

Oral health knowledge, attitudes and behavior of elementary school teachers in India

Author

Kumar, Santhosh, Kulkarni, Suhas, Jain, Sandeep, Meena, Yogesh, Tadakamadla, Jyothi, Tibdewal, Harish, Duraiswamy, Prabu

Published

2012

Journal Title

Revista Gaucha de Odontologia

Version

Version of Record (VoR)

Rights statement

© The Author(s) 2012. This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Downloaded from

<http://hdl.handle.net/10072/349033>

Link to published version

http://revodonto.bvsalud.org/scielo.php?script=sci_arttext&pid=S1981-86372012000100003&lng=en&nrm=iso&tlng=en

Griffith Research Online

<https://research-repository.griffith.edu.au>

Oral health knowledge, attitudes and behavior of elementary school teachers in India

Conhecimento, atitudes e comportamento de professores do ensino primário da Índia sobre saúde oral

Santhosh KUMAR¹
Suhas KULKRANI²
Sandeep JAIN²
Yogesh MEENA²
Jyothi TADAKAMADLA³
Harish TIBDEWAL²
Prabu DURAISWAMY²

ABSTRACT

Objective

This study assessed the oral hygiene attitudes and behavior of elementary school teachers, and determined the influence of variables like language used in class and gender on oral health knowledge, attitudes and behavior.

Methods

A stratified random sampling was done to collect a representative sample of teachers from the Udaipur district. The total sample encompassed 126 teachers who teach in Hindi, India's official language along with English, and 104 teachers who teach in English. Of the 230 filled out questionnaires, 12 (5.2%) were rejected either because the answers were inconsistent, such as two replies to the same question, or because the answer was blank.

Results

Teachers who taught in English were more likely to brush their teeth twice daily (77.6%) than those who taught in Hindi (63.3%). All teachers who taught in English used tooth paste while only 71.7% of those who taught in Hindi did. Most females (53.1%) used a soft brush to brush their teeth and were more likely (84.4%) to brush twice daily than males. The brushing frequency differed significantly between genders. All female teachers stated that regular tooth brushing prevents tooth decay.

Conclusion

Most school teachers presented acceptable knowledge, attitudes and behavior. Teachers should be made aware of their responsibility as role models, and school staff should be given incentives to encourage their participation.

Indexing terms: Behavior. Índia. Knowledge

RESUMO

Objetivo

Este estudo avaliou as atitudes e comportamento dos professores do ensino primário com relação à higiene oral e determinou a influência de variáveis, como o idioma usado na sala de aula e o sexo, sobre o conhecimento, atitudes e comportamento com relação à saúde oral.

Métodos

Uma amostragem aleatória estratificada foi realizada para a coleta de dados de uma amostra representativa de professores do distrito de Udaipur na Índia. A amostra completa consistiu de 126 professores que ensinam em hindi, um dos idiomas oficiais da Índia junto com o inglês, e 104 professores que ensinam em inglês. Dos 230 questionários preenchidos, 12 (5,2%) foram rejeitados porque havia respostas inconsistentes, por exemplo, duas respostas para a mesma pergunta, ou respostas em branco.

Resultados

Professores que ensinavam em inglês (77,6%) eram mais propensos a escovar os dentes duas vezes ao dia que professores que ensinavam em hindi (63,3%). Todos os professores que ensinavam em inglês usavam creme dental enquanto que apenas 71,7% dos que ensinavam em hindi o faziam. A maioria das mulheres (53,1%) usava uma escova macia para escovar os dentes, e as mulheres eram mais propensas (84,4%) que os homens a escovar duas vezes ao dia. A frequência de escovação entre homens e mulheres diferiu significativamente. Todas as mulheres afirmaram que escovação regular previne a cárie dentária.

Conclusão

A maioria dos professores apresentou conhecimento, atitudes e comportamento aceitáveis com relação à saúde oral. Os professores devem estar cientes de sua responsabilidade como exemplo para os alunos e os funcionários da escola deveriam receber incentivos para estimular sua participação.

