TEMPORAL TRENDS OF DENTAL DISEASE IN ANCIENT ECUADOR

ABSTRACT: Research conducted since 1973 on archeologically recovered samples of human remains from Ecuador has resulted in the published analysis of over 1000 skeletons from 10 different pre-European contact sites. The sites date from as early as 6000 B.C. to about the time of European contact. The cultural periods represented by these samples extend from the early pre-agricultural, pre-ceramic populations, through the subsistence shift to agriculture and include the latest periods of extensive agriculture and urbanism. The data available suggest a general decline in dental health through time, apparently resulting from subsistence change as well as a general increase in morbidity, likely related to increased sedentarism and population density.


Since 1973, I have collaborated with a multinational group of archaeologists and museum personnel in the excavation and analysis of prehistoric mortuary sites in Ecuador, South America (Ubelaker 1988a). This effort has resulted in the published analysis of over 1000 human skeletons from 10 different sites and the ongoing analysis of material from several others. These sites range in antiquity from as early as 6000 B.C. to about 1500 A.D. The earliest site, Sta. Elena from Guayas Province dates to about 6000 B.C. (Ubelaker 1983a) and yielded 192 skeletons from a pre-ceramic pre-agricultural population living on the coast. Other site samples include 199 from Cotocollao of the highlands dating from 1000 B.C. to 540 B.C. (Ubelaker 1980a) when subsistence included maize, potato and other agricultural products; 24 from the coastal site of La Libertad dating between 900 B.C. and 300 B.C. (Ubelaker 1988d), Engory culture; 30 skeletons from OGS-MA-172, a coastal Guayllabamba site dating to about 100 B.C. (Ubelaker 1983a); 106 skeletons from San Lorenzo de Jambeli culture dating from 500 B.C. to 500 A.D. (Ubelaker 1983b); 18 skeletons from La Tolita on the northern coast, dating from 90 A.D. to 190 A.D. (Ubelaker 1986c); 52 skeletons from the highland high status shaft tombs of La Florida, dating to about 340 A.D.; 51 skeletons from the non-urn component of Ayllan dating from between 300 B.C. and 1155 A.D. (Ubelaker 1981); 7 skeletons from the coastal Manteno site of Agua Blanca (Ubelaker 1986d), dating from 800 A.D. to 1500 A.D.; and 384 skeletons from the urn component of Ayllan, dating from 700 A.D. to 1700 A.D. (Ubelaker 1981).

Collectively, samples from these sites span the sweep of Ecuadorian history (Ubelaker 1984) and offer an opportunity to document aspects of variation and temporal change of morphological and morbidity factors and to correlate them with cultural events (Table 1). Such analysis suggests that levels of infectious disease, porotic hyperostosis and other indicators of morbidity were lowest within the earliest sample of Sta. Elena. All indicators of morbidity increase steadily in the later samples, apparently reflecting a temporal increase in sanitation problems associated with increasing population density and sedentarism.

Data collected on dental disease from these samples include dental hypoplasia, dental caries,
Table 1. Human skeletal samples from Ecuador utilized in study.

