

Current nutritional status of mothers and children in Al Ain, United Arab Emirates

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الوضع التغذوي الراهن للأمهات والأطفال في العين ، بالإمارات العربية المتحدة
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خلاصة : اشترك ستة وأربعون أمًا وطفلًا من الإمارات العربية المتحدة في دراسة ارتيادية لتحديد ما يمكن أن يوجد من عوز في المغذيات الزهيدة المقدار في البلاد . وتبين أن هناك انخفاضاً في مستويات الفيريتين بالمصل لدى 35% من الأطفال و21% من الأمهات بينما وجد انخفاض في مستوى 25 - هيدروكسي فيتامين د بالمصل لدى 30% من الأمهات ، وانخفاض في مستوى فولات المصل لدى 28% منهن . وتتفق هذه النتائج مع الآراء السابقة التي تقول إن فقر الدم الناجم عن عوز الحديد وعوز المغذيات الزهيدة المقدار حالة واسعة الانتشار بين مواطني الإمارات العربية المتحدة . وبالنظر إلى الأهمية المتزايدة لتغذية الأطفال في المرحلة الرحمية ومرحلة الرضاعة المبكرة ، يبدو من الضروري إجراء مزيد من الاستقصاء ودراسة على الصعيد الوطني حول هذا الموضوع

ABSTRACT Forty-six mothers and children from the United Arab Emirates participated in a pilot study to determine possible micronutrient deficiencies in the country. Thirty-five per cent (35%) of the children and 21% of the mothers had low serum ferritin levels, while 30% of the mothers had low serum 25-hydroxyvitamin D with 28% of mothers having a low serum folate status. These findings are in keeping with previous suggestions that iron deficiency anaemia and micronutrient deficiencies are widespread in the nationals of the United Arab Emirates. In view of the increasing importance of intrauterine and early infant nutrition, further investigation and a national study seem warranted.

L'état nutritionnel actuel des mères et des enfants à Al Ain (Emirats arabes unis)

RESUME Quarante-six mères et enfants des Emirats arabes unis ont participé à une étude pilote visant à déterminer d'éventuelles carences en micronutriments dans le pays. Trente-cinq pour cent (35%) des enfants et 21% des mères avaient un faible taux de ferritine sérique tandis que 30% des mères avaient un faible taux de 25-hydrocholécalférol et 28% d'entre elles avaient un faible taux de folate sérique. Ces résultats correspondent aux éléments d'information fournis par des études précédentes qui donnent à penser que l'anémie ferriprive et les carences en micronutriments sont répandues chez les ressortissants des Emirats arabes unis. Du fait de l'importance croissante de la nutrition au stade de la vie intra-utérine du fœtus et durant les premières semaines de la vie du nourrisson, des recherches supplémentaires et une étude au niveau national semblent justifiées.

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Introduction

The United Arab Emirates Annual Health Report in 1992 stressed the need for a detailed assessment of nutrition in the country [1]. The report emphasized the lack of reliable information on possible micronutrient deficiencies in the United Arab Emirates. Data from a 1981 United Arab Emirates study suggested that 45% of United Arab Emirates schoolchildren have a haemoglobin level of below 11 g/dl [2]. Recent work from our group revealed that levels of anaemia were, in fact, increasing, and 20% of national mothers delivering their babies in Tawam Hospital, Al Ain, had haemoglobin levels of less than 10 g/dl in contrast to a figure of 7% in Saudi Arabia and 1.1% in Australia [3]. However, a survey showed that the United Arab Emirates fell into the moderately severe iodine-deficient regions and the presence of goitre in young children was as high as 40.4% (Ministry of Health/WHO, unpublished data, 1994).

The aim of the present study was to conduct a community-based pilot assessment of the iron and micronutrient status of United Arab Emirates mothers and their children under two years of age.

Methods

A sample of mothers and children presenting to a primary health care clinic or a maternal and child health clinic formed the study group. Women who had delivered a child within the past two years were approached to be included in the study. No selection was made other than seeking volunteers at random.

A brief history of previous illnesses, data regarding the number of pregnancies and the most recent child's age and health

details were recorded from the mothers. A venous sample of blood was drawn from the mother and the child after the parents' informed consent. To this end an Arabic language explanatory leaflet was produced. The study had the permission of the Research Ethics Committee of the United Arab Emirates Medical Faculty. Blood samples were collected in lithium heparinized and plain tubes. They were brought directly to the laboratory and centrifuged at 2000 rpm; the plasma and serum samples were protected from direct sunlight and fluorescent light and were kept frozen at -20°C until analysed.

Estimations of vitamins A and E, vitamin D and ferritin, folic acid and thyroid-stimulating hormone (TSH) were carried out by the methods described.

Vitamins A and E

The analyses of retinol (vitamin A) and α -tocopherol (vitamin E) were performed according to Shearer [4] and Bieri et al. [5].

The plasma retinol and α -tocopherol were extracted with *n*-hexane. The hexane upper layer was isolated carefully and evaporated to dryness under nitrogen, and the residue redissolved in an appropriate solvent prior to injection on the HPLC column.

A 40 μl volume was injected onto a reverse-phase column (Whatman Partisil 5 ODS-3, 25 cm \times 4.6 mm, for retinol, and Supelcosil 5 LC18, 25 cm \times 4.6 mm, for α -tocopherol) and eluted with 100% methanol at a flow rate of 1.0 ml/min. Retinol and α -tocopherol were monitored by UV absorbance at 325 nm and 290 nm respectively.

Vitamin D

25-OHD (25-hydroxyvitamin D), the major circulating metabolite of vitamin D, was measured in serum by competitive protein-

binding (CPB) assay and radioimmunoassay kit (Nichols, San Juan Capistrano, California).