Termos de indexação: Comportamento. Índia. Conhecimento.

¹ Department of Preventive & Community Dentistry, Vishnu Dental College. Bhimavaram 534 202, West Godavari District, Andhra Pradesh, India.
Correspondence to: S KUMAR. E-mail: <santosh_dentist@yahoo.com>.

² Department of Preventive & Community Dentistry, Darshan Dental College and Hospital. Udaipur, Rajasthan, India.

³ Department of Oral Medicine and Radiology, Vishnu Dental College. West Godavari District, Andhra Pradesh, India.

INTRODUCTION

Children who brush their teeth more than once a day at the younger ages are more stable in their behavior through the adolescent years than those who brush their teeth less often¹⁻². Children have, however, established oral hygiene habits, which in general remain consistent. Hence, oral health education of school children is important as the behavior acquired during childhood is supposed to continue for life time. School teachers can play a major role in imparting knowledge of the causes and prevention of common oral diseases. It is believed that the higher prevalence of the two most common dental disease, dental caries and periodontal disease are influenced by the lack of dental awareness among the public at large. Many industrialized countries have experienced a decline in dental caries prevalence among children over the past decades^{1,3}.

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.

The school provides an ideal setting for promoting oral health. At the global level, approximately 80% of children attend primary schools and 60% complete at least four years of education, with wide variations between countries and gender⁴. Nonetheless, schools remain an important setting, offering an efficient and effective way to reach over 1 billion children worldwide and, through them, families and community members⁵.

Though there is fall in the prevalence of dental caries in developed countries, increasing levels have been found in some developing countries, especially for those countries like India where preventive programmes have not been established^{2,4}. It is well established that oral health behavior significantly influences the oral health status. The data available at the World Health Organization (WHO) Global Oral Health Data Bank suggests that the prevalence and severity of periodontal diseases do not differ markedly across developed and developing countries⁶⁻⁷. In developing countries, changing living conditions due to urbanization and adoption of western lifestyles are often considered potential risk factors for the incidence of dental caries

and recent population data show that the prevalence of dental caries is related to socioeconomic factors in developing countries as for developed countries⁸⁻⁹.

Previous studies focusing on school-based oral health education were primarily concerned with the relationship between the oral health status and the pattern of oral health knowledge and behavior in school children¹⁰⁻¹⁴. Besides dealing with this relationship, others have assessed the oral health knowledge, attitudes and practices of the school children's mothers¹⁵⁻¹⁶. Moreover, studies including the assessment of the school teachers' knowledge and attitudes with regard to oral health education of children were also carried out¹⁷⁻¹⁸. However, there are very few reports from Indian subcontinent that assessed the school teachers' dental health knowledge and awareness.

In many countries, a considerable number of children have limited knowledge of the causes and prevention of the most common oral diseases¹⁹⁻²⁵. Moreover, while many parents recognize the importance of tooth brushing in general, some do not know how to prevent tooth decay and gum disease and the role of fluoride in the prevention of dental decay is poorly understood. In many countries, less than half of mothers have received oral health advice from dentists^{21,23,25-27}.

School teachers in India constitute one of the biggest organized forces. They shape the future of the country and prepare young ones for life. Thus they should remain as role models for the children²⁸. With respect to the child population behavior modification may be a family responsibility, but oral health education could also be given by school teachers. However, there are very few reports from Indian subcontinent that assessed the school teachers' dental health knowledge and awareness.

Teachers can not assist in developing well-informed students, if they themselves remain misinformed. Thus increasing the oral health knowledge of school teachers provides an opportunity to educate an important segment of the public that has access to a large population of young people²⁸. Teachers and school staff play a fundamental role in carrying out day-to-day oral health promotion activities and interventions.

While teachers are crucial to the implementation of school oral health education, they do not necessarily

possess adequate knowledge and skills that enable them to deliver health education programmes effectively.

METHODS

A list of Hindi and English medium schools was obtained from the office of the District Educational Officer, Udaipur (Rajasthan, India). All the school teachers of various Hindi and English medium primary schools constituted the target population.

