

Dental caries and oral health behaviour situation of children, mothers and schoolteachers in Wuhan, People's Republic of China

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Summary

This study was undertaken in order to describe the occurrence of dental caries in Chinese schoolchildren and to highlight the oral health behaviour situation. Clinical examinations of grade 1 children (age 6, n=381) and grade 6 children (age 12, n=413) were performed. At age 6, 86 per cent of the children were affected by dental caries and at age 12 the mean DMFT index was 1.0. Personal interviews with the mothers (n=691) showed that dental care habits of children were poor; 22 per cent of all children brushed their teeth twice a day and 20 per cent had seen the dentist within the past 12 months. Very few children (4 per cent) had practical support from their parents in daily toothcleaning. Self-administered questionnaires for schoolteachers (n=138) revealed that most (85 per cent) are positive towards oral health education of children. Systematic school-based programmes should be implemented to promote oral health.

Many industrialised countries have experienced a decline in dental caries prevalence among children over the past decades^{1,2}. This trend of caries reduction may be ascribed to several factors of which the most important are improved oral hygiene, a more sensible approach to sugar consumption, effective use of fluorides, and school-based preventive programmes¹. Against this, increasing levels of dental caries have been found in some developing countries, especially for those countries where preventive programmes have not been established^{3,4}.

In the People's Republic of China, public oral health services are generally oriented towards treatment and mostly delivered from hospitals or health care centres. Since the late 1980s, the health authorities have given emphasis to preventive oral care and oral health education in order to improve the oral health behaviour of the public. With respect to the child population, behaviour modification may be a family responsibility, but oral health education could also be given by schoolteachers.

However, systematic information is scarce on the oral health status and behaviour of schoolchildren as well as the level of dental knowledge and attitudes among parents and schoolteachers. The specific aims of the present study were: to describe the occurrence of dental caries in Chinese schoolchildren aged 6 and 12; to evaluate the oral health care habits of children and mothers; and to assess the level of dental knowledge and attitudes among Chinese mothers and schoolteachers. The intention of the study was to provide baseline data for the planning and evaluation of school-based oral health promotion programmes.

Study population and methods

The study took place in Wuhan (Hubei Province, PR China) in 1995 and a combined WHO pathfinder⁵ and convenience sampling⁶ technique was applied for the

identification of 8 primary schools in urban and rural areas. The survey included children of 1st grade (6 years; $n=381$) and 6th grade (12 years; $n=413$) and the sample was balanced by sex. All children in the classroom took part in a clinical examination of dental status and dental caries and the recordings were based on the criteria of the Recording System for the Danish Municipal Child Dental Health Services⁷. Moreover, the study comprised the mothers of the children ($n=691$, 87 per cent of the original sample) who responded to structured interviews. The interviews were performed by a trained Chinese dentist (ZE) and the questions concerned oral health knowledge, attitudes towards prevention of oral disease, sources of dental health information, oral health practices of child and mother, parental support in oral health, and self-assessment of oral health of the child. Finally, the study comprised the teachers of the 16 primary schools and the total of 138 teachers responded to self-administered questionnaires (response rate 89 per cent). The questionnaires to the schoolteachers covered oral health knowledge and attitudes and involvement in oral health education of children. Identical structured and semi-structured questions on knowledge and attitudes were given to mothers and teachers. The questionnaires were initially formulated in English and then translated into Chinese, and prior to the study pre-tests took place in order to control reliability and validity of the questions.

All data sheets were transferred to the University of Copenhagen for analysis. The data analyses were performed using the Statistical Analysis System (SAS) and frequency distributions were computed. Means of dental caries experience were calculated and the children were classified also by caries severity zones⁸. The Chi-square test was applied for the statistical evaluation of proportions and Student's *t*-tests were performed for the comparison of means.

Results

Dental caries

The mean caries experience is given in *Table 1* and it is shown that the *d/D*-component constituted most of the caries indices. No significant differences in the caries indices were found by sex, however, the figures were significantly higher in children of urban than rural areas ($P < 0.01$). *Table 2* presents the distributions of children by absolute value of caries index according to school grade and urbanisation and *Table 3* shows the distribution of children by caries severity zones.

