Fasting during the holy month of Ramadan does not change the composition of breast milk

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Abstract

To determine possible effects of fasting on breast milk composition for Muslim mothers during the holy month of Ramadan in the United Arab Emirates (UAE).

A prospective descriptive study.

Muwajihi Primary Health Care (PHC) Clinic, Al-Ain Medical District.

26 healthy nursing mothers were recruited. Their mean age was 27 ± 5 years.

Each mother was seen twice by a physician in the morning at the PHC clinic firstly between the second and fourth weeks of Ramadan and secondly two weeks after the end of Ramadan. Before attending the clinic, the mothers had allowed their babies to suckle. At the first visit, the mother was personally interviewed by the doctor and a sample of breast milk was taken for analysis. A second sample was similarly taken at the second visit after Ramadan. For each sample, total fat, protein, lactose, total solids, non-fat solids, triglycerides and cholesterol were measured.

No significant differences were seen in the content of major nutrients of milk taken during and after Ramadan. There was a slight increase and a slight decrease respectively in the concentrations of triglycerides and cholesterol after the end of Ramadan, although these changes were also not significant.

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The present study showed that no major changes occur in the composition of human breast milk as a consequence of reverting to a normal alimentary pattern at the end of Ramadan. © 2001 Elsevier Science Inc. All rights reserved.

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1. Introduction

Sustained fasting over a period of time is or has been a feature of several of the world’s great religions. For Islam, the whole of the holy month of Ramadan is a time of strictly observed fasting during the daylight hours [1]. This month-long regime of intermittent fasting every year is peculiar to Islam and during Ramadan, all healthy adults are obliged to abstain from eating and drinking from sunrise to sunset. Fasting is not obligatory for children nor menstruating women and the sick and travelers are also excused. Pregnant and lactating women also usually observe Ramadan fasting although they are permitted to postpone fasting until another month [2]. Because the Islamic year is shorter than the Gregorian year, Ramadan, the ninth month of Islamic Lunar calendar of Hijrah, moves forward about 11 days every year. Ramadan can, therefore, occur in any of the four seasons and the duration of fasting can vary from 11 to 18 hours depending upon the exact time of sunrise and sunset in each country or region [3].

Globally, up to about 800 million Muslims strictly observe Ramadan fasting by going without food and water from sunrise to sunset during the entire month [2,4]. This pattern of intermittent activity and fasting is different from normal fasting or ongoing food deprivation which has been widely studied [5–8]. To date only limited studies on the physiological effects of altered activity and feeding schedule associated with Ramadan fasting have been reported [3,4,9,10].

It is well established that breastfeeding of infants is associated with their better biological, psychological and intellectual development [11]. The effects of mothers’ diet on the composition of their milk has been extensively reviewed by Lonnerdal [12], but no studies appear to have been made of the effects of Ramadan fasting on milk components. Therefore, the present study, was initiated to determine whether breast milk composition is altered in mothers observing Ramadan fasting by taking for analysis milk samples during and after the month of Ramadan.

2. Materials and methods

2.1. Subjects

A prospective descriptive study was conducted in the Muwaijihi Primary Health Care (PHC) Clinic of the Al-Ain Medical District of United Arab Emirates. Twenty six nursing mothers of Muslim faith and mixed nationality in the age range of 20 to 38 years (mean 27.0 ± 5.0) and who were engaged mainly in housework and sedentary activity, volunteered...
for the study. None of the subjects was clinically obese and their mean height and weight were 158.7 ± 6.0 cm, 66.5 ± 12.0 kg respectively. The subjects appeared to be healthy and were physically fit enough to be observing Ramadan fasting. All were non-smokers and none of them was taking any medication during or after Ramadan. While observing the fast during daylight hours, all mothers broke their fast soon after sunset and consumed at least one other meal before daybreak. The mothers were recruited from the second week of Ramadan as they attended the immunization clinic with their children and were interviewed to obtain information on educational level, income, housing etc. At the time of the study, the period of Ramadan was from 9th December 1999 to 6th January 2000.

2.2. Sample collection

At the time of recruitment, milk samples were obtained after normal suckling in the morning between 9.00–11.30 a.m. Similar samples were obtained from the same mothers two weeks after the end of Ramadan. The samples were kept cold and transported to the laboratory and analyzed immediately. Aliquots of each milk sample specimens were also kept frozen at −70°C.

2.3. Analysis of major nutritional components of milk

The major nutrients, fat, protein and lactose, in each milk sample together with total and non-fat solids were determined using a milkoscan FT120, Type 71200 [Foss Electric A/S, Denmark]. This instrument was calibrated before use against a range of human milk samples of known composition [13]. Cholesterol and triglycerides were measured in lipid extracts of milk according to methods described by Holme and Peck [14]. We have compared our results with those reported by Committee on Nutritional status during pregnancy and Lactation, Institute of Medicine, summarizing composition data for macronutrients of human milk [15].

