The influence of oral steroidal contraceptives on magnesium concentration in breast milk

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Abstract. This study determined the total magnesium concentration in the breast milk of mothers that were using oral, steroidal contraceptives during lactation. The study involved two groups of breast-feeding mothers that were receiving oral contraception, and a control group of 15 breast-feeding mothers that did not receive oral contraception. The first group received a daily combination pill (levonorgestrel 0.15 mg + ethinylestradiol 0.03 mg); the second group received a daily mini-pill (progestin-only pill, containing norethindrone 0.35 mg). The total magnesium concentrations of plasma and breast milk were determined before the start of contraception and after 30 days of contraception. The results showed that after 30 days of contraception, the contraceptive drugs had not significantly modified the total breast milk magnesium concentration (1.16 ± 0.11 mmol/L before treatment versus 1.01 ± 0.12 mmol/L, in first group; 0.97 ± 0.16 mmol/L before contraception versus 1.08 ± 0.11 mmol/L, in the second group). There were no significant changes in the total magnesium concentration in the breast milk of the control group after the 30 days. In addition, the oral, steroidal contraceptives (pill and mini-pill) did not affect the total magnesium concentration in the plasma of lactating mothers.

Key words: oral steroidal contraceptives, magnesium, blood plasma, breast milk, mini-pill

Breast milk composition is very important for a baby’s health [1, 2]. The bivalent cations are important constituents of breast milk. Milk is the only source of these cations (magnesium, calcium, zinc, copper and others) for the new-born in the first months of life. Therefore, any variations in magnesium concentrations in breast milk may significantly affect the new-born.

The oral steroidal contraception is used by women today during the breast-feeding. A possible influence of the steroid hormones from contraceptive pills on cation concentrations in the breast milk may cause problems for the child’s nutrition in the first six months of life. Thirty to forty five days after having given birth, the mother’s fertility returns, which means that oral steroidal contraceptives can be used if the woman so desires. One type of oral contraceptive is the progestin-only contraception pill (the so-called mini-pills) [3]. Some authors [4] consider that progestin-only (mini-pills) are preferable to estrogen-containing contraceptives during the first six months following delivery. One of the arguments in favor of using progestin-only pills is that the milk volume decreases after the administration of an estrogen-containing pill [4]. This

does not seem to happen with medroxyprogesterone or other progestin-type preparations. The level of magnesium in breast milk is important because a magnesium deficiency in the infant can cause or facilitate convulsions [5, 6]. Magnesium levels in the breast milk vary during lactation. In colostrum, the magnesium level is higher (about 1.65 mmol/L), but in mature milk the level is more stable (about 1.23 mmol/L) [7]. In this study we followed the effect of a combined oral contraceptive pill (estrogen + progestin) and progestin-only oral contraceptives (mini-pills) on magnesium concentrations in breast milk.

**Patients and method**

The blood plasma and breast milk total magnesium concentrations were determined in three groups of mothers that used contraceptive drugs during lactation, and in a control group that did not use contraceptive drugs. Venous blood samples were collected in blood separation tubes (5 mL Vacutainer) and immediately analysed for total serum magnesium.

Inclusion criteria: in our study were included mothers who were less than 40 years of age, and who did not smoke or use alcohol habitually. The interval between pregnancies was at least two years and oral contraceptive use lasted at least 30 days.

Exclusion criteria: mothers with eclampsia or preeclampsia, or women who had received magnesium during pregnancy were not included in this study. Women who interrupted the oral contraceptive treatment and women who stopped lactation (for various reasons) were also not included. During the postnatal period (before the study and during the contraceptive treatment), the study participants did not receive drugs that contained calcium, magnesium or other cations, or diuretics. We worked with three groups of healthy mothers.

Group I received daily a pill (levonorgestrel 0.15 mg + ethinylestradiol 0.03 mg) (19 mothers)

Group II received a mini-pill daily (norethindrone 0.35 mg) (17 mothers)

Group III (control group) (not receiving contraceptives) (15 mothers)

The study included mothers, during lactation after normal delivery. The demographic characteristics of the study participants are presented in table 1.

All infants were born at term and were an appropriate size for their gestational age. The diet followed by all of the lactating mothers was a typical European diet, but was not a diet that was rich in vegetables.

The milk samples (5-10 mL) were collected by manual expression or by electric pumps before the start of the treatment and after 30 days of contraceptive administration. All mothers were included in the study from two to four months after delivery. None of the women interrupted lactation during the study. All mothers received a pill or a mini-pill each day. The breast milk and plasma total magnesium concentrations were determined before contraceptive drug administration and after 30 days of pill or mini-pill use using atomic absorption spectrophotometry (AAS1N Carl Zeiss Jena spectrophotometer, Germany). Samples of fresh milk were obtained in the morning between 6-9 h a.m. using an electric pump or by the mother manually expressing one breast. In all cases, the first milliliter of milk was discarded to prevent contamination of breast milk by perspiration. The results were statistically interpreted using ANOVA with a paired test. The study was performed after obtaining written, informed consent and after the approval of the protocol by the Ethical Committee for Clinical Research.

