

Hypercalcaemia in a Psychogeriatric Population

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Summary: Serum calcium concentration was estimated, via a multichannel analyser, in all patients admitted to a 25 bed psychogeriatric inpatient unit and associated day hospital. Case notes of 629 consecutive admissions over a 42 month period were studied, and the prevalence of hypercalcaemia found to be 0.7 per cent, close to that estimated for the general population. Cases of hypercalcaemia with psychiatric symptoms, undetected medically because of vague and non-specific physical symptoms, do not appear in excess in a psychogeriatric population.

Widespread use of the multichannel analyser in many hospitals has made measurement of serum calcium concentration a routine procedure. The incidence of detected hypercalcaemia has consequently risen sharply in recent years, particularly in patients who are either asymptomatic or who have non-specific symptoms which would not suggest hypercalcaemia. Prevalence rates vary with the population studied: in the general population or in unselected out-patients, the prevalence has varied between 0.1 and 0.6 per cent (Boonstra and Jackson, 1971; Strenström and Heedman, 1974; Christensson *et al*, 1976). In general hospital inpatients, prevalence rates of up to 3.6 per cent (Keating *et al*, 1969) have been reported.

In both populations, hyperparathyroidism seems to be a common cause of hypercalcaemia, accounting for between 30 and 60 per cent of all cases. Consequently hyperparathyroidism is also recognised as being very much more common than previously estimated. In a health screen programme offered to the Stockholm county council, 3.6 subjects out of every 1000 were diagnosed as having hyperparathyroidism (Christensson *et al*, 1976). A large population survey from the Mayo Clinic, Minnesota (Heath *et al*, 1980) has reported an annual incidence reaching 188 cases per 100,000 among women aged 60 and over. A recent British survey (Mundy *et al*, 1980) has also demonstrated that primary hyperparathyroidism is most commonly detected in the elderly and especially in elderly females.

Psychiatric symptoms are a recognised feature of hypercalcaemia, with a prevalence of up to 50 per cent in selected series of patients, usually with hyperparathyroidism (Peterson, 1968; Karpati and Frame, 1964). Gatewood *et al* (1975) have reported 5 cases of hyperparathyroidism where the presenting symptoms were mainly psychiatric, and 4 of these showed no

evidence of bone or renal pathology. Furthermore, these studies show that psychiatric symptoms can be wholly reversible when the serum calcium is reduced. Recently, Heath *et al* (1980) reported a series of 12 elderly patients, many with relatively mild hypercalcaemia where parathyroidectomy produced marked improvements in cognitive function, lethargy and general malaise.

In view of the apparent increase in detected cases, the known association with psychiatric symptoms and, in many cases, the successful alleviation of such symptoms by surgical or medical intervention, it could be argued that a serum calcium concentration should be part of a biochemical profile in all psychiatric patients over the age of 60. This study was undertaken to establish the value of such a screening test in a psychogeriatric population, and to review the presentation and outcome in those with detected hypercalcaemia.

Method

Because of the availability of a multichannel analyser, it is policy to include a serum calcium in a biochemical profile of all patients admitted to a 25 bed psychogeriatric unit and attached day hospital. A 5ml sample of clotted blood is obtained from patients and despatched to the laboratory on the same day. Serum calcium is estimated by a cresolphthalein complexone method on a Technicon SMAC analyser.

Case records of all day and inpatients admitted over a 42 month period were examined retrospectively and the incidence of hypercalcaemia established. Although the upper limit of the normal range in the laboratory involved is 2.65 mmol/l, for the purpose of this survey it was decided to define hypercalcaemia as a serum calcium greater than 2.70 mmol/l, in order to exclude cases of doubtful significance.

There is considerable debate about the use of correction factors which relate serum calcium to proteins, especially albumin. For the purpose of this study the following arbitrary guidelines were adopted after Fiskens *et al* (1980): if serum albumin was between 26 g/l and 30 g/l a serum calcium above 2.60 mmol/l would be considered abnormal, and when the albumin was below 25 g/l a serum calcium above 2.55 mmol/l would be considered abnormal.