Knowledge and attitudes of mothers

The responses concerning boys and girls and rural and urban participants were combined as no substantial differences in knowledge, attitudes, or behaviour were

Table 1 Dental caries experience of Chinese grade 1 and grade 6 children according to urbanisation.

Dental caries index	Grade 1 (6 years) ($n=216$) ($n=165$)		Grade 6 (12 years) ($n=239$) ($n=174$)	
	Urban	Rural	Urban	Rural
<i>d-s</i>	12.1	8.0	0.7	1.0
<i>m-s</i>	0.8	0.5	-	-
<i>f-s</i>	0.1	0.1	-	0.1
<i>dmfs</i>	13.0	8.6	0.7	1.1
<i>dmf-t</i>	5.7	3.9	0.4	0.6
<i>D-S</i>	0.5	0.1	2.3	0.4
<i>M-S</i>	-	-	0.1	0.2
<i>F-S</i>	-	-	0.1	0.1
<i>DMF-S</i>	0.5	0.1	2.5	0.7
<i>DMF-T</i>	0.4	0.1	1.5	0.4

found. A significant proportion of the mothers (42 per cent) answered that dental caries is caused by sugar; the role of bacteria was mentioned by 35 per cent, and the importance of bacteria plus sugar by 56 per cent. The negative effect of sugar consumption was first of all considered in relation to sweets since relatively few of the mothers were aware of the effect of sugary drinks (soft drinks, milk, tea or coffee with sugar) (*Table 4*). Further, 21 per cent claimed dental caries to be explained by general illness, worms by 10 per cent, and hereditary factors by 20 per cent. As to the causes of bleeding gums, incorrect tooth cleaning was reported by 59 per cent; general illness by 32 per cent, unhealthy diet by 23 per cent; mixing of hot and cold foods by 23 per cent, and hereditary factors by 8 per cent. With respect to prevention, 79 per cent of the mothers answered that dental caries may be prevented by toothbrushing; 66 per cent emphasised restriction of sugar; rinsing of the mouth with water was recommended by 37 per cent, regular dental visits by 32 per cent, and use of fluoride by 18 per cent. Forty-four per cent indicated that toothbrushing can prevent gingival bleeding. Moreover, regular dental visits were stressed by 35 per cent, restriction of sugar by 35 per cent, rinsing of mouth with water 27 per cent, use of fluoride 14 per cent, and 14 per cent claimed the use of drugs. *Table 5* illustrates the sources of dental health information. Less than one third of the mothers held the attitude that children younger than 10 years old need help from adults in toothbrushing, and three in four mothers stressed that parents should restrict children's consumption of sweets (*Table 6*).

Oral health habits

Thirty-one per cent of the urban children against 9 per cent of children in rural areas had seen a dentist within the past 12 months ($P < 0.01$), whereas no significant differences in oral hygiene habits were observed by urbanisation. *Table 7* summarises the findings on dental care habits of the children. In total, 91 per cent of the children brushed their teeth before breakfast, 2 per cent after breakfast, and 35 per cent before bedtime. The use of fluoridated toothpaste was claimed by 42 per cent. As

Table 2 Distribution (%) of Chinese children according to absolute value of dental caries index by school grade and urbanisation.

Grade	Urbanisation	0	1-4	5-8	9-12	13-16	17-20	21+
1 (primary teeth)	Urban	14.3	18.5	16.8	10.1	9.2	6.7	24.4
	Rural	31.5	17.2	15.1	10.9	4.2	6.1	14.6
6 (permanent teeth)	Urban	49.6	33.6	6.2	6.2	2.6	0.9	0.9
	Rural	74.6	20.8	4.5	0.6	-	-	-

Table 3 Chinese children distributed (%) by caries severity zones according to grade/age.

Caries severity zones	6 years (primary teeth)		12 years (permanent teeth)	
	Urban	Rural	Urban	Rural
Zone 1 (caries free)	14.3	31.5	49.6	74.6
Zone 2 (caries in pits/fissures in molars/premolars)	3.4	1.8	32.7	16.2
Zone 3 (caries in approximal surfaces of canines/premolars/molars)	22.7	20.6	4.4	4.5
Zone 4 (caries in incisors and/or smooth surfaces)	59.7	46.1	13.3	5.2

Table 4 The percentages of mothers and schoolteachers who indicated that 'the following items can harm your natural teeth'.

