Preservation or Excavation?

An ongoing discussion in bioarchaeology is the extent to which differential preservation of subadult versus adult bones affects the composition of the excavated collection. This question is relevant because differential preservation might cause a bias in the sample. In human osteoarchaeology it is sometimes argued that intrinsic bone properties of subadults and old adults cause differences in preservation making them less likely to be preserved in the archaeological record (Lewis 2007, 21). Alternatively, it is possible that poor excavation techniques cause a low number of subadults to be recovered (Lewis 2007, 26, 30). In this research a Dutch skeletal collection is used to investigate if there is a difference in preservation between adults and subadults and what this difference is caused by.

Methods

To add to this discussion, material from the 17th to 19th century Dutch cemetery Middenbeek is examined. Seven age groups with ages from before birth to over 50 years were established as can be seen in table 1. 49 individuals were randomly selected from the excavation sample (n=450) so that each age group contained seven individuals. The skeleton was examined for traces of damage caused by external factors, their completeness, and fragmentation. Weathering was assessed using the method by Fehrenbacher (1978). The epiphyses, metaphyses and diaphyses of long bones were examined separately for all age groups. The completeness of the metaphyses and epiphyses was compared between the age groups. The shafts of the long bones were examined separately for the age groups.

Results

Results show that subadults under the age of three were significantly more complete and more poorly preserved than older subadults and adults (figure 1). Old adults were not significantly different in terms of completeness or preservation. Epiphyses are significantly more poorly preserved in children under three years (figure 2). Long bone diaphyses were significantly better preserved than the metaphyses and epiphyses, and this is much more pronounced in subadults under three years of age (figure 3).

No difference in excavation damage was seen between the groups. Therefore, it is proposed that these differences are caused by the intrinsic properties of the bone in young subadults, and not by excavation damage. Intrinsic bone properties causing the remains of young subadults to be less complete and well preserved include higher porosity (Currey 1979, 461), lower percentage of hydroxyapatite (Nielsen 2002, 440), larger surface-to-volume ratio (Von Endt and Ortner 1984, 252), and lack of fusion (Morton and Lord 2002, 156).

Conclusion

This research supports the view that subadults are not as well preserved as adults because degradation effects are more pronounced (Gay et al. 1997, Bello et al. 2006, Djuric et al. 2011). Especially the remains of children under three years are significantly more poorly preserved. Degradation processes have a stronger impact on the long bones of this age group than on those of older individuals. To improve the recovery of children under two years old, excavations where such remains can be expected should be conducted more carefully to make sure that the few bones that are still present are recovered.