Key points:

1. The research focuses on understanding heat-induced bone modifications in a Hungarian Bronze Age Cemetery.
2. The study examines 68 human burials from the Békés 103 Cemetery site.
3. The research questions the presence of heat-induced bone modifications, specifically warped fractures and warping.
4. The research uses statistical analysis to determine the presence of these modifications.
5. The study concludes that there was no difference between subadults and adults for the presence of curved transverse fractures.

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, Duffly et al., 2014). Over the past several years, the Bronze Age Körösfő Tell Archaeological Project (BAKOTA) project has examined evidence for social differentiation in a Bronze Age population from the Körösfő 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, Duffly et al., 2019) in order to better understand the mortuary customs of this population. The 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 (Bulukota and Szewie, 1989). Curved transverse fractures may also be a result of mechanical stress as muscle striations during burning and is most apparent on the distal ends of long bones (Goncalves et al., 2014). Warping results from a structural collapse of the bone. Both of these occur more commonly when fleshed bodies burn in this type of fire. 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 fractures over 5 cm, and a 20% sample of the other skeletal pieces (Following Bontrager and Nauwroks, 2015). For this study, only fractures 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 repair, 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 scorabe” data recorded as “not scorabe” 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 13) 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-cremation 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 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.

Discussion and Conclusion

Our results have implications for how adults and subadults were treated in death within the region and may provide further evidence for the hypothesis that bone warping has been used as a method of distinguishing age at death. Future research will examine the increase in warping at age 4, with an additional 13% of burials under 4 (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.

References

We also would like to thank Audrey Choi for her data collection in the 2016 BAKOTA research season.

Acknowledgments

We would also like to thank the National Science Foundation (Grant No. 1462304) for its support of this project, and Quinnipiac University for helping us make this research possible.

We also would like to thank Audrey Choi for her data collection in the 2016 BAKOTA research season.

Table 1

| Burials Scored for Fractures by Year | Human Burials | 2016 | 2018 | Both |
|-----------------------------------|-------------|------|------|-----|---|
| 21*                               | 46          | 47   | 48   | 6   | 8*  | 9  | 10  | 11  | 12* | 13  | 54  |