UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

efsa
European Food Safety Authority

Creagen
Environmental, Genetic and Nutritional Epidemiology Research Center

Dietary intake of calcium, phosphorus and magnesium in a Northern Italy community

Marcella Malavolti[a], Tommaso Filippini[a], Carlotta Malagoli[a], Silvia Cilloni[a], Federica Violi[a], Luciano Vescovi[b], Marco Vinceti[a,c]

Introduction

Minerals are essential micronutrients for growth, development, and maintenance of healthy tissues, the long term insufficient intake of minerals may lead to bone demineralization and often requires the use of food supplements. The ratios of certain minerals intake like calcium and phosphorus are also proved to can affect the bioavailability of calcium and even lead to adverse health consequence. This study was designed to explore the dietary sources of calcium (Ca), phosphorus (P), and magnesium (Mg) and the ratios between different minerals (Ca/P), in a representative sample of Northern Italy population previously described .

Methods

We measured the content of these elements in foods composing typical Italian diet using inductively coupled plasma-mass spectrometry and we estimated their daily dietary intakes assessing through a semi-quantitative food frequency questionnaire specifically developed within the European Prospective Investigation into Cancer and Nutrition (EPIC) study in a Northern Italian Community. We combined data on the estimated trace elements in foods and the EPIC FFQ to compute total weekly trace element intake using the equation for element daily intake estimation, wherein it is multiplied the element content measured in food (μg/kg) with the intake as estimated with the FFQ (g/day) and we divided by the body weight (kg) of each participant.

Table 1. Distribution of element concentrations in foods composing the usual diet in study population. Median and interquartile range (IQR) are reported.

	Ca (mg/Kg)		Mg (mg/kg)		P (mg/kg)	
Food (N)	**50th**	**(IQR)**	**50th**	**(IQR)**	**50th**	**(IQR)**
Cereals (126)	255	(202 - 389)	368	(243 - 625)	1237	(789 - 2012)
Meat (86)	101	(65 - 152)	229	(172 - 290)	1961	(1219 - 2571)
Milk & dairies (72)	6285	(2074 - 8570)	234	(125 - 346)	2988	(1125 - 5613)
Eggs (9)	497	(132 - 1318)	130	(126 - 135)	720	(179 - 6788)
Fish & seafood (62)	211	(128 - 557)	303	(240 - 416)	1539	(900 - 2269)
Vegetables (193)	374	(182 - 651)	147	(97 - 262)	277	(166 - 460)
Legumes (42)	665	(390 - 986)	1241	(766 - 1674)	3350	(2417 - 4049)
Potatoes (14)	103	(46 - 152)	187	(170 - 416)	381	(273 - 1327)
Fresh fruits (65)	157	(61 - 268)	95	(74 - 137)	164	(92 - 233)
Dry fruits (39)	925	(473 - 1543)	1662	(1190 - 2503)	4735	(3685 - 5884)
Sweets (64)	630	(404 - 1029)	212	(89 - 830)	934	(581 - 2048)
Oils and fats (22)	10	(4 - 57)	2	(0 - 10)	11	(3 - 59)
Beverages (96)	40	(13 - 79)	36	(12 - 86)	79	(39 - 438)

References

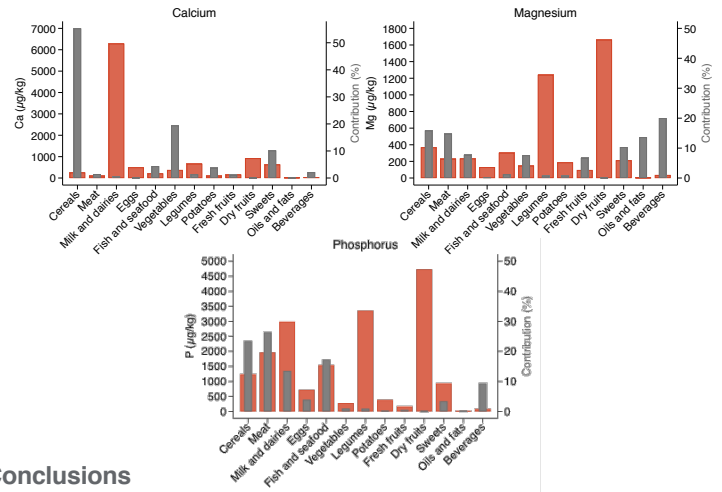
Malagoli et al. J Nutr. 2015 Aug;145(8):1800-7.
EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA), EFSA Journal 2015;13(5):4101
EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA), EFSA Journal 2015;13(7):4185
EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA), EFSA Journal 2015;13(7):4186

