A BIOMECHANICAL INVESTIGATION OF POSTCRANIAL SKELETAL SPECIMENS OF THE PEOPLE IN WADI FAYNAN

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Thesis for Master Degree
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Physical Anthropology
at
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Under the Supervision
of
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Abstract

Biomechanics - “the application of engineering principles to biological material” exemplifies a substantial mean in the comprehension of skeletal morphology inherent within the contextual mechanical environment. The present research utilizes a relatively new radiographic technique (computerized tomographic scanning) for image reconstruction purposes regarding three dimensional objects, in the studies case, long bone diaphyseal cross-sections.

Geometric properties reveal important structural mechanical functions of the femora, tibiae and humeri among a late Roman/early Byzantine enslaved copper mining population in southern Jordan. Femoral and humeral CA, TA, and J Values indicate no nutritional deprivation complications among the Wadi Faynan male or female populace. In fact CA values, in some cases, exceed other prehistoric population CA values.

Imax/Imin ratios in the femora and tibiae, propose a confined population that has undergone extreme bending and torsion load forces most probably due to the climbing of in and out of mines carrying heavy loads.
The significant increase in TA and J values of the femora and humeri, even after standardization for bone length differences, reinforce Imax/Imin values substantiating the fact that mechanical loadings were localized in the upper limbs. The implication of the consequential elevation of upper body strength is most likely due to the pulling, pounding and lifting involved in mining activities the people of Wadi Faynan engaged in.

Humeral bilateral asymmetry percentage differences of cross-section properties confirm that females, at least for the sample population, engaged in similar manual labor activities, hence, a decline in sexual dimorphism.

The unusual high mortality rate of young individuals, between the ages of 20-29, has been suggested to be the result of exposure to severe environmental pollutants in addition to dysentery, parasitic, psychological and other physically harmful environmental conditions present among the subjugated people of Wadi Faynan.