Caries-preventive Measures Applied by Mongolian Dentists to their Own Children

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Purpose: To investigate caries-preventive measures (CPMs) applied by dentists in Mongolia to their own children in relation to the dentist-parents' professional and preventive care-related backgrounds and the children's dental health.

Materials and Methods: A questionnaire distributed to Mongolian dentists in 2000 surveyed their professional and preventive care-related backgrounds. The dentists filled in a dental chart for their own children aged 3 to 13 years and indicated which of seven listed CPMs were applied to each child. Of the dentists surveyed, 245 replied (98%); with 146 having children (n = 208) of the target age. Statistical evaluation included chi-square test, one-way ANOVA, linear regression analysis, and odds ratios based on 2X2 tables.

Results: Of the seven CPMs, the following were applied on average per child: 3.7 (SD = 1.6) to 3- to 5-year-olds; 4.4 (SD = 1.3) to 6- to 11-year-olds; 4.3 (SD = 1.4) to 12- to 13-year-olds; with the youngest children receiving the fewest CPMs (p = 0.02). Demonstrating toothbrushing techniques and taking children for regular preventive check-ups were the most frequently reported measures applied to the children. Conversely, pit and fissure sealants and restriction of sugar were the least reported. The number of CPMs was unrelated to any factors connected with the dentist-parents' backgrounds among the youngest group; correlated negatively to dentist-parents' work experience (p = 0.002) among the middle group; and positively to dentist-parents' preventive knowledge (p = 0.04) and self-reported competency (p = 0.005) among the oldest group. Among the middle group, more CPMs were applied to those with greater DMFT/dmft scores.

Conclusion: Caries-preventive measures applied to dentists' children should be improved, especially in regard to sugar consumption. Comprehensive efforts are called for, stressing modern CPMs.

Key words: caries preventive measures, dentists' children, Mongolia

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E ffective CPMs have been developed and refined in dentistry (Rozier, 2001), with some of them emphasizing the role of dental professionals and others emphasizing the patients' own responsibility in managing oral diseases. The CPMs are either

patient-active or patient-passive. Active measures may be any kind of motivation and instruction given to a patient concerning self-care, such as recommendations for oral hygiene, dietary counseling, and advice on the use of fluoride and xylitol products. Conversely, passive CPMs are those applied by practitioners in a dental office, e.g. application of topical fluoride and placing sealants (Helminen et al, 1999). Application of these measures to children and adolescents differs between countries and from one dentist to another (Chen, 1990; Helminen et al, 1999; Källestål et al, 1999).

In general, dentists' children enjoy better dental health than their counterparts across populations

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(Ainamo and Holmberg, 1974; Tala, 1983; Tseveenjav et al, 2003), indicating that dentists, using available CPMs, are effective in preventing dental caries in their own children (McDonald et al, 1981).

The present study investigated CPMs applied by dentists in Mongolia to their own children in relation to the dentist-parents' professional and preventive care-related backgrounds and the children's dental health.

MATERIAL AND METHODS

Questionnaire and Survey

In May 2000 a questionnaire-based survey was carried out among all actively practicing dentists (n = 250) in Ulaanbaatar, the capital of Mongolia. The questionnaire enquired about dentists' professional and preventive care-related backgrounds. In addition, dentists were asked to fill in a dental chart for each of their own children (if any) aged 3 to 13 years, and to state the frequency of use of a list of seven CPMs applied to each child.

Questions and Variables

The CPMs listed were: a) demonstration of toothbrushing technique; b) supervision of toothbrushing; c) recommendation of fluoridated toothpaste; d) application of topical fluoride; e) restriction of sugar consumption; f) regular preventive checkups; and g) placing pit and fissure sealants. Answers for measures b, c, and e were collected by means of a four-point scale: always or almost always, quite often, seldom, and not at all. In the analysis, the scale was dichotomized into: 'at least quite often' and 'seldom, or not at all'. The possible answers for measures a, d, f, and g were: 'yes' or 'no'.

The professional practice-related background was assessed as: years of work experience as a dental practitioner; type of practice (state institution or private practice); field of practice (general or specialty); and postgraduate degree (holding such a degree or no degree).

Each dentist-parent's professional and preventive care-related background was described by professional preventive knowledge and self-perceived competency in carrying out preventive measures. Professional preventive knowledge was assessed by 14 statements relating to the role of fluorides, frequency of sugar consumption, sugar-free chewing gum and xylitol, and use of sealant in preventive dental caries, and to the etiology of gingivitis. Answers were collected by means of a five-point Likert scale and further, each answer was given 0 to 4 points, with higher points corresponding to greater knowledge. The sum of the points for these statements represented each dentist's knowledge score, with the maximum theoretical score being 56. For further analysis, dentists were classified by quartiles of the knowledge score. The highest quartile included those dentists with a knowledge score of 43 to 56. Self-reported competency in carrying out preventive measures was determined on a four-point scale: very competent, guite competent, not very competent, and not competent at all. Further, answers were given points from 0 to 4, with higher points corresponding to greater competency. For the analysis, perceived competency was dichotomized into: 'at least quite competent', which included very or quite competent and 'not very, or not at all competent', which included all others.

