Middle East Fertility Society Journal (2015) **20**, 54–56

Middle East Fertility Society

Middle East Fertility Society Journal

www.mefsjournal.org
www.sciencedirect.com

ORIGINAL ARTICLE

Effect of Ramadan fasting on amniotic fluid index in last month of pregnancy

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Received 28 February 2014; accepted 1 April 2014
Available online 14 June 2014

KEYWORDS

Maternal fasting;
Ramadan;
Amniotic fluid index

Abstract *Objective:* To assess the effect of fasting in Ramadan on amniotic fluid index (AFI).

Design: A cross sectional observational study.

Methods: This study was conducted between July 21, 2012 and August 17, 2012, which corresponded to the 3rd and 27th days of the month of Ramadan 1433 and from July 12, 2013 and August 6, 2013, which corresponded to the 3rd and 27th days of the month of Ramadan 1434. Pregnant women attending the antenatal care clinic at Assiut and Qena University Hospitals were included in this study. The study groups included fasting and non fasting women beyond 36 weeks of gestation. The study took place at the same time of day (i.e., between 9 and 12 AM).

Results: A total of 221 pregnant women were studied, 97 fasting and 124 non fasting. As regards age, parity and the gestational age no significant differences were reported. The AFI was less affected by fasting, also there was a significant difference in the AFI between fasting and non fasting pregnant women with oligohydramnios (4.00 ± 0.82 and 2.64 ± 1.12 respectively). A positive relationship with gravidity was observed as AFI increased with the increase of gravidity in pregnant fasting women, on the other hand there was variable non significant relation between AFI and gravidity in pregnant non fasting women.

Conclusion: We conclude that the fasting in Ramadan has no effect on or may improve the AFI in the last month, while gravidity plays a role in the AFI in fasting group.

1. Introduction

Fasting during Ramadan is one of the five main religious practices of Islam. Ramadan is a holy month in the Islamic calendar during which healthy adults abstain from food and drink during the daylight hours from dawn to sunset throughout the month of Ramadan. Pregnant women are exempt and allowed to choose fasting or non fasting state, regarding their

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Peer review under responsibility of Middle East Fertility Society.

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http://dx.doi.org/10.1016/j.mefs.2014.04.001

abilities, after delivery, they are expected to fast the number of days they missed during Ramadan. Many women are interested and able to fast, but they worry about their fetus and ask their doctor about possible effects. Women would like to fast with their families rather fasting alone later (1).

A significant fall in glucose, insulin, lactate, and carnitine levels and a rise in triglyceride concentrations have been observed in pregnant women observing Ramadan (2).

Accelerated starvation after short-term fasting in pregnant women resulted in hypoglycemia, raised circulating fatty acids and ketones, and reduced concentration of amino acids (3). These changes are related to the duration of fasting and to gestational age (4).

Oligohydramnios in the presence of intact membranes is a common obstetric complication, occurring in 3–5% of pregnancies at term. Such pregnancies are at an increased risk of fetal distress and are associated with a high rate of operative delivery and meconium aspiration (5). Fasting induces dehydration in addition to some metabolic changes (6,7).

On the other hand, a noninvasive option to increase amniotic fluid volume is maternal oral hydration. In two studies Kilpatrick et al. and Kilpatrick and Safford reported that maternal intake of 2 L of water in a 2-h period increased the amniotic fluid index in pregnancies with oligohydramnios and in those with a normal amniotic fluid volume (8,9). However, the mechanisms for such improvement in the amniotic fluid index were not addressed. Most of the previous studies that observed the effects of fasting on the amniotic fluid volume and index were performed when Ramadan was concordant with autumn and winter (1,6).

The aim of this study was to determine the possible adverse effect of fasting in long hot days of late summer during Ramadan on the amniotic fluid index during the last month of pregnancy.

2. Materials and methods

A cross sectional observational study was conducted between July 21, 2012 and August 17, 2012, which corresponded to the 3rd and 27th days of the month of Ramadan 1433 and between July 12, 2013 and August 6, 2013, this corresponded to the 3rd and 27th days of the month of Ramadan 1434. The Ethics committee of Faculty of Medicine, Assiut University approved this study. Inclusion criteria were low-risk pregnant women attending the antenatal care clinic at Assiut and Qena University Hospitals with a singleton pregnancy beyond 36 weeks of gestation (determined by menstrual weeks and confirmed by an early ultrasound between 11 and 14 weeks) and aged between 23 and 38 years.

Women with medical diseases, receiving prostaglandin synthetase inhibitors, fetal renal abnormalities, multiple pregnancy, rupture of membranes and post-term pregnancy were excluded from participation in the study.

The study recruited 97 fasting women and 124 non fasting women beyond 36 weeks of gestation. Complete history taking and physical and obstetric examination were done for all women by a gynecologist. The personal and medical data collected were treated confidentially and were not made available to a third party. After obtaining informed consent, primary data including mother's age, parity, weight and gestational age according to the last menstrual period (LMP) were collected and reported. The range of the fasting duration at the time of examination was between 10 and 12 h. Ultrasound examination for each woman was done using sonoline G60 S ultrasound imaging system, Siemens, Germany. All examinations were done using a convex 3.5 MHz with the woman in a recumbent position and were performed by an investigator who was unaware of the study. Normal amniotic fluid volume is defined as an amniotic fluid index (AFI) between 8.0 and 24.0 cm. Oligohydramnios is defined as an amniotic fluid index $\leqslant$5.0 cm. The study took place at the same time of day (i.e., between 11 AM and 1 PM).

