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Monitoring iron in Spanish adolescents' scalp hair: potential effect of age and sex

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SUMMARY

A comprehensive monitoring study carried out in young adults (20-24 years-old) from the Comunidad de Madrid (Spain; Fig 1) by our group highlighted a lower iron (Fe) status in this group, especially in women, due to their low dietary intake of iron-fortified cereals, eggs, fish and seafood (González-Muñoz et al., 2008; Table 1).

POPULATION & STUDY DESIGN

Scalp-hair was collected from 97 adolescents (13- to 16-years-old; 68 girls) which met strict inclusion criteria, as Fe hair analysis would not be affected by rapid fluctuations due to dietary intake. Following removal of exogenous contamination, Fe was monitored by ICP-MS (LoD=1.148 µg/g). Data was processed in the 'NADA' statistical package.

OUTCOMES

➢ Contrarily to the results observed in young adults, Fe hair concentrations did show sex dependency being significantly higher in female adolescents [p-value=0.000057; median and ranges; all in µg/g: 5.524 (3.167-13.262) vs. 4.464 (2.666-6.173)].

➢ The observed effect of sex might be reflective of the endocrine system, which usually becomes active earlier in females with the onset of adolescence. Thus, levels of Fe did not show statistical differences according to the four areas of residency (p-value=0.370) distributed in relation to Alcalá's environmental characteristics.

➢ Levels of Fe were similar to those detected in young adults (5.157 vs. 5.054) but were much lower than those detected in individuals 11-15 years-old (14.8; all in µg/g) living in the Madrid region. Previous studies have documented a decline of iron in hair with age, which could explain our observations.

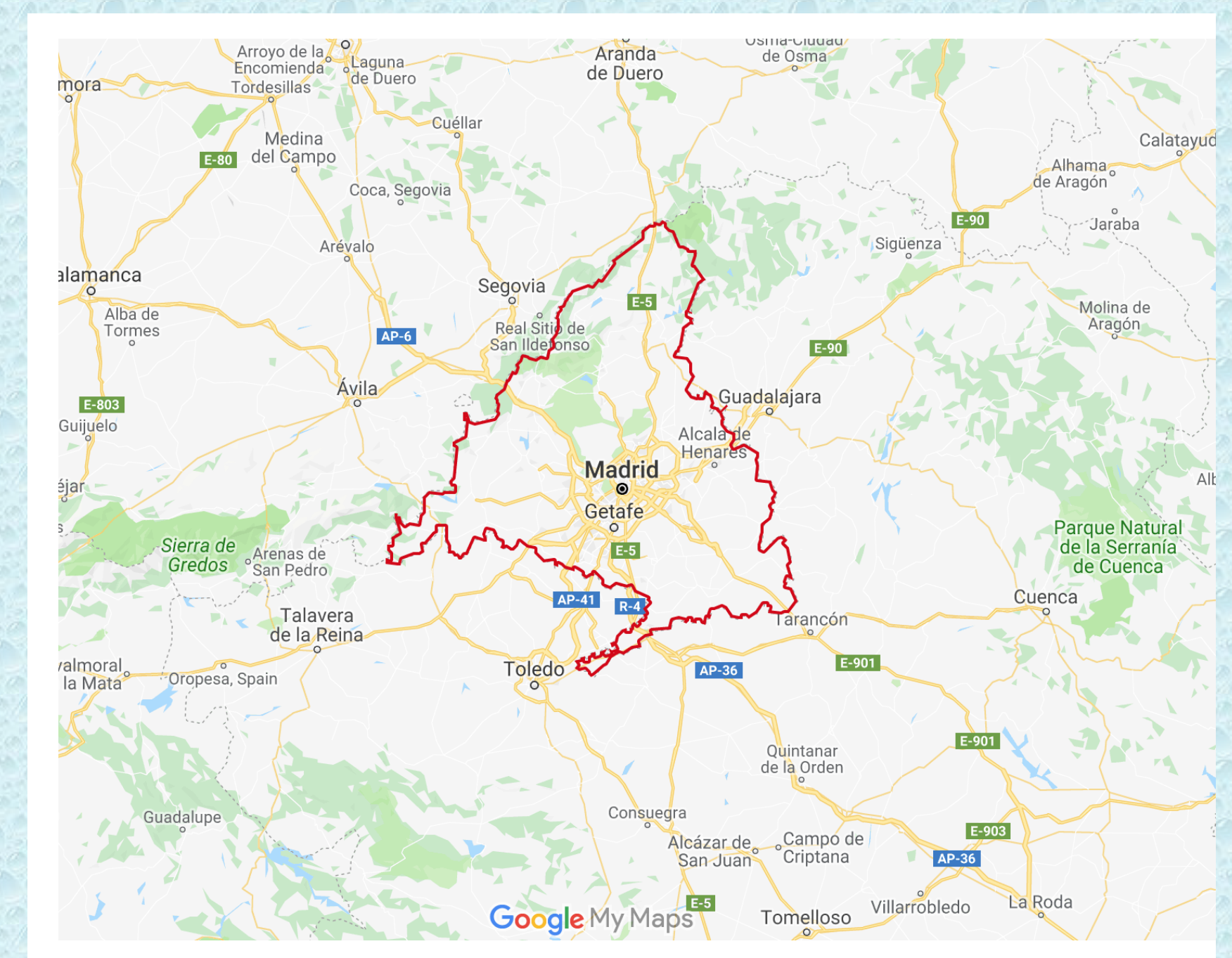**Figure 1.** Study area. The Community of Madrid is indicated in red.

Table 1. Intake (g) by food group in **young adults (20 to 24 years-old)** in Region of Madrid, Spain. Results are provided for men and women respectively.

	Men	Women	Significance
Cereals	230.97 ± 74.05	138.80 ± 75.33	**
Eggs	43.57 ± 6.27	32.83 ± 10.30	***
Dairy products	527.68 ± 110.08	410.11 ± 141.06	ns
Oils	36.71 ± 4.45	34.43 ± 8.79	ns
Vegetables	257.86 ± 96.51	240.99 ± 34.17	ns
Pulses	21.71 ± 4.65	19.11 ± 6.23	ns
Fruit	211.32± 87.22	248.79± 65.13	ns
Meat	205.45 ± 37.06	209.67 ± 62.13	ns
Fish	98.22 ± 18.26	75.81 ± 22.56	**

Results are presented as mean values ± S.D. (in g); Statistical significance: ns, no significant; *($p<0.01$); **($p<0.05$); ***($p<0.001$)

CONCLUSIONS

Although our results have shown a similar trend in relation to the effects of age and sex reported in the literature, it might highlight a lower Fe status in Alcalá's adolescent population, which should be further investigated to raise public health interventions to enhance the status of iron in the population monitored.