	Mothers	Schoolteachers
Sugar	76	72
Milk with sugar	41	55
Coffee with sugar	27	46
Tea with sugar	30	52
Sweets/candy	67	75
Soft drinks	29	57
Smoking	62	80

Table 5 The percentages of mothers and schoolteachers who reported various sources of dental health information (more than one response allowed).

	Mothers	Schoolteachers
Dentist	44	61
Physician	6	4
Schoolteachers	19	35
Books	48	77
Television	54	87
Radio	26	64
Newspapers	34	64
Magazines	29	62
Relatives/Friends	14	31
Mother/Father	12	25

shown in Table 8, few of the mothers helped their children in daily toothbrushing. Among the mothers themselves, half the respondents reported toothbrushing at least twice a day (Table 7). Table 9 gives the frequencies on consumption of sugary items. Relatively more urban children (32 per cent) than rural children (12 per cent) had milk with sugar at least once a day ($P < 0.01$).

Knowledge and attitudes in schoolteachers

In the semi-structured questions, 61 per cent of the teachers answered that bacteria cause teeth to decay, 47 per cent mentioned sugar, and 72 per cent indicated bacteria

plus sugar. Relatively high proportions of the teachers were also aware of the harmful effect of sweets ($P < 0.05$) and soft drinks ($P < 0.01$) when compared with mothers (Table 4). With respect to the question on what causes bleeding gums, incorrect toothbrushing was stressed by 75 per cent, 53 per cent suggested general illness, and 30 per cent claimed that it was due to unhealthy diet. One quarter answered that bleeding gums were caused by mixing of hot and cold foods. Seventy-eight per cent of the teachers stressed the importance of toothbrushing in prevention of dental caries while this answer was given less frequently with respect to bleeding gums (42 per cent). Fifty per cent were aware of the positive effect of fluoride, and reduction of sugar was mentioned by 54 per cent. Finally, 38 per cent suggested rinsing of the mouth with water for the prevention of bleeding gums and 45 per cent stressed the role of regular dental visits. The sources of dental health information for teachers are illustrated in Table 5.

One fifth of the teachers answered that children's teeth were poor or very bad, and 72 per cent indicated that children of first grade were in need of dental treatment. Nearly all teachers held the opinion that children's teeth should be checked regularly by a dentist (Table 6). Furthermore, 85 per cent responded positively to the statement that schoolteachers should teach children about the causes of dental diseases, 92 per cent were positive towards teaching children how to take care of their teeth, and 89 per cent agreed to teach children about diet and sugar. A total of 83 per cent of the teachers answered that their children were told about teeth in the classroom during the past year, and with a mean number of 2.6 lectures.

Discussion

In PR China, few data are available on dental caries prevalence and oral health behaviour of children and the present study provides such information as regards

Table 6 The percentages of mothers and schoolteachers who responded positively to statements on the prevention of dental diseases in children.

	Mothers	Schoolteachers
Children's' teeth should be checked regularly by a dentist	75	96
Children less than 10-years old need help from adults in toothbrushing	29	20
Toothbrushing prevents tooth decay	76	83
Toothbrushing prevents bleeding from gums	46	45
Improper consumption of sugar causes teeth to decay	78	79
Parents should restrict children's consumption of sweets and sweetened drinks	76	80
Fluoride protects the teeth against decay	43	89

Table 7 The percentages of Chinese children and mothers with specific dental care habits.

Dental care habits	Children		Mothers
	6 years	12 years	
Toothbrushing			
at least twice a day	22	22	50
once a day	39	62	40
less often/never	39	16	10
Dental visits within the last 12 months	20	20	16
Never been to a dentist	58	47	45

Table 8 Mothers distributed (%) according to how often they help their child in toothbrushing.

	Every day	Weekly	Sometimes	Seldom/never
I clean his/her teeth	4	1	13	82
I check the teeth after cleaning	8	2	25	65
I talk about cleaning	9	4	50	37

Table 9 The Chinese children distributed (pct) according to frequency of consumption of sugary drinks/foods.