**Results**

The pill and the mini-pill treatment do not change breast milk and blood plasma total magnesium concentration in lactating mothers’ (table 2). There are no differences between the combined pill and the progesterone-only pill regarding the effect on total magnesium concentration.

**Discussion and conclusions**

The concentrations of bivalent cations in the plasma and milk of lactating women vary during different stages of lactation. There are few data regarding the correlation between plasma and breast milk magnesium concentrations [8]. In our study, we measured the magnesium concentration
Table 1. Demographic characteristics of lactating mothers.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Group I (Pill group) n = 19</th>
<th>Group II (Mini-pill group) n = 17</th>
<th>Group III (Control group) n = 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>24.7 ± 4.2</td>
<td>27.1 ± 3.3</td>
<td>26.2 ± 5.1</td>
</tr>
<tr>
<td>Associated pathology (number of cases)</td>
<td>biliary dyskinesia (2)</td>
<td>biliary dyskinesia (1)</td>
<td>biliary dyskinesia (1)</td>
</tr>
<tr>
<td></td>
<td>cystitis (2)</td>
<td>cystitis (2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>headache (1)</td>
<td>myopia (2)</td>
<td></td>
</tr>
<tr>
<td>The use of combined pills or mini-pills before pregnancy</td>
<td>8 mothers</td>
<td>9 mothers</td>
<td>3 mothers</td>
</tr>
</tbody>
</table>

Age values are presented as mean ± SD

Table 2. Blood plasma and milk concentration of total magnesium in pill and mini-pill treated lactating mothers.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Blood Plasma Total magnesium (mmol/L)</th>
<th>Milk Total magnesium (mmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before After P</td>
<td>Before After P</td>
</tr>
<tr>
<td>Combined pill group n = 19</td>
<td>0.73 ± 0.13 0.75 ± 0.09 NS</td>
<td>1.16 ± 0.11 1.01 ± 0.12 NS</td>
</tr>
<tr>
<td>Mini-pill group n = 17</td>
<td>0.68 ± 0.16 0.66 ± 0.14 NS</td>
<td>0.97 ± 0.16 1.08 ± 0.11 NS</td>
</tr>
<tr>
<td>Control group n = 15</td>
<td>0.74 ± 1.10 0.74 ± 0.17 NS</td>
<td>1.05 ± 0.10 1.11 ± 0.15 NS</td>
</tr>
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</table>

The level of statistical significance was set at p < 0.05. All values are presented as mean±/SD. NS – not significant.

only in mature milk. This cation represents 1.43-2.40% of the total mineral content found in human milk [9]. The magnesium concentration in mature human breast milk (2-4 months) varies over a wide range, but has median value of 1.42 mmol/L and it is relatively stable [10]. Several factors can modify breast milk magnesium concentration. The level of magnesium in the milk of adolescent and teenage mothers was lower than in adult mother breast milk [11]. The differences in parity were not important for milk magnesium concentration. In women consuming low-magnesium diets during lactation, breast milk magnesium levels remained relatively constant, although there was a reduction in urinary magnesium loss that probably compensated for the lower intake of magnesium [12]. Progesterone plays a role in the regulation of serum magnesium levels. The Ca$^{2+}$/Mg$^{2+}$ ratio correlated inversely with the progesterone level [13]. Magnesium is the second most abundant bivalent cation stored in a large proportion of the skeleton. In lactating women, some of the magnesium from bones is mobilized [14, 15].

There are a few studies involving the influence of oral steroidal contraceptives on breast milk and plasma magnesium concentrations. Our data are in agreement with the findings of other authors that show that oral contraception using a combination pill or a mini-pill (administered for 2-15 weeks) does not have a significant effect on breast milk or plasma magnesium concentrations in lactating women [15]. However, there are data showing that serum magnesium levels in women taking injectable contraceptives, progestin-only drugs (Depot medroxyprogesterone acetate and Norgestrel) are significantly increased [16]. The composition of the oral contraceptives used in other studies was different from that taken by the lactating women in this research. Our study was performed using a relatively small number of lactating mothers, but clearly indicated that oral, steroidal contraceptives used during lactation, regardless of composition or type of steroid contained, do not significantly modify the total magnesium concentration in mother’s plasma or breast milk.

Disclosure

Contraceptives and magnesium in milk

References


