European Medical Association,
Place de Jamblinne de Meux 12, 1040 Brussels, Belgium
Tel: +32 2 734 21 35
Fax: +32 2 734 21 35
Internet: EMA @sp1.y-net.be

European Public Health Alliance,
1 Place du Luxembourg, 1040 Brussels, Belgium
Tel: +32 2 512 93 60
Fax: +32 2 512 66 73

Gunn E, ed. *Vacher's European companion.* London: Vacher's Publications, 1995.
Useful for finding institutions in the European Union and your member of the European parliament

King's Fund Library,
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Tel: 0171 307 2400

Standing Committee of Doctors of the EC (CP),
66 Avenue de Cortenbergh, Bte 2, 1040 Brussels, Belgium
Tel: +32 2 732 7202
Fax: +32 2 732 7344
Coordinates the views of other European medical groupings and represents the medical profession as a whole to the institutions of the European Union. One of its aims is to promote the free movement of doctors within the union.

Unit for Social Security for Migrant Workers, DGV,
Rue de la Loi 200, 1049 Brussels, Belgium
Publishes a free summary of both social security and health care schemes of the member states.

European Commission. *Your social security rights when moving within the European Union: a practical guide.* Luxembourg: Office for Official Publications of the European Communities, 1995. (Also available from HMSO Books.)

HMSO Books (Agency Section),
HMSO Publications Centre, 51 Nine Elms Lane, London SW8 5DR
Tel: 0171 873 8372

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Lesson of the Week

Hypovitaminosis D in immigrant women: slow to be diagnosed

Jeannine F J B Nellen, Yvo M Smulders, P H Jos Frissen , Ed H Slaats, Joseph Silberbusch

Hypovitaminosis D osteopathy should be considered in immigrant women with musculoskeletal pain

Department of Internal Medicine, Onze Lieve Vrouwe Gasthuis, 1e Oosterparkstraat 279, PO Box 95500, 1090 HM Amsterdam, Netherlands
Jeannine F J B Nellen, *registrar*
Yvo M Smulders, *registrar*
P H Jos Frissen, *consultant*
Ed H Slaats, *clinical chemist*
Joseph Silberbusch, *consultant*

Correspondence to:
Dr Nellen.

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Vitamin D deficiency in adults eventually leads to the osteomalacia syndrome, with its characteristic clinical features of bone pain, muscle weakness, and difficulty in walking. Even in moderate deficiency there is both biochemical and histological evidence of secondary hyperparathyroidism and increased bone remodelling. At this stage the characteristic symptoms of classic osteomalacia may still be absent, although irreversible cortical bone loss has already occurred. This is referred to as hypovitaminosis D osteopathy stage I.[1]

Hypovitaminosis D is common in western Europeans, especially in patients with malabsorption and in elderly people eating a deficient diet. An increased incidence of hypovitaminosis D osteopathy among immigrant women could be expected because of their low intake of calcium and vitamin D, minimal exposure to sunlight, skin pigmentation, and high parity.[2] We report symptomatic hypovitaminosis D in six immigrant women, focusing on the time between the first consultation with a doctor and the establishment of the correct diagnosis.

Patients, methods and results

We diagnosed hypovitaminosis D osteopathy as musculoskeletal pain in the presence of an increased intact parathyroid hormone concentration, a decreased concentration of 25-hydroxycholecalciferol, and a favourable clinical response to vitamin D replacement. We analysed the general practitioner's and hospital notes of all patients with this disorder who had been referred to this department from January 1990 to December 1992. From the notes we recorded (*a*) the time taken to refer the patient to this department, where the hypovitaminosis D osteopathy was eventually diagnosed; (*b*) the symptoms reported by the patients (localised or diffuse bone pain, difficulty in walking with or without muscle weakness, neurological complaints such as paraesthesia or muscle spasms, and non-specific complaints such as fatigue and malaise); and (*c*) referrals to other specialties, undue diagnostic procedures, and unsuccessful therapeutic interventions.

Table 1 shows the demographic and clinical data of six patients who satisfied the above criteria. The duration of complaints before diagnosis varied from 7 to 103 months (mean 59·2 (SD 36·2)). In retrospect, the symptoms the patients complained of were typical of hypovitaminosis D osteopathy from the beginning. Symptoms were at first unrecognised or misinterpreted. Previous referrals were mostly to orthopaedic surgeons and for many *x* ray examinations and blood tests. All patients had been prescribed non-steroidal anti-inflammatory drugs, and four had undergone intensive physiotherapy.