2.4. Statistical methods

Data were analyzed using the Statistical Packages for Social Sciences [16] [SPSS] and are expressed as mean and standard deviation (SD) unless otherwise stated. The paired-t test was used to ascertain the significance of differences between mean values of two paired continuous variables and confirmed using the Wilcoxon signed rank test for non-parametric distribution. The Spearman’s rank correlation coefficient was used to evaluate the strength of association between two continuous variables. The level $p < 0.05$ was considered as the cut-off value for significance.

3. Results

Table 1 gives the socio-demographic characteristics of the mothers who were included in the study. Most of the subjects had only a basic level of education with an average attendance at school of 8.5 ± 5.8 years. At the time of the study, two thirds (65%) lived in flats or villas...
with the remainder (35%) living in traditional mud dwellings. The average income per month per family was 1919 ± 1062 US Dollars.

Table 2 shows the values for fat, protein, lactose, total and non-fat solids, triglycerides and cholesterol. No significant differences between mean values for the major milk nutrients were seen for samples taken during and after Ramadan. In post fasting samples there was a small increase and a small decrease respectively in triglyceride and cholesterol content of milk, but whilst these findings may point to qualitative changes in milk lipoprotein composition, these changes were again not significant.

4. Discussion

Fasting during Ramadan is from sunrise to sunset, but is a variable pattern of behavior since the actual period of abstinence may be anything between 11 and 18 hours. The period

Table 2
Effect of Ramadan feeding and fasting on infant mother milk composition and quality

<table>
<thead>
<tr>
<th>Variables</th>
<th>During Ramadan</th>
<th>After Ramadan</th>
<th>p-value* signf.**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fasting N = 26</td>
<td>(Non-fasting) N = 26</td>
<td></td>
</tr>
<tr>
<td>Fat gm/100 ml</td>
<td>3.97 (1.11)</td>
<td>3.91 (1.10)</td>
<td>P = 0.759 (NS)</td>
</tr>
<tr>
<td>Protein gm/100 ml</td>
<td>1.62 (0.28)</td>
<td>1.65 (0.21)</td>
<td>P = 0.356 (NS)</td>
</tr>
<tr>
<td>Lactose gm/100 ml</td>
<td>5.28 (1.27)</td>
<td>5.25 (1.14)</td>
<td>P = 0.903 (NS)</td>
</tr>
<tr>
<td>Total solids gm/100 ml</td>
<td>11.5 (0.73)</td>
<td>11.53 (0.89)</td>
<td>P = 0.797 (NS)</td>
</tr>
<tr>
<td>Solid non-fat gm/100 ml</td>
<td>6.69 (0.40)</td>
<td>6.70 (0.39)</td>
<td>P = 0.795 (NS)</td>
</tr>
<tr>
<td>Triglycerides mmol/L</td>
<td>35.64 (19.28)</td>
<td>39.48 (13.13)</td>
<td>P = 0.315 (NS)</td>
</tr>
<tr>
<td>Cholesterol mmol/L</td>
<td>1.34 (0.51)</td>
<td>1.21 (0.34)</td>
<td>P = 0.260 (NS)</td>
</tr>
</tbody>
</table>

* Paired-t test was used to ascertain the significance of differences between mean values of two paired groups, Sig. (2-tailed).
** NS = Not Significant.
may be particularly long for Muslim living northern latitudes when Ramadan falls during the summer months [3]. In general, there is some evidence from Saudi Arabia [17,18], that there is a reduction in feeding frequency during Ramadan, but that each meal is nutritionally more dense than meals taken outside of Ramadan. There are some reports concerning the effects of Ramadan fasting on lipid levels, but the results are often based on small numbers and may be contradictory [18]. Thus Gumaa et al. [9] reported an increase in plasma triglyceride, total lipid and ketone body levels accompanying a decrease in the level of total cholesterol (TC). However, according to Fedail et al. [19], TC levels increased during Ramadan fasting whilst TG levels were unaffected. In another study, El-Hazmi et al [20] demonstrated that TG and TC levels decreased after the first week of Ramadan and subsequently increased towards the end of the month. More recently, Raza et al [10] have shown small increases in TG, TC and both low density lipoprotein-cholesterol and high density lipoprotein cholesterol following one month of Ramadan fasting, but using electrophoresis, only the $\beta$-lipoproteins were significantly increased.

Plasma lipids were not measured in the present study, but a detailed analysis of the breast milk composition in relation to Ramadan fasting was undertaken for 26 nursing mothers. The results obtained compare well with published data on human milk composition [15] and they also show that abstaining from daytime eating and drinking during Ramadan has no significant effect on breast-milk composition. The results, therefore, suggest that Ramadan fasting is unlikely to have any untoward effects on the quantity and quality of breast milk or on infant nutrition.

5. Conclusion

The current study showed that breast milk quality and composition in nursing mothers was unaffected by Ramadan fasting.

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