

Effect of the Number of Ramadan Fasting Days on Maternal and Neonatal Outcomes

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ARTICLE INFO	ABSTRACT
<p><i>Article type:</i> Original article</p> <hr/> <p><i>Article History:</i> Received: 12 Jun 2014 Revised: 15 Jul 2014 Accepted: 31 Aug 2014 Published: 9 Sep 2014</p> <hr/> <p><i>Keywords:</i> Fasting Maternal Neonatal Outcome Ramadan</p>	<p>Introduction: Gynecologists and perinatologists are left with many unanswered questions and concerns regarding fasting during pregnancy and its effects on maternal and neonatal health. The current study was conducted to investigate the correlation between the number of Ramadan fasting days and pregnancy outcomes.</p> <p>Method: In this descriptive, analytical study, 641 newborns, whose mothers had fasting experience during pregnancy, were enrolled and allocated to three groups, based on the number of maternal fasting days during pregnancy (group A: ≤10 days, group B: 11-20 days, and group C: 21-30 days). Demographic and anthropometric data of neonates and mothers were recorded. Descriptive statistics, Chi-square, and non-parametric tests were performed for data analysis.</p> <p>Results: No statistically significant difference was found in maternal weight (during the last month of pregnancy), neonatal height, incidence of pre-term labor, or neonatal congenital abnormality in the three groups. Increased number of fasting days was not correlated with decreased neonatal head circumference or weight, while 1- and 5-minute Apgar scores significantly improved ($P < 0.05$).</p> <p>Conclusion: As the current findings indicated, with increasing number of fasting days, neonatal birth weight or maternal weight did not decrease. In addition, incidence of pre-term labor and low birth weight did not increase, while significant improvements were detected in 1- and 5-minute Apgar scores. Since pregnancy is a delicate state for women, further research on larger populations is recommended to evaluate other parameters and obtain more convincing results about the effects of Ramadan fasting on pregnant women.</p>

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Introduction

Fasting during the holy month of Ramadan is a religious obligation for healthy, adult Muslims. Duration of fasting depends on the time of sunrise and sunset, ranging between 12 and 18 hours. During Ramadan, Muslims abstain from all kinds of foods and drinks from dawn till sunset for 29 to 30 consecutive days (1, 2). According to Islamic rules, Ramadan fasting is not mandatory for Muslim females during menstruation, pregnancy, or lactation.

Most Muslim pregnant women are concerned about the potential adverse effects of Ramadan fasting on maternal and neonatal health (3). Although limited research has been conducted regarding the effects of Ramadan fasting on pregnancy, labor, lactation, and neonatal outcomes, no adverse effects have been reported

in these studies (4); such findings are explained by maternal physiological adaptation (5).

Kavemanesh et al. found no significant difference in duration of pregnancy among two groups of fasting and non-fasting pregnant women (1). Contrarily, some studies have noted an increased risk of pre-term labor for fasting mothers (6, 7). As previously indicated, prolonged duration of fasting (more than 13 hours) was correlated with higher corticotropin-releasing hormone (CRH) level, compared to a fasting duration less than 13 hours (8). However, several studies have rejected the adverse effects of pregnancy on Apgar score, birth weight, pre-term labor, or neonatal health indices (9-11).

Apparently, inconsistent results have been reported concerning Ramadan fasting and

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Table 1. Participants' demographic and anthropometric data and the results of comparison between the three groups

	Group A (n=137)	Group B (n=160)	Group C (n=344)	P-value
Maternal variables				
	Median (IQR)			
Maternal age (year)	25 (10)	26.5 (10)	27 (10)	0.007
Pre-pregnancy weight (kg)	57 (17)	60 (19)	60 (16)	0.06
Maternal weight during the last month of pregnancy (kg)	70 (15)	72 (15)	72 (16)	0.63
Gestational age (term/preterm)	117/20	147/13	318/26	
Prematurity (%)	15.7	7.6	6.9	0.009
Neonatal variables				
	Median (IQR)			
Sex (M/F)	57/80	67/93	173/171	0.1
One-minute Apgar score	9(1)	9(1)	9(0)	0.002
Five-minute Apgar score	9(1)	9.5(1)	10(1)	0.02
Height at birth (cm)	50(2)	50(2)	50(3)	0.113
Head circumference at birth (cm)	34(2)	35(1.13)	35(1)	0.007
Weight at birth (g)	3100(83)	3300(75)	3300(80)	<0.001
Congenital anomaly (No.)	1	2	4	0.892

pregnancy outcomes. Although research to date has not indicated any adverse effects of fasting, available evidence is inadequate to decide on the safety of maternal Ramadan fasting. In fact, many of these studies are methodologically inaccurate or small-scaled (12).

Few studies have discussed the correlation between duration of fasting and pregnancy outcomes. Herrmann et al. reported a three-fold increased risk of pre-term labor in females with prolonged duration (more than 13 hours a day) of fasting during pregnancy (8, 13), while insignificant differences were reported between duration of pregnancy and fasting duration in a comparison between 284 fasting and 225 non-fasting pregnant women (1).