Ferritin, folic acid and TSH

Ferritin, folic acid and TSH were measured in serum by immunoradiometric assay (IRMA), charcoal boil and double antibody assay kit (DPC, Los Angeles, California), respectively.

Results

Forty-six mothers and children participated in the study. The mothers had a mean age of 30 years (range 24–37 years). Their mean number of pregnancies was five (range 1–11 children). Hypertension during pregnancy was reported by two mothers, the remainder were stated to be in good health.

The children were equally divided between males and females and their mean age was 18 months. No illnesses were reported in any of the children.

Table 1 lists the vitamin assay results while Table 2 gives the ferritin and TSH results for the mothers and the children.

Discussion

The mothers and children recruited for this community-based study were apparently well and were attending a doctor for immunization or routine health advice. No mothers (or infants) known to have had significant antenatal or postnatal disorders were included.

The major findings of the study are not unexpected, but do support previous work in that iron deficiency in both children and mothers, together with 25-hydroxyvitamin D and folic acid deficiencies in mothers have been identified. This is a cause for some concern.

Thirty-five per cent (35%) of children and 21% of mothers in this sample had serum ferritin levels less than 10 ng/ml which is well below the reference range limits for our laboratory and the reported results elsewhere using the immunoradiometric assay method. These findings are in keeping with the prior observations that half of United Arab Emirates schoolchildren and 20% of mothers are anaemic and implicate iron deficiency as the cause [2]. However, there was no correlation between maternal ferritin levels and those of their respective children.

Table 1 Vitamin levels for mothers and children

	Vitamin A (µg/100 ml) Mother	Vitamin A (µg/100 ml) Child	Vitamin E (µg/100 ml) Mother	Vitamin E (µg/100 ml) Child	Folic acid (ng/ml) Mother	Folic acid (ng/ml) Child	Vitamin D (ng/ml) Mother	Vitamin D (ng/ml) Child
Mean	59.93	38.3	1129.5	893.19	7.42	14.4	15.18	27.04
s	13.1	11.12	309.27	313.95	6.08	8.28	7.2	9.86
95% CI for mean	55.96, 63.9	34.97, 41.63	1007.7, 1195	804.2, 992.2	5.536, 9.31	11.76, 17.04	12.94, 17.41	23.94, 30.14
Maximum	93	60	1936	1696	31.75	39.11	34.35	49.32
Minimum	32.8	15	657	336	1.84	3.26	0.72	7.96
n	42	43	42	43	40	38	40	39

s = standard deviation

Thirty per cent (30%) of mothers had vitamin D levels below 10 ng/ml. This, again, is in keeping with other findings that, despite adequate sunshine, there are low serum 25-hydroxyvitamin D levels in Arab women [6,7]. Dawodu et al. (unpublished data) have shown significant differences between United Arab Emirates national women and Caucasian women resident in the United Arab Emirates. Two infants with suboptimal vitamin D levels had mothers with low vitamin D levels also. In addition, 28% of the mothers had low serum folic acid levels (below 3 ng/ml), but only one child had a similar finding. This child's mother had low folic levels also.

Three children showed low vitamin E and three showed low vitamin A status, but none of the mothers had levels which were below those expected for young women [8]. Interestingly, the infants who had low vitamin E levels tended to have marginal low vitamin A levels, but the converse was not true.

While results such as these from a small pilot study can at best be considered indicative, it is now clearly an area of importance and concern for the future health of United

Arab Emirates mothers and their children. The role of folates in nucleotide synthesis and amino-acid interconversions is well documented together with the efficacy of folate supplementation in the prevention of recurrence of neural tube defects. The role in primary prevention is less clear [9]. However, a steady stream of data is now establishing links between the intrauterine and first year of life "environment" and later adult disease. Maternal anaemia in pregnancy is associated with a large placental weight and placental weight to birth weight ratio, both predictors of adult blood pressure [10]. Such an association between maternal anaemia and raised blood pressure at age 10 to 12 years has also been shown in other ethnic groups [11]. Dietary supplementation *per se* is not, however, an appropriate response. Excess intake of some nutrients (vitamins A, D) is known to result in birth defects, and other possibilities exist [12].

No elevation of TSH levels in the study group was demonstrated. It must be remembered that the children's mean age was 18 months, and previous work has indicated that the "at risk" group were the 9-13 years age range (Ministry of Health/WHO, unpublished data, 1994).

Overall, this small pilot study on micronutrient deficiencies confirms earlier concerns about anaemia and possible iron deficiency in the United Arab Emirates. In addition, folic acid deficiency as judged by serum folate levels was frequently found in the sample. These findings should prompt much closer scrutiny of dietary micronutrients in the United Arab Emirates and the need for a national nutritional study, especially in rural women and children where traditional lifestyles are still practised. They may also reflect that multiparity is an important factor in the nutritional inadequacies found when consideration is taken

Table 2 Ferritin and TSH levels for mothers and children

	Ferritin (ng/ml) Mother	Ferritin (ng/ml) child	TSH (μ U/ml) Mother	TSH (μ U/ml) child
Mean	32.79	30.35	1.52	1.32
s	25.2	42.08	1.13	0.94
95% CI for mean	25.25, 40.33	17.29, 43.41	1.186, 1.862	1.019, 1.617
Maximum	99	200	7.62	5.42
Minimum	4.9	0.91	0.19	0.02
n	43	40	43	38

s = standard deviation

of the fact that the mean number of pregnancies in the United Arab Emirates group of mothers was five, a familiar pattern in the United Arab Emirates.

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