Autistic children: experience and severity of dental caries between 1980 and 1995 in Kagoshima City, Japan

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The present study indicates that experience and severity of dental caries in 1995 showed a clear decrease from observations in 1980 in Kaogsima City, Japan. This decline may be attributed to several factors such as the qualitative and quantitative improvements in treatment of caries, more regular visits to dental clinics, improved daily oral hygiene, and changes in dietary pattern.
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INTRODUCTION

A recent national dental survey by the Japanese Ministry of Health and Welfare has shown a decline in the prevalence of dental caries in healthy Japanese children.[1,2] Most notable in urban area, this decrease has been attributed to heightened appreciation and awareness of oral health care issues.[3] However, few data are available to explain a trends of dental caries in persons with special needs, and little information is available regarding the oral health status of handicapped children living at home.[4-9] Such areas of uncertainty limit our efforts to evaluate the effectiveness of existential public oral health programs. Also, information pointing to factors that arc changing the frequency of caries in handicapped children living at home is needed to plan and monitor future dental services for this population. Such information is important to identify major issues affecting dental caries for these children.

We examined changes in dental caries levels and dental health behavior between 1980 and 1995 in children with autistic disorders.

MATERIALS AND METHODS

This study was designed as a cross-sectional survey for examination dental health of autistic children who participated in a summer-camp for psychosocial rehabilitation in 1980 and in 1995. Subjects who took pan in and gave informed consent for participation in this experiment numbered 41 in 1980 and 34 in 1995, and were 3 to 12 years old living at home in Kagoshima-city. Autistic children were 453 at 1986 in Kagoshima prefecture. It is estimated that participating subjects in this study are about 10% of autistic children in Kagoshima prefecture. However, we could not clarify the proportion of the participating subjects in Kagoshima-city, because there are no data on the number of autistic children in Kagoshima-city.

The distribution of ages in subjects was similar in both years (Table 1). Birth order distributions also were generally similar in 1980 and 1995, although the number of third children participating was higher in 1995 than in 1980 (Table 2).

The diagnosis of autistic disorder in study subjects was based upon criteria listed by the American Psychiatric Association in the current Diagnostic and Statistical Manual (DSM-IV).[10] A few subjects are mentally handicapped with autistic traits that did not strictly satisfy these criteria in both years of testing. Therefore, subjects were described as “autistic children” rather than children having an “autistic disorder”.

In neither year of this study did subjects have a history of residence in areas where drinking water was fluoridated. No subjects underwent regular topical applications of fluoride or used toothpaste with fluoride.

We provided guidance regarding everyday oral health care to these children as well as families beginning in 1980. Specifically, we informed the responsible adults of the oral findings of the children upon clinical dental examination. We participated in play therapy for psychosocia1 rehabilitation that included tooth brushing instruction using manual toothbrushes.

In both years of testing, the same dentist (TM) did the examinations for dental caries in sunlight with a

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Table 1. Subjects by age categories

Age Group	Investigated Year	Male	Female	Total	%
3yr to <6yr	1980	14	3	17	41.5
	1995	12	1	13	38.2
6yr to <14yr	1980	23	1	24	58.5
	1995	20	1	21	61.8
Total	1980	37	4	41	100
	1995	32	2	34	100

Figure 1. M-CSI

M-CSI = Total score x 100 / (2 x total erupted teeth)

Score: Healthy = 0, C0 = 0.5, C1 or C2 = 1, C3 or C4 = 2.

Secondary caries = 1.5, treated tooth = 1

- The severity of caries was evaluated by cavitation level of carious lesions.
- C0: no cavity with demineralization in enamel.
- C2: cavity within enamel.
- C3: cavity reached pulp.
- C4: destroyed tooth crown by caries.

M-CSI corresponds to report by Shimono et al.[6]

standard oral mirror and a blunt probe (diameter 0.5mm). Subjects were seated in a chair designed for field dentistry. Assistants were present to record findings and position the subjects as well as manage their behavior. Subject's teeth were not brushed or professionally cleaned in the period immediately preceding examination. No radiographic examinations were performed. Carious lesions at the cavitation stage were the basis for diagnosis. Demineralization was also recorded as C0.