The unit has a wide spectrum of referrals for assessment, and patients requiring longer term care are usually transferred elsewhere. Over the period of the survey 66 per cent of admissions were female and 34 per cent male. Of the inpatients, 50 per cent were diagnosed as dementia, 33 per cent affective illness, and other diagnoses including acute confusional states and paraphrenia accounted for 17 per cent. Of the day patients, 40 per cent were diagnosed as dementia, 46 per cent affective disorder and 14 per cent had other diagnoses.

Over one third of admissions were re-admissions within the period of the survey, but only consecutive first time admissions were considered in this study.

Results

Over the 42 month period 16 patients were admitted to inpatient and day patient facilities for holiday relief only, and a further 17 had been investigated elsewhere. Four hundred and one inpatients and 228 day patients

had first admissions for investigation. Of these, 7 died before the relevant tests were performed, 3 were transferred to other wards and notes could not be traced in 6 patients. A further 31 patients failed to have a calcium concentration because of machine breakdown, insufficient or spoiled samples, or failure to request the investigation. Ten more patients refused investigation or attended once only. A serum calcium concentration was obtained therefore in 92 per cent of 629 first admissions.

The distribution of serum calcium values for the population of 572 patients is shown in the Fig. Only four patients had hypercalcaemia as defined in the method, a prevalence of 0.7 per cent.

Case 1: male, age 76—Hypercalcaemia (2.72 mmol/l), normal phosphate, but patient died before second investigation; probable massive cardiovascular attack. Two year history of cognitive impairment and Parkinson's disease, with EMI scan appearances consistent with multi-infarct dementia.

Case 2: female, age 84—Hypercalcaemia (2.78 mmol/l) with hyperphosphataemia and high blood urea. Raised calcium was related to severe dehydration and haemoconcentration on admission. Died of probable myocardial infarction 12 days after admission. Several months history of retarded depression with recent refusal to eat or drink.

Case 3: female, age 71—Hypercalcaemia (3.16 mmol/l, 3.10 mmol/l) with normal phosphate and high alkaline

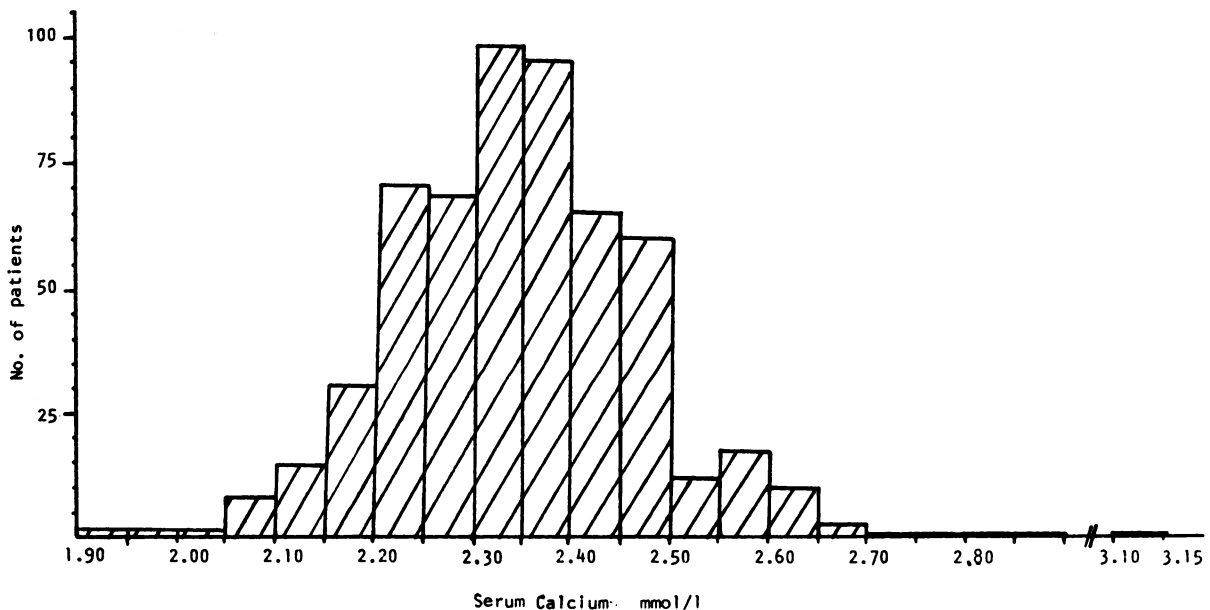


Fig.—Distribution of serum calcium values in the total population (n = 572, mean = 2.35, SD. 0.13)

