Plasma 25-hydroxy vitamin D concentrations in patients with fractures of the femoral neck

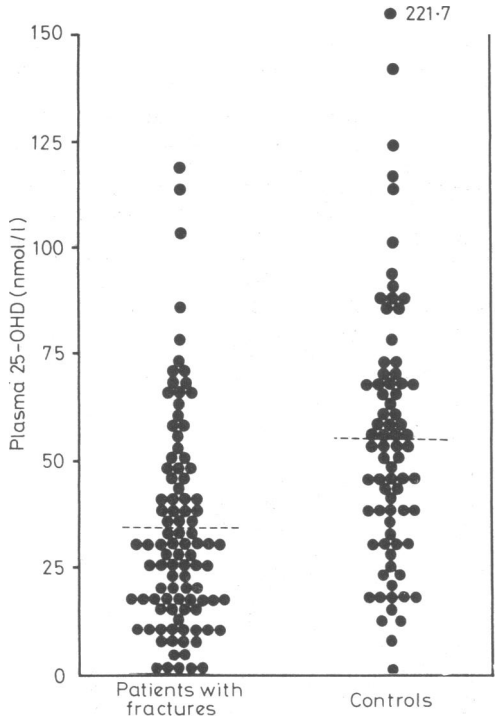
Fractures of the neck of the femur, which are common in the elderly, occur more often in women than in men and the incidence increases exponentially with age.[1] The finding of histological osteomalacia in one-third of these patients[2,3] suggests that vitamin D deficiency may be an important causal factor, but no controlled study of vitamin D status in these patients has been performed in Britain. We have studied 25-hydroxy vitamin D (25-OHD) concentrations in patients with fractures and in matched controls drawn from a home-based population—the source of most fractures.

Patients, methods, and results

Plasma 25-OHD was measured by a radiocompetitive protein-binding assay[4] in 98 white women aged 65 and over who were admitted to hospital consecutively with fractures of the neck of the femur. 25-OHD concentrations were also measured in 76 controls, matched for age and sex, who were drawn from a random sample of the Leeds population taken from the electoral register and demographically and socially representative of the sampling frame. The mean age (±SD) of the patients was 80·2±7·3 years and that of the controls 79·4±7·2 years. A history of vitamin D in the diet was also obtained at interview from the patients and controls, and an environmental history was taken to calculate the time spent out of doors during the week preceding the interview ("sunlight exposure"). The investigation was extended through a year to exclude seasonal factors, and plasma samples from both groups were assayed together to exclude the effect of interassay variation on comparative analysis.

The mean plasma 25-OHD concentration was significantly lower in the patients with fractures (34·5±24.5 nmol/l; 13·8±9.8 ng/ml) than in the controls (55·8±33·8 nmol/l; 22·3±13·5 ng/ml) ($P<0.001$). Values below 25nmol/l (10 ng/ml) were found in 40% of patients and 17% of controls ($P<0.001$) ($2\times 2\chi^2$ with Yates's correction). The dietary intake of vitamin D was also significantly lower in patients with fractures (97·6±62·4 IU/day compared with 118·7±59·4 IU/day ($P<0.05$)). Intakes of under 100 IU/day were recorded in 58% of the patients and 41% of the controls ($P<0.05$). Similarly, sunlight exposure was 24±34 min/day in the patients and 44±40 min/day in the controls ($P<0.02$). Just over half (51%) the patients and 29% of the controls were housebound ($P<0.005$).

In the fracture group plasma 25-OHD concentration was more closely correlated with dietary vitamin D ($r=0.36$; $P<0.001$) than with sunlight exposure ($r=0.18$; not significant). Conversely, in the controls, plasma 25-OHD was more closely correlated with sunlight exposure ($r=0.42$; $P<0.001$) than with diet ($r=0.30$; $P<0.01$).



Plasma 25-OHD concentrations in elderly women with fractured neck of femur and controls matched for age and sex.
Horizontal dotted line represents mean values.
Conversion: SI to traditional units—1 nmol/l ≈ 0·4 ng/ml.

Comment

Our data show clearly that low plasma 25-OHD concentrations are more common in patients suffering a fracture of the femoral neck than in matched controls. The figure of 40% with 25-OHD concentrations below 25 nmol/l (10 ng/ml)—the level below which most cases of histological osteomalacia occur[5]—is consistent with the 30% prevalence of histological osteomalacia reported,[2] since not all patients with vitamin D deficiency develop osteomalacia. Low dietary vitamin D and lack of sunlight both contribute to this deficiency but the latter is clearly the more important factor. The patients with fractures, 51% of whom were housebound, depended for their vitamin D supply on their diet, which was inadequate. The controls, being more active, obtained their vitamin D from sunlight, which is why their plasma concentrations were relatively independent of their vitamin D intake.

We suggest that vitamin D deficiency contributes to the high incidence of fractures of the neck of the femur in Britain through an effect on the skeleton or on muscle power, or both. If this is so the rate of fractures to the femoral neck might be substantially reduced by improving the vitamin D status of the elderly population.

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Lepromatous leprosy and onchocerciasis

Some recent reports[1-3] mention a striking impairment of cell-mediated immunity in heavily infected patients, especially in areas where onchocerciasis is hyperendemic. As a similar disturbance occurs in the lepromatous form of leprosy we tried to compare the prevalence of leprosy in districts with and without a high prevalence of severe onchocerciasis in the Republic of Upper Volta, in West Africa.

Methods and results

In Upper Volta national medical field services and the World Health Organisation Onchocerciasis Control Programme provide consistent data for both leprosy and onchocerciasis. We studied two populations: (*a*) that of 26 districts in the south of the country, where onchocerciasis is hyperendemic and the blindness rate higher than the national average of 1%,[4] and (*b*) that of 17 larger areas in the centre and north of the country which are largely free of onchocerciasis. For each district and area we calculated the percentage of the census population with leprosy and the percentage with lepromatous leprosy.

The results are shown in the table. Because the two populations studied