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BONE MINERAL LOSSES IN ALCOHOLICS

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Bone mineral measurements were performed at five skeletal sites in seven alcoholics. The mean annual loss of bone mineral in alcoholics was about 2 per cent higher than that of controls.

Key words: osteoporosis; bone mineral; alcoholics; photon attenuation measurement

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Alcoholics have a high incidence of fractures (Nilsson 1970). This fact may be explained by an increased exposure to trauma. It is also possible that the increased incidence of fractures in alcoholics is caused by bone fragility since they have a reduced bone mass as compared with controls (Saville 1965, Nilsson & Westlin 1973, Dalén & Feldreich 1974).

The purpose of the investigation presented here was to study quantitatively the bone mineral losses in different parts of the skeleton in a number of alcoholics.

MATERIAL AND METHODS

The change in bone mineral content was determined by X-ray spectrophotometry (Jacobson 1964, Gustafsson et al. 1974, Dalén & Jacobson 1974). By this method the amount of bone mineral in the radiation beam is measured per unit area (mg/mm^2). By scanning over a site of the skeleton a profile of the mineral content is obtained and the mineral content per unit length of the bone (mg/mm) is automatically calculated. Soft tissue absorption is compensated for by using two radiation energies.

Measurements were made at five sites: distal radius and ulna, femoral neck, femoral shaft and calcaneus (Dalén & Jacobson 1974). The follow-up time was 43.0 months (S.D. = 1.9) for the alcoholics and 43.1 months (S.D. = 1.5) for the controls.

The investigation was conducted on seven patients at the Alcoholic Research Clinic, Karolinska Sjukhuset, Stockholm, and on seven age-matched controls. The patient selection was limited to middle-age subjects in whom the period of excessive alcohol consumption varied from 7–40 years. The patients were included in a group described earlier by Dalén & Feldreich (1974). They were not socially deprived and none had undergone gastric resection. The mean age for the alcoholics at the end of the follow-up time was 55.9 years (S.D. = 4.2) and for the controls 56.3 years (S.D. = 4.1).

RESULTS

The bone mineral content in the alcoholics and the controls at the end of the investigation is given in Table 1. At all five skeletal sites the bone mineral content in the alcoholics was decreased as compared with the controls (Table 2).

DISCUSSION

Alcoholics were found to lose bone mineral and the result is in accordance with

Table 1. Bone mineral content in alcoholics and controls at the end of the investigation. The deviation in the alcoholics is expressed as a percentage of the mean value for the controls.

	Controls (mg/mm)		Alcoholics (mg/mm)		Deviation per cent	t-value	*P*
	Mean	S.D.	Mean	S.D.			
Radius + ulna, distal	185	39	171	38	− 7.7	0.7	> 0.05
Radius + ulna, shaft	246	34	233	25	− 5.2	0.8	> 0.05
Femur, neck	348	51	336	17	− 3.6	0.6	> 0.05
Femur, shaft	594	42	547	32	− 8.0	2.4	< 0.05
Calcaneus	323	49	239	45	− 25.9	3.3	< 0.05

previous observations (Saville 1965, Nilsson & Westlin 1973, Dalén & Feldreich 1974). The loss of bone mineral was of the same magnitude as in postmenopausal women (Dalén & Lamke, to be published). Since the fracture incidence is greatly increased after menopause (Alffram & Bauer 1962) it appears reasonable to assume that the bone mineral losses found will lead to a weakening of the skeleton.

Table 2. Annual loss of bone mineral in alcoholics as compared with controls.

	Percentage loss	t-value	*P*
Radius + ulna, distal	− 0.2	0.1	> 0.05
Radius + ulna, shaft	− 2.5	2.0	> 0.05
Femur, neck	− 0.7	0.5	> 0.05
Femur, shaft	− 2.1	1.7	> 0.05
Calcaneus	− 3.4	3.4	< 0.05
Mean of sites	− 2.3	2.5	< 0.05

The effect of alcohol on the skeleton has been experimentally studied by Saville & Lieber (1965). Ethanol-fed rats were found to have a low bone density as compared with that of controls. The difference in bone density could be explained by difference in weight. Ethanol was therefore interpreted to have an unspecific effect on the skeleton acting as an inhibiting factor on growth.

Little is known of the mechanism in man. A relationship between bone mass and variables such as physical activity (Dalén & Feldreich 1974) and nutrition (Lowe & Labbate 1970) has been found in alcoholics. Other possible factors are endocrine imbalance and impairment of the D-vitamin metabolism due to liver cirrhosis. Many alcoholics develop peptic ulcers and have undergone gastric resection which will contribute to bone mineral losses (Nilsson & Westlin 1972).

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