

Dietary fatty acid intake, its food sources and determinants in healthy European adolescents. The HELENA study.

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Background & Objectives

Dietary fatty acids (FA) play a role in several (patho)physiological processes at any age, and different FA have different effects on lipid status and health outcome.

This study describes the FA intake and its main food sources in a population of European adolescents and assesses the variation in intake as a function of non-dietary factors. Intake was compared to the FAO recommendations.

Methods

Healthy Lifestyle in Europe by Nutrition in Adolescence Cross-Sectional Study (HELENA-CSS), is a multi-centre collaborative study conducted in European adolescents. The study aims to get insight in the nutritional status and lifestyles of adolescents.

Study Population

800 boys, 893 girls

Age 12,5 – 17,5 years.

Exclusion of underreporters if:

Energy Intake/Estimated Basal Metabolic Rate < 0.96

Assessments

- Weight, height, tricipital and subscapular skinfolds, Tanner stage
- Fatty acid intakes based on two 24h dietary recalls
- Correction for within-person variability with Multiple Source Method
- Educational level of the mother
- International Physical Activity Questionnaire for Adolescents

Statistical analyses

- PASW for Windows.
- Multilevel regression analysis with the centres as grouping variable and controlled for age and physical activity as covariates.
- Usual fatty acid intakes were log-transformed.

Results

Table 1: Usual fatty acid intake of European adolescents (geometrical means and 95% CI).

	Boys (n=800)		Girls (n=893)		p*
	Mean	95% CI	Mean	95% CI	
Total fat (%E)	33.12	(31.91 ; 34.37)	33.73	(32.51 ; 35.01)	NS
SFA (%E)	13.77	(13.37 ; 14.18)	13.85	(13.45 ; 14.26)	NS
C12:0 (%E)	0.69	(0.64 ; 0.74)	0.72	(0.67 ; 0.77)	NS
C14:0 (%E)	1.48	(1.41 ; 1.55)	1.51	(1.45 ; 1.58)	NS
C16:0 (%E)	6.83	(6.61 ; 7.07)	6.87	(6.65 ; 7.11)	NS
C18:0 (%E)	3.06	(2.92 ; 3.20)	3.04	(2.90 ; 3.18)	NS
MUFA (%E)	12.17	(11.37 ; 13.02)	12.39	(11.59 ; 13.26)	NS
C18:1n9 (%E)	10.61	(9.88 ; 11.39)	10.82	(10.08 ; 11.61)	NS
PUFA (%E)	4.39	(4.16 ; 4.64)	4.76	(4.51 ; 5.03)	<0.001
n-6 PUFA (%E)	3.71	(3.52 ; 3.91)	4.03	(3.82 ; 4.25)	<0.001
C18:2n6 (%E)	3.57	(3.38 ; 3.77)	3.90	(3.69 ; 4.12)	<0.001
C20:4n6 (%E)	0.11	(0.09 ; 0.13)	0.11	(0.09 ; 0.12)	NS
n-3 PUFA (%E)	0.63	(0.58 ; 0.69)	0.69	(0.63 ; 0.74)	<0.001
C18:3n3 (%E)	0.54	(0.49 ; 0.59)	0.57	(0.52 ; 0.63)	<0.001
C20:5n3 (%E)	0.02	(0.02 ; 0.02)	0.02	(0.02 ; 0.03)	<0.001
C22:5n3 (%E)	0.01	(0.00 ; 0.01)	0.00	(0.00 ; 0.01)	<0.001
C22:6n3 (%E)	0.05	(0.04 ; 0.06)	0.06	(0.04 ; 0.07)	<0.001
Cholesterol (mg/1000kcal)	150.0	(134.7 ; 167.1)	151.3	(135.9 ; 168.6)	NS

%E, percentage of energy; SFA, saturated Fatty Acid; MUFA, monounsaturated fatty acid; PUFA, polyunsaturated fatty acid. *Comparison of geometrical means between boys and girls, assessed with a multilevel analyses corrected for study centre, including age and physical activity as independent variables. (NS > 0.003)

In the study population:

- 39% had a total fat intake of > 35%E
- 99.8% had a SFA intake of > 8%E
- 12.7% had a PUFA intake between 6-11%E
- 95.7% had a LA intake of > 2.5%E
- 64.5% had an ALA intake of > 0.5%E

Table 2 Percentage contributions of the main food groups to the intake of fats and fatty acids in European adolescents.

Food Group	Total Fat	SFA	C12:0	C14:0	C16:0	C18:0	MUFA	C18:1n9	PUFA	Σn-6	C18:2n6	C20:4n6	Σn-3	C18:2n3	C20:5n3	C22:5n3	C22:6n3	Cholesterol
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Beverages	2.43	2.34	2.29	2.24	2.56	2.13	2.20	2.16	2.81	2.69	2.69	2.70	3.48	3.97	1.40	1.12	1.21	2.14
Bread and Cereals	6.32	5.25	6.49	5.23	5.37	4.52	6.40	6.39	7.54	7.92	7.78	13.00	5.40	6.24	1.38	0.93	1.84	2.93
Potatoes & Grains	5.37	3.91	4.88	3.62	4.33	3.13	4.65	4.69	10.03	10.42	10.75	1.68	7.87	9.34	0.80	0.86	1.49	7.98
Vegetables & Fruits	3.37	2.55	2.53	2.24	2.94	2.07	3.58	3.78	4.76	4.45	4.58	1.46	6.47	7.50	1.80	0.97	1.99	1.54
Dairy & Soy products	16.93	23.07	22.39	32.86	20.38	17.70	14.64	14.15	6.39	5.54	5.72	0.97	11.16	13.44	0.19	0.23	1.35	13.59
Fat & Oil	7.73	8.36	8.04	10.99	7.92	6.66	7.83	7.03	7.41	7.57	7.85	0.16	6.57	7.99	0.10	0.06	0.21	3.83
Meat/Fish/Egg	28.74	23.22	12.93	12.78	28.12	27.72	33.43	34.01	32.81	32.63	31.68	54.16	33.78	21.51	92.34	94.93	85.82	48.87
Low-nutrient, energy-dense group	29.11	31.33	40.46	30.05	28.39	36.06	27.30	27.77	28.22	28.76	28.94	25.85	25.30	29.98	2.00	0.90	6.08	19.11

Discussion

Girls showed a more beneficial FA intake pattern than boys. Differences between boys and girls became less apparent or disappeared with increasing age. In boys, but not in girls, physical activity was a determinant of fat intake. No remaining associations were found with BMI, body fat percentage, socio-economic status and sexual maturation.

The most important public health concerns were the low intake of ALA and the high intake of SFA, mainly palmitic and stearic acids; primarily seen in the younger-aged boys.

The major contributor to SFA intake was meat followed by cakes/pies/biscuits and cheese.