The dental health status of dentists' children was assessed by tooth on the basis of each dentist-parent's answers as reported in the dental chart. Instructions to fill in each child's dental chart included pre-prepared codes and an explanation on how to deal with the primary and permanent teeth. The presence of caries was to be considered if the lesion was at the cavitation level. Dental health outcome of dentists' children was expressed as being caries-free or not (DMFT/dmft = 0 or > 0) and having no or some untreated caries (DT/dt = 0 or > 0).

Subjects and their Background Variables

Of the dentists surveyed, 245 replied (98%); with 146 having children (n = 208) of the target age. The younger the child, the higher was his/her total caries experience. Of all the children, 50% were caries-free (DMFT/dmft = 0) (Tseveenjav et al, 2003) and 80% were free of untreated caries (DT/dt = 0). Percentages of those free of untreated caries were 65% for 3- to 5-year-olds, 83% for 6- to 11-year-olds, and 92% for 12- to 13- year-olds. The dentist-parents' mean age was 36 (SD = 6.6) with a mean work experience of 10 (SD = 6.8) years; 34% had no more than 5 years of work experience; 64% were general practitioners and 36% were in a specialty field; 57% were practicing in public clinics and the

rest in private sector; 40% held a postgraduate degree. Dentist-parents' mean score for preventive knowledge was 42.0 (SD = 5.9), ranging from 26 to 54, with 50% belonging to the highest quartile for the knowledge score. Overall, 65% reported the perception of themselves as 'at least quite competent' in carrying out preventive measures.

Statistical Evaluation

Statistical evaluation included the chi-square test and one-way ANOVA. Odds ratios (OR) were calculated as the cross-product of a 2X2 table with a corresponding confidence interval of 95%. Linear regression analysis was applied to explain the variation in the number of preventive measures applied to each child and the variation in a child's DMFT/dmft score. Three parallel models, one for each age group, were separately constructed for two dependent variables.

RESULTS

The average number of caries CPMs applied per child was 4.4 (SD = 1.4), ranging from 0 to 7. The number for 3- to 5-year-olds was 3.7 (SD = 1.6); 4.4 (SD = 1.3) for 6- to 11-year-olds; and 4.3 (SD = 1.4) for 12- to 13-year-olds; with the youngest children receiving the fewest preventive measures (p = 0.02). Corresponding medians were 4.0, 5.0, and 4.0 (Fig 1).

According to dentist-parents' reports, 95% of all children were given demonstrations of toothbrushing techniques, and 91% were taken for regular preventive check-ups - these measures being those most commonly applied. Additionally, 23% of children received pit and fissure sealants and 30% experienced some restriction of their consumption of sugar-containing food between main meals - these measures being the ones most infrequently applied (Table 1). Demonstrations of toothbrushing techniques and recommendations of fluoridated toothpaste differed by children's age group - both being more frequently applied to older children (Table 1). Those children whose dentist-parents reported restriction of sugar consumption were more likely to be free of untreated caries (p = 0.04) in the youngest age group; those with untreated caries were more likely to receive pit and fissure sealant (p = 0.03) (Table 1).



Fig 1 Frequency distribution of dentists' children, by age group (years), according to number of preventive measures received from a maximum of seven.

Children whose parents had more than 5 years of work experience were more likely to be recommended the use of fluoridated toothpaste (p = 0.01, OR = 2.5, Cl95% 1.2 - 5.1) than children of parents with less work experience. Children whose parents were engaged in public service or state institutions were less likely to have their toothbrushing supervised (p = 0.05, OR = 0.6, Cl95% 0.3 - 1.0), but more likely to receive topical fluoride (p = 0.03, OR = 1.8, Cl95% 1.1 - 3.2) than were those in private practice. All other preventive measures applied to dentists' children were similar, regardless of their parents' professional practice-related backgrounds (p > 0.05).

Concerning dentist-parents' professional and preventive care-related backgrounds, children whose parents belonged to the highest quartile of the preventive knowledge score were more likely to be taken for preventive check-ups (p = 0.04, OR = 2.9, CI95% 1.0 - 8.4) than were those belonging to lower quartiles. Children of those parents perceiving themselves 'at least guite competent' in carrying out preventive treatment were more likely to receive supervised toothbrushing (p = 0.02, OR = 2.0, CI95% 1.1 - 3.6), have their sugar consumption restricted (p = 0.03, OR = 2.1, Cl95% 1.1 - 4.0), and toothbrushing techniques demonstrated to them (p = 0.02, OR = 4.7, Cl95% 1.2 - 18.6) than the children of parents perceiving themselves as 'not very or not at all competent'.