Indices used for evaluation of dental caries experience and severity were the total DMF patient rate, total DMF-T, total-DMF-T index, modified caries severity index (M-CSJ) (Figure 1)[11] treated tooth rate and secondary caries rate. The secondary caries rate reflected the behavioral status of oral health care after treatment and the quantitative status of treatment. The totalDMF-T index was basically used to express caries experience. Ordinarily, this index is employed with DMF for permanent teeth and def for deciduous teeth with respect to experience of dental caries. In this study, however, we expressed dental caries experience as total-DMIF with def and DMIF for all subjects because of small number of subjects.

Behavioral status associated with oral health care was investigated in 1995 by questionnaire using essentially the same items (prophylaxis. tooth brushing, and between-meal snacks with sugar) as in 1980.

Table 2. Subjects by birth rank

Birth Rank	1980		1995	
	Number	Percent	Number	Percent
First	19	46.3	14	41.2
Second	20	48.8	13	38.2
Third	2	4.9	7	20.6

These were a self-recorded questionnaire completed by their parents or their guardians. However, a 1995 item concerning attendance at a dental clinic for treatment and routine checkups was compared with results from a survey of handicapped children living at home done by Morinushi *et al*. in Kagoshima-city in 1983[12] since these items were not included in the 1980 questionnaire.

Statistical analysis of differences between 1980 (or 1983) and 1995 was performed using unpaired tests and chi-squared tests. Differences were deemed significant at P< .05. The Statview program (version J-4.5: Abacus xonxeprs Incr. Berkely, California) was used.

RESULTS

Experience and severity of dental caries in 1995 VS. 1980

Total DMF patient rate, total DMF-T, total DMF-T index and M-CSI all were significantly lower in 1995 than in 1980 (P< .01): (Table 3). The treated tooth rate in 1995 was significantly higher than in 1980 (P < .01). The secondary caries rate was significantly lower in 1995 than the rate in 1980 (P <.01).

Table 3. Caries experience and severity in both investigated years

Indices	1980	1995
t-DMF patient care	90.9%	61.7%
t-DMF-T rate	33.6%	8.6%
mean t-DMF-T	7.3	1.8
M-CS I	17.0	3.1
Treated tooth rate	3.6%	57.8%
Secondary caries rate	19.4%	10.6%

Dental caries experience and severity was evaluated with def and DMF in all and was expressed as t-DMF.
Treated tooth rate = {(F/F+D) X 100}
There is significant difference (p<0.01) between 1980 and 1995 in all indices.

Behavioral status concerning dental clinic attendance

The proportions of subjects going to a dental clinic in 1995 for treatment (21/34. or 61.8%) and for routine checkups (27/34. or 79.4%) were significantly higher (P<.01) than in 1983 (68/166. or 40.1% and 56/166 or 33.7%. respectively).

Prevention of dental caries

The proportion of subjects pursuing combination of prophylaxis in 1995 was significantly higher than in 1980 (Table 4). The median frequency of tooth brushing was twice a day in both 1995 and 1980. The proportion of subjects having teeth brushed by both themselves and guardians was significantly higher at 1995 (79.2%) than in 1980 (51.2%)($P<.05$). Moreover, the mean number of daily between-meal snacks with sugar in 1995(1.65±0.75) was significantly lower than in 1980 (2.00±0.83)($P<.05$).

Table 4. Oral hygiene for caries prevention at home

Oral hygiene	1980		1995	
	Number	Percent	Number	Percent
Tooth brushing only	21	61.8	13	54.2
Temperance in sucrose only	5	14.7	0	0.0
Either F application or Ca intake	3	8.8	1	3.2
Combination	3	8.8	9	37.5
Not particular	2	5.9	1	3.2

The combination is performed within four oral hygiene measures (tooth brushing, temperance in sucrose only, fluoride application and Ca intake) for dental caries prevention.

