Measurement of Calcaneus Bone Mineral Density Using the Osteoanalyzer Model SPXHA 110 in Patients Receiving Hemodialysis

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dialysis. A cross-sectional comparison of data from the right and left feet was performed.

Calcaneus BMD had a tendency to decrease in patients receiving dialytic therapy compared to the control group (fig. 1, 2). Duration of dialytic therapy was not correlated with %BMD in males ($r = -0.091$). The duration of dialytic therapy was correlated with %BMD in females ($r = +0.476$). Age was not correlated with %BMD in males ($r = -0.01$). In females, it was weakly correlated ($r = -0.245$). HS-parathyroid hormone and %BMD were

Dear Sir,

A review of the literature failed to reveal any previous reports of a measurement of calcaneus bone mineral density (BMD) using an osteoanalyzer (single-energy X-ray absorptiometry). If dual-energy X-ray absorptiometry is used in this measurement, it will need more than 20 min to set up and measure a patient. In this study, calcaneus BMD was measured in patients undergoing hemodialysis therapy. The results were examined according to various clinical parameters and compared with BMD observed among subjects in the control group. The control data on women were obtained from Matsumoto Medical Instruments Inc., Osaka, Japan, and those on men were taken from Katagiri et al. [1]. Thirteen males (mean age 58.2 ± 8.9 years; range 41-71 years) with a mean duration of dialytic therapy of 2.7 ± 2.6 years and 11 females (mean age 56.9 ± 10.1 years; range 42-74 years) with a mean duration of dialytic therapy of 6.3 ± 4.1 years were evaluated. Calcaneus BMD were measured, and the results were expressed as a percentage of the corresponding normal values (%BMD) according to gender and age. %BMD of patients on dialytic therapy was examined according to the following parameters: duration of hemodialysis, age, HS-parathyroid hormone (male $6,754 \pm 6,098$, female $4,909 \pm 2,875$, our normal range 160-520 pg/ml) and alkaline leukocyte phosphatase (13 males 87 ± 31 , 10 females 94 ± 41 , our normal range 30 ± 130 IU/l, 1 female had a reduced level due to hepatitis). BMD was also used in a control group and compared with those from patients on hemo-

700 γ

600

Ne 800 0

-0.2
 S
 Q 400
 2
 0
 300
 HD duration ■ Less than 5 years • 5-10 years
 -a- +SD -»- Mean
 -SD
 200
 20-29 30-39
 0-49 50-59 60-69 70-79 Age (years)

Fig. 1. BMD of os calcis of male hemodialysis (HD) patients.

not correlated in males ($r = -0.016$). In females, they were correlated ($r = -0.587$). Alkaline leukocyte phosphatase and %BMD were weakly correlated ($r = -0.268$) in males. In females, the correlation was also weak ($r = -0.320$). There were no significant differences as examined by the t test in BMD between the left and right feet in both males and females.

Measurement of calcaneus BMD using an osteoanalyzer is useful for the following reasons. Compared to measurements of radial

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600

HD duration ■ Less than 5 years □ 6-10 years ▲ More than 11 years

Fig. 2. BMD of os calcis of female hemodialysis (HD) patients. The cases that touch the lowest line include those who had BMD of less than 200 mg/cm².

25 30 35 40 45

Age (years)

T- I- " " " " T- *

55 60 65 70 75

BMD using the single-photon absorptiometry by an other type of machine and of the femoral head/lumbar vertebrae using dual-energy X-ray absorptiometry, the calcaneus BMD measurements by the osteoanalyzer are much easier to perform within 5 min, and it can also determine the radial BMD. Almost no radiation exposure is necessary. The equipment used for the measurements is less costly. Measurements can be repeated three times a year in Japan. Since the calcaneus bone is 95% cavernous, changes due to pathological processes and the effects of therapy are rapidly observed. The measured values are highly reliable because spinal processes, blood vessels and soft tissues are relatively scant in the calcaneus region compared to other measurable regions. Our data of this time suggest that the bone of females on he-modialysis is more weak than that of males because most of the bone mineral parameters had a worse correlation compared with those of males. It might have a relation with menopause.

From our findings, we conclude that the measurement of calcaneus BMD using an osteoanalyzer is useful in the evaluation of renal osteodystrophy, not only osteoporosis.

References

1 Katagiri H, Yamamoto K, Kishimoto H, Hagino H, Kagawa T, Okano T, Tsuda K: Bone mineral measurement of calcaneus by osteoanalyzer -preliminary study. West Jpn Soc Orthop Traumatol 1993;42:357-359.

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