NUTRITION OF LACTATING WOMEN IN SLOVENIA

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ABSTRACT

The dietary intake during lactation plays an important role. Till now 40 lactating Slovenian women at 1–3.5 month post partum participated in the study. Dietary intakes were assessed by 7-day weighted protocols and evaluated by Prodi 4.5 expert plus computer programme. The preliminary results were compared with the central European reference values for nutrient intakes (D-A-CH, 2000). We observed a too low average daily carbohydrate intake by 31 % and a too low average daily protein and fat intake by 24 %. This reflected in a relatively low daily energy intake, which was by 27 % below the recommended Central European referential values.

Intakes of Mg (88 %), Fe (67 %), I (52 %), F (41 %), Vit.A (48 %), D (53 %), E (88 %), B1 (78 %), C (75 %) and folic acid (42 %) were below the D-A-CH recommended values. The ratio between SFA, MUFA and PUFA was 2.5 : 2.1 : 1. The energy intake was too low; whereas the proportion between macronutrients was adequate. The absolute and proportional intake of dietary fibre, Mg, Fe, I, F, vitamins A, D, E, B1, C and folic acid was too low, whereas the intake of saturated fatty acids was too high. Our preliminary results suggest that the diet of lactating women in Slovenia needs further attention and should be studied in more detail.

Key words: human nutrition / lactating women / lactation / breast-feeding / dietary intake / recommendations / infant health

PREHRANA DOJEČIH MATER V SLOVENIJI

IZVLEČEK

Razmerje med nasičenimi (SFA), mononasičenimi (MUFA) in polonasičenimi (PUFA) maščobnimi kislinami je bilo 2.5 : 2.2 : 1. Razmerje makronutrientov je bilo primerno. Vnos vlaknin, nekaterih mineralov (Mg, Fe, I in F) in vitaminov (A, D, E, folna kislina in vit. C) je bil pod priporočeno vrednostjo. Vnos nasičenih maščobnih kislin je bil previsok. Preliminarni rezultati naše študije kažejo na precejšnja odstopanja prehrane doječih mater v Sloveniji od srednjeevropskih priporočil, zato je smiselno spremljati in proučevati prehrano doječih mater v Sloveniji tudi v prihodnosti.

Ključne besede: prehrana ljudi / doječe materce / laktacija / dojenje / prehranski vnos / priporočila / dojenčki / zdravje

INTRODUCTION

Lactation confers marked benefits to infants, mothers, families and the society. Health care of nursing mothers and their infants is an important priority of primary preventive care (Mullerova et al., 1998). Human milk from healthy, well-nourished mothers is the preferred form of feeding for healthy newborn infants (Koletzko et al., 2001). Nutritional inadequacies during lactation may affect the well-being of both mothers and their infants. The mother’s diet and lifestyle during lactation period plays an important role.

In Slovenia, mothers are stimulated to breastfeed their infants. At the time of leaving maternity hospital, usually the third day after delivery, on average 95 % of women are breastfeeding (Kraševec, 2001). Breast-feeding rates among Slovenian mothers are increasing and the average duration is approaching 6 months (Hoyer and Pokorn, 1998). In this pilot study we investigated the adequacy of nutrient intake of healthy lactating Slovenian women in comparison with the central European reference values for nutrient intakes (D-A-CH, 2000).

SUBJECTS AND METHODS

Subjects

The study population comprised 40 healthy lactating Slovenian women at 1 to 3.5 months postpartum. All women gave birth to a single, full-term, healthy infant and were enrolled into the study during their visit of the University Children’s Hospital in Ljubljana. The study protocol was approved by the Ethical Committee of the Medical Faculty of the University of Ljubljana, Slovenia. After a careful explanation of the study, a written informed consent was obtained from all participating women.

Study design

All women consumed a habitual omnivorous diet. Diets were assessed by prospective 7-day weighted dietary protocols. Each woman was carefully instructed to record the exact amount of all foods and drinks consumed (quantity in g, ml or household measures) and the corresponding brands. Energy and nutrients intakes were calculated from dietary records with the nutrition database software Prodi version 4.5, expert plus, using the nutrient databases Bundeslebensmittelschlüssel, II.3 and Souci, Fachmann, Kraut Nährwerttabellen (Kluthe, 2000). These databases contain 11 500 food items with the composition for 330 nutrients. The German databases were chosen, because there is no appropriate Slovenian database, suited for the research work. The values for iodine in table salt and fluorine in water were checked and accommodated to Slovenian values.
Statistical analysis

Statgraphics Plus for Windows (version 4.0: 1994–1996) was performed for statistical analyses. The test for normal distribution of data was performed.