Stratified random sampling procedure was executed to collect the representative sample. All the 12 panchayat samithis represented the strata and from each stratum, English and a Hindi medium school were selected randomly. Thus, a total of 24 primary schools were included in the study. All the teachers present in the schools during the days of the survey were included in the study and those teachers who were not interested in participating comprised the exclusion criterion. The total sample encompassed 126 Hindi medium (Hindi medium teachers teach students in hindi, a local language in India) and 104 English medium school teachers. Of the 230 questionnaires filled 12 (5.2%) were rejected due to either inconsistent answers such as two replies given to the same question.

The study began by developing the questionnaire in English which was translated to Hindi and again retranslated to English. English questionnaire was administered in English medium schools and the Hindi in the corresponding schools.

The questionnaire consisted of two parts, first part dealt with demographic information such as age and gender whereas the second part comprised of 16 items related to knowledge, attitudes and practices.

Pre-testing of the questionnaire was done on the similar teacher population to assess the validity of the questionnaire and subsequently few questions were modified, it was determined from the pre-testing that the approximate time required to complete questionnaire was 15 minutes.

Prior permission from the school heads' was procured and ethical approval for conducting the study was availed from the ethical committee for research of Darshan Dental College and Hospital.

Questionnaires were distributed to the interested teachers and purpose of the study was explained by one of the author who was available while filling the questionnaire.

Reliability of questionnaire was assessed by re-administering the questionnaire to 40 school teachers (20 Hindi and 20 English medium school teachers) after 15 days and the reliability for various questions ranged from 84% to 100%. The least reliability was observed for the item "reason for taking care of your teeth and gums" whereas highest reliability was observed for "method used for cleaning the teeth".

Data collected was entered into the spread sheets and statistical analysis was done by statistical package for social sciences (version 15.0). Chi-square analysis was used to assess the differences in the proportions for various questions according to age, gender and medium. A significance value of less than 0.05 was considered as statistically significant.

RESULTS

Table 1 reveals the difference in knowledge, attitudes and behavior between Hindi and English medium primary school teachers. On Chi square analysis, it was observed that there was a significant difference between all the items except for "Dental visit every 6 months is necessary", "Fluoridated tooth paste is beneficial than other tooth pastes" and "Regular tooth brushing prevents tooth decay" though English medium school teachers reported better ratings than the Hindi medium teachers. It was observed that 77.6% of English medium teachers brushed their teeth twice as compared to 63.3% of Hindi medium teachers. Surprisingly, 87.6% English medium teachers used tooth brush as mode for cleaning the teeth in contrary to 61.7% of Hindi medium teachers. For the use of tooth brush, it was found that greater percentage of the teachers from the English medium (49%) used brushes with soft bristles than the other medium subjects (38.3%). All the English medium teachers used tooth paste while only 71.7% of Hindi medium teachers did the same.

Regarding the regularity of dental visit, many more Hindi teachers paid regular dental visits than the English ones. For many subjects routine check up was the reason for last dental visit and for about half the

Table 1. Frequency of responses to various items among English and Hindi medium primary school teachers.