Results

In 890 analyzed food samples the main contributors to calcium are milk and dietary products, dry fruits, legumes and sweet products. Important sources of phosphorus are represented by dry fruits, legumes, milk and dairy products and meat. While dry fruits, legumes, cereals and fish symbolized the most important sources for magnesium. In our Italian population sample, the estimated median (interquartile range) dietary daily intakes are 786.3 (592.2-1062.7) mg/kg for calcium; 1291.7 (1017.2-1591.4) mg/kg for phosphorus and 323.2 (260.3-396.6) mg/kg for magnesium. The calcium-phosphorus (Ca/P) ratio in this study was 0.63 (0.52-0.73).

Table 2. Daily dietary intake, resulting from food groups, of calcium, magnesium, and phosphorus in the study population. Median and interquartile range (IQR) are reported.

	Ca (mg/day)		Mg (mg/day)		P (mg/day)	
Food	**50th**	**(IQR)**	**50th**	**(IQR)**	**50th**	**(IQR)**
Cereals	60.6	(41.4 - 81.1)	59.0	(40.9 - 82.3)	199.9	(140.8 - 276.2)
Meat	11.2	(7.7 - 15.6)	29.0	(20.1 - 40.2)	233.3	(160.3 - 322.5)
Milk & dairies	479.8	(299.1 - 689.2)	28.8	(16.3 - 42.6)	279.7	(171.8 - 406.8)
Eggs	6.7	(3.6 - 10.5)	1.8	(1.0 - 2.8)	9.7	(5.3 - 15.3)
Fish & seafood	9.4	(4.6 - 17.3)	0.9	(5.0 - 14.5)	45.9	(26.0 - 72.0)
Vegetables	44.5	(28.0 - 68.0)	22.1	(14.7 - 32.5)	35.5	(23.8 - 52.6)
Legumes	9.1	(4.2 - 16.8)	16.9	(7.8 - 31.4)	45.6	(21.1 - 84.8)
Potatoes	1.9	(1.1 - 3.3)	3.4	(2.0 - 6.0)	6.9	(4.1 - 12.2)
Fresh fruits	40.4	(25.7 - 56.0)	26.0	(16.6 - 36.6)	41.3	(26.3 - 58.4)
Dry fruits	0.3	(0.2 - 1.5)	0.5	(0.3 - 2.7)	1.4	(1.0 - 7.6)
Sweets	37.1	(20.5 - 61.2)	14.1	(6.9 - 25.0)	55.3	(23.1 - 94.6)
Oils and fats	0.2	(0.1 - 0.4)	0.1	(0.1 - 0.1)	0.4	(0.3 - 0.6)
Beverages	61.0	(39.7 - 87.4)	85.1	(52.6 - 126.1)	226.8	(136.5 - 340.8)
TOTAL	786.3	(592.2 - 1062.7)	323.2	(260.3 - 396.6)	1291.7	(1017.2 - 1591.4)



Conclusions

These values are in agreement with those suggested by European and International recommended intake for adult population, with the exception of calcium which is slightly lower than recommended values and suggest that this population does not present nutritional deficiencies requiring any supplementation.

Dr. Marcella Malavolti, Department of Biomedical, Metabolic and Neural Sciences, Section of Public Health - University of Modena and Reggio Emilia, Via Campi, 287 – 41125 Modena.
marcella.malavolti@unimore.it

Affiliations: [a]Environmental, Genetic and Nutritional Epidemiology Research Center (CREAGEN), Department of Biomedical, Metabolic and Neural Sciences, University of Modena and Reggio Emilia, Modena, Italy; [b]IREN, Reggio Emilia, Italy; [c]Department of Epidemiology, Boston University School of Public Health, Boston, USA.

EFSA Conference 2018
Parma- Italy, 18-21 September 2018