Short Communication: Intra-Individual Microwear Variation: Deciduous versus Permanent Dentition

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ABSTRACT  This study compares microwear patterns on deciduous and permanent dentition within individuals. Number of features, total number of pits, mean pit breadth and mean scratch breadth are compared in 11 individuals aged 6-12 years. For each individual, the second deciduous molar and first permanent molar are used. Paired sample t-tests show no significant difference between deciduous and permanent enamel for any of the microwear features examined. This study suggests that differences in the physical and chemical structures of deciduous and permanent enamel are not sufficient to cause differences in microwear patterning. Any difference between juveniles and adults can be assumed to represent a true dietary difference rather than enamel structural differences. Dental Anthropology 23(2):66-68.

MATERIALS AND METHODS

A total of 11 individuals were chosen for the study; five from Hierakonpolis and six from Naqada. Both locations are Predynastic sites in Upper Egypt dating to 3,800-3,650 BC. The two sites have been shown to have similar diets (Greene, 2007). Individuals in this sample fell within the 6 to 12 year age range and had both a deciduous second molar and permanent first molar erupted and in occlusion. While most researchers use the mandibular left second molar (Gordon, 1982; Harom and Rose, 1988; Kay, 1987; Schmidt, 1998), deciduous molars would not be expected to remain in occlusion until the eruption of the second molar.

Casts of the teeth were prepared following Schmidt (1998). Casts were separated and given unique random numbers so the researcher did not know which teeth were a pair during study. Micrographs were taken of the Phase II wear facet (as defined by Kay, 1977). Images were obtained on an International Scientific Instruments (ISI-40) SEM at 500X magnification in the secondary emissions mode (Teaford and Walker, 1984; Teaford, 1984, 1991, 1994; Teaford et al., 1996). Images were transferred directly from the SEM to computer via an Iridium Digital Imaging System. A semi-automated computer program, Microwear 4.0 (Ungar, 2000), was used to analyze digital images of the tooth surface. Microwear characteristics examined include total number of features (pits and scratches), total number of pits, mean breadth of pits, and mean breadth of scratches (Table 1). Comparisons were made between the deciduous and permanent molar using paired-sample t-tests.
RESULTS AND DISCUSSION

The differences between the deciduous and permanent molar were generally small for all individuals. Figure 1 shows the deciduous and permanent dentitions with the greatest overall differences. The average feature tally differs by 13 features, with the majority differing by less than 10 features. The average pit tally differs by only five pits, with the majority differing by less than five. Mean pit breadth differs by 0.1 μm to 4.44 μm, with the majority differing by less than 2 μm. One individual was not included in the test for mean pit breadth because this individual did not exhibit any pits on the deciduous molar. Mean striation breadth differs by 0.29 μm to 8.58 μm, with the majority differing by less than 1 μm. Paired-samples t-tests showed no significant difference between the deciduous and permanent molars for any of the characteristics examined (Table 2).

The results of this study suggest that, despite some small differences, the deciduous and permanent enamel generally react the same way in regard to microwear features. Although the deciduous and permanent teeth were not identical in each individual, the differences were no greater than intertooth differences between first and second permanent molars of the same individual (Mahoney, 2006). Therefore, subadults with deciduous dentition can reasonably be included in population studies of microwear. Also, any difference in microwear patterns between juveniles and adults within a population should represent actual dietary differences rather than differences in enamel structure.

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LITERATURE CITED


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