CHINESE MED J-PEKING | 中国城市地区健康哺乳期妇女母乳中矿物质组成及相关因素分析

本文关键字：母乳；矿物质；矿物间相互作用；相关因素

影响因子：1.064

建议阅读时间：2 分钟

目的

最佳矿物质摄入量对婴儿的生长和发育非常重要。然而，有关中国女性母乳中矿物质成分的相关数据很少，大部分数据是在 1990 年以前采集的。本次研究目的有三个：（1）调查中国健康母亲在不同哺乳阶段母乳中的矿物质组成；（2）探讨影响母乳中矿物质浓度的相关因素；（3）探讨影响母乳中矿物质组成的相关因素。

方法

采用电感耦合等离子体质谱法（ICP-MS）分析中国三个城市的 444 名健康哺乳期女性母乳中的矿物质含量。同时使用问卷来调查社会人口学特征和妊娠史。同时使用食物频率问卷和 24 小时膳食回顾法来衡量哺乳期女性的食物摄入情况。

结果

不同地区母乳中的矿物质组成不同。除了镁和铁外，大部分矿物质浓度在哺乳期的前一到两个月中较高，然后随着时间推移而下降。多种矿物质之间存在相关性。在各个哺乳阶段，钙磷比均高于 2:1。与阴道分娩女性（237.5 μg/kg）相比，剖宫产女性过渡乳中的碘含量较高（349.9μg/kg, P<0.001）。最近 6 个月的膳食矿物质摄入量、补充剂、食物摄入频率、母亲年龄以及母亲 BMI 并未显示出与母乳矿物质含量有显著的相关性（均 P>0.05）.

结论

母乳中的矿物质会随着时间而降低，且在哺乳期的前一到两个月里变化最快。剖宫产可能会影响过渡乳中的碘含量。

Table 1. Basic information of lactating mothers (mean±SD, %)

Items	Total	Beijing	Suzhou	Guangzhou	*P* values
Age (years)					
n	441	149	145	147	0.798
Mean±SD	27.6±3.9	27.5±4.1	27.8±3.7	27.6±3.8	
BMI					
n	441	147	146	148	<0.001
Mean±SD	23.4±3.4	24.3±3.8	23.4±2.9	22.5±3.2	
BMI<24	59.1	48.6	54.8	73.6	
BMI≥24	40.9	51.4	45.2	26.4	
Delivery way					
n	410	134	135	141	0.038
Normal delivery	48.8	56.0	50.4	40.7	
Cesarean section	51.2	44.0	49.6	59.3	

Table 2. Minerals concentrations in maternal breast milk across lactation stages (mean±SD (*n*))

Items	Transitional milk		Mature milk		
	5–11 days	12–30 days	31–60 days	61–120 days	121–240 days
Sodium (mg/100 g)	37.5±25.4 (90)	25.9±26.2 (87)	14.3±6.8 (89)	13.3±6.9 (90)	12.1±9.3 (88)
Calcium (mg/kg)	303.3±52.4 (90)	293.6±46.7 (87)	309.6±43.1 (89)	287.4±40.0 (90)	267.4±43.8 (88)
Phosphorus (mg/kg)	143.8±33.6 (90)	148.0±25.0 (87)	136.4±19.3 (89)	118.0±11.4 (90)	113.4±19.3 (88)
Potassium (mg/kg)	665.8±111.0 (90)	601.3±79.6 (87)	537.6±63.5 (89)	489.1±61.4 (90)	459.1±48.3 (88)
Magnesium (mg/kg)	36.1±6.0 (90)	33.1±5.6 (87)	32.8±5.1 (89)	35.8±3.9 (89)	35.9±6.6 (88)
Iron (mg/kg)	0.90±0.3 (89)	1.0±0.7 (87)	1. 0±1.0 (87)	0.9±0.9 (89)	1.1±1.1 (86)
Zinc (mg/kg)	3.9±1.5 (90)	2.8±1.2 (87)	2.0±0.7 (89)	1.5±0.6 (89)	1.3±0.5 (84)
Selenium (μg/kg)	21.0±9.1 (89)	17.8±7.5 (85)	19.5±8.3 (88)	15.1±7.5 (77)	14.3±7.2 (80)
Copper (mg/kg)	0.56±0.15 (90)	0.50±0.16 (87)	0.35±0.09 (89)	0.31±0.07 (90)	0.29±0.16 (85)
Iodine (μg/kg)	292.4±159.1 (89)	226.7±122.0 (86)	230.6±297.5 (86)	222.0±331.0 (90)	184.3±95.7 (88)

Table 3. The correlations between minerals intake, food supplements, food intake frequencies and minerals concentrations in breast milk

Items	*r* values	*P* values	Partial-*r**	Partial-*P**
Minerals intakes from diet correlated with milk minerals *(n=444)*				
Diet Na vs. Milk Na	–0.056	0.241	–0.024	0.622
Diet Ca vs. Milk Ca	–0.021	0.660	0.016	0.740
Diet K vs. Milk K	–0.147	0.002	–0.026	0.585
Diet Mg vs. Milk Mg	–0.023	0.627	–0.034	0.472
Diet Zn vs. Milk Zn	–0.116	0.015	–0.063	0.182
Diet Fe vs. Milk Fe	–0.087	0.070	–0.089	0.062
Diet Cu vs. Milk Cu	–0.135	0.004	–0.071	0.138
Diet P vs. Milk P	–0.019	0.695	–0.044	0.355
Diet Se vs. Milk Se	0.055	0.257	–0.076	0.122
Minerals intakes from food supplements correlated with milk minerals				
Supplement Ca vs. Milk Ca (*n*=441)	0.002	0.989	–0.039	0.786
Supplement Zn vs. Milk Zn (*n*=436)	–0.009	0.966	–0.154	0.464
Supplement Fe vs. Milk Fe (*n*=435)	0.111	0.599	0.070	0.745
The daily food intake frequencies in each food categories correlated with each milk mineral (*n*=444)				
Staple food vs. Each milk minerals		NS†		NS
Root-stock food and tubers food vs. Each milk mineral		NS		NS
Leafy vegetables vs. Each milk mineral		NS		NS
Fruits vs. Each milk mineral		NS		NS
Meat vs. Each milk mineral		NS		NS
Fish and shrimp vs. Each milk mineral		NS		NS
Eggs vs. Each milk mineral		NS		NS
Dairy products vs. Each milk mineral		NS		NS
Legumes vs. Each milk mineral		NS		NS
Nuts vs. Each milk mineral		NS		NS
Fats and Oils vs. Each milk mineral		NS		NS

*After controlling the "lactation stages", partial-correlation was performed to analyze the correlations between mineral intakes, food supplements, food intake frequencies and minerals concentrations in breast milk. †NS indicates no significant correlations were found between food intake frequencies and either mineral concentration in maternal breast milk.

参考文献：Zhao A,et al. Chin Med J (Engl). 2014;127(14):2643-8.

文献链接：https://www.ncbi.nlm.nih.gov/pubmed/25043082