Iron deficiency anaemia in healthy South African women despite iron fortification

Denise Lawrie, Lindi Marie Coetzee, Deborah Kim Glencross

To the Editor: The prevalence of iron deficiency in a South African urban environment is probably in keeping with European and USA findings of around 10%. Although our results present the prevalence of iron deficiency anaemia among urban females, a more detailed study that includes ferritin levels is needed for confirmation. Awareness of and attention to screening for iron deficiency remain essential for improving the quality of life and productivity of women in South Africa.

National Health Laboratory Service, Johannesburg Hospital and University of the Witwatersrand, Johannesburg
Denise Lawrie, ND Med Tech, MSc (Med)
Lindi Marie Coetzee, BSc, MSc, PhD (Haematol)
Deborah Kim Glencross, MB BCh, MMed (Haematol)

Corresponding author: *D Lawrie (denise.lawrie@nhls.ac.za)*

Method and findings

We used data from a study on the prevalence of HIV infection among health care workers in South Africa,[1] to evaluate and revalidate the current automated full blood count reference ranges for the Gauteng region. A striking finding was the large number of samples that had to be excluded from the statistical analysis because of the presence of anaemia.

Samples were obtained from 631 HIV-negative adult females working at the Helen Joseph and Coronation Hospitals in Gauteng. The demographics were representative of the urban population in South Africa.

The current National Health Laboratory Service (NHLS) full blood count reference range for adult females in the Gauteng region for haemoglobin (Hb) is 12.1 - 16.3 g/dl, haematocrit (HCT) 0.37 - 0.49 l/l, and mean cell volume (MCV) 79.1 - 98.9 fl. Using these reference ranges, the criteria for possible iron deficiency were defined as a combined Hb level below 12 g/dl, an HCT below 0.37 l/l, and an MCV of less than 79 fl. Approximately 10% of the 631 participants had microcytic

hypochromic red cell indices, which is in keeping with possible iron deficiency. One participant showed the macrocytic indices and thrombocytopenia associated with megaloblastic anaemia. Another had an elevated red cell count with microcytic hypochromic indices suggestive of a haemoglobinopathy. A further 5% had haemoglobin levels below 12 g/dl and HCTs <0.37 l/l, but normal MCV.

Of the subjects with possible iron deficiency (10% overall), 19% were aged 20 - 30 years, 14% 40 - 50 years, 7.6% 30 - 40 years and 7.5% >50 years. Few local data are available on the prevalence of anaemia in 'normal' non-pregnant urban women. A prevalence of 10% in non-pregnant coloured women was reported from the Cape Peninsula in 1994.[2] Local studies on pregnant women reported a prevalence of iron deficiency anaemia (IDA) of 9 - 12% in 2000 that contributed to 7.3% of perinatal deaths and 4.9% of maternal deaths. An estimated 0.4% of all deaths in South Africa in 2000 could be attributed to iron deficiency.[3]

Discussion

Our conservative estimate of the prevalence of anaemia among 'healthy' South African adult females in Gauteng is 15%, with 10% of females showing features suggestive of IDA. This probably underestimates the prevalence in South Africa, as the study was conducted among economically active, apparently healthy females in an urban environment.

IDA remains a global health care problem affecting an estimated 2 billion people, both in developing and First-World countries.[4] The Global Burden of Disease project in 2000 concluded that there was an urgent need to develop effective and sustainable interventions in the control of IDA. Europe and the USA introduced iron fortification of flour in 1998, and the prevalence of anaemia decreased from 30% to 10%. Food fortification was identified as a possible strategy for preventing iron deficiency in South Africa in 1975.[5] Although opinions on fortification still vary,[6] fortification of maize and wheat flour was legislated in South Africa in 2003. At the time, South Africa also received a US$2.8 million grant from the World Health Organization (WHO)-led Global Alliance for Improved Nutrition (GAIN) to support a food fortification programme for 3 years. Successful management of IDA has also been achieved through the UN World Food Program (WFP) by cereal fortification in Afghanistan, Angola and Zambia and bio-fortification strategies in China.[7,8] These efforts underline the importance of food fortification as an effective strategy against nutritional iron deficiency.

Although our figures for possible IDA were lower than those in Japan (22.3%), Israel (24%) and India (20%), their laboratory methods for assessing the condition were more detailed, and the population socio-demographics are different. In addition, it was assumed that most women in our study consumed iron-fortified foodstuffs.

The laboratory infrastructure for screening and diagnosing anaemia is widely available throughout South Africa in the private and public sectors. The cost of basic screening (haemoglobin – Board of Healthcare Providers (BHF) rate R13.20) is low. However, most women only have their haemoglobin levels tested (and are incidentally diagnosed as having IDA) on admission to a hospital or antenatal clinic, or when donating blood. In South Africa, with the current prevalence of IDA and in the context of the high prevalence of HIV, clinicians and primary health care professionals should consider basic screening of haemoglobin more frequently. This could be extended further at the primary health care level by a basic 'dipstick' method.

References

1. Connelly D, Veriava Y, Roberts S, *et al*. Prevalence of HIV infection and median CD4 counts among health care workers in South Africa. *S Afr Med J* 2007; 97: 115-120.
2. Kruger M, Dhansay A, Van Staden, *et al*. Anaemia and iron deficiency in women in the third trimester of pregnancy receiving selective iron supplementation. *S Afr J Food Sci Nutr* 1994; 6: 132-137.
3. Nojilana B, Norman R, Dhansay MA, Labadarios D, van Stuijvenberg ME, Bradshaw, D and the South African Comparative Risk Assessment Collaborating Group. Estimating the burden of disease attributable to iron deficiency anaemia in South Africa in 2000. *S Afr Med J* 2007; 97: 741-746.
4. Zimmermann MB, Hurrel RF. Nutritional iron deficiency. *Lancet* 2007; 370: 511-520.
5. Disler PB, Lynch SR, Charlton RW, Bothwell TH, Walker RB, Mayet F. Studies on the fortification of cane sugar with iron and ascorbic acid. *Br J Nutr* 1975; 34: 141-152.
6. Wald NJ, Oakley GP. Should folic acid fortification be mandatory? *BMJ* 2007; 334: 1252-1253.
7. van den Briel T, Cheung E, Zewari J, Khan R. Fortifying food in the field to boost nutrition: case studies from Afghanistan, Angola and Zambia. *Food Nutr Bull* 2007; 28(3): 353-364.
8. Campos-Bowers MH, Wettenmyer BF. Biofortification in China: practice and policy. *Health Research Policy and Systems* 2007; 5: 10.

Accepted 14 January 2008.