DISCUSSION

Improved oral health care for handicapped children mainly reflects more effective assistance by caregivers and increased awareness of dental health concerns on their part rather than heightened effort by children themselves. Specific circumstances of public dental care and personal care in the community are also important factors for the oral health of handicapped children who are in need of assistance. These factors are much more important for oral health in Japan where fluoridation of drinking water has not been practiced. Knowledge and interest in oral health care by care givers and conduciveness of the environment of handicapped children to oral health, are strongly reflected in the children's oral findings.[13-17] Education and implementation regarding oral health practices are especially important in preventing dental caries in handicapped children at home. Routine checkups (termed recall visits) at a dental clinic familiar with the child also promote oral health in handicapped children.[18-21] However, only a few reports have described the relationship between oral findings in handicapped children and behavioral aspects of oral health care.[20,22] Price has advocated greater involvement of teachers in oral health education.[20] Broutta and Heinrich have concluded that handicapped patients should receive regular prevention-oriented dental care beginning at the age of 3 years.[22]

To clarify relationships between oral findings in handicapped children living at home and carious potentially influential factors, we asked ourselves questions. First, how did the experience and severity of dental caries in autistic children in the city of Kagoshima change in 15 years? Second, did dental treatment status relate to experience and severity of dental caries? Third, how did children's attendance at dental clinic for such dental health care as routine dental examination change in 15 years? Fourth, how did the experience and severity of dental caries relate to care givers' dental health behavior at the two time points?

Experience and severity of dental caries in 1995 vs. 1980

Kamen and Skier,[23] Kopel[24] have reported that caries susceptibility in autistic child is not remarkably different from non-autistic individuals and maybe even lower.

The experience and severity of dental caries in the subjects it 1995 were significantly lower in 1995 than in 1980. Furthermore, the results in 1995 were much the same as the dental caries experience (total DMF patient rate: 49.1%. total DMF-T index: 2.5) reported in healthy 3 year-old children at almost the same time in the same residential area of Kagoshima.[25] Specifically. the experience of dental caries in subjects with many deciduous teeth at 19 months was similar to the experience of caries in healthy children 3 years old living at the same area, which could make the experience in our subjects decidedly lower than that in healthy 6 year olds. The total DMF patients rate in healthy subjects, age 5 to 14 year. in Japan was 90.41% at 1993 and 96.25% at 1981 by a national dental survey by the Japanese Ministry of Health and Welfare.[1] The experience of dental caries in our subjects at 1995 is significant lower than the experience (90.41%) of healthy children at 1993. By the way, the experience of dental caries in our subjects at 1980 was not significant difference as compared with the experience at 1981 by a national dental survey. We also found the dental caries severity index (MCSI), which quantitatively assesses dental caries, was significantly lower in 1995 than in 1980. Overall then, the experience and severity of dental caries in autistic children showed evidence of strong improvement during the 15-year interval.

Morinushi *et al.* has been reported that the experience and severity of dental caries in autistic child is almost same to the experience and severity of siblings.[26] It is inferred that the changes in the experience and severity of dental caries in this study is related to dental health behavior in the home.

Secondary caries and the status of treatment for caries

The treated teeth ratio in 1995 was significantly higher than in 1980, and the secondary caries ratio, which reflects the qualitative nature of the treatment, was significantly lower in 1995 than in 1980. From these

findings, it is suggested that both qualitative and quantitative indications of treatment of dental caries could be improved between 1980 and 1995.

Some reports indicated that treatment needs is high in handicapped children.[27,28] Morinushi *et al*. also reported that the treated teeth ratio in autistic children is significantly lower compared with siblings.[26] Many clinicians have noted difficulty in managing the behavior of autistic children during the treatment of dental caries as causes of a high treatment needs. Many reports have described behavioral management of autistic children using analgesic medication.[29-32] Poor cooperation during dental manipulations makes subjects less likely as receive dental effective treatment and as a result treatment needs are high among handicapped children.[33,34] Moreover, some reports have noted that caregivers for handicapped children sometimes avoid taking them for treatment.[12,32] Therefore, the increase in the treated teeth ratio and reduction in the secondary dental caries ratio m subjects with many social problems affecting dental health care, such as poor patient cooperation and rejection of such patients by some general dental practitioners, suggested that the social context of dental treatment for handicapped children might have been improved during the 15-year period.

