

Chapter 7 Case Study (7.4, 7.4.1, 7.4.2): Dental Wear in South Australian Hunter-Gatherers

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Dental wear studies provide information regarding diet and behavior in past populations. Hunter-gatherer dentitions are often characterized by a high rate of macrowear owing to their diets, food preparation methods, and extramasticatory use of teeth. Small sample sizes lacking specific provenience data have often made it difficult to assess patterns or differences in dental wear of hunter-gatherers on a regional scale. Judith Littleton and colleagues (2013) examined macrowear patterns on the dentitions of Southeastern Australian hunter-gatherers to investigate the extent of heterogeneity in dental wear throughout the region as well as possible causes of the heterogeneity. To do this, the researchers used two approaches to their dental wear analysis: examining the pattern of wear across the dentition and examining the degree of variability within samples. They hypothesized that there should be differences in wear patterns between riverine populations and mixed coastal/terrestrial groups.

Dentitions used in this study originated from Southeastern Australia, including the lower Murray River, the Adelaide Plains, and the Yorke Peninsula. This region is primarily semi-arid although there is variable access to water. Riverine populations, such as those along the Murray River, are thought to have had higher population densities than non-riverine populations, such as those on the Yorke Peninsula and in the Adelaide Plains, although available resources among riverine groups varied. The samples used in the study by Littleton and colleagues included 338 human dentitions from a twentieth-century collection of individuals, recovered as the result of erosion, construction, or other disturbances. The exact dates for most of the samples are unknown but believed to be within the last 3000 years. Estimations of age were primarily made to distinguish adult from subadult remains.

To test their hypothesis, the researchers used previously recorded wear data, as many of the original remains were repatriated and no longer accessible for analysis. Although those who initially recorded the dental wear data did so using different scoring systems, Littleton and colleagues were able to compare the wear among the three regional samples by matching wear descriptions from each method. The researchers conducted comparisons based on average degree of wear per tooth and individual patterns of wear. Gradients of wear were also assessed for males and females within each sample. Gradients were calculated by dividing the degree of wear of each tooth compared by the wear of the first molar, creating a percentage of wear. Analyses included comparisons of second molar to first molar, first premolar to first molar, and central incisor to first molar. Statistical analysis included T-tests for independence and univariate analysis of variance for multiple comparisons.

The results of this study demonstrated that all samples included examples of extreme dental wear with extensive dentine exposure. Samples from the Yorke Peninsula and the Adelaide Plains have similar, steep wear gradients. One of the samples from the Murray River area (Euston) had the lowest gradient of wear on the mandibles compared to all other samples. As a result, there is a statistically significant difference among the three samples for wear on mandibular teeth. Analysis of average degree of wear by tooth resulted in several important differences among the groups. For the Gillman sample from the Adelaide Plains area, male incisors are worn more extensively than male first molars, a pattern that is not observed in females. Additionally, females have steeper wear gradients than males, indicating faster wear of the first molar. In the Yorke Peninsula sample, there is less anterior wear compared to the posterior teeth. No sex differences are observed for this sample. In the Euston sample from the Murray River area, there is an even plane of wear on the dentitions.

This analysis demonstrates that comparing averages of dental wear between populations hides significant differences among the groups. By considering all teeth, systematic differences among the Australian samples were found. While there was substantial wear on the incisors and canines of males from the Murray River and Yorke Peninsula samples, there was a high degree of intra-individual variability. For some of the Murray River samples, females had high wear of their premolars, which may be related to extramasticatory functions, such as processing bulrush fibers. These patterns may be related in part to resource availability, resource choices, gendered dietary patterns, and sexual division of labor.

This study illustrates the utility of dental macrowear studies in assessing not only diet, but also behavior, in past populations. Moreover, examining intra-sample variability across the entire dentition provides a more nuanced assessment of wear patterns within and among populations of the same general region. Dental microwear and stable isotope analyses would complement these results and enable researchers to assess additional hypotheses related to the causes of the observed dental wear patterns.

Reference

Littleton J, Scott R, McFarlane G, Walshe K. 2013. Hunter-gatherer variability: Dental wear in South Australia. *American Journal of Physical Anthropology* 152:273-286.