Question	English		Hindi		Chi square value	P value
	n	%	N	%		
<i>Mode of cleaning the teeth</i>						
Tooth brush	84	87.5	74	61.7	21.320	0.001
Finger	0		14	11.7		
Both	12	12.5	32	26.7		
<i>Type of tooth brush used</i>						
Hard	0		0		6.919	0.031
Medium	50	51	60	50.0		
Soft	48	49	46	38.3		
Don't know	0		14	11.7		
<i>Material used for cleaning the teeth</i>						
Tooth paste	98	100	86	71.7	32.897	0.001
Tooth powder	0		34	28.3		
Others	0		0			
<i>Time of cleaning the teeth</i>						
Soon after waking up	56	58.3	40	35.1	17.690	0.001
Before going to bed	8	8.3	14	12.3		
Every time after eating	30	31.3	42	36.8		
Others	2	2.1	18	15.8		
<i>Frequency of teeth cleaning</i>						
One time	16	16.3	24	20.0	6.989	0.03
Two time	76	77.6	76	63.3		
Occasionally	6	6.1	20	16.7		
<i>Regularity of dental visit</i>						
Yes	68	69.4	96	81.4	5.697	0.048
No	30	30.6	22	18.6		
<i>Reason for the last dental visit</i>						
Routine check up	48	57.1	58	50.0	7.47	0.048
Dental pain	32	38.1	40	34.5		
Bleeding from gum	4	4.8	10	8.6		
Mobile teeth	0		8	6.9		
<i>Source of dental information</i>						
News paper/ Magazine	16	17.0	30	25.0	13.704	0.008
Friends or family members	10	10.6	10	8.3		
TV/radio	14	14.9	12	10.0		
Dentist	46	48.9	68	56.7		
Physician	8	8.5	0			
<i>Reason for taking care of teeth and gums</i>						
To improve your look	20	20.4	34	28.3	42.81	0.0001
To keep the teeth as long as possible	64	65.3	30	25.0		
Reduce future dental treatment	10	10.2	50	41.7		
Bad breath	0		2	1.7		
Be a good example among children	4	4.1	4	3.3		
<i>Are natural teeth better than artificial teeth?</i>						
Yes	86	87.8	84	77.8	7.320	0.026
No	10	10.2	24	22.2		
Not answered	2	2.0	0			
<i>Does oral health influence quality of life</i>						
Yes	70	71.4	100	83.3	4.453	0.035
No	28	28.6	20	16.7		
<i>Is visiting dentist a costly affair</i>						
Yes	52	53.1	10	8.3	57.099	0.0001
No	46	46.9	110	91.7		
<i>Dental visit every 6 months is necessary *</i>						
Yes	90	91.8	108	90	3.451	0.178
No	8	8.2	12	10		
<i>Fluoridated tooth paste is beneficial than other tooth pastes*</i>						
Yes	72	73.5	88	73.3	0.001	0.982
No	26	26.5	32	26.7		
<i>Improper consumption of sugars cause tooth decay</i>						
Yes	58	60.4	44	37.3	11.351	0.001
No	38	39.6	74	62.7		
<i>Regular tooth brushing prevents tooth decay *</i>						
Good	92	97.9	114	95	1.272	0.259
Poor	2	2.1	6	5		

Note: Chi square test, * Not significant (P>0.05). +The totals of the numbers in the categories do not add up to the total sample because of missing responses.

Table 2. Responses to questionnaire items in relation to gender of the study population

