Demonstrating an anthropological application of the Economides orthodontic collection: deciduous and permanent tooth size in European and Hispanic Americans

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Demonstrating an anthropological application of the Economides orthodontic collection: deciduous and permanent tooth size in European and Hispanic Americans

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Abstract

Deciduous, permanent, and photographic and physical materials are available in the Economides orthodontic collection. We present data on deciduous and permanent tooth size available in the collection, and provide examples of analyses that can be performed with this database. A number of topics are demonstrated, including comparisons of tooth size, age at first treatment, and sex. The database can be accessed at http://hsc.unm.edu/programs/ocfs.

In order to demonstrate just one of the myriad applications of this collection, we conducted comparing linear and area measurements of intra-individual serial dental models made, deciduous molars in one model can be compared to permanent molars in a later model. We developed two alternate hypotheses:

1) Correlations between deciduous and permanent measures are higher in European Americans than in Hispanic Americans. If European Americans are significantly more economically stable, they should be more developmentally stable and their deciduous tooth size should predict permanent tooth size more than Hispanic Americans.

2) Correlations between deciduous and permanent measures are higher in Hispanic Americans than in European Americans. If a hybrid population is significantly developmentally more stable than a less hybridized one, Hispanic American deciduous tooth size should better predict permanent tooth size than European Americans.

Materials and Methods

Two samples were drawn at random from subject records matching two criteria: 1) being either European American or Hispanic American, and 2) having serial dental models made that include deciduous and permanent teeth. An alternate hypothesis was developed for deciduous and permanent molar size comparisons in HA compared to EA first, higher tooth size correlations might indicate development stability in an older adult group (HA). Inversely, lower tooth size correlations might indicate developmental stability in a younger socioeconomically diverse group. Correlations range from -1 (EA m2 v. HA m2) to 0.72 (EA um1 v. HA um1). Overall, differences between HA and EA are not consistently significant, indicating that neither alternative hypothesis is in effect, tooth size in each sample (HA and EA) is independent.

Results

In 2003, the Maxwell Museum of Anthropology received a donation of patient records from James K. Economides, an Albuquerque, NM orthodontist. The donation consisted of complete records of all of Economides' patients (~5,615) who entered treatment between 1972-1999. Thanks to a grant from the National Library of Medicine, NLM, the collection is now available for research. A subset of the collection is available in an on-line database free of charge for research and teaching, including patient and treatment histories, diagnoses, demographic, intra-oral photographs (~400,000), and 2200 lateral cephalograms (~400,000). The physical collection, available for research in the Maxwell Museum includes additional resources, such as full facial and profile photographs and patient names. The development of this database received approval from the University of New Mexico Human Research Review Committee (protocol #05-410).

In order to demonstrate just one of the myriad applications of this collection, we conducted comparing linear and area measurements of intra-individual serial dental models made, deciduous molars in one model can be compared to permanent molars in a later model. We developed two alternate hypotheses:

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Results

Correlations ranged from -0.222 (EA mandibular m2 v. P4) to 0.718 (EA maxillary m2 v. M1). Three of the 36 correlations were significant results were in mandibular teeth. Three were in area measures, which is not surprising as area multiplies the chance of finding a correlation. Deciduous to permanent correlations were significantly higher in European Americans than in Hispanic Americans. Of course, this conclusion only pertains to these population samples, which reflect Albuquerque New Mexico 1972-1999.

Table 1. Demography of the collection.

<table>
<thead>
<tr>
<th>Ancestry</th>
<th>Approximate number*</th>
<th>Approximate percent*</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>9,273</td>
<td>15.4%</td>
</tr>
<tr>
<td>Asian American</td>
<td>9,273</td>
<td>15.4%</td>
</tr>
<tr>
<td>European American</td>
<td>22,024</td>
<td>36.8%</td>
</tr>
<tr>
<td>Hawaiian American</td>
<td>2,754</td>
<td>4.6%</td>
</tr>
<tr>
<td>Hispanic American</td>
<td>20,800</td>
<td>34.5%</td>
</tr>
<tr>
<td>Native American</td>
<td>1,000</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

Table 2. Correlations between measures of deciduous and permanent tooth measures for European and Hispanic Americans. Significant differences are shaded in orange.

<table>
<thead>
<tr>
<th></th>
<th>age at first treatment</th>
<th>Male</th>
<th>Female</th>
<th>sex</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>m1 v. M1</td>
<td>12.3</td>
<td>70</td>
<td>3920</td>
<td>3920</td>
<td>10000</td>
</tr>
<tr>
<td>p</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Table 3. Correlation results for one subject.