	Twice a day or more often	Once a day	Several times a week	Sometimes	Seldom/never
Milk with sugar	5	17	6	33	39
Soft drinks	6	2	10	51	31
Fruit drinks	5	3	8	49	34
Sugary breakfast cereals	2	3	7	30	58
Cakes/pastry	2	4	12	51	31
Biscuits	5	5	15	51	24
Jam	1	1	5	26	66
Chewing gum with sugar	2	2	7	50	40
Sweets/chocolate bars etc.	5	6	12	49	29

to primary school children. The survey was confined to oral health demonstration schools of Wuhan and therefore the data are not representative in pure statistical terms. However, the sampling of urban and rural children may be indicative of the oral health situation of Chinese children.

The registration of dental caries was based on the Danish Recording System for the Municipal Child Dental Health Services⁷. This system was established in order to plan and evaluate the services delivered. Furthermore, the recording system is a valuable epidemiological tool since the methods and the criteria for assessment of oral health status are practical and reli-

able under field conditions. The clinical examination procedures and the diagnostic criteria are very close to the WHO methods⁵ and therefore comparisons with other studies would be possible. The present findings are in agreement with previous surveys of 12-year-olds which have shown the mean DMFT at 1.1. to 1.9⁹⁻¹² and the somewhat higher disease level among urban children was also confirmed. The relatively high d/D-components of the caries indices document the need for systematic dental care of Chinese children.

The interview method was chosen for the study of the mothers since many of these were not familiar with questionnaire surveys. Due to practical and economical

reasons the data on the schoolteachers were collected by means of self-administered questionnaires. Acceptable response rates were obtained for both data sets. In order to control the reliability, highly structured questionnaires were created and the wording of the questions to mothers and teachers was identical to ensure valid comparisons of the responses. Besides the Chinese pilot tests, the methodology of the questionnaires has been assessed in previous studies^{13,14}. However, the data collection methods may have certain limits¹⁵. With respect to dental knowledge, oral hygiene habits and frequency of dental visits, over-reporting may be assumed whereas underreporting has to be considered with regard to the consumption of sugar, sweets and sugary drinks.

The need for oral health education of Chinese mothers and children was supported by the present results. First of all, the survey revealed that dental knowledge of the mothers is rather diffuse. On the one hand, significant proportions of the mothers knew about the role of bacteria and sugar in dental caries, on the other hand, irrelevant factors (for example, worms) were often claimed. In particular, the level of knowledge was low with regard to the effect of hidden sugar and fluoride. Such a diffuse response pattern was also found for gingival problems. The importance of proper oral hygiene was indicated by a certain number of the mothers, however, gingival bleeding was often explained within the context of traditional beliefs, such as the mixing of hot and cold foods. Only a few mothers held the attitude that young children needed help from adults in toothcleaning and the negative attitudes were reflected by the poor oral hygiene habits of both children and mothers. In addition, family support of the children as to daily care of the teeth was extremely infrequent.

Due to tradition and lack of formal oral health care at community level the dental attendance rates were low and about half of the children and mothers had never been to a dentist. In general, the consumption of sugary items seemed to be moderate, and the study indicates that the somewhat higher level of dental caries among urban children may partly be ascribed the higher intake of sugary drinks.

The family represents the children's primary source of information about oral health and awareness could be raised by giving accurate information to the parents. Television, books, and the dentist were found to be the most important in communication with mothers. During recent years, oral health campaigns have been organised in order to improve oral health knowledge and practises of the public¹⁶ and the campaigns also emphasise the responsibility of parents in the oral health care of the child. However, the primary schools also have great potential for influencing health behaviour of the children; they spend considerable time in the schools and can be reached at a life-stage when their health habits are being formed^{17,18}. Health education in the schools may be conducted by schoolteachers; the advantage of using teachers are the potentials of reaching all children, for continuity and the low cost of the activities. The possible disadvantage may be the inadequate background of teachers for providing health education. All in all, the teachers showed a higher level of dental knowledge compared with the mothers, the attitudes were positive towards prevention and they responded positively to becoming involved in the oral health education of children. The teachers had received their information on oral health from a variety of formal and non-formal sources. However, systematic training programmes for teachers would be needed and practical support from dentists should also be given, including the provision of educational material.

In view of the scarce health resources and the current pattern of oral disease in China, oral health policy that emphasises prevention would seem more advantageous than curative care. Oral health education would play a most important role in order to control oral disease and the school-based approach should be combined with family and community-oriented oral health programmes.