Table 2 shows that the number of CPMs was unrelated to any factors connected with the den-

Table 1 Reported frequency of caries-preventive measures (CPMs) applied to dentists' children (n = 208) by dentist-parents

Caries preventive measures	All %	Age 3–5 years (n = 54)		Age 6–1 (n =	1 years 115)	Age 12–13 years (n = 39)	
		dt = 0	dt > 0	DT + dt = 0	DT + dt > 0	DT = 0	DT > 0
Demonstration of toothbrushing technique 'Yes'	95ª	94	79	99	95	94	100
Regular preventive dental check-ups 'Yes'	91	94	95	92	90	86	100
Recommendation of fluoridated toothpaste 'at least quite often'	80 ^b	60	58	85	75	100	100
Supervision of toothbrushing 'at least quite often'	61	63	42	68	65	50	68
Application of topical fluoride 'Yes'	40	34	26	42	50	42	33
Restriction of sugar consumption 'at least quite often'	30	37	11°	32	35	25	33
Placing pit and fissure sealants 'Yes'	23	9	32 ^d	21	40	25	33

Statistical evaluation: chi-square test for differences in reported frequency by children's age (ap = 0.001 and bp = 0.03), and by having DT/dt or not, within three age groups (cp = 0.04 and dp = 0.03); Significant values (p < 0.05) in bold

Dentist-parents' professional and preventive care-related backgrounds	Model 1 (R ² = 0.11) Age 3–5 years (n = 54)			Model 2 (R ² = 0.16) Age 6–11 years (n = 115)			Model 3 (R ² = 0.35) Age 12–13 years (n = 39)		
	β	SD	р	β	SD	р	β	SD	р
Practice-related factors:									
Work experience (years)	- 0.005	0.042	0.990	- 0.056	0.018	0.002	0.002	0.030	0.953
Type of practice	- 0.161	0.496	0.747	- 0.421	0.236	0.077	- 0.080	0.450	0.861
Field of practice	- 0.787	0.510	0.129	-0.071	0.255	0.781	- 0.253	0.495	0.613
Postgraduate degree	0.599	0.538	0.271	- 0.010	0.236	0.968	0.400	0.407	0.334
Preventive care-related factors:									
Preventive knowledge	- 0.032	0.046	0.486	0.037	0.021	0.088	0.077	0.035	0.035
Self-reported competency	0.276	0.351	0.436	0.241	0.210	0.252	0.979	0.325	0.005
Constant	2.508	2.212		3.765	0.978		- 0.391	1.488	

tist-parents' backgrounds among the youngest 3- to 5-year-old group; correlated negatively to dentist-parents' work experience (p = 0.002) among the middle 6- to 11-year-old group; and positively to dentist-parents' preventive knowledge (p = 0.04) and self-reported competency (p = 0.005) among the oldest 12- to 13-year-old group (Model 3). As shown in Table 3, among the 6- to 11-yearolds, a positive association appeared between the child's dental health as DMFT/dmft score and number of CPMs applied to them. All other background factors related to a dentist-parent showed no significance (p > 0.05) in these three parallel models.

analysis									
Factors	Model 1 (R ² = 0.06) Age 3–5 years (n = 54)			Model 2 (R ² = 0.08) Age 6–11 years (n = 115)			Model 3 (R ² = 0.12) Age 12–13 years (n = 39)		
	β	SD	р	β	SD	р	β	SD	р
Number of preventive measures	0.013	0.309	0.967	0.468	0.203	0.023	0.161	0.279	0.569
Practice-related factors:									
Work experience (years)	0.126	0.090	0.168	- 0.028	0.039	0.480	- 0.043	0.047	0.366
Type of practice	- 0.585	1.052	0.581	0.816	0.507	0.110	0.176	0.710	0.806
Field of practice	0.113	1.108	0.919	0.414	0.540	0.445	- 0.387	0.785	0.625
Postgraduate degree	- 0.547	1.155	0.638	0.136	0.499	0.785	- 0.223	0.653	0.734
Preventive care-related factors:									
Preventive knowledge	- 0.040	0.098	0.685	- 0.030	0.046	0.511	0.044	0.059	0.460
Self-reported competency	0.025	0.749	0.974	- 0.445	0.046	0.320	- 0.308	0.581	0.600
Constant	4.476	4.751		0.593	2.204		- 0.280	2.350	
Statistically significant p-value in bold									

Table 3 Dentists' children's DMFT/dmft scores explained by selected variables, by linear regression

DISCUSSION

As hypothesized, the number of CPMs applied to dentists' children was positively related to their dentist-parents' preventive knowledge and self-perceived competency in carrying out such measures. as shown in earlier findings among Mongolian dental students on preventive care practice for their patients (Tseveenjav et al, 2002). This highlights the importance of professional knowledge and competency for dental care practice.