Item	Males		Females		Chi square value	P value
	N	%	n	%		
<i>Mode of cleaning the teeth</i>						
Tooth brush	56	62.2	102	81.0	14.951	0.001
Finger	12	13.3	2	1.6		
Both	22	24.4	22	17.5		
<i>Type of tooth brush used</i>						
Hard	0		0		8.935	0.011
Medium	52	57.8	58	45.3		
Soft	32	35.5	68	53.1		
Don't know	6	6.7	2	1.6		
<i>Material used for cleaning the teeth</i>						
Tooth paste	64	71.1	120	93.8	20.574	0.0001
Tooth powder	26	28.9	8	6.3		
Others	0		0			
<i>Time of cleaning the teeth</i>						
Soon after waking up	30	34.1	66	54.1	16.393	0.001
Before going to bed	6	6.8	16	13.1		
Every time after eating	38	43.2	34	27.9		
Others	14	15.9	6	4.9		
<i>Frequency of teeth cleaning</i>						
One time	26	28.9	14	10.9	32.448	0.0001
Two time	44	48.9	108	84.4		
Occasionally	20	22.2	6	4.7		
<i>Regularity of dental visit*</i>						
Yes	70	79.5	94	73.4	2.097	0.351
No	18	20.5	34	26.6		
<i>Reason for the last dental visit</i>						
Routine check up	46	56.1	60	50.8	15.031	0.002
Dental pain	22	26.8	50	42.4		
Bleeding from gum	6	7.3	8	6.8		
Mobile teeth	8	9.8	0	0		
<i>Source of dental information</i>						
News paper/ Magazine	28	31.1	18	14.5	15.261	0.004
Friends or family members	8	8.9	12	9.7		
TV/radio	4	4.4	22	17.7		
Dentist	48	53.3	66	53.2		
Physician	2	2.2	6	4.8		
<i>Reason for taking care of teeth and gums</i>						
To improve your look	42	46.7	12	9.4	50.575	0.0001
To keep the teeth as long as possible	22	24.4	72	56.3		
Reduce future dental treatment	24	26.7	36	28.1		
Bad breath	2	2.2	0	0		
Be a good example among children	0	0	8	6.3		
<i>Are natural teeth better than artificial teeth?*</i>						
Yes	66	84.6	104	81.3	1.381	0.501
No	12	15.4	22	17.2		
Not answered	0	0	2	1.6		
<i>Does oral health influence quality of life*</i>						
Yes	72	80.0	98	76.6	0.364	0.546
No	18	20.0	30	23.4		
<i>Is visiting dentist a costly affair*</i>						
Yes	20	22.2	42	32.8	4.595	0.101
No	70	77.8	86	67.2		
<i>Dental visit every 6 months is necessary *</i>						
Yes	80	88.9	118	92.2	2.982	0.225
No	10	11.1	10	7.8		
<i>Fluoridated tooth paste is beneficial than other tooth pastes</i>						
Yes	74	82.2	86	67.2	6.117	0.013
No	16	17.8	42	32.8		
<i>Improper consumption of sugars cause tooth decay *</i>						
Yes	40	45.5	62	49.2	0.292	0.589
No	48	54.5	64	50.8		
<i>Regular tooth brushing prevents tooth decay</i>						
Good	82	91.1	126	100.0	11.631	0.001
Poor	8	8.9	0	0		

Note: * Not significant (P>0.05). +The totals of the numbers in the categories do not add up to the total sample because of missing responses.

Hindi medium school teachers visiting a dentist was a costly affair.

Majority of the females (53.1%) used soft brush to brush their teeth. 93.8% of female teachers used tooth paste to brush their teeth in comparison to 71.1% male teachers. More number of females (84.4%) tended to brush twice daily and statistical analysis revealed significant differences between the genders for the brushing frequency. Nearly three fourths of the teachers regularly visited the dentist. Routine check up was the reason for dental visit and dentist was the source of dental information for more than half the subjects. 46.7% of males in contrary to 9.4% of females reported that the reason for taking care of teeth and gums was to improve the look and 6.3% females choose the response "Be a good example for children". Nearly three quarters of the study population opined that natural teeth are better than artificial ones and oral health does influence quality of life. For many of the teachers visiting dentist was not a costly affair. All the female teachers stated that regular tooth brushing prevents tooth decay. There was almost equal frequency of males and females supposed improper consumption of sugars to cause tooth decay.

DISCUSSION

Oral health is the mirror to general well being of an individual. Maintenance of oral hygiene forms a small yet considerably significant part in everyday life. Effective oral hygiene is actually the only efficient method to prevent caries and periodontal diseases. Thus the knowledge about basic oral hygiene measures is a must for every professional other than dentists. The school provides an ideal setting for promoting oral health and teachers form the major work force for the country in instilling good oral health behavior among children. Studies have proved that behaviors acquired during early life remain throughout the life. In order to instill good behaviors among children school teachers are supposed to be well equipped with sound knowledge, attitudes and behavior regarding the oral health. Studies to assess the oral health awareness among the school teachers are few and till date there is no such study from north of India. All these reasons formed the impetus for the present study which aimed to assess the oral hygiene attitudes and behavior of primary school teachers in addition

to determine the influence of variables like medium of education and sex on the oral health knowledge, attitudes and behavior.

The study area was limited to Udaipur district of Rajasthan and hence the results of the present study may not represent the whole primary school teacher population of the nation.