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Les caries dentaires et le comportement des enfants, des mères et des enseignants en matière de santé bucco-dentaire, à Wuhan, République Populaire de Chine

Résumé

Cette étude a été entreprise afin d'avoir des données sur l'occurrence des caries dentaires parmi les enfants chinois scolarisés et de mieux connaître le comportement en matière de santé bucco-dentaire. Des examens cliniques ont été effectués sur les enfants de niveau 1 (âge 6 ans, n=381) et de niveau 6 (âge 12 ans, n= 413). A l'âge de 6 ans, 86 pour cent des enfants sont atteints de caries dentaires et à l'âge de 12 ans, l'indice moyen CAO est de 1,5. Des entretiens avec les mères (n=691) montrent que les habitudes des enfants en matière de soins dentaires laissent à désirer ; 22 pour cent des enfants se brossent les dents deux fois par jour et 20 pour cent ont vu le dentiste au cours des 12 derniers mois. Très peu d'enfants (4 pour cent) sont assistés par leurs parents lors du brossage quotidien des dents. Les questionnaires remplis par les enseignants (n=138) révèlent que la plupart (85 pour cent) sont

favorables à une éducation bucco-dentaire des enfants. Il convient de mettre en place des programmes systématiques à l'école afin de promouvoir la santé bucco-dentaire.

D

Zustand der Zahnkaries und des Mundgesundheitsverhaltens bei Kindern, Müttern und Schullehrern in Wuhan, Volksrepublik China

Zusammenfassung

Diese Studie wurde durchgeführt, um die Prävalenz von Zahnkaries bei chinesischen Schulkindern zu beschreiben und den Zustand des Mundgesundheitsverhaltens aufzuzeigen. Klinische Untersuchungen wurden an Kindern der ersten Klasse (6 Jahre alt, n = 381) und der 6 Klasse (12 Jahre alt, n = 413) durchgeführt. 86 Prozent der 6jährigen waren von Zahnkaries betroffen und bei den 12jährigen betrug der Mittelwert des DMFT-Indexes 1,5. Persönliche Befragungen der Mütter (n = 691) ergaben, daß die Zahnpflegegewohnheiten der Kinder schlecht waren; 22 Prozent der Kinder putzten ihre Zähne zweimal täglich und 20 Prozent hatten einen Zahnarzt innerhalb der letzten 12 Monate aufgesucht. Sehr wenige Kinder (4 Prozent) erhielten praktische Unterstützung von ihren Eltern beim täglichen Zähneputzen. Die Ergebnisse der von den Schullehrern (n = 138) selbst ausgefüllten Fragebogen zeigten auf, daß die meisten (85 Prozent) positiv gegenüber der Mundgesundheitserziehung von Kindern eingestellt waren. Es sollten systematische Programme zur Mundgesundheitsförderung in Schulen eingeführt werden.

E

Caries dental y la conducta respecto a salud buco-dental de los niños, madres y profesores en Wuhan, República Popular China

Resumen

Este estudio se llevó a cabo con el objeto de describir la prevalencia de la caries dental entre los escolares chinos y para destacar la situación con respecto a la conducta de salud oral. Se realizó el examen clínico de los niños de 1er grado (edad 6, n=381) y de los escolares de sexto grado (edad 12, n=413). A los 6 años, un 86 por ciento de los niños ya había sido afectado por la caries dental, mientras que a la edad de 12 años el índice CPOD/CAOD medio fue de 1,5. Las entrevistas personales con las madres (n=691) revelaron que los hábitos con respecto al cuidado dental eran deficientes entre los niños; un 22 por ciento del total de los niños cepillaba sus dientes dos veces al día y un 20 por ciento de ellos había ido al dentista en los últimos 12 meses. Muy pocos niños (4 por ciento) contaban con el apoyo práctico de sus padres para la limpieza diaria de sus dientes. Los cuestionarios auto-administrados dirigidos a los profesores (n=138) revelaron que la mayoría de ellos (85 por ciento) exhibía una actitud positiva en relación a la educación para la salud buco-dental de los niños. Es necesario implementar programas sistemáticos basados en los colegios para fomentar la salud buco-dental.

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