

magnitude as the incidence estimated from the Leukaemia Research Fund the condition is unlikely to be appreciably more common than our figures suggest. Statistical analysis is inappropriate for the small number of cases reported here, but, unless the calculation of the population of elderly shoe repairers at risk in our area is a large underestimate, our findings suggest an association between the occupation and the disease. Several other malignant conditions also seem to be more common in workers manufacturing shoes and other leather goods, including cancers of the nose and paranasal sinuses,<sup>2</sup> bladder,<sup>3</sup> and rectum.<sup>4</sup> An increase in perinatal loss has also been reported in women in the leather industry, for which solvents and glues have been implicated.<sup>5</sup> Careful assessment of the patient's occupation in new cases of Waldenström's macroglobulinaemia coupled with case-control studies and surveys of the incidence of paraproteinaemias in leather

workers are needed to ascertain the importance of our findings.

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## Iron deficiency in adolescents

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There has recently been considerable speculation about iron deficiency in young people, and the need for community based surveys to assess the size of the problem has been emphasised.<sup>1</sup> As little is known about iron deficiency in adolescents in the British Isles this study aimed to assess its prevalence.

### Subjects, methods, and results

The subjects were students from the five second level schools in Sligo, north west Ireland (population 20 000; located at sea level). Of 439 students in the fourth year, 234 agreed to take part in the study; both the students and their parents gave written consent. The students who took part and those who did not were similar in age and sex. One hundred and forty eight subjects who took part were female and 86 male. They ranged in age from 14.5 to 18.4 years (mean 15.9). A full blood count was carried out for each of the students and blood samples analysed with a Coulter counter (S8 80). Serum ferritin concentration, which is an accurate estimate of iron stores,<sup>2</sup> was assayed with a Becton Dickinson radioimmunoassay kit (I-125).

The mean haemoglobin concentration was 137 g/l overall. In the young men the mean was 143 (range 103-166) g/l, and in the young women the mean was 133 (range 102-154) g/l. Eleven (13%) of the young men had haemoglobin concentrations <130 g/l, and 11 (7%) of the young women had haemoglobin values <120 g/l. The mean ferritin concentration was 16.0 µg/l overall, being 17.3 µg/l in the young men (range 2.1-87.3) and 15.3 µg/l in the young women (range 2.1-122.4). Ferritin concentrations were <10 µg/l in 40% of the subjects (30 young men and 64 young women) and 10-20 µg/l in 35% (30 young men and 51 young women). The mean haemoglobin concentration in the group with a ferritin concentration <10 µg/l was 133 g/l and that in the group with a ferritin concentration ≥10 µg/l was 139 g/l ( $p < 0.001$ ).

### Comment

Iron depletion is said to correspond with serum ferritin concentrations <10 µg/l.<sup>3</sup> On this basis 40% of the adolescents in this study were iron depleted, which is an unexpectedly high proportion. As there are no other reports of the iron state of adolescents in the British Isles, however, these results may represent normal values for adolescents. Results were obtained for a fairly high number of students (53% of the sample population) considering their age and that blood sampling was necessary.

In clinical practice the haemoglobin concentration (along with red cell variables) is usually used in diagnosing iron deficiency; at the recommended cut off points of 130 g/l for young men and 120 g/l for young women<sup>4</sup> the numbers of adolescents diagnosed as anaemic were higher than expected. Again, no comparable data are available and these cut off points for diagnosing anaemia in this group are arbitrary. The haemoglobin concentrations of the students with low ferritin concentrations indicate the low sensitivity when haemoglobin concentration is used as the criterion for iron depletion.

Iron deficiency is said to be the most prevalent nutritional disorder in the world today,<sup>5</sup> yet no studies have defined either the normal values or the extent of the problem in adolescents in the British Isles. This study indicates that iron state in this age group warrants further evaluation and research.

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