

The Iron Requirements of Infancy and the Iron Content of Milk Formulas in South Africa*

RONALD L. VAN DER HORST, M.B., CH.B., M.MED. (PAED.) (CAPE TOWN), *Part-time Senior Paediatrician and Senior Lecturer, Department of Paediatrics, University of Natal, Durban*

SUMMARY

The iron requirements of infancy are discussed and information is given in regard to those infant formulas in South Africa which do and which do not contain iron.

Recent evidence supports the necessity for 10-15 mg iron/litre of milk formula from birth to 1 year of age. At present only one formula on the South African market meets these requirements.

S. Afr. Med. J., 45, 923 (1971).

In South Africa no laws and regulations exist in respect of infant formula additives nor are any recommendations laid down by a paediatric or nutrition group. Furthermore, formula manufacturers and distributors have up till now been guided entirely by their own principles and ideas, some possibly influenced by practices elsewhere and by the recommendations of various authorities mentioned below.

In 1968 the National Academy of Sciences of the USA Food and Nutrition Board made certain recommendations for daily quantities of various nutrients considered to be the optimum quantity to ensure a good nutritional status.¹ These recommendations have no legal standing but because of their wide diffusion they are regarded as an international standard. These recommendations are shown in Table I.

TABLE I. RECOMMENDED DIETARY ALLOWANCE OF IRON FOR INFANTS (AMOUNT PER 100 KCAL)

Age	Iron (mg)	kcal
0-6 mths	1.2	kg x 120
6 mths-1 yr	1.3	kg x 110

In 1969, the Committee on Nutrition of the American Academy of Pediatrics recommended that it be deemed desirable and necessary to ensure adequate intake of iron in infancy.² A more recent communication emphasizes the need for an iron fortified formula as absolutely essential for infant health.³ At a recent meeting of experts in the USA, conclusions support the necessity for 10-15 mg of iron per quart (1.137 litre) of milk formula from birth to 1 year of age.⁴

It is the purpose of this report to detail the milk formula sources of iron in this country.⁵ Table II shows those

TABLE II. STANDARD INFANT FORMULAS CONTAINING IRON

	Iron content mg/quart fully reconstituted
Bonimil	7.5
Carnation	6.4
Cow & Gate	4.0
Lactogen	7.0
Nan	5.7
Pelargon	6.2
SMA	7.5
S 26	7.5
Similac with iron	12.0

standard formulas which contain iron and the quantity of elemental iron per fully reconstituted quart. Only one preparation has more than 10 mg of iron per quart. The following standard formulas, Bremil, Klim, Nespray and Ideal, as well as breast milk and cow's milk, contain virtually no iron. It is clear that a number of formulas are inadequate in so far as iron content is concerned and it is suggested that such formulas should not be used or recommended for infant feeding *unless* they are complemented by an assimilable and adequate iron-fortified syrup.

DISCUSSION

It is known that in the first 6 months of life (an arbitrary age range: there being individual variability for both iron storage and rapidity of growth) the infant is dependent on the iron reserves acquired during foetal life.⁶ One question is the word dependent, since depletion requires dietary iron to meet the standards of growth. Moreover, depletion is a common occurrence, wrongly accepted as physiological, which should be considered as truly pathological.

While full-term infants receive sufficient iron during foetal life to meet their needs for at least the first few months of life, I believe that it is wrong to accept as inevitable that such iron stores should be depleted and to regard this as being what nature intended. It must be emphasized that an infant born with a diminished iron reserve (the premature infant, the infant who has haemorrhaged retroplacentally, or one of twins) will require complementary iron in addition to that derived from even the best diet.

All infants grow rapidly—the premature especially so. Increase in weight, blood volume and total red-cell mass

*Date received: 26 April 1971.

tend to overcome the various stabilizing factors in early infancy which help to restore haemoglobin values to those found at birth. A limited dietary supply of iron predisposes to development of anaemia based upon exhaustion of stored iron.

A great number of infants receive a diet deficient in iron due, in the main, to ignorance on the part of the advisors on nutrition (doctors, nurses, health clinic sisters, etc.) as to the nutritive value of certain foods, the need for a well-balanced diet and the lack of iron in many of the formulas used in infant feeding. The problem can be tackled in 3 ways:

Early introduction of iron-enriched foods such as cereals, eggs, meat and vegetables. It is still common practice to delay the introduction of 'solids' until 4-5 months of age. Some nutrition advisors who answer queries by the public in the national newspapers and magazines for women still advocate an approach to infant feeding that is based on antiquated ideas, hearsay or myth. Their advice incorrectly suggests that the infant's digestion is the most delicate of organ systems. Regrettably for the infant, they advocate a cautious, delayed approach to those foods which every normal infant is quite capable of digesting and which contain those very substances which his rapidly growing body requires. Thus, before the introduction of 'solids' containing assimilable iron, infants fed on formulas without iron (and receiving no adequate iron complement) will be jeopardized and likely to develop iron-deficiency anaemia.

Complementing with an iron tonic. One should ensure that infants fed on the breast, those fed on cow's milk and those fed on formulas with virtually no iron, are given an iron-fortified syrup as a routine. Most of the multi-vitamin syrups are *not* adequate in this regard since their iron content is limited or nil. Only liquid syrups such as

Ferro-Ped (Pediatric Laboratories), Colliron (Evans), Ferro Drops (Parke Davis), Fersamal (Glaxo-Allenbury) and ferrous sulphate BP contain iron in adequate quantity and form. It is not the purpose of this report to discuss in detail the merits of each preparation, but one of these iron tonics should be given from birth if the diet is deficient in iron.

Giving an iron-containing formula. In order to obviate the bother and expense of an oral iron complement, it is rational to feed infants on a complete total food. Iron in a formula is effective in both full-term and premature infants; it is quickly absorbed and well tolerated; it produces higher haemoglobin levels; prevents iron-deficiency anaemia and accelerates recovery from 'physiological' anaemia.

CONCLUSION

The best method of preventing iron-deficiency anaemia in infancy is by the provision of a formula containing sufficient additional iron. Iron-supplemented formulas should always be used as the standard formula. When other formulas are used, complementary iron *must* be given.

I wish to thank Professor E. B. Adams for his review and comment in respect of this article.

REFERENCES

1. USA Food and Nutrition Board (1968): *Recommended Dietary Allowances*, revised ed. Washington, DC: National Academy of Sciences.
2. American Academy of Pediatrics, Committee on Nutrition (1969): *Pediatrics*, **43**, 134.
3. *Idem* (1970): Newsletter, suppl. 15 December 1970.
4. Smith, W. J., ed. (1970): In *Iron Nutrition in Infancy. Report of the 62nd Ross Conference on Pediatric Research*, p. 45. Columbus, Ohio: Ross Laboratories.
5. Van der Horst, R. L. (1969): *S. Afr. Med. J.*, **43**, suppl., 13 December.
6. Smith, C. H. (1966): *Blood Diseases of Infancy and Childhood*, 2nd ed. St Louis: C. V. Mosby.