RESULTS AND DISCUSSION

Table 1. Anthropometric measures of Slovenian lactating women (mean±SD)

<table>
<thead>
<tr>
<th>Anthropometric measures</th>
<th>Lactating Slovenian women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>27.5 ± 4.8</td>
</tr>
<tr>
<td>Height, cm</td>
<td>166.3 ± 26.1</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>64.5 ± 13.8</td>
</tr>
<tr>
<td>BMI, kg m⁻²</td>
<td>23.4 ± 4.3</td>
</tr>
<tr>
<td>Wrist circumference, cm</td>
<td>15.4 ± 2.5</td>
</tr>
<tr>
<td>r – construction</td>
<td>10.8 ± 0.8</td>
</tr>
<tr>
<td>Percentage of muscle</td>
<td>15.8 ± 6.2</td>
</tr>
<tr>
<td>Muscle index*</td>
<td>5.8 ± 3.1</td>
</tr>
</tbody>
</table>

r = (high / wrist circumference): above 10.9 = gentle; 10.9–9.9 = medium; under 9.9 = strong construction
* = Muscle index: under 5 = gracile; 5–12 = normally formed; above 12 = strongly formed musculature

Energy

The lactating Slovenian women included in our study reported a rather low energy intake (73 % of D-A-CH). In view of the normal BMI, some degree of underreporting cannot be excluded. However lactating women are at risk of energy and nutrient inadequacies.
Table 2. Average dietary daily intake of selected nutrients by the participating Slovenian women at 1 to 3.5 months postpartum and the D-A-CH reference (D-A-CH, 2000) recommendations

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Lactating Slovenian women (mean ± SD)</th>
<th>D-A-CH reference 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy intake, kJ day⁻¹</td>
<td>9 169 ± 2 392</td>
<td>12 490 *</td>
</tr>
<tr>
<td>Protein, g day⁻¹</td>
<td>85 ± 20</td>
<td>112</td>
</tr>
<tr>
<td>Carbohydrate, g day⁻¹</td>
<td>270 ± 84</td>
<td>392</td>
</tr>
<tr>
<td>Fat, g day⁻¹</td>
<td>82 ± 23</td>
<td>108</td>
</tr>
<tr>
<td>P : CH : F Ratio, %</td>
<td>16 : 50: 34</td>
<td>15 : 53 : 32</td>
</tr>
<tr>
<td>Water, ml day⁻¹</td>
<td>2 800 ± 800</td>
<td>2 710</td>
</tr>
<tr>
<td>Dietary fibre, g day⁻¹</td>
<td>22.0 ± 6.5</td>
<td>37</td>
</tr>
<tr>
<td>SFA : MUFA : PUFA Ratio</td>
<td>2.5 : 2.1 : 1</td>
<td>1 : 1 : 1</td>
</tr>
</tbody>
</table>

* = 12 490 kJ day⁻¹ (total energy need) = 9 790 kJ day⁻¹ (basic energy need) + 2 700 kJ day⁻¹ (net increment for the lactation); P : CH : F Ratio = ratio between proteins : carbohydrates : fats; SFA : MUFA : PUFA Ratio = ratio between saturated, monounsaturated and polyunsaturated fatty acids

The recommended total daily energy consumption of lactating women until 4 months postpartum is 12 490 kJ day⁻¹ (2 985 kcal day⁻¹). Due to lactation, this recommendation considers the net increment need of 2 700 kJ day⁻¹ (635 kcal day⁻¹; see text under table 2) (D-A-CH, 2000). Studies of dietary intake of lactating women in other countries similarly report energy intakes below the recommendations, i. e. 8 978 kJ day⁻¹ in Ontario, Canada (Doran and Evers, 1997), 8 511 kJ day⁻¹ in South Africa (Kesa et al., 2001) and 8 700 kJ day⁻¹ in the Czech republic (Mullerova et al., 1998).

Macronutrients

The proportion between macronutrients obtained in our study was adequate. The daily absolute water intake was sufficient as well. The absolute and proportional intakes of dietary fibre were too low.

Figure 1. An average daily intake of macronutrients consumed by lactating Slovenian women at 1 to 3.5 months postpartum compared to D-A-CH reference values 2000 (D-A-CH, 2000) (% of recommendations).
**Ratio between fatty acids**

The ratio between saturated, monounsaturated and polyunsaturated fatty acids in the diet of lactating Slovenian women studied was 2.5: 2.1: 1, whereas the recommended ratio is 1:1:1 (D-A-CH). This indicates an inappropriate ratio of the ingested fatty acids, with a too high proportion of saturated fatty acids (44 % vs. recommended ≤ 33 % total fat intake), see fig. 2), which were mainly of animal origin (milk, milk products, meat and meat products) and there was a considerably too low intake of polyunsaturated fats (18 % vs. recommended 23–33 % total fat intake, see fig. 2) that are mainly found in plant oils and sea fish.

