IRON AND VITAMIN D DEFICIENCY IN A MOTHER AND SON

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ABSTRACT

The impact of maternal malnutrition on neonatal outcomes in developed countries is not always evident: we report a case of an infant whose nutritional compromise at 18 months of age resulted from significant maternal problems during the pregnancy. The case illustrates that antenatal care in London merits attention with respect to micronutrients in order to improve neonatal and toddler health.

KEYWORDS

Vitamin D, Iron, Zinc, Antenatal, Anaemia, Rickets

CASE REPORT

An eighteen-month old boy, A.D., presented to his General Practitioner with a perineal rash and pain on passing stool. He was described as an unhappy child with frequent crying. There was some delay in talking and walking. His weight and height was 11.2kg (40-50th centile) and 80.1cm (40-50th centile), respectively. Physical examination revealed a bow legged gait and tender, swollen wrists. A rickety rosary was also suspected. Skin findings included a general discoloration and dryness with altered pigmentation around the anus. The chest, cardiovascular and abdominal exams were unremarkable. Examination of the mucosa and hair showed no significant abnormalities. Blood tests revealed markedly low ferritin (5.0ng/ml normal range 30-400 ng/ml), vitamin D (5.0nmol/L normal 51-163nmol/L) and calcium levels (1.8-1.9 normal range 2.15-2.55mmol/L). A diagnosis of rickets, iron deficiency and proctitis secondary to zinc deficiency was made. The child was not receiving a daily multivitamin. He was therefore prescribed vitamin D, iron and zinc.

Three months later at a follow up appointment AD weighed 12.90kg (75-91 percentile) with a height 85.2cm (50-75th percentile); there were no new
concerns. His parents stated that he was walking and running properly and that his perianal rash and constipation were no longer present. On physical examination rickety rosary and bow legs were still present. His speech continued to be delayed. At six months his ferritin was still low (13ng/ml normal range 30-400 ng/ml), hemoglobin normal (11.7g/dl normal range 11.5-13.5g/dL), but his vitamin D (55.7nmol/L normal 51-163nmol/L) and calcium (2.44mmol/L normal range 2.15-2.55mmol/L) levels were within normal limits.

A.D. was born in west London, the second child of unrelated Asian parents, with a birth weight of 3780g. His delivery was by Ventouse instrumentation at 40 weeks + 3 days with no complications and no significant maternal bleeding (500ml). APGARs were 9/1 and 9/5 with no significant abnormalities found on examination. The antenatal course was unremarkable except for a UTI at 20 weeks gestation for which his mother was successfully treated with augmentin. Antenatal ultrasound studies showed measurements within range of gestation and no fetal abnormalities. At 34 weeks his mother was found to have a low Hb (9.9g/dl normal range 11.5-15.5g/dL) and ferritin (8ng/ml normal range 13-150ng/ml) for which she was prescribed ferrous sulfate. Her test at 30 weeks had showed normal values except for a slightly low Hb (10.5g/dL normal range 11.5-15.5g/dL). She has a vegetarian diet that allows eggs and fish. She stated that she did not take additional supplements prior to pregnancy. She delivered A.D. when she was 26 years old. Her height was 5’2” and weight 71.5kg with BMI 29. A.D. was breast fed for 10 months and started receiving mashed foods, mostly vegetables, around 9 months until he could chew. Once solid foods were introduced his diet consisted mostly of vegetables, milk and occasionally meat. A.D. was described as having a good diet and not a picky eater.

A.D.’s elder sister, R.D., was born 11 months prior to A.D. at 39 weeks + 4 days with a birth weight of 3140g. An emergency LSCS was indicated because of fetal distress with 30 minutes of variable decelerations and fresh PV blood. There was no significant maternal blood loss (400ml). APGAR scores were 9/1 and 10/5. The antenatal course showed no abnormalities on US, but untreated maternal hypertension was noted. At 10 weeks gestation M.D.’s weight was 63.5kg with a BMI of 24. Her daughter was breast fed for less than one month. During pregnancy mother had a low Hb (9.9 g/dl normal range 11.5-15.5g/dL) during the third trimester, probably due to the increased plasma volume of pregnancy. Her ferritin level (24ng/ml normal range 13-150ng/ml) however was within low normal values compared with A.D. (8ng/ml normal range 13-150ng/ml). The first child did not have any of the clinical problems manifest as her younger brother. At the same time A.D. had his six month blood level follow up R.D.’s blood showed a low ferritin (11ng/ml normal range 13-150ng/ml) and normal Hb (12g/dl normal range 11.5-13.5g/dL). Her vitamin D levels were low (24.2 normal 51-163nmol/L) and adjusted calcium normal (2.39 mmol/L normal 2.15-2.55).
DISCUSSION

Antenatal nutrition is crucial to the development of healthy infants. A UK national rolling diet and nutrition survey published from a 2008/2009 and 2009/10 surveys has demonstrated that a significant proportion of adolescents suffer iron, zinc and vitamin D deficiency, with levels lower for girls than boys. These conditions will be manifest in pregnancy and exacerbated by successive pregnancies particularly if the infants are breast fed and mother’s diet is inadequate. The same national survey suggested that the use of supplements was low in adolescents and young adults (1).

Vitamin D deficiency causes hypocalcemic seizures in some infants, delayed motor milestones and rickets. The effects of deficiency at birth may be detected in children entering puberty. Additionally vitamin D levels have been associated with increased rates of multiple sclerosis, autoimmune disease, malignancy and mental function (2).

Iron deficiency has been linked to anaemia in infancy, preterm delivery, low birth weight, higher risk of stillbirth and newborn death. Most iron transfer to the fetus occurs after week 30 of gestation which corresponds to M.D.’s low ferritin level at 34 weeks (3). Zinc deficiency has been seen with decreased growth retardation, decreased motor development, neurosensory disorders, immunological dysfunctions, and skin changes. It is vital for DNA synthesis, cell division and protein synthesis (4). This may account for A.D.’s skin rash and contributed to his apparent problems in development.

A number of studies have been undertaken to examine the effects of micronutrient supplementation in pregnancy. Adequate vitamin D levels improve several pregnancy outcomes and have protective effect against bone disease and muscle weakness, (6,7,8,9). One study showed iron supplementation and increased maternal Hb concentration resulted in increased APGAR scores and lower risk of birth asphyxia (3). A Japanese study of 38 women showed that zinc administration correlated with increases of IGF-I, Hb, and RBC (5). There are relatively few studies however relating adolescent supplementation with pregnancy outcomes (9,10); none shows harm from such strategies.

CONCLUSION

Antenatal malnutrition may manifest in infancy; more severe cases present to paediatric services. This case illustrates that despite significant advances in a nationalized health service the British population continues to suffer micronutrient deficiencies that adversely affect the health of children. The example supports other evidence in favour of the development of a policy that aims to improve nutrition in adolescence, as this is a point at which many such deficiencies develop.
FINANCIAL DECLARATION

None

REFERENCES