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## The Effect of Ramadan Fasting on Outcome of Pregnancy

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### Abstract

**Objective:** Pregnancy is a physiological condition that its concurrence with fasting introduces some controversies about condition of mother and fetus. This study was conducted to evaluate the effect of fasting on pregnancy outcome.

**Methods:** The historical cohort paradigm of this study was conducted on referrals of one of the Tehran's hospitals in 2004. All pregnant women at one of the trimesters in holy month of Ramadan were included in the study. The women were divided into non-fasting, 1-10 days fasting, 11-20 days fasting, and 21-30 days fasting. For statistical analysis of data, covariance analysis and SPSS package was used.

**Findings:** In this study, 189 cases were evaluated and their mean age, weight, and body mass index (BMI) were 25.9 years, 61.7 kg, and 23.9 kg/m<sup>2</sup> respectively. The mean for number of days on fasting was 13 days and 66 cases (34.9%) had not been on fasting. In addition, there was no significant difference between BMI at the beginning of pregnancy, mother's age, number of pregnancies, and a history of abortion in different groups. Meanwhile, there was also no significant difference between means of weight, height, and head circumference of infants with number of days on fasting. Furthermore, there was no significant difference between pregnancy outcome parameters and fasting at different trimesters.

**Conclusion:** According to these findings, in healthy women with appropriate nutrition, Islamic fasting has no inappropriate effect on intrauterine growth and birth-time indices. Meanwhile, relative risk of low weight birth was 1.5 times in mothers on fasting at first trimester as compared to non-fasting mothers.

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**Key Words:** Ramadan Fasting; Pregnancy; Outcome; Birth weight

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## Introduction

In sacred religion of Islam, it is an obligation for all adult and healthy Muslims to be on fasting during the holy month of Ramadan<sup>[1]</sup>. Each year, about 400 millions out of 1 billion Muslims do this duty. Such tasks like eating, drinking, and smoking are forbidden from sunrise until sunset. Fasting during pregnancy has been always considered as a debatable condition. There are Muslim women who do not fast during pregnancy for the sake of their children's health; however, they feel guilty because of their religious beliefs. On the other hand, some pregnant mothers prefer to cherish their religious principles despite their hesitation on children's health and they fast during pregnancy<sup>[2]</sup>. It should be taken into consideration that either low birth weight (LBW) neonates or lower intrauterine growth may be at higher risk of mortality, neonatal side effects, and severity of increased neonatal diseases<sup>[1]</sup>.

There have been many studies on metabolic changes and different aspects of human health during and after Ramadan<sup>[3-5]</sup>, but there have been few studies on the effect of fasting on pregnancy outcome and there are also some controversies in the findings of different studies.

Although in some studies, there have been no significant differences for birth time indices of fasting and non-fasting mothers<sup>[3-6]</sup>, other studies reported that there are some differences for anthropometric parameters in neonates from fasting mothers<sup>[7,8]</sup>. In addition, there have not been any differences for fasting during the different trimesters. The present study was carried out to evaluate the effect of fasting in pregnant women in different trimesters on pregnancy outcome.

## Subjects and Methods

This historical cohort study was performed in a referral hospital in Tehran in 2004. All pregnant women with an age range of 20-35 years and delivering in this center and on fasting during one of the pregnancy trimesters were included

in the study. Those mothers with a history of systemic disorder, drug consumption during pregnancy (except for iron, folic acid, multivitamin, and anxiolytics less than 48 hours), smoking, narcotic or alcohol use, the presence of any major anomaly under sonography and not having an appropriate weight during the pregnancy before fasting period were excluded from the study. The cases were divided into non-fasting (group 1), group 2 with mild fasting (1-10 days), group 3 with moderate fasting (11-20 days) and group 4 with full fasting (21-30 days). In addition, fasting mothers were divided into groups with appropriate, moderate, and poor nutrition according to serving *eftar* and *sahar* meals. If they served both *efatr* and *sahar* completely, they were categorized in appropriate nutrition group and if they had one or none of those completely were categorized in moderate or poor nutrition group, respectively.

Considering the standard deviation of weight, height or head circumference of the neonates from "fasting" and "non-fasting" mothers at  $\alpha=0.05$  and  $b=0.20$  and with attention to used sample size for cohort studies, a sample size of 101 was calculated. In this study, a non-random sampling was used and a questionnaire was provided for data collection. Weight, height, and Head circumference were measured and recorded at birth. Verbal consent was taken from all cases and this study was approved by research committee of the Faculty of Medicine and ethics committee of Tehran University of Medical Sciences. SPSS package (Ver 13) was used for data entry and analysis using covariance test. Data were expressed as mean ( $\pm$ SEM) and a *P* value less than 0.05 was considered significant.

