CARIES FREQUENCY IN DECIDUOUS DENTITIONS OF PROTOHISTORIC EASTER ISLANDERS

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INTRODUCTION

Dental pathology studies of prehistoric and early historic populations have found the deciduous dentition to be less prone to caries than were permanent teeth of the same series (Brabant and Brabant 1962; Wells 1975). Consequently, dental decay is considered predominantly an adult disease in early groups. In populations dependent upon agriculture, however, dental decay often affected both adults and children. Agriculturally derived subsistence diets, rich in carbohydrates, promote an oral environment conducive to dental decay (Turner 1979).

Recent examination of a late prehistoric-early protohistoric (ca. A.D. 1700) skeletal sample from Easter Island showed a high percentage of permanent teeth affected by caries (Owsley, Mires and Gill n.d.). This archaeological series represents a self-sufficient island community whose horticultural subsistence economy is ethnographically described (Metraux 1940).

This study determined whether deciduous dentitions of the Easter Island collection were similarly affected by caries. Frequency of dental decay was determined by tooth type. An ethnohistoric approach was used to relate the frequency of carious teeth to foods available to the islanders. Data for children were contrasted with values for early continental European populations for comparative perspective.

Methods

A total of 121 deciduous teeth from 23 individuals were available for examination. This sample is part of the collection recently established by the 1981 Easter Island Anthropological Expedition (Gill 1981), and is curated at the Easter Island Museum, Easter Island, Chile.

Data were tabulated by individual and on a per tooth basis. The presence of at least one lesion on an erupted tooth determined coding as carious. Ages of children were determined using the tooth eruption standards of Schour and Massler (1944), and the Johnston (1962) standards for longitudinal bone growth. The patterning of lesions by tooth type was quantified to delineate which teeth were prone to caries at each age.

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	.5 - 2.5 yrs			2.5 - 4.5 yrs			4.5 - 9 yrs			10 - 14 yrs		
Maxilla	#	C	%	#	C	%	#	C	%	#	C	%
I_1	1	0	0.0	3	0	0.0	2	0	0.0	0	0	0.0
I_2	0	0	0.0	3	1	33.3	2	0	0.0	0	0	0.0
C	2	0	0.0	3	0	0.0	2	0	0.0	0	0	0.0
M_1	3	0	0.0	4	2	50.0	9	0	0.0	1	0	0.0
M_2	2	0	0.0	4	0	0.0	11	4	36.4	1	0	0.0
Total	8	0	0.0	17	3	17.6	26	4	15.4	2	0	0.0
Mandible												
I_1	4	0	0.0	5	0	0.0	2	0	0.0	0	0	0.0
I_2	0	0	0.0	4	0	0.0	2	0	0.0	0	0	0.0
C	3	0	0.0	4	1	25.0	3	0	0.0	0	0	0.0
M_1	7	2	0.0	7	3	42.9	6	2	33.3	0	0	0.0
M_2	5	0	0.0	8	3	37.5	6	2	33.3	2	1	50.0
Total	19	2	10.5	28	7	25.0	19	4	21.1	2	1	50.0

Table 1: Frequency of carious deciduous teeth (C) by age.

Results

The age distribution of dental decay by tooth type is shown in Table 1. The youngest age category, .5 to 2.5 years, had a low frequency of decay that involved only mandibular first molars. The 2.5 to 4.5 year age group had the highest incidence of carious teeth and different teeth were affected including the maxillary second incisor and first molar and the mandibular canine and first and second molars. In the 4.5 to 9 year age interval only the maxillary second molar and both mandibular molars displayed lesions. Among 10 to 14 year olds, only one remaining mandibular second molar was noted as carious.

Throughout each age interval, molars displayed the highest frequency of lesions. The mandibular arcade showed equal or higher percentages of caries per tooth relative to maxillary teeth. In pooling all ages and teeth, the subadult caries frequency was 17.3% (21/121). The use of the tooth rather than the person as the unit of measurement ignores the question of intra-oral correlation of caries experience. It therefore is useful to tabulate the number of individuals with decayed teeth at each age. The distribution was as follows: 0.5-2.5 years, 2 with decay, 6 total; 2.5-4.5 years, 4/5; 5-9 years, 4/8 and 10-14 years, 1/4. Approximately one-half (52.4%) of the children recovered with erupted deciduous teeth showed evidence of caries.

Comparative data for deciduous dentitions of early world populations are rare. Of note, however, is evidence that the Easter Island deciduous caries rate of 17.3% exceeds frequencies reported for European populations (Table 2).

Date	Location	Number of teeth examined	Percentage of teeth carious
Bronze Age	Hungary	-	5.0
Frankish	Ciply and Spy, Belgium	100	11.0
Frankish	Coxyde, Belgium	116	1.7
Frankish	Achet	134	5.9
Merovingian	Belgium	325	3.6
Merovingian	Germany	368	3.0
Slavic	Moravian	2082	2.7
Medieval	Sweden	129	5.4
Hunnish (after Wells 1975)	Mözs, Hungary	80	3.7
Easter Island	17-1800 A.D.	121	17.4

Table 2: Caries rates of deciduous teeth.

DISCUSSION

The frequency of dental pathology in the deciduous sample was high when compared with early Europeans. In an earlier study that examined the adult frequency of caries (27.1%) among Easter Islanders, the adult series was also above European values (Owsley, Mires and Gill n.d.). High frequencies of carious lesions in both the permanent and deciduous teeth of Easter Islanders probably is attributable to the diet of this island group.

The contact population depended on gathered and cultivated foods. Cultivated foods were predominant and included sweet potatoes, taro, yams, ti, sugar cane, bananas, gourds, turmeric, and arrowroot (Metraux 1940). The antiquity of these plants is uncertain, but according to legend the island founder, Hotu Matua, brought to Easter Island all plants formerly cultivated. The population sample examined in this study dates to A.D. 1700. The diet recorded for the contact population applies well to this archaeological sample.

The subsistence diet was dominated by high carbohydrate foods, which were baked in earth ovens and eaten unpounded. Processing required large quantities of fresh water which were scarce (Metraux 1940). To overcome the natural limitations of available fresh water, the natives used the sweet juices of the sugar cane stalk as a liquid subsistute. Up until the 1900s, islanders consumed quantities of the sweet juice to relieve thirst, expecially during journeys and at feasts (Metraux 1940). The high carbohydrate diet, with its sticky consistency, and the presence of a natural sugar that was heavily exploited, was conducive to a high caries rate for all age groups and tooth types among the islanders.

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