Short Communication

A Comparative Study of Caries Experience among Scottish, Nigerian and Japanese Children Aged 5 Years

スコットランド、ナイジェリアと日本の
5歳児における齲蝕罹患状態について

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Introduction

In recent years, deciduous dental caries has been reported to be decreasing in Japan. It is however claimed that dental caries prevalence in aged 4 or 5 years still remains at high level.

The aim of this paper is to compare the deciduous dental caries experience of 5 year-old children among the three countries Scotland, Nigeria and Japan.

Subjects and methods

The Japanese data were collected at OHYA nursery school in MOTOYOSHI, MIYAGI in May 1989. MOTOYOSHI is located on the east coast of the north-eastern part of HONSHU (the main island of Japan). Comparative dental examinations were also carried out in March 1990 on first school years at three primary schools in FIFE located on the east coast of Scotland and in November 1986 at SIJUADE nursery school in ILE-IFE, Nigeria.

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Both FIFE and MOTOYOSHI are very similar geographically and socio-economically, having a similar distribution of commerce, agriculture and fishing as their main industries. ILE-IFE is a famous ancient city located on the south-west of Nigeria.

Using the WHO's criteria for caries¹⁾, the dental examinations were carried out by three dentists who have calibrated well each other.

Results

The number of subjects and caries prevalence rate are showed in Table 1. The numbers of girls in each area are 17 (MOTOYOSHI), 28 (FIFE) and 13 (ILE-IFE). In cases like this global study, as it is not important the analyzing by sex, all analyses were performed under the combination of both sexes.

The caries prevalence rate was the highest in MOTOYOSHI, 95.1 % and the lowest in ILE-IFE, 25.0 %. Among these three prevalences, there were statistically significant differences. Table 2 shows the mean number of dmft and dmfs. The mean number of dmft were 10.22 in MOTOYOSHI, 3.28 in FIFE and 0.50 in ILE-IFE. In the mean number of dt and ft, MOTOYOSHI was the highest level and FIFE was the highest in the mean number of mt. In ILE-IFE, there was no mt and ft.

The Care-Indexes were 41.1 % in MOTOYOSHI, 21.6 % in FIFE and 0.0 % in ILE-IFE, respectively (Table 3).

The distribution of affected tooth surface is showed in Table 4 as the mean number of dmfs. In all surfaces, MOTOYOSHI was the highest and

Table 1 Number of subjects and caries prevalence rates

	No. of children	%	
Motoyoshi	41	95.1 (39/41)	***
Fife	58	67.2 (39/58)	
ILE-IFE	20	25.0 (5/20)	

** : $p < 0.01$, *** : $p < 0.001$

(Fisher exact probability test)

Table 2 The mean number of dmft and dmfs

	dt	mt	ft	dmft	dmfs
Motoyoshi	6.00±4.97	0.02±0.14	4.20±3.46	10.22±5.84	21.68±17.10
Fife	2.28±2.89	0.29±1.12	0.71±1.32	3.28±3.74	5.52±8.44
ILE-IFE	0.50±1.05	0.00±0.00	0.00±0.00	0.50±1.05	0.50±1.05

*** : $p < 0.001$ (Welch's test)

Table 3 The Care Index (ft/dmft %)

	mean dmft	mean ft	Care Index
Motoyoshi	10.22	4.20	41.1
Fife	3.28	0.71	21.6
ILE-IFE	0.50	0.00	0.0

the lowest in ILE-IFE. To explain the caries susceptibility of the proximal and free gingival surface in each area, scores of the proximal and free-gingival surface were calculated after definition that mean numbers of dmfs of the occlusal surface were as 1.00 (Table 5).

In both proximal and free-gingival surfaces, scores of MOTOYOSHI were the highest and the lowest in ILE-IFE. In MOTOYOSHI, the score of proximal surface was the same as that of the occlusal surfaces. The score of free-gingival surfaces in MOTOYOSHI was very near to that of proximal surfaces in FIFE.

Discussion

There were remarkable differences in deciduous caries experience among Scottish, Nigerian and Japanese children aged 5 years. The same tendency on permanent teeth was observed in previous studies^{2,3}.

The mean number of DMFT in primary school children is the highest in Japan and the lowest in Nigeria.

Comparison between Scottish and Japanese children

The Scottish schoolchildren are managed well by the community dentist employed by the regional health board as full-time staff in each school. The dental services system for pre-school children in Scotland is however inferior to that of Japan when providing the routine dental examination, health instruction and application of preventive measures in health centers. To explain the differences of deciduous caries experience between Scottish and Japanese children, one of the most important factors is the share of dentifrices containing fluoride. In Scotland, that is more than 95 % compared with about 25 % available in Japan.

Secondly, Japanese children have been eating high-level sugar snacks more often than Scottish children². The sugar consumption per person a year are 38.0 kg in the U.K. (1984) and 22.7 kg in Japan (1987). It is however possible that there are important differences between age groups in their sugar consumption⁹. Scottish children were getting frequently low-level sugar snacks like crisps,

Table 4 The distribution of affected tooth surfaces (mean dmfs)

	Occlusal	Proximal	Free gingival	Total
Motoyoshi	5.88	11.07	4.73	21.68
Fife	2.34	2.10	1.07	5.52
ILE-IFE	0.40	0.05	0.05	0.50

Table 5 Caries susceptibility scores on proximal and free gingival surfaces compared to occlusal surfaces

	Occlusal	Proximal	Free gingival
Motoyoshi	1.00	0.94	0.40
Fife	1.00	0.45	0.23
ILE-IFE	1.00	0.06	0.06

fruits and soft drinks sweetened with artificial sweeteners, aspartame, saccharin etc. In spite of the low caries prevalence in Scottish children, they have a tendency to extract their carious teeth easily as observed higher score in mt than that of Japanese children. It will suggest that the dental health thought by Scottish people is lower than that by Japanese people, even though the cost of dental treatment is covered for children up to 16 years old by National Health Service.

Comparison between Nigerian and Japanese children

Despite their oral cleanliness was very poor, the indices of caries prevalence were extremely lower in Nigeria⁵⁾. They brush their teeth with "PACO", a stick of tree. But it is not enough to move out dental plaque. Toothbrushes are sold at general stores but too expensive for them. The most remarkable factor influencing the difference of caries experience between Nigerian and Japanese children has been the food environment. The sugar consumptions per person a year were 10 kg in Nigeria (1980) and 22.7 kg in Japan (1987). Nigerian diet was based on original materials, yam, casava, maize and vegetables. Nigerian people have been eating less processed foods than Japanese. Therefore the Nigerian diet has generally been a fiber-rich and low-nutrient diet. It turned out to be that the amount of masticatory functions was needed more in Nigerian children than in Japanese children, and Nigerian children has consequently the intensive attrition causing to disappear some of their incipient caries.

The fluoride concentration in drinking water

were 0.22~0.31 ppm in Nigeria ; 0.1 ppm in Scotland and in Japan, respectively. That also caused the lowest caries experience in Nigeria. Although there is no paper reported about the regional differences of caries prevalence in Nigeria, those of FIFE and MOTOYOSHI are similar to the published national average levels of caries prevalence in each country. Therefore, in the case of Japan, it seems very difficult without efficient measures to clear the WHO's goal for the year 2000 for which it is proposed that "50 percent of 5-6 year-old children will be caries free" which is naturally cleared in Nigeria.

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