Overall, English medium school teachers possessed better oral health knowledge, attitudes and behavior than Hindi medium school teachers. For the brushing habit, mode and frequency many more school teachers of English medium reported positive responses. The teachers had received their information on oral health through from a variety of formal and non formal sources. Many of the dental information sources are available in English language and there is less scope for availability of dental information in Hindi which is the national language. This might be the plausible reason for the observed difference.

Study clearly showed that females from both the mediums were more aware regarding oral hygiene practices. The present study also found that the use of tooth brush and tooth paste was the most common method for cleaning the teeth though few were using finger and other methods also. Majority of the teachers were using brush with medium hard bristles. This indicates clear cut lack of knowledge about brushing techniques.

Three fourths (74%) of the teachers believed that fluoridated tooth paste is beneficial than other tooth pastes, this is in accordance to previous study among Chinese teachers which was found to be 89%²¹.

Only half the subjects felt that improper consumption of sugars cause tooth decay which is in disagreement to the previous Chinese study which reported that 78% of mothers and 79% of school teachers believed improper sweet consumption to be causative factor tooth decay²¹.

Gender clearly influenced the attitudes and behavior with females being more positive than males.

More number of females (84.4%) tended to brush twice daily and statistical analysis revealed significant differences between the genders for the brushing frequency, many studies among children have reported that gender appears to be especially important in that females brush their teeth more often than males²⁹⁻³⁰.

Though, majority of school teachers reported acceptable knowledge, attitudes and behavior.

English medium school teachers and females tended to possess more positive attitudes and behavior than their counterparts. Hence, systematic training programmes for these teachers would be needed and practical support from dentists should also be given, including the provision of education material.

All the teachers should be engaged in the design and planning stages of school health programmes. Teachers should be made aware of their duties as role models, facilitators and partners of parents and community members, benefit they can avail from oral health promotion efforts and the way oral health promotion can help them achieve learning and teaching objectives.

Incentives should be given to teachers and school staff to encourage participation. Some of the examples stated by the WHO include time release, continued professional development points, qualifications and free materials⁵.

Emphasis on dental health care should be developed among young Indian adults in order to improve their dental health behavior and it is the most important requirement. It can only be achieved if the teachers are well educated for the oral hygiene.

Further studies with larger samples should be conducted to assess the oral health awareness among this major workforce of the nation.