phosphatase, previously diagnosed as Paget's disease. She presented with an 18 month history of visual hallucinations and delusions in clear consciousness, with no evidence of cognitive impairment. There was a good response to depot phenothiazines and support from a community nurse. Follow-up at two years still showed slightly raised calcium (2.67 mmol/l), but no subsequent admissions or deterioration in mental state.

Case 4: female, age 68—Five year history of fluctuating depression with anxiety. She responded to inpatient care and antidepressant therapy, but one month after discharge was re-admitted to another hospital with agitated depression. Her mood improved sufficiently to allow discharge after three months, but she was re-admitted two weeks later following a suicide attempt, and died three months later, probable cardiovascular attack.

	1st admission	2nd admission
calcium	2.66	2.83 mmol/l
phosphate	0.99	0.90 mmol/l
albumin	40	41 g/l
alk. phos	114	128 IU/l

Discussion

Despite the higher risk for hypercalcaemia in this elderly population of which two thirds are female, and the association between raised calcium and psychiatric symptoms, the prevalence in psychogeriatric patients was little above that found in unselected medical outpatients, or the general population.

In the four cases detected, it is unlikely that raised serum calcium was relevant to the mental state in case 1 and it is difficult to establish the significance of hypercalcaemia retrospectively in the remainder. In case 2 the refusal to eat and drink most probably caused the chronic dehydration and haemoconcentration. Despite a continuing raised calcium the patient with Paget's disease (case 3) continued well at 2 year follow-up, albeit on maintenance phenothiazines. However, in case 4, the comparatively long history of depression apparently resistant to treatment, in a patient with two consecutively raised calcium levels, certainly raises the possibility of a relationship. Whilst the normal phosphate values do not exclude hyperparathyroidism, more detailed investigation would have been required to make the diagnosis. Alternatively, this finding may be quite coincidental. None of these patients had a history of urolithiasis or gastro-intestinal problems.

It is clear that patterns of physical symptoms in patients with hypercalcaemia detected by screening differ considerably from those described as presenting features of the condition. Classical features of

'bones, stones and abdominal groans' are often replaced by a range of non-specific symptoms or, in 50 per cent of cases, by no symptoms at all (Mundy *et al*, 1980). The same may be true of psychiatric symptoms: the Mayo Clinic study of routinely detected patients (Heath *et al*, 1980) reported emotional disorders ('depression, severe neurosis and psychosis') in 20 per cent of cases. It is not clear, however, what proportion of such symptoms are coincidental and, in the absence of specified diagnostic criteria, how much may simply reflect minor psychiatric morbidity in an elderly population. It is also not clear when such symptoms respond to traditional psychiatric treatments and when a reduction in calcium (e.g. by parathyroidectomy) is desirable. We certainly cannot extrapolate from studies of patients showing symptoms at presentation to those identified by screening (Leader *BMJ*, 1980). The significance of psychiatric symptoms in deciding about surgical intervention can only be investigated by a larger prospective survey, at present being undertaken.

Meanwhile, this study shows that cases of hypercalcaemia, undetected because of vague and non-specific physical symptoms, but with psychiatric manifestation, are not contributing significantly to the inpatient and day patient population of a busy psychogeriatric unit. This is reassuring for those centres without the services of a multi-channel analyser. However, in patients with resistant depression, especially with vague, non-specific symptoms and chronic malaise, the possibility of hypercalcaemia should always be considered. Similarly in acute confusional states with polyuria/polydipsia, and any case with a history of abdominal symptoms or urolithiasis, measurement of serum calcium continues to be mandatory.

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