It was encouraging that all the dentists' children, in the 12- to 13-year-old group, had received recommendations on the use of fluoridated toothpaste, which experts agree is one of the main reasons for the caries decline in developed countries (Bratthall et al, 1996); and that the majority of dentists' children in this study were taken for regular preventive dental check-ups. Unfortunately, the number of CPMs applied to the youngest children was the lowest. This may be due to these parents' underestimation of the importance of primary dentition and ignorance of the infectious character of dental caries (Anusavice, 1998).

Fewer dentist-parents than expected supervised their children's toothbrushing. Children's health-related behavior including toothbrushing is learned

and adopted at home and is thus influenced by their parents. Primary care-givers, usually mothers, need to help preschool children with toothbrushing. Later, when children start to brush by themselves, parents should still be supervising their toothbrushing until it becomes a regular, frequent, learned, automatic, and self-perpetuating habit (Honkala, 1993).

Oral hygiene-related measures were dominant for dentists' children compared to modern methods of caries prevention. This coincides with earlier findings revealing that dentists appear to overemphasize oral hygiene measures compared to measures such as topical fluorides and pit and fissure sealants (Gift et al, 1991; Källestål et al, 1999; Lewis and Main, 1996). This overemphasis was also evident regarding Mongolian dental students' caries preventive practice for their patients (Tseveenjav et al, 2002).

The use of patient-passive measures such as in-office-applied topical fluoride and sealants may be limited by the lack of these materials in Mongolia. However, the patient-active measures could have been better encouraged by dentist-parents; for example, fluoridated toothpaste could have been recommended for all younger children, because its availability has markedly increased in the past 10 years on the Mongolian market, where other forms of fluorides are scarce.

Sealant placement in the primary molars of dentists' children seems to suggest that its use may be based on dentists' enthusiasm to do the best for their children rather than on available scientific evidence concerning the use of sealants (Davies, 2003), despite the fact that resin-bonded sealants could have been used as a routine treatment at the cavitation level of caries in primary molars, and reported as sealed primary teeth. These details indicate that the value placed on, and knowledge of CPMs may be insufficient among Mongolian dentists. This further suggests that both the undergraduate curriculum and the continuing education program in Mongolia should place more emphasis on the use of modern methods of caries prevention.

The effectiveness of CPMs as applied to dentists' children is doubtful in that the children's dental health did not show a variation based on the measures. This finding is contrary to earlier reports that improved dental health is achieved emphasizing preventive treatment (Kressin et al, 2003; Mc-Donald et al, 1981; Tickle et al, 2003; Vehkalahti and Helminen, 1994). This suggests that Mongolian dentists need to improve their knowledge and procedures for the use of scientifically proven measures in order to benefit their children.

Despite socially and professionally acceptable answers, more CPMs were reported to have been applied to those children with past and present caries experience (DMFT/dmft score); however, the variation in dental health explained by the factors in three parallel regression models remained small. This may suggest that there are other factors controlling the dental health outcomes of the children. The magnitude of the reported preventive measures represents dentists' maximum rather than minimum practice in real life. It may be the case that if dentists do not practice sufficient preventive dentistry for their children, they certainly will not do it for their patients.

In low-fluoride communities, sugar consumption has a detrimental effect on dental health (Ismail et al, 1997) suggesting more emphasis be placed on sugar consumption as an etiological factor for dental caries. In the present study, restriction of sugar consumption was reported for 30% of the children, which is very low, contrasting with the study by Mc-Donald et al (1981) where use of sugar was restricted for 81% of British dentists' children, followed by a marked increase in caries-free status. The low level of sugar restriction in the present study may be partially explained by dentists' own high sugar consumption in Mongolia (Tseveenjav et al, 2004). Dentists, as a section of the general population, seem to follow the same pattern of lifestyle change seen in urban populations in Mongolia over the past ten years during the transitional period towards a free market system. Due to socio-economic changes, availability of, and accessibility to sugar-containing snacks and soft drinks has increased tremendously, with people becoming increasingly exposed to sugar by adopting a 'western lifestyle'. Both lay and professional persons and their children seem to enjoy sugar-containing food in the absence of proper oral health promotion, which underlines the significance of a social and environmental support system for health promotion.

In conclusion, patient-active preventive measures applied to dentists' children should be improved, with an emphasis on lower sugar consumption. Both the undergraduate curriculum and the continuing education program need to emphasize the use of modern methods of caries prevention.

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