Burning Up and Breaking Up: Understanding Heat-Induced Bone Modifications in a Hungarian Bronze Age Cemetery

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Introduction and Background

In some archaeological sites from Eastern Hungary, there is evidence of a shift to more complex societal structures during the Middle Bronze Age (Kristiansen, 1999, Duffy et al, 2014). Over the past several years, the *Bronze Age Körös Off-Tell Archaeology* (BAKOTA) project has examined evidence for social differentiation in a Bronze Age population from the Körös region of Eastern Hungary, where mortuary data had been previously unavailable.

Prior to the 2018 research season, the team excavated 68 human burials from the Békés 103 Cemetery site (Paja et al, 2016, Duffy et al, 2019) in order to better understand the mortuary customs of this population. This poster focuses on one method of analysis by examining the state of the body prior to cremation as indicated by the presence of some heat-induced bone modifications (Symes et al, 2015).

Previous research into heat-induced fractures indicates that curved transverse fractures and warping may be indicative of whether a body is fleshed or defleshed prior to cremation (Buikstra and Swegle, 1989). Curved transverse fractures occur as muscle shrinks during burning and is most apparent on the diaphyses of long bones (Gonçalves et al, 2014). Warping results from a structural collapse of the bone. Both of these occur more commonly when fleshed bodies burn. In this study, we compare burials across age groups to assess whether differences in pre-burning conditions exist between subadults and adults.

Materials & Methods

Fracture data were collected from 19 human burials (HB) from the Békés 103 site. From each burial, a sample of bones were identified, which included all diagnostic elements, all fragments over 5 cm, and a 20% sample of the other skeletal pieces (following Bontrager and Nawrocki, 2015). For this study, only fragments that could be identified specifically as cranial or postcranial were examined because different fractures are present in different parts of the body. For cranial fragments, delamination, patina, warping, curved tissue regression, and linear fractures are most common. For postcranial fragments, the fractures also include delamination, patina, and warping (Figure 1), but also longitudinal, non-directional, straight transverse, and curved transverse fractures (Figures 2 and 3) (Symes et al, 2015).

Each bone fragment was scored based on the presence or absence of various fractures. If it was not able to be determined, the fracture would be scored as "not scorable." Data recorded as "not scorable" are not included in the final analysis.

Of the 19 burials scored, 13 are adults, 5 are subadults, and 1 is of an indeterminate age. For this poster, we chose not to include "subadult" burials that were associated with the broad age range of 13-19 because of the morphological ambiguity. Because of this, 11 adults (20+) and 3 subadult burials (younger than 12) (total n = 14) are considered in this analysis. The HBs excluded because of age ambiguity are HB 12, 17, and 51. We also excluded HBs 8 and 21 (HB 8 was found to be a double burial including two sets of remains, and there was an issue with the completeness of our dataset for HB 21). Data were collected by two different researchers in two different field seasons (Table 1).

This analysis focuses on curved transverse fractures and warping because these types of fractures are most indicative of a body's pre-incineration state (Gonçalves et al, 2011). Only postcranial elements were analyzed, as sample size was too small to examine warping in cranial elements. The null hypothesis used for statistical analysis is that there are no differences in the presence of warping or curved transverse fractures between adults and subadults. This hypothesis reflects the current trend in the burials at large, which are all cremated regardless of age. In this analysis, we wanted to further examine this funerary ritual by analyzing to what extent the trend exists across broad age groups.

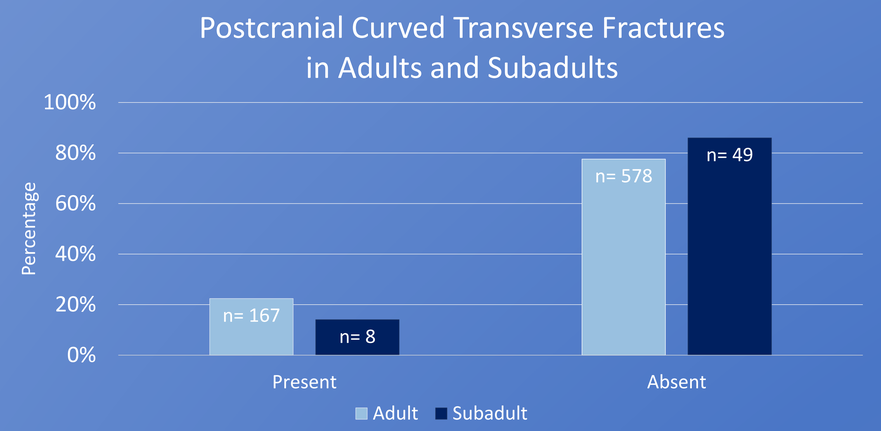

Figure 4: Chart representing the comparison between subadult and adult postcranial curved transverse fractures.