Relationship between the experience and severity of dental caries and dental clinic attendance

Appropriate conventional treatment reportedly decreases numbers of bacteria associated with dental caries in saliva with only 50% of treated subjects. and reversing to the originally bacterial counts at 5 months following the caries treatment.[35,36] These findings show that treatment aimed at prevention of caries reduces numbers of bacteria in saliva. Recently, intensive caries treatment by a pediatric dental specialist was shown not only to improve the status of untreated teeth, but also to reduce experience and severity of dental caries in an area with non-fluoridated drinking water. These reports supported our findings that increased dental clinic attendance might be associated with reduced prevalence of dental caries in autistic children in 1995 relative to a 1983 survey.

The practice of going to a dental clinic for treatment and routine dental examination was significantly higher in 1995 than that observed in questionnaire findings from handicapped children living at home in 1983. The 1983 survey was done in subjects with mental retardation who were considered to have fewer behavioral problems interfering with treatment than our autistic population. Behavioral difficulties related to dental treatment make caregivers anxious about dental clinic visits. Especially given that the children studied in 1983 probably had fewer behavioral problems associated with clinic visits than subjects in 1995. Clinic attendance showed a clear improvement in the 1995 subject group that can be attributed to heightened awareness of the importance of dental health care on the part of caregivers and increased acceptance of the patients by general dental practitioners.

Routine checkups and dental health care education are very important for prevention. Especially, routine checkups at least three in a year beginning at under 3 years at age and ideally every 3 months is important for dental promotion and maintenance.[38,39] Some reports also have stressed intensified education and professional care provided in the brief period of a routine checkup has a clear preventive effect against dental caries.[40] Moreover, frequent routine checkups beginning at 3 years at intervals no longer than 12 month is necessary to prevent dental caries in handicapped children. In Japan. a general dental practitioner ordinarily forms a routine checkup at intervals from 3 to 6 months.

Improvement of compliance with routine checkups in this study might be associated with the decline observed in experience and severity of dental caries in this study.

Relationship between experience and severity of dental caries and oral health care practice by caregivers and children

In daily life, oral health care practices for handicapped children are highly dependent on home caregivers. Many reports have linked reductions in the prevalence of caries to various behavioral factors including snacking between meals, consumption of sugary foods, regularity of meals. and number of tooth brushings daily.[40-42] In the present study, the frequency of combination-type prophylaxis in 1995, performed over 1 year and including some prophylaxis for dental caries, increased significantly beyond the frequency observed in 1980. Furthermore, the frequency of tooth brushing done by both subjects and guardians in 1995 was significantly higher than in 1980. Numbers of snacks with sugar eaten between meals were fewer in 1995 than in 1980. These results suggested that attitudes toward dental health and caregiver behavior aimed at preventing dental caries might be improved in 1995 comparison to 1980. These improvements are likely to have contributed to the reduced experience and severity of caries in 1995.

In this study, consumption of sugary foods was related to experience and severity of dental caries as in previous studies of healthy children.[40,41,43] However, the influence of everyday meal time behavior on dental caries is likely to be less in autistic children than healthy children. Since autistic children are less partial to sweets and characteristically are more regular in their behavior at meals than other healthy children

Overall numbers of tooth brushings per day did not differ between 1995 and 1980 possibly because the frequency of brushing already had improved in 1980 as a result of our encouragement.

CONCLUSION

The present study indicates that experience and severity of dental caries in 1995 showed a clear decrease from observations in 1980 in Kaogsima City, Japan. This decline may be attributed to several factors such as the qualitative and quantitative improvements in treatment of caries more regulars visits to dental clinics improved everyday prophylaxis and changes in dietary pattern.

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