The current descriptive, analytical study was conducted to investigate the correlation between the number of Ramadan fasting days and pregnancy outcomes.

Materials and Method

In this descriptive, analytical study, 641 newborns, whose mothers had fasting experience during pregnancy, were enrolled. The study was conducted at the Obstetrics Department of Qaem Hospital in Mashhad during 2010-2014. In the current study, the average fasting hours was 14 hours a day.

This study was approved by the Ethics Committee of Mashhad University of Medical Sciences. Non-random purposeful sampling was applied. Inclusion criteria were as follows: 1) maternal fasting; and 2) absence of current or previous maternal diseases. Subjects with previous history of diseases such as diabetes mellitus, tuberculosis, malignancies, epilepsy, asthma, infections, pre-eclampsia, cervical

insufficiency, and gastrointestinal, respiratory, cardiac, endocrine, autoimmune, and rheumatologic diseases before or during pregnancy were excluded.

After obtaining an informed consent from all parents, 641 neonates were allocated to three groups, based on the number of fasting days during pregnancy: group A: 10 days or less, group B: 11-20 days, and group C: 21-30 days.

Demographic and anthropometric data of neonates and mothers were recorded. Nurses who recorded the data and measurements were blind to categorization details. Neonates were categorized on the first day of birth by a physician. Neonatal weight was measured using SECA weight scale (Uniko company, Turkey) with 0.01 kg accuracy. Height and head circumference measurements were performed in supine position with an accuracy of 0.5 cm.

Statistical analysis was performed using SPSS version 16 and mean \pm standard deviation were calculated. Chi-square and non-parametric statistics were used to compare the means between variables. Significance level was considered less than 0.05.

Results

A total of 641 newborns were enrolled in this cross-sectional study. During Ramadan, 515 (80%), 88 (13.5%), and 37 (6.5%) mothers were in the first, second, and third trimesters, respectively. Number of fasting days during pregnancy was less than 10 days in 137 (21.4%) women, 10-20 days in 160 (25%) women, and more than 20 days in 344 (53.7%) mothers. Maternal and neonatal demographic and anthropometric data and Kruskal-Wallis test results are presented in Table 1 for comparison

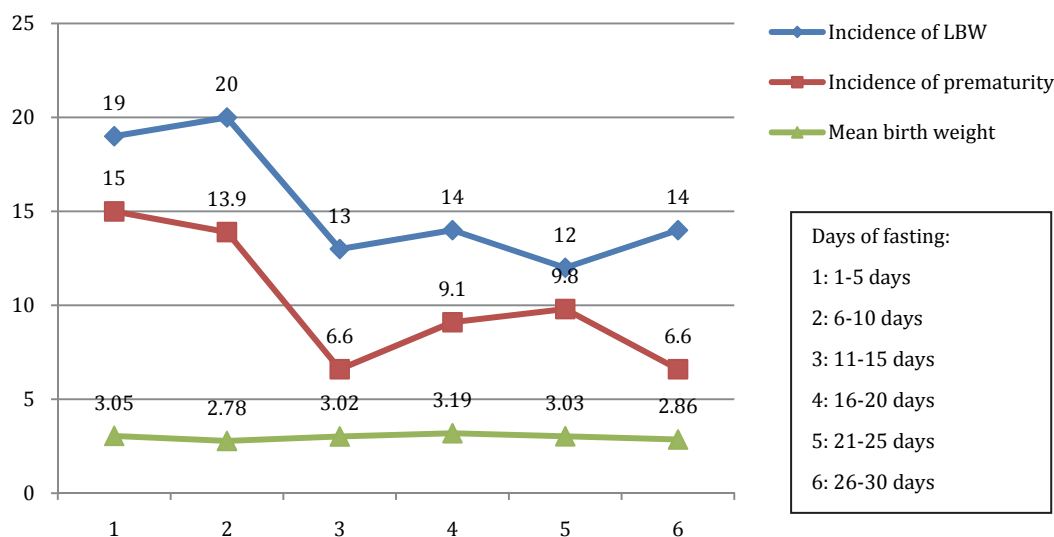


Figure 1. Comparison of neonatal variables among six groups of pregnant women, based on the number of fasting days

of different variables among the three groups.

Figure 1 has a more precise look at the detailed categorization of fasting days and comparison between neonatal weight, frequency of low birth weight, and prematurity in six groups of pregnant women.

Discussion

According to the current findings, as the number of fasting days during pregnancy increased, no significant changes were observed in risk of prematurity or maternal/neonatal weight among the three groups. Danesh et al. indicated that increased body mass index (BMI) during pregnancy among pregnant fasting and non-fasting women was insignificantly different, compared to baseline BMI (14). In the current study, the correlation between the number of fasting days and BMI was not evaluated, whereas another study indicated a significant 1-3 kg decrease in fasting pregnant women, compared to their non-fasting counterparts (15).

