H83 The Effects of Ethanol Abuse on Bone Mineral Density in the Proximal Femur

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After attending this presentation, attendees will have a better understanding of secondary osteoporosis and the relationship between bone mineral density and alcoholism.

This presentation will impact the forensic community by explaining that the results of this study using ANOVA showed no significant difference between the BMD of ethanol abusers and the control group. The authors conclude that it is preemptive at best to state whether or not a skeleton with a younger age and bone de-mineralization was possibly alcoholic.

This research explores the effects of alcoholism on bone mineral density of the proximal femur using dual energy X-ray absorptiometry (DEXA). The clinical consequences of excessive alcohol consumption have been well documented in the medical literature. The goal of this research is to test the assumption that bones from a sample of known ethanol abusers will have reduced bone density compared to an age-matched control sample.

Due to confounding effects of alcohol related illnesses, research evaluating the changes in bone density related to chronic ethanolism has been limited. Moreover, population-based analyses of alcohol-related bone loss are hindered by a lack of control for patient ages, sex and age specific hormonal effects, variability in the duration and patterns of alcohol abuse, and questionable self-reporting, which yield obscured and contradictory results.

Purportedly, it is common knowledge among forensic anthropologists that chronic alcoholics frequently present characteristics similar to those observed in individuals of advanced age or “osteoporotic” skeletons. This information is often inherited from mentors or practically acquired while working with skeletal collections for which medical history is reported or in similar “known” contexts. Alcoholism has received little attention in discussions of forensic anthropological method and theory. A recent literature review of AJPA and JFS shows an absence of empirical investigation and published documentations. As a result, suggestions of alcoholism are commonly relegated to side notes (*possible alcoholic?*). For example, the assessed age indicators do not warrant an assignment of “old age” for the unknown individual and do not support age-related diagnosis for the skeletal demineralization, especially if pathological explanations are not logical.

The sample consists of the femora of 35 white males from the William M. Bass Donated Skeletal Collection at the University of Tennessee, Knoxville between the ages of 20 and 70 years old. Fifteen of the males reportedly suffered from alcoholism. This collection offers a unique opportunity to study skeletons known individuals with medical histories. Only males were sampled in order to reduce the effect of sex- specific risks typically found in the female skeleton. Due to the small sample of ethanol abusers, the control sample is age-matched. DEXA is a simple and inexpensive means of establishing bone mineral content (BMC) and bone mineral density (BMD = BMC/area) at different regions of the body. Each femur was placed in a plastic container filled with dry white rice to a depth of approximately 12 cm. The rice served as a soft-tissue density equivalent for the DEXA scans, as suggested by GE, the producer of the DEXA Lunar scanner. A 2 cm thick cube of low- density foam was placed under the lesser trochanter to approximate anatomical position. Standard measurements of bone mineral density (BMD)(g/cm2) were calculated automatically for the femoral neck, Ward’s triangle, the greater trochanter, proximal shaft and total BMD.

The results of this study using ANOVA showed no significant difference between the BMD of ethanol abusers and the control group. The authors conclude that it is preemptive at best to state whether or not a skeleton with a younger age and bone de-mineralization was possibly alcoholic. There exist too many confounding factors related to chronic alcohol abuse to clearly state whether loss of bone mineral density is the direct result. Confounding variables include the effects of body mass, nutritional deficiencies and hormone balance, among others. For clinical applications, it is important to predict osteoporotic fracture and for the development of orthopedic devices. Bone density analysis may be of interest to forensic anthropology and bioarcheology in order to individuate human skeletal remains for other purposes, but low BMD does not conclusively suggest alcoholism in the current study.

Alcoholism, Bone Mineral Density, DEXA

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