<table>
<thead>
<tr>
<th>Site</th>
<th>Date</th>
<th>Location (Province)</th>
<th>Culture</th>
<th>Approximate Number in Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aguas Blancas</td>
<td>800 A.D. – 1200 A.D.</td>
<td>Manabí</td>
<td>Manteno</td>
<td>7</td>
</tr>
<tr>
<td>Ayapel Urn</td>
<td>730 A.D. – 1270 A.D.</td>
<td>Guayas</td>
<td>Milingo</td>
<td>364</td>
</tr>
<tr>
<td>Ayapel Non-ur.</td>
<td>310 B.C. – 1155 A.D.</td>
<td>Guayas</td>
<td>Milingo</td>
<td>51</td>
</tr>
<tr>
<td>La Florida</td>
<td>380 A.D.</td>
<td>Pichincha</td>
<td>Cotocollao</td>
<td>52</td>
</tr>
<tr>
<td>Jama-cosque</td>
<td>200 B.C. – 800 A.D.</td>
<td>Manabí</td>
<td>Jama-cosque</td>
<td>1</td>
</tr>
<tr>
<td>La Tolita</td>
<td>90 A.D. – 190 A.D.</td>
<td>Ecuadórñas</td>
<td>Tola-Tevalo</td>
<td>18</td>
</tr>
<tr>
<td>OGS-MA-172</td>
<td>100 B.C.</td>
<td>Guayas</td>
<td>Guapule</td>
<td>30</td>
</tr>
<tr>
<td>La Libertad (OGSE-46)</td>
<td>900 B.C. – 200 B.C.</td>
<td>Guayas</td>
<td>Engoyé</td>
<td>24</td>
</tr>
<tr>
<td>Conocodao</td>
<td>1000 B.C. – 540 B.C.</td>
<td>Pichincha</td>
<td>Cotocollao</td>
<td>199</td>
</tr>
<tr>
<td>Sta. Elena</td>
<td>690 B.C.</td>
<td>Guayas</td>
<td>Guaynas</td>
<td>192</td>
</tr>
</tbody>
</table>

Comparative data on carious lesions from my research are presented as the percentage of fully formed permanent teeth with at least one carious lesion (Figure 2). The pattern is similar to that with hypoplasia data; early low frequency at Sta. Elena, an increase at about the time of Christ followed by a rapid decline and then a rapid increase again.

These data suggest a general increase in caries frequency with time in prehistoric Ecuador, but the correlation is much more complex than suggested by Turner. His reported frequency for the small Machalilla sample (14%) is the highest in prehistoric Ecuador. The absence of carious lesions with the small Machalilla C sample was also found with the small Agua Blanca sample which dates from the Late Integration Period and is derived from a population that surely practiced intensive agriculture. The frequencies at La Tolita (2%) and Cotocollao (3%) are also low for populations that date well into the agricultural period.

Another indicator of dental morbidity is the frequency of alveolar abscesses (Figure 3). These abscesses occur when some aspect of the pulp cavity becomes exposed, usually through crown loss due to attrition or carious destruction, and subsequently becomes infected. When the infection is prolonged, an abscess will form in the bone at the base of the tooth. In the absence of treatment, the abscess will lead to loss of the tooth with subsequent remodelling of the alveolus. Data on alveolar abscesses are expressed as the ratio of the number of alveolar abscesses in adults to the number of observations on abscess recorded (presence or absence) associated with permanent teeth. In these samples, the highest value is from La Tolita, followed by OGS-MA-172 and Cotocollao.

The high rate of dental attrition is the major factor influencing the formation of alveolar abscesses in these samples, although caries does contribute. Obviously, the age at death also is a factor, since the likelihood of attrition penetrating the pulp cavity increases with the age of the individual.

Antemortem loss of teeth is the ultimate product of most untreated dental disease. Data from the Ecuadorian samples (Figure 4) are expressed as the ratio of permanent teeth lost antemortem to the number of observations on the presence of permanent teeth (absent and present). The highest value comes from Guayanas at 0.40, followed by La Libertad. Again, the data are highly variable, but suggest a general increase from early low levels, until shortly before the time of Christ with subsequent reductions.

The new data available on skeletal biology of prehistoric Ecuador reveal some general trends and greater complexity than previously realized. Like other indicators of morbidity in the populations, the dental evidence suggests declining dental health through time. Deviations from this pattern may represent sampling problems, but most likely suggest complexity in the factors that contribute to dental problems. The long term shift in subsistence and settlement patterns toward agriculture, sedentism, and increased population density appears to have been accompanied by a general decline in health, mediated by local conditions and complicating factors. Additional research with augmented samples from Ecuador hopefully will clarify the dynamics of this process.

REFERENCES


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