). The existing discrepancies between our results and the Sherbaf study may be due to a smaller sample size in each trimester.

In the present study, there was also no significant difference between pregnant women with different numbers of fasting days, with regard to LBW neonates; similar results have been also reported in Ziaee's study (2). In another similar study, fasting women were divided into four groups, and it was revealed that fasting more than 20 days could cause a significant reduction in neonatal birth weight (14). Most fasting women in our study served their *dawn* meals on most days. Therefore, appropriate nutritional programs are essential for fasting pregnant women to maintain neonatal growth indices.

## Conclusion

According to the results, Ramadan fasting does not affect neonatal birth weight. In addition, in healthy women with appropriate nutrition, Islamic fasting has no negative effect on intrauterine growth and birth weight indices.

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