

PREVALENCE OF HYPOCALCAEMIA AND HYPOPHOSPHATAEMIA IN THE ELDERLY MALES IN HARYANA

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Summary : Concentrations of serum calcium and inorganic phosphate and serum alkaline phosphatase activity have been determined in 75 males over the age of 60 years and 40 young adult controls. Serum calcium and inorganic phosphate levels were significantly lower in the elderly group. Serum calcium-inorganic phosphate product was below 30 in 36% of the aged individuals. Serum alkaline phosphatase activity was elevated in one subject only. These results indicate the existence of mild vitamin D deficiency in the elderly males in this region.

Key words : elderly males osteomalacia hypocalcaemia hypophosphataemia

INTRODUCTION

Hypocalcaemia, Hypophosphataemia (8) and even classic osteomalacia seem to occur frequently after the age of 60 years. These abnormalities have been attributed to dietary deficiency (6, 9) coupled with age-related malabsorption of Vitamin D (8) or a deterioration of renal function (3). However lack of solar exposure may also be an important factor since severe forms of the disorder are seen chiefly in women (6, 9) and most of the reports have originated from countries with limited sunshine (1, 2, 6, 9). This study was conducted to find out the incidence of abnormalities in blood chemistry and clinical osteomalacia amongst the elderly males residing in the sunny climate of Haryana.

MATERIAL AND METHOD

The study was conducted in 75 males aged 60-85 years (mean age 73 years) admitted to the wards for the elective surgical treatment of benign hypertrophy of the prostate. The subjects were physically active and were living with their children. 40 young adult males (mean age 28 years) admitted to the wards for minor surgical procedures were investigated to serve as controls. The dietary intake of the subjects in both the groups did not exceed 30 I.u. vitamin D per day. All the subjects were Hindus and residents of Haryana State (Latitude 27° to 30° N) where sunshine is available practically

throughout the year. The subjects were investigated during the months of May to December. Serum was analysed for calcium by oxalate permanganate procedure (18), inorganic phosphate by the method of Fiske and Subbarow (18), alkaline phosphatase by the method of King and King (19), and creatinine by the alkaline piorate method (18). Serum calcium values were corrected to the specific gravity of 1.027 (7). The pelvis and the dorsolumbar spine were radiologically examined for the evience of osteomalacia.

RESULTS

Compared to young adults, serum calcium and inorganic phosphate levels were significantly lower in the aged (Table I). Serum calcium level was below 9.0 mg% in 15 subjects (20%) and serum calcium inorganic phosphate product was below 30 in

TABLE I : Serum calcium, phosphate and alkaline phosphatase in the elderly and young adult male subjects (Mean \pm SD).

	Young adult (n=40)	Elderly n=75	P value
Serum calcium (mg%)	10.07 \pm 0.52	9.21 \pm 0.62	<0.001
Serum inorganic phosphate (mg%)	3.90 \pm 0.61	3.55 \pm 0.78	<0.01
Serum alkaline phosphatase (KAU%)	8.42 \pm 2.38	8.39 \pm 2.97	>0.1
Serum creatinine (mg%)	0.95 \pm 0.10	1.58 \pm 0.65	>0.001

Normal range : Calcium 9.0–11.0 mg%; inorganic phosphate 2.5–5.0 mg%; SAP, 5.0–13. KAU%; creatinine 0.5–1.3 mg%.

TABLE II : Distribution of serum calcium–inorganic phosphate product in 75 elderly and 40 young adult males.

	Elderly (%)	Young adult (%)
Calcium–inorganic phosphate product		
>34	36	80
30–34	28	17
25–29	24	3
<25	12	0

36% of the aged individuals (Table II). Serum alkaline phosphatase activity was greater than 13 KAU% in one old man but the mean enzyme activity in the aged was not significantly different from the young individuals. Serum creatinine levels were significantly greater in the aged (Table I). However, no correlation was observed between the elevated serum creatinine levels and serum calcium-phosphate product ($r=0.1$). Radiological evidence of mild to moderate degree of osteoporosis was present in 40% of the aged individuals but there was no evidence of osteomalacia in any of them.

DISCUSSION

Numerous studies have shown diminished intake of the various nutrients including vitamin D in the elderly (14). Age dependent reduction in the absorptive capacity of the intestine has also been reported (5, 10). These factors may explain the significantly lower serum calcium and inorganic phosphate levels (grade I osteomalacia) observed by us in the elderly males. In the tropical climate of Jerusalem, however, Guggenheim *et al.* (11) failed to observe any significant difference in blood chemistry or serum 25-hydroxycholecalciferol between the elderly and young individuals of either sex. On the other hand, clinical (grade IV) osteomalacia (1, 2, 6, 9) and significantly lower serum 25-hydroxy-cholecalciferol levels (13, 15, 16) have been reported in the aged in the temperate climate. The regional variations in the severity of vitamin D deficiency in the elderly indicate that the disorder may be chiefly due to an age-related decrease in the out door activity leading to diminished cutaneous production of the vitamin. This factor would be critically important in countries with limited sunshine. The work of Haddad and Hahn (12) has shown that solar exposure rather than dietary intake is the chief source of vitamin D in most of the world communities. Greater incidence of severe senile osteomalacia reported in the females (2, 6, 9) may also be due to their tendency to remain indoors.

In view of the role of the kidney in the production of 1, 25-dihydroxycholecalciferol, lower serum calcium-phosphate product observed in this study in the elderly may possibly be due to the reduction in the nephron mass known to occur in old age (17). An inverse correlation between creatinine clearance and circulating parathormone level has been reported in elderly individuals (4). Although renal function was depressed in our old subjects (Table I), no correlation could be detected between low serum calcium-phosphate product and serum creatinine levels.

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