![Figure 2. Proportion of average daily intake of saturated (SFA), monounsaturated (MUFA) and polyunsaturated (PUFA) fatty acids ingested by lactating Slovenian women at 1 to 3.5 months postpartum.](image)

An inappropriate composition of ingested fat, characterised by too high saturated fat intake and too low polyunsaturated fat intake, reported in our study for lactating women is in agreement with previously reported results for a sample of Slovenian population (Koch, 1997) as well as recent dietary survey by CINDI (Mavčec-Zakotnik, 2000). Too low intake of polyunsaturated fats is associated with insufficient intake of docosahexaenoic acid (DHA). According to literature data amount of DHA in human milk is influenced by maternal diet (Fidler, 2000).

**Vitamins and minerals:**

D-A-CH reference values contain recommendations for the intake of 12 vitamins (vit. A, D, E, B₁, B₂, niacin, B₆, folic acid, panthothenic acid, biotin, vit. B₁₂ and vit. C) and 12 minerals (Na, K, Cl, Ca, Mg, P, Fe, I, F, Zn, Cu, Mn) during the lactation period.

In our study the evaluation of these vitamins and minerals showed low absolute and proportional intakes for six vitamins A (48 % of D-A-CH), D (53 %), E (88 %), B₁ (78 %), folic acid (42 %) and C (75 %); and four minerals Mg (88 % of D-A-CH), Fe (66 %), I (53 %) and F (41 %). A low intake of vitamin D and calcium was also reported for lactating women in Austria. That indicates a high risk for the development of disorders of bone metabolism (Koenig and Elmadfa, 2000). Too low intake of some vitamins and minerals (Vit. E, B₁, Vit. C and Mg) can be associated with low energy intake. Figure 3 and 4 show the dietary intake of Slovenian lactating women compared to D-A-CH recommendations.
Figure 3. An average daily intake of vitamins consumed by lactating Slovenian women at 1 to 3.5 months postpartum compared to D-A-CH reference values 2000 (D-A-CH, 2000) (% of recommendations).

Figure 4. An average daily intake of minerals consumed by lactating Slovenian women at 1 to 3.5 months postpartum compared to D-A-CH reference values 2000 (D-A-CH, 2000) (% of recommendations).

In many researches low intake of iron (Dewey, 2001, Kesa et al., 2001), vitamin A and vitamin E was reported (Muslimatum et al., 2001, Olafsdottir et al., 2001). Low iron intake in breastfeeding women is critical, because iron is one of the most limiting minerals in the diet of breastfed infants (Dewey, 2001). Iron deficiency is widespread among females of reproductive age. It is partly induced by plant-based diets containing low levels of poorly bio-available food. The most effective technological approaches to combat iron deficiency include food fortification and dietary strategy (Kesa et al., 2001). Many pregnant and lactating women in developing countries are anaemic and vitamin A deficient. Vitamin A also plays an important role in iron metabolism (Muslimatum et al., 2001). There is a relationship between the content of vitamins A
and E in human milk and the maternal diet. The recommended intake of fat-soluble vitamins for lactating women can easily be met with a cod liver oil supplementation, rather than with diet alone (Olafsdottir et al., 2001). For Slovenian lactating women we could suggest appropriate oil supplements to achieve the recommended intake of fat-soluble vitamins.

**CONCLUSIONS**

Nutrition of the lactating mother plays a very important role. The mammary gland exhibits metabolic priority for nutrients, often at the expense of maternal reserves (Picciano, 1998). Nutrient deficiencies, which can arise during this vulnerable period of the life cycle, may impact both mother and her infant.

The diet of lactating women in Slovenia needs further attention and should be studied in more detail. An adequate nutritional education should be directed to lactating women to help them achieve the recommended nutrient intake. The programs to promote breastfeeding in Slovenia should also include strategies to assure an adequate diet during lactation.

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mesnih izdelkov, in premalo večkrat nenasičenih maščobnih kislin, ki se nahajajo pretežno v morskih ribah, mikroalgah in rastlinskih oljih (zlasti v repnem in sončnem olju).

V primerjavi s srednjeevropskimi D-A-CH-ovimi priporočili slovenske materne z obroki zaužijejo premalo vitaminov Vit. A (48%), D (53%), E (88%), B₁ (78%), C (75%) in mineralov Mg (88%), Fe (67%), I (52%), F (41%). Vzrok za prenizek prehranskih vnos nekaterih vitaminov in mineralov (Vit. E, B₁, Vit. C in mineral Mg) lahko iščemo tudi v prenizkem kaloričnem vnosu. Najbolj zaskrbljujoča je nizka vsebnost železa pri dojenčkih materah, saj je železo pri dojenem dojenčku tudi eden od najbolj limitirajočih mineralov. Prehranski primankljaj, ki lahko med dojenjem pri materi še narašča, lahko vpliva na zdravje tako materje kot dojenčka. Prehrana dojenčkih mater v Sloveniji kaže na precejšnja odstopanja od priporočil za dojenčke matere, zato bi bilo v prihodnosti slovenskim dojenčkim materam smiselno zagotoviti potrebne informacije, da bo njihova prehrana v času dojenja v skladu s priporočili.

REFERENCES