Weight loss among fasting pregnant women is sometimes associated with lower energy intake, which is likely to be related to differences in culture and eating patterns. Husain et al. (16) and Adlouni et al. (17) reported a 6-25% decrease and 20% increase in energy intake among Malaysian and Moroccan fasting pregnant women, respectively. Mehrmanesh et al. (18) suggested that Ramadan fasting during the second and third trimesters

does not affect weight gain in case of complete and sufficient energy intake.

Results regarding weight changes during Ramadan among normal healthy individuals are inconsistent. One study pointed a 1.7-3.8 kg weight loss among non-pregnant females (19), while Salleh et al. (20) and Sharbaf et al. (21) found no difference in weight gain among fasting and non-fasting pregnant women. The results of other studies are either in agreement or inconsistent with the current findings. This might be due to cultural differences or various types of food sources and eating patterns. Our findings regarding maternal weight gain might be related to the fact that pregnant females prefer to consume more calorie-dense food sources. Therefore, no decrease in total daily energy intake occurred despite the lower meal frequency.

Current results showed that the incidence of prematurity and pre-term labor was lower in pregnant women who fasted for longer periods; similar finding were reported by Raadnia et al., Emlae et al., and Koohbumei et al. (13, 22, 23).

Prematurity is considered a serious problem in perinatology and is mainly related to low socio-economic status, smoking habits, vaginal bleeding, multiple gestation, placenta previa, genetic abnormalities, and several other factors (24). Starvation is associated with increased secretion of CRH, which is directly related to pre-term labor (6). Studies, reporting an

increased risk of pre-term labor, have explained a correlation between pre-term labor and CRH (which increases after more than 13 hours of fasting) (6-8). Siega-Riz et al. even reported a three-fold increased risk of pre-term labor in pregnant females with 12-13 hours of fasting per day (7).

In this regard, Hobel et al. showed an increased risk of pre-term labor in pregnant females who had less than three meals per day (6). On the contrary, Koohbumi et al. showed that fasting does not affect the risk of pre-term labor in a case-control study on 976 fasting and non-fasting pregnant females (23).

It should be noted that Ramadan fasting is different from starvation or abstinence from eating. There seems to be a multifactorial predisposition for pre-term labor. Perhaps, decreased incidence of prematurity, associated with increased days of fasting in this study is due to contentment and comfort of religious people, while practicing their religious duties (2, 7, 11).

Current results presented a significant difference in neonatal weight and head circumference among the three groups. Although height was insignificantly different, it did not decrease as the number of fasting days increased; some other studies have reported similar results (9, 10, 25). Other studies regarding metabolic changes and different aspects of human health during and after Ramadan have found no remarkable changes in perinatal indices among fasting and non-fasting women (19, 26-28).

However, some other studies have obtained contradictory results (29,30). Arab evaluated 4,343 fasting pregnant females and found no effects of fasting on birth weight. This study showed that the incidence of low birth weight was higher among pregnant women, who had fasting experience during the second trimester, although it was insignificant ($P=0.09$) (31).

Almond et al. indicated a remarkable decrease in neonatal weight of fasting pregnant women, especially on longer fasting days or during the first trimester (32). Other studies have indicated that fasting during the second and third trimesters was associated with lower neonatal birth weight (9, 29). Since fetal growth during the first trimester is less than that of other two trimesters (fetus usually weighs 100 g at 12 weeks of gestation), fasting during this

trimester does not seem to change the neonatal birth weight; however, the reason for higher birth weight, found in neonates of mothers who fasted for longer periods during pregnancy, remains undetermined.

According to our results, increased number of fasting days did not have an adverse effect on Apgar score, while the score was even higher among neonates in group C. According to other similar studies, maternal fasting does not have a significant effect on Apgar score (9, 10, 25). Similarly, Malhotra et al. found that Apgar score is not altered by fasting, despite the biochemical changes during fasting (33).

Generally, it seems that fasting less than 15 hours a day in pregnant females is not associated with obvious metabolic changes, compared to overnight fasting (9, 10, 25). It seems that the process of delivery may not undergo any alterations by increased number of fasting days. Moreover, based on the current findings, the incidence of fetal anomalies was not affected by the higher number of fasting days; these results are confirmed by the findings of Ziaee et al. (26).

One limitation of this study was lack of evaluation of nutritional status and eating patterns of pregnant women and their families during Ramadan. It is suggested that these factors be taken into account in future studies.

Conclusion

The current study indicated that increased Ramadan fasting days did not lead to decreased neonatal birth weight or maternal weight. Incidence of pre-term labor and low birth weight did not increase, while higher number of fasting days had a significant direct effect on 1- and 5-minute Apgar scores. Since pregnancy is a delicate state for women, further research on larger populations is recommended to evaluate other parameters and obtain more convincing results about the effects of Ramadan fasting on pregnant women.

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