In three cases misinterpretations had serious therapeutic consequences. One patient (case 2) was treated with prednisone for suspected polymyalgia rheumatica, one woman (case 1) received oestrogen because osteoporosis was suspected, and one woman (case 6) underwent cholecystectomy because of subcostal and back pains combined with a solitary gall

Table 1—*Demographic and clinical data on six immigrant female patients with hypovitaminosis D*

Case No	Country of origin	Age (years)	Parity	Duration of complaints until referral (months)	Time from referral to diagnosis (months)	Complaints	Other referrals	Diagnostic tests	Treatment before diagnosis
1	Surinam	50	2	79	7	Pain in back, neck, and knees	Orthopaedic surgery	Intravenous pyelography; ultrasonography of kidney; radiography of cervical spine, lumbar spine, thoracic spine, chest, pelvis; bone scintigraphy; photon absorption scintigraphy; serological tests for rheumatoid arthritis	Paracetamol, floctafenine, ibuprofen, naproxen; oestrogen patches; physiotherapy
2	Turkey	59	0* (fertile)	18	69	Pain in neck and shoulders; fatigue	—	Radiography of chest, shoulder, cervical spine, thoracic spine, lumbar spine, knees; echocardiography of upper abdomen; serological tests for rheumatoid arthritis	Indomethacin, ibuprofen, prednisone; physiotherapy
3	Morocco	36	7	93	10	Pain in back and hips; difficulty in walking	Orthopaedic surgery	Radiography of chest, lumbar spine, pelvis, hips, femurs; computed tomography of sacroiliac joints; bone scintigraphy; open bone biopsy	Ibuprofen; physiotherapy; spongiosaplasty
4	Pakistan	40	5	7	—	Pain in back and legs; muscle weakness; muscle spasms	Orthopaedic surgery; neurology	Radiography of chest, ribs, lumbar spine, pelvis, knees	Ibuprofen, naproxen
5	Pakistan	45	4	17	1	Pain in hips, back, and legs; muscle weakness; fatigue	—	Radiography of chest, lumbar spine, ribs (in detail)	Ibuprofen, naproxen; physiotherapy
6	Morocco	46	1	30	24	Pain in muscles, shoulder, back, and abdomen	Surgery	Radiography of chest; ultrasonography of upper abdomen; endoscopic retrograde cholangiopancreatography	Diclofenac, diazepam; cholecystectomy

*Infertile.

stone. In all three cases the initial treatment was ineffective.

Relevant laboratory results are shown in figure 1. All patients had a creatinine concentration within the normal range. The concentration of 25-hydroxycholecalciferol was normal in one patient (case 5), who later admitted treating herself with vitamin D shortly before.

Treatment with vitamin D and calcium was started in all patients. They all became free of symptoms within three months, and alkaline phosphatase activity and intact parathyroid hormone concentration became normal within one to two years.

Discussion

The most striking finding of this survey was the long time it took to establish a correct diagnosis of vitamin D osteopathy. Complaints were taken seriously by doctors, as shown by the amount of diagnostic procedures, therapeutic interventions, and referrals—mostly directed at disclosing orthopaedic and rheumatic diseases.

The delay in diagnosis may have been due to unfamiliarity with the clinical picture of hypovitaminosis D osteopathy and, possibly, a language barrier. Peach *et al* found that history taking with special attention to change in gait, place of birth, vegetarian diet, and whether arms were usually covered outdoors was more effective than biochemical tests in screening patients.[3] The bone pain of hypovitaminosis D is usually dull and poorly localised, often beginning in the lower back and later spreading to the pelvis and hips, upper thighs, upper back, and ribs. Characteristically, the pain is symmetrical, is not felt below the knee and shoulder, and is felt in the bones rather than in the joints. On questioning, patients often complain of muscle weakness and difficulty in walking.

The biochemical results in our patients corresponded to published data on moderate vitamin D deficiency.[4] Calcium concentration is often normal, and phosphate concentration can be low, normal, or raised. Alkaline phosphatase activity has a low specificity and a wide range of normal values. Concentrations of 25-hydroxycholecalciferol may be within the normal range because of seasonal variation or, occasionally, self treatment.[5] Secondary hyperparathyroidism is the first stage of hypovitaminosis D osteopathy, and intact parathyroid hormone concentrations do not return rapidly to the normal range after treatment has been started.[6] Whether intact parathyroid hormone concentrations can be used as an index of disease activity deserves further study. In the absence of a totally sensitive and specific biochemical marker for this disorder, the typical combination of biochemical test results provides strong support for the

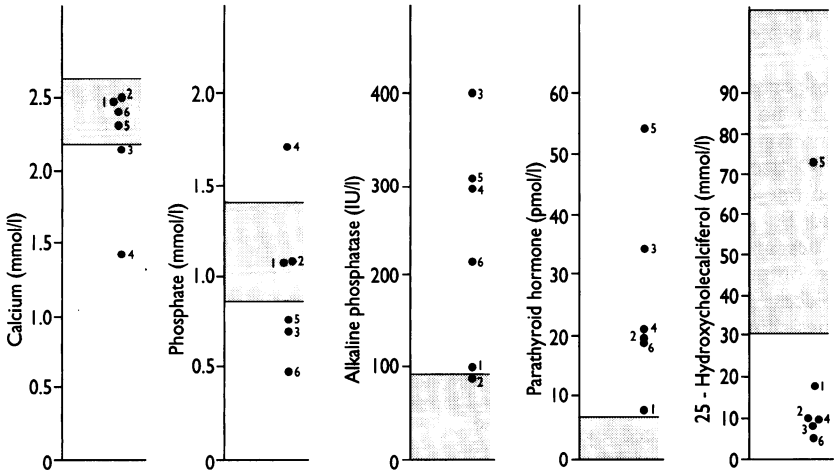

Fig 1—*Biochemical results in the six patients at time of diagnosis. Horizontal lines show normal reference values and numbers are case numbers of patients*

diagnosis of hypovitaminosis D osteopathy. An alternative approach in clinically suspected disease would be to store serum samples and to evaluate clinical improvement after a test dose of 10 000 IU of vitamin D plus extra calcium. Apart from being cheaper and more practical, this approach may even prove to be the best treatment.