REFERENCES

1. Burt BA. Trends in caries prevalence in North American children. *Int Dent J.* 1994;44(4 Suppl 1):403-13.
2. Peterson PE, Razanamihaja N. Oral health status of children and adults in Madagascar. *Int Dent J.* 1996;46(1):41-7.
3. Sheiham A. Changing trends in dental caries. *Int J Epidemiol.* 1984;13(2):142-7.
4. Brazil Report: priorities and major school health promotion efforts in 1998-1999. Washington, D.C.: WHO PAHO; 1999 [cited 2003 April 10]. Available from: <<http://165.158.1.110/english/hpp/>>.
5. World Health Organization. The status of school health. Report of the school health working group and the WHO expert committee on comprehensive school health education and promotion. Geneva: WHO; 1996.
6. Petersen PE. The World Oral Health report 2003: continuous improvement of oral health in the 21st century - the approach of the WHO global oral health programme. *Community Dent Oral Epidemiol.* 2003;31(1):3-24.
7. World Health Organization. Global oral health data bank. Geneva: WHO; 2004.
8. Miura H, Araki Y, Haraguchi K, Arai Y, Umenai T. Socioeconomic factors dental caries in developing countries: a cross-national study. *Soc Sci Med.* 1997;44(2):269-72.
9. Diehnelt DE, Kiyak HA. Socioeconomic factors that affect international caries levels. *Community Dent Oral Epidemiol.* 2001;29(3):226-33.
10. Buischi Y, Axelsson P, Oliveira L, Mayer M, Gjermeo P. Effect of two preventive programs on oral health knowledge and habits among Brazilian schoolchildren. *Community Dent Oral Epidemiol.* 1994;22(1):41-6.
11. Kinnby CG, Palm L, Widenheim J. Evaluation of information on dental health care at child health centers. *Acta Odontol Scand.* 1991;49(5):289-99.
12. Peng B, Petersen PE, Fan MW, Tai BJ. Oral health status and oral health behavior of 12-year-old urban schoolchildren in the People's Republic of China. *Community Dent Health.* 1997;14:238-44.
13. Petersen PE. Oral health behavior of 6 year-old Danish children. *Acta Odontol Scand.* 1992;50(1):57-64.
14. van Palenstein Helderma WH, Munck L, Mushendwa S, van't Hof MA, Mrema FG. Effect evaluation of an oral health education programme in primary schools in Tanzania. *Community Dent Oral Epidemiol.* 1997;25(4):296-300.
15. Sheiham A, Watt RG. The common risk factor approach: a rational basis for promoting oral health. *Community Dent Oral Epidemiol.* 2000;28(6):399-406.
16. Vigild M, Petersen PE, Hadi R. Oral health behavior of 12-year-old children in Kuwait. *Int J Paediatric Dent.* 1999;9:23-9.
17. Nyandindi U, Palin-Palokas T, Milen A, Robinson V, Kombe N, Mwakasagule S. Participation, willingness and abilities of schoolteachers in oral health education in Tanzania. *Community Dent Health.* 1994;11(2):101-4.
18. Petersen PE, Mzee MO. Oral health profile of schoolchildren, mothers and schoolteachers in Zanzibar. *Community Dent Health.* 1998;15:256-62.
19. Zhu L, Petersen PE, Wang HY, Bian JY, Zhang BX. Oral Health knowledge, attitudes and behavior of children and adolescents in China. *Int Dent J.* 2003;53:289-98.
20. al-Tamimi, Petersen PE. Oral health situation of schoolchildren, mothers and schoolteachers in Saudi Arabia. *Int Dent J.* 1998;48(3):180-6.

21. Petersen PE, Zhou E. Dental caries and oral health behavior situation of children, mothers and schoolteachers in Wuhan, People's Republic of China. *Int Dent J.* 1998;48:210-6.
22. Wierzbicka M, Petersen PE, Szatko F, Dybizbanska E, Kalo I. Changing oral health status and oral health behavior of schoolchildren in Poland. *Community Dent Health.* 2002;19:243-50.
23. Rajab LD, Petersen PE, Bakaeen G, Hamdan MA. Oral health behavior of schoolchildren and parents in Jordan. *Int J Paediatr Dent.* 2002;12:168-76.
24. Petersen PE, Danila I, Samoila A. Oral health behavior, knowledge, and attitudes of children, mothers and schoolteachers in Romania in 1993. *Acta Odontol Scand.* 1995;53:363-8.
25. Petersen PE, Hadi R, al-Zaabi FS, Hussein JM, Behbehani JM, Skougaard MR, Vigild M. Dental knowledge, attitudes and behavior among Kuwaiti mothers and school teachers. *J Pedod.* 1990;14(3):158-64.
26. Petersen PE, Nyandindi U, Kikwilu E, Mabelya L, Lembariti BS, Poulsen VJ. Oral Health Status and Oral Health Behavior of School Children, Teachers and Adults in Tanzania. Technical Report. Geneva: WHO; 2002.
27. Petersen PE, Mzee MO. Oral health profile of schoolchildren, mothers and schoolteachers in Zanzibar. *Community Dent Health.* 1998;15:256-62.
28. Pai V, Siqueira P, Rap A, Kundabala M. Dental awareness among Kannada and English medium primary school teachers in Mangalore city. *J Indian Assoc Public Health Dent.* 2006;(7):7-12.
29. Hodge HC, Holloway PJ, Bell CR. Factors associated with tooth brushing behavior in adolescents. *Br Dent J.* 1982;152:49-51.
30. Macgregor IDM, Balding JW. Tooth brushing frequency and personal hygiene in 14-yearold schoolchildren. *Br Dent J.* 1987;162:141.

Received on: 28/12/2010

Final version resubmitted on: 26/3/2011

Approved on: 3/7/2011