Collected data were subjected to statistical analysis using SPSS version 15.0 (SPSS, Chicago, IL, USA). Amniotic fluid index data were compared by analysis of variance. A P value less than 0.05 was considered significant.

3. Results

A total of 221 pregnant women were studied, 97 of whom were fasting and 124 were non fasting, the pregnant fasting women with decreased AFI were 5% while those non fasting with decreased AFI were 17%. As regards age, parity and the gestational age no significant differences were reported.

The AFI was less affected by fasting as the mean ± SD of those fasting with normal AFI was significantly increased than those non fasting (13.94 ± 5.22 and 11.81 ± 3.54 respectively), also there was a significant difference in the AFI between fasting and non fasting pregnant women with oligohydramnios (4.00 ± 0.82 and 2.64 ± 1.12 respectively) as shown in Table 1.

The AFI in Fig. 1 represents a positive relationship with gravidity as it increased with increase of gravidity in pregnant fasting women, on the other hand there was variable non significant relation between AFI and gravidity in pregnant non fasting women.

The estimated AFI in non fasting women decreased with the progress of pregnancy while in the fasting group there was no relation between the AFI and the gestational age (Fig. 2).

4. Discussion

The effect of the Ramadan on the AFI in the last month of pregnancy was unsuspected to show no adverse effect, but

Table 1 The criteria of the pregnant women and amniotic fluid index in both fasting and non fasting groups.

	Fasting n = 97		Non-fasting n = 124		P value
	Normal AFI	Decreased AFI	Normal AFI	Decreased AFI	
Frequency	62 (28%)	12 (5%)	110 (50%)	37 (17%)	0.005
Age	29.56 ± 6.22	27.67 ± 5.03	29.16 ± 4.83	29.64 ± 4.60	NS
Parity	2.11 ± 1.53	1.67 ± 1.52	2.19 ± 1.62	2.55 ± 151	NS
GA	38.17 ± 1.15	38.33 ± 1.25	38.41 ± 1.13	38.18 ± 1.17	NS
AFI (cm)	13.94 ± 5.22	4.00 ± 0.82	11.81 ± 3.54	2.64 ± 1.12	0.005

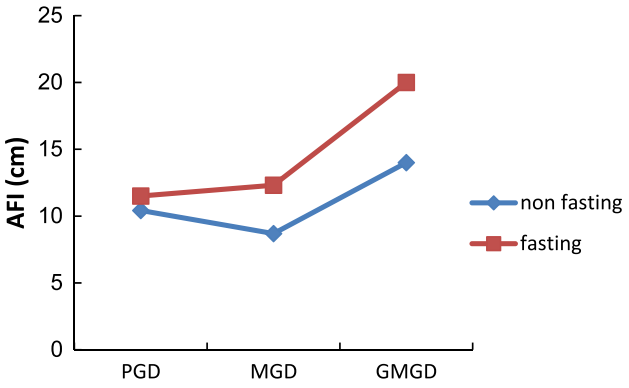

Figure 1 The relationship between the AFI and gravidity.

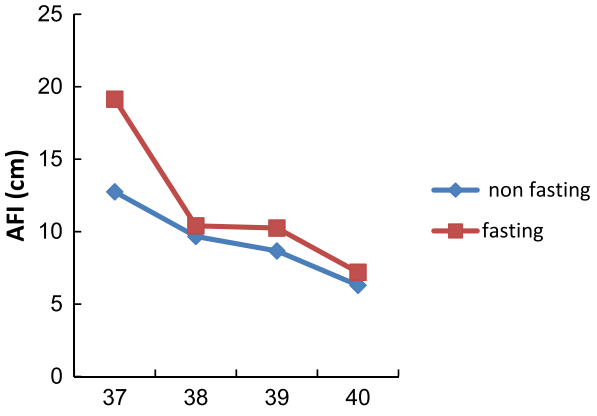

Figure 2 The relationship between the AFI and gestational age.

our study represents that Ramadan may have a positive effect on the AFI in the last month as we found that the normal AFI in the fasting group was higher (13.94 ± 5.22) than the non fasting group (11.81 ± 3.54) which means that the AFI even if normal was improved by fasting in Ramadan. This result was supported by Mirghani et al., as they found no evidence of amniotic fluid or fetal bladder volume alteration with maternal fasting (1).

Also, oligohydramnios was less frequent (5%) in the fasting group rather than those non fasting (17%) and this may be explained by the marked and frequent fluid intake at night with more period of rest at day.

Short-term maternal oral hydration increases the amniotic fluid index in women with third-trimester oligohydramnios. Although the mechanism for this effect remains unclear, it could not be accounted for fetal urination but instead was associated with improved uteroplacental perfusion (10).

The gravidity was found to be have an impact effect on the AFI in the fasting pregnant women as it was increase with the increase number of gravidity this may be explained by experience and sharing of the family in snacks. While in non fasting group there was no definite relation with gravidity.

The AFI in the non fasting group was inversely related to the gestational age while this relation was variable in the fasting group. This means fasting in the Ramadan may improve the AFI in the last month of pregnancy in some women.

Schreyer et al. were able to demonstrate a significant reduction in the amniotic fluid volume in pregnant ewes dehydrated for 54 h (11). This might be due to the difference between the duration of dehydration in the two studies. The study was done by Mirghani et al., who found that with the mean duration of fasting was 8 h (1) and there was unchanged amniotic fluid volume which might indirectly suggest that no major long-term changes in renal function are affected during Ramadan fasting.

We conclude that the fasting in Ramadan has no effect on or may improve the AFI in the last month, while gravidity play a role in the AFI in fasting group.

Conflicts of interest

The authors have no conflicts of interest concerning the work reported in this paper.

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