We conclude that hypovitaminosis D osteopathy in immigrant women may remain undiagnosed for an unacceptably long time. A higher degree of suspicion in this patient group should shorten the delay and may reduce the number of undue investigations.

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Statistics Notes

Presentation of numerical data

Douglas G Altman, J Martin Bland

This is the 15th in a series of occasional notes on medical statistics

The purpose of a scientific paper is to communicate, and within the paper this applies especially to the presentation of data.

Continuous data, such as serum cholesterol concentration or triceps skinfold thickness, can be summarised numerically either in the text or in tables or plotted in a graph. When numbers are given there is the problem of how precisely to specify them. As far as possible the numerical precision used should be consistent throughout a paper and especially within a table. In general, summary statistics such as means should not be given to more than one extra decimal place over the raw data. The same usually applies to measures of variability or uncertainty such as the standard deviation or standard error, though greater precision may be warranted for these quantities as they are often used in further calculations. Similar comments apply to the results of regression analyses, where spurious precision should be avoided. For example, the regression equation[1]

$$\text{birth weight} = -3{\cdot}0983527 + 0{\cdot}142088 \times \text{chest circumf} + 0{\cdot}158039 \times \text{midarm circumf},$$

purports to predict birth weight to 1/1 000 000 g.

Categorical data, such as disease group or presence or absence of symptoms, can be summarised as frequencies and percentages. It can be confusing to give percentages alone, as the denominator may be unclear. Also, giving frequencies allows percentages to be given as integers, such as 22%, rather than more precisely. Percentages to one decimal place may sometimes be reasonable, but not in small samples; greater precision is unwarranted. Such data rarely need to be shown graphically.

Test statistics, such as values of t or χ^2, and correlation coefficients should be given to no more than two decimal places. Confidence intervals are better presented as, say, "12·4 to 52·9" because the format "12·4-52·9" is confusing when one or both numbers are negative. P values should be given to one or two significant figures. P values are always greater than zero. Because computer output is often to a fixed number of decimal places P=0·0000 really means P<0·00005—such values should be converted to P<0·0001. P values always used to be quoted as P<0·05, P<0·01, and so on because results were compared with tabulated values of statistical distributions. Now that most P values are produced by computer they should be given more exactly, even for non-significant results—for example, P=0·2. Values such as P=0·0027 can be rounded up to P=0·003, but not in general to P<0·01 or P<0·05. In particular, the use of P<0·05 (or, even worse, P=NS) may conceal important information: there is minimal difference between P=0·06 and P=0·04. In tables, however, it may be necessary to use symbols to denote degrees of significance; a common system is to use *, **, and *** to mean P<0·05, 0·01, and 0·001 respectively. Mosteller gives a more extensive discussion of numerical presentation.[2]

The choice between using a table or figure is not easy, nor is it easy to offer much general guidance. Tables are suitable for displaying information about a large number of variables at once, and graphs are good for showing multiple observations on individuals or groups, but between these cases lie a wide range of situations where the best format is not obvious. One point to consider when contemplating using a figure is the amount of numerical information contained. A figure that displays only two means with their standard errors or confidence intervals is a waste of space as a figure; either more information should be added, such as the raw data (a really useful feature of a figure), or the summary values should be put in the text.

In tables information about different variables or quantities is easier to assimilate if the columns (rather than the rows) contain like information, such as means or standard deviations. Interpretation of tables showing data for individuals (or perhaps for many groups) is aided by having the data ordered by one of the variables—for example, by the baseline value of the measurement of interest or by some important prognostic characteristic.

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IRCF Medical Statistics Group, Centre for Statistics in Medicine, Institute of Health Sciences, PO Box 777, Oxford OX3 7LF
Douglas G Altman, *head*

Department of Public Health Sciences, St George's Hospital Medical School, London SW17 0RE
J Martin Bland, *professor of medical statistics*

Correspondence to:
Mr Altman.

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Correction

Calculating correlation coefficients with repeated observations: Part 2—correlation between subjects

An authors' error occurred in this Statistics Note (11 March 1995, p 633). The formula for a weighted correlation coefficient had a superior 2 missing in the denominator. The full formula should have read:

$$\frac{\Sigma m_i \bar{x}_i \bar{y}_i - \Sigma m_i \bar{x}_i \Sigma m_i \bar{y}_i / \Sigma m_i}{\sqrt{(\Sigma m_i \bar{x}_i^2 - (\Sigma m_i \bar{x}_i)^2 / \Sigma m_i)\,(\Sigma m_i \bar{y}_i^2 - (\Sigma m_i \bar{y}_i)^2 / \Sigma m_i)}}$$