## Findings

The questionnaire was completed for 195 mothers from whom 6 mothers did not meet the inclusion criteria. None of the cases was smoker or drug abuser or had fetal anomalies. In total, 189 cases were evaluated with a mean age of

**Table 1:** Incidence of fasting in studied mothers and with regard to trimesters

| Group                       | First Trimester | Second Trimester | Third Trimester | Total      |
|-----------------------------|-----------------|------------------|-----------------|------------|
| <b>Without fasting</b>      | 31 (47.0%)      | 15 (22.7%)       | 20 (30.3%)      | 66 (34.9%) |
| <b>1-10 days fasting</b>    | 6 (21.4%)       | 10 (35.7%)       | 12 (42.9%)      | 28 (14.8%) |
| <b>11-20 days fasting</b>   | 14 (40.0%)      | 11 (31.4%)       | 10 (28.6%)      | 35 (18.5%) |
| <b>&gt; 20 days fasting</b> | 31 (51.7%)      | 20 (33.3%)       | 9 (15.0%)       | 60 (31.7%) |
| <b>Total</b>                | 82 (43.4%)      | 56 (29.6%)       | 51 (27.0%)      | 189 (100%) |

25.9 years, a mean weight of 61.7 kg and a weight range of 38-98 kg. In addition, their mean for BMI was 23.9 kg/m<sup>2</sup> with a range of 15.6-36.8. Meanwhile, the average for number of days on fasting was 13 days; 66 cases (34.9%) were not on fasting. Table 1 shows the frequency of cases in different fasting groups for different trimesters. Most of cases were in non-fasting and full-fasting groups, about half of the cases were on fasting in first trimester. Out of 123 cases on fasting, 64 (52%), 49 (39.9%) and 10 (8.1%) had good, moderate, and poor nutritional habit respectively.

There were also no significant differences between different groups on fasting regarding BMI at beginning of pregnancy, age, number of pregnancies, and a history of abortion ( $P>0.05$ ).

In addition, a history of stillbirth was 7.7% in non-fasting group and it was 1.6% in fasting group with a significant difference between them. Meanwhile, mean of weight, height, and head circumference in studied groups was 3.03 kg, 49.7 cm, and 34.2 cm. Table 2 shows these parameters in different groups. In this respect, there were no significant differences between these parameters and number of days on fasting.

Using covariance test, the effect of compounding parameters like weight, mother's age and BMI, nutritional status during pregnancy, a history of abortion or dear birth and number of pregnancies was ignored and there was still no significant differences regarding the studied parameters.

Table 3 shows the comparison of pregnancy outcome with fasting in different trimesters. As it has been shown, there was also no significant difference between the studied parameters for pregnancy outcome and fasting in different trimesters.

In this study, totally 32 neonates with a weight less than 2500 g were born. In this respect, 11 (16.7%), 4 (14.3%), 5 (14.3%), and 12 (19.7%) neonates were within groups with no fasting, mild, moderate and full fasting respectively. Although rate of low weight births was higher in full fasting group, but there was no significant differences with the other two groups ( $P=0.8$ ). In addition, incidence of low weight births in cases on fasting during first, second, and third trimesters was 25.5, 11.9, and 9.7% respectively and the difference was not significant ( $P=0.1$ ).

**Table 2:** Comparison of pregnancy outcome indices in pregnant mothers with number of days on fasting

| Parameters<br>Mean (SD)        | Without<br>fasting | 1-10 days<br>fasting | 11-20 days<br>fasting | More than 20<br>days fasting | P-value |
|--------------------------------|--------------------|----------------------|-----------------------|------------------------------|---------|
| <b>Weight (Kg)</b>             | 3.01 (0.5)         | 3.27 (0.5)           | 3.01 (0.3)            | 2.96 (0.7)                   | 0.1     |
| <b>Length (cm)</b>             | 49.7 (2.9)         | 49.9 (1.7)           | 50.2 (2.5)            | 49.2 (44)                    | 0.5     |
| <b>Head circumference (cm)</b> | 34.4 (1.4)         | 34.5 (1.4)           | 34.4 (1.6)            | 33.7 (2.3)                   | 0.1     |

**Table 3:** Comparison of mean height, height, and neonatal circumference in mothers on fasting in different trimesters of pregnancy

| Parameters<br>Mean (SD) | First Trimester<br>(n=44) | Second Trimester<br>(n=31) | Third Trimester<br>(n=15) | P-value |
|-------------------------|---------------------------|----------------------------|---------------------------|---------|
| Weight (Kg)             | 2.998 (0.676)             | 2.949 (0.733)              | 3.105 (0.585)             | 0.3     |
| Length (cm)             | 49.0 (3.9)                | 50.1 (4.3)                 | 20.2 (3.3)                | 0.6     |
| Head Circumference (cm) | 33.9 (2.1)                | 33.9 (2.5)                 | 34.4 (1.9)                | 0.4     |

Meanwhile, although relative risk of low birth weight in women on fasting during first trimester was 1.5 times of those with no fasting (CI=0.23-1.44), but this risk was not higher relative to non-fasting ones during second and third trimesters.