Figure 1: Example of warping from a postcranial scapula from HB 8

Figure 2: Example of curved transverse fractures in a postcranial long bone from HB 9

Figure 3: Example of curved transverse fractures in a postcranial long bone from HB 9

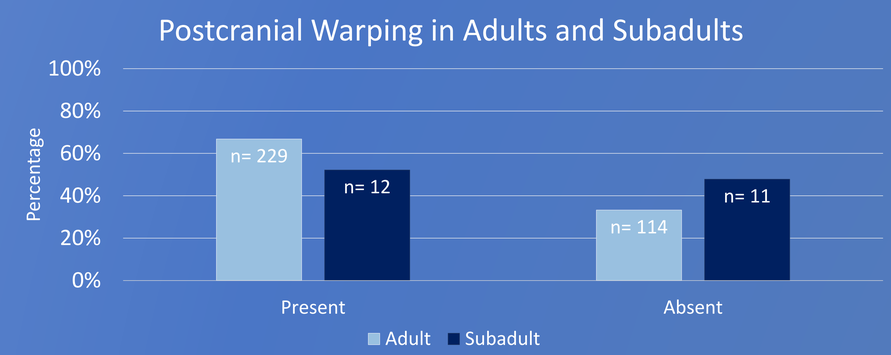

Figure 5: Chart representing the comparison between the presence of postcranial warping in adult and subadult burials.

Human Burials Scored for Fractures by Year

2016				2018			Both	
21*	46	47	48	6	8*	9	10	11
49	50	51*	53	17*	28	41	12*	13
54								

Table 1: Table indicating year that data were collected for each human burial in this study. The data from 2016 were collected by previous participant Audrey Choi. The data from 2018 were collected by author Crystina Friese. The 4 human burials scored in both years include data scored from both participants. The asterisks indicate which burials are excluded from this analysis.

Results

There was no difference between subadults and adults for presence of curved transverse fractures (χ^2= 1.72, df= 1, p < 0.1897) (Figure 4), nor was there a difference in warping between the two age groups (χ^2= 1.44, df= 1, p < 0.2301) (Figure 5).

Discussion and Conclusion

Our results have implications for how adults and subadults were treated in death within this society. Based on the lack of statistically significant differences based on age, we can tentatively conclude that subadults and adults were given similar burial rituals when the bodies were cremated. This may indicate that younger people had identities of personhood similar to adults.

The idea of personhood describes the relationship in both life and death between an individual and the society in which they live (Cerezo-Román, 2014). Funerary rituals are directly linked to social status during life, and age can be an important factor that societies use to define personhood. For example, in cemeteries of the nearby Bronze Age Maros culture, subadults under the age of 4 were not buried in cemeteries (O'Shea, 1995). In the Békés 103 cemetery, 15% of the 68 burials excavated are under the age of 4, with an additional 13% of burials under 6 (Paja et al, 2016). Some of these subadult burials are so young that they may have died at or around birth. Given the presence of all age categories in the Békés 103 cemetery, and the results from this study, we hypothesize that age was not used to determine the type of burial ritual or the way the body was burned.

With that being said, there are many factors that can obscure this conclusion. The absence of statistically significant differences between adults and subadults can also result from a small sample size. With a total of 3 subadult burials and 11 adult burials, the comparison may be skewed. The results could also be impacted by the state of preservation of most of the burials. Most fragments are less than 5cm in length and can be difficult to determine which fractures are present with certainty. For instance, warping is more difficult to definitively identify with such small fragments and was scored more conservatively.

As the number of excavated burials increases with subsequent field seasons, more data will be collected to have comparable sample sizes across different demographics, such as sex or specific subcategories of age. A larger sample size will help us gain a better understanding of the social structure within the Békés 103 cemetery.

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