

mentioned fears among both undergraduates and postgraduates from the other disciplines due to the departmental plans to provide more condensed neurology training for non-neurologists.

The need for trained neurologists in the Kingdom is high. To ensure adequate neurological health care in the Kingdom, more than 200 neurologists are needed at present. This is based on a recommended ratio of one neurologist for each 60,000 population. This target would not be achieved unless all the national postgraduate programs in neurology increase their intake of trainees per year.

The graduation of the first two locally trained neurologists in the King Faisal University Fellowship program in 1999 is really a milestone for the first academic Department of Neurology in the Kingdom. Although the number is small, it is a positive step nationally in graduate medical education that confirms feasibility, practicality and convenience of these programs and their cost-effectiveness in providing the community with the needs of specialist in the various medical subspecialties.

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Folate deficiency and neurologic complications in elderly Omani patients.

Sir,

Vitamin B₁₂ and folate deficiencies are highly prevalent in the geriatric population.^{1,2} Studies revealed that low serum vitamin B₁₂ was observed in 5-21% of geriatric patients and folate in 5-19% of geriatric patients. Neurological impairment due to vitamin B₁₂ deficiency is well-known, however, folate deficiency, previously considered free of neurological consequences, can also be associated with psychic and mental deterioration, neuropathy and even spinal cord syndromes similar to those observed in vitamin B₁₂ deficiency.^{3,4} Since the symptoms related to vitamin B₁₂ and folate deficiency can sometimes be very subtle and go unnoticed by patient and physician alike, we prospectively evaluated the neurological status, as well as serum vitamin B₁₂ and folate levels in elderly Omani patients with no clinical evidence or history of folate or vitamin B₁₂ deficiency.

Elderly patients (aged 55 years or above not suffering from any major organ failure) referred to the Ophthalmology Clinic and presenting with benign ophthalmological problems were enrolled after providing informed consent. Subsequently, they underwent a thorough neurological examination and a blood sample was taken for the analysis of serum vitamin B₁₂ and folate levels, red cell folate levels, and hematological parameters (hemoglobin (Hb), Hematocrit (Hct), mean cell hemoglobin (MCH), mean cell hemoglobin concentration (MCHC), mean cell volume (MCV) and red blood cell count (RBC). Vitamin B₁₂ in serum was measured by a microparticle enzyme intrinsic factor assay (Imx B₁₂, Abbott Laboratories). Serum and red cell folate concentrations were measured with an ion capture assay (Imx Folate, Abbott Laboratories). A Coulter STKs Blood Analyzer using spectrophotometry and the electrical impedance principle analyzed the hematological parameters.

One hundred and ten elderly Omani patients (47 males and 63 females) participated in this study. The mean age was 58.4 ± 6.6 years. The hematological results were the following: Hb 13.64 ± 1.52 g/dl, Hct 0.41 ± 0.04, MCH 26.41 ± 3.35 pg, MCHC 33.05 ± 3.56 g/dl, MCV 79.04 ± 9.46 fl, RBC 5.22 ± 0.70 × 10⁶/l serum vitamin B₁₂ 516 ± 244 pg/ml, serum folate 7.3 ± 2.9 ng/ml, red cell folate 218 ± 109 ng/

Letters to the Editor

ml. With respect to the neurological status, 5 patients had neurological complications which were unnoticed by the patients: one patient had anosmia, one patient had mild ataxia, one patient had numbness due to peripheral polyneuropathy confirmed by nerve conduction studies, and 2 patients had mild orthostatic lightheadedness. All 5 patients had normal serum B₁₂ and folate levels, but red cell folate levels were reduced (between 82-103 mg/ml). None of these 5 patients presented hematopoietic changes of folate or vitamin B₁₂ deficiency like macrocytic anemia. Following folic acid therapy (5 mg o.d.), their symptoms improved progressively over 2 months, confirming that the neurological symptoms was due to folate deficiency.

Studies in the elderly revealed that low serum folate levels were observed in 5-19% of patients.^{1,2} The incidence of folate deficiency in our series was 4.5%. It is difficult to compare these 2 incidences because of differences in demographic and nutritional factors.^{2,6} Despite low serum folate levels in 5 of our patients none developed, macrocytic anemia which tend to confirm reports that, only a minority of elderly patients (23%) present with a mean cell volume (MCV) of ≥ 100 fl.^{7,8} Although folate deficiency accounted for the neurological complications observed in our 5 patients, it is realized that measuring serum vitamin B₁₂ is not the optimal diagnostic tool for diagnosing vitamin B₁₂ deficiency. It is well established that vitamin B₁₂ levels can be normal in patients with frank clinical signs and symptoms of vitamin B₁₂ deficiency.⁷ Measurements of the serum levels of the downstream metabolite homocysteine - which will be increased in vitamin B₁₂ deficiency - would therefore probably be a more sensitive indicator.

So far we have not attempted exploring the cause of deficiency in our folate deficient patients. Foliates are widely distributed in foods but there is mounting evidence that folate deficiencies are the result of long-standing suboptimal folate nutrition.³ Impaired availability due to their liability under various food cooking and processing conditions is probably one of the contributing factors. In addition, folate deficiency is also associated with mutation leading to the thermolabile variant of N5,10 methyl-enetetrahydrofolate reductase, which is observed in

about 10% of the general population.⁹

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