## Discussion

The goal of this study was to compare pregnancy outcome following holy month of Ramadan in pregnant mothers and different days of pregnancy. Although fasting is not an obligatory duty for pregnant women, some pregnant women go on fasting on the basis of their religious beliefs<sup>[2]</sup>. In this study, 34.9% of studied mothers were not on fasting during their pregnancy period and 31.7% were on full fasting. In a similar study in Singapore, only 13% of mothers were not on fasting and 57% of them were on fasting for more than 20 days<sup>[2]</sup>.

Therefore, it is essential for health professionals to reduce possible negative impact of fasting.

Our results showed that in mothers with an age range of 25-35 years and with an appropriate BMI and no systemic or chronic disorder, holy month fasting did not have an effect on three principal indices (ie weight, height, and head circumference) of pregnancy outcome. Some similar factors evaluated in this study have also been reported in other studies<sup>[3-6,9]</sup>. The difference of our study with other

studies has been the division of fasting according to different trimesters. El Ati et al in a study showed that if input calorie does not change during fasting in healthy women, weight, fat level, and bodily composition does not change.

This study shows the adaptation of the body to different nutritional status<sup>[10]</sup>. Kiziltan et al in another study on fasting and non-fasting pregnant women showed that although calorie input and weight gain in mothers on fasting is lower than non-fasting ones, but this does not affect mother's health<sup>[11]</sup>. In another study which was similar to our study, fasting women were divided into four groups and it was found out that fasting during third trimester can cause a significant reduction (about 60 g) in birth time weight<sup>[7]</sup>. The existing difference of our results with the latter study may be due to a smaller sample size. In another study by Mirghani et al, it was found out that there is no significant difference between fasting and non-fasting mothers regarding fetus weight at 30<sup>th</sup> week of pregnancy<sup>[12]</sup>. In another study by Kavemanesh et al, it was shown that there is a significant difference between fasting and non-fasting women regarding birth-time weight<sup>[8]</sup> that may be due to dissimilarity of studied cases regarding pre-pregnancy weight and more frequent early labor in non-fasting women. In the latter study, weight of fasting women was greater than non-fasting ones and pre-term labor was 1.3 greater in non-fasting mothers relative to fasting cases<sup>[8]</sup>.

In our study, there was also no significant difference between fasting and non-fasting mothers regarding height; a similar result was also found out in other studies<sup>[4,6,8]</sup>. In addition, head circumference of neonates was not

different in fasting and non-fasting mothers; a similar result was also found out in a few studies<sup>[4,6]</sup>. Meanwhile, although number of low weight labors was greater in full-fasting cases, there was no significant difference between number of days on fasting and low weight births in different trimesters. In a study by Cross et al, it was shown that incidence of low weight births are more frequent in second trimester<sup>[9]</sup>.

Despite an appropriate sample size, however the latter study lacked accurate information regarding fasting. In our study, there was also no significant difference between pregnant women with different day on fasting regarding low weight neonates. However, relative risk of low weight neonates was higher in mothers on fasting in first trimester as compared to non-fasting cases. In another study<sup>[4]</sup>, this was obtained as 1.9 that is greater than our results.

In our study, there was also no congenital anomaly in neonates from fasting mothers. Only in one study, one case of adrenogenital syndrome from a fasting mother was reported<sup>[6]</sup>.

Most of fasting women in our study in most days serve their *sahar* and *eftar* (even supper) meals. Therefore, appropriate nutritional programs are essential for pregnant women on fasting to maintain neonatal growth indices. In this study, BMI was lower in fasting mothers but the existing difference with non-fasting cases was not significant.

One of the limitations of this study is not evaluating objectively nutritional status of mothers using nutritional outcome questionnaire during pregnancy and fasting due to its retrospective nature. In addition, comparison of neonatal weight in recent and previous labors was not conducted.

## Conclusion

Holy month fasting does not affect birth time weight, height, and head circumference. In addition, according to our findings, in healthy women with appropriate nutrition, Islamic fasting has no inappropriate effect on intrauterine growth and birth-time indices.

Meanwhile, no congenital anomaly was observed in fasting mothers in this study. Also, although there was no significant difference for incidence of low weight neonates at birth time between groups on fasting and with non-fasting women, but relative risk of low birth weight was 1.5 times in mothers on fasting at first trimester as compared to non-fasting mothers.

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**Conflict of Interest:** None

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