

Effectiveness of a Dental Health Counseling for Parents in Preventing Caries among School-Going Children

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ABSTRACT

Objective: To assess the effectiveness of dental counseling for parents of young school-going children in increasing use of fluoride toothpaste and tablets thus, preventing dental caries.

Methodology: An intervention study was conducted at the Department of Operative Dentistry, HBS Dental Hospital, Islamabad between December 2018 and June 2020. A total of 1605 school-going children aged 3 to 18 years were included in the study. During the study, 667 could not be reached after six months of study. For further comparison, a control group of 315 participants were also included. The control group included children between the age of 3-17 years with similar demographics as the intervention group. The intervention group was counseled about the use of fluoride toothbrushing and tablets. Brushing instructions and training were reinforced at each visit. Parents were further dismayed from providing their child with sugary beverages and snacks.

Results: The study revealed that the frequency of consuming carbonated drinks ($p=0.0005$) and the rate of unsupervised toothbrushing ($p=0.017$) were statistically different. Consumption of carbonated drinks was significantly higher in the control group ($p=0.0002$). The proportions of unsupervised toothbrushing in the intervention group was significantly lower than the control ($p<0.0001$). The lack of fluoride toothpaste was significantly lower in the intervention group as compared to the control group ($p<0.0001$).

Conclusion: The study found that dental health counseling was significantly associated with decreased dental caries and improved dental practices among school-going children. Proper counseling for use of fluoride toothpaste is effective in improving the dental health status among the pediatric population. Dental health practitioners should encourage parents to provide healthy diets to children and reinforce the habit of toothbrushing to the adequate prevention of dental decay.

Keywords: caries, dental health, DMFT, fluoride, toothbrushing

INTRODUCTION

Tooth decay which is more commonly known as dental caries causes destruction of the rigid and calcified tissues of teeth. Decay causing bacteria metabolizes the fermented carbohydrates unevenly which leads to the said condition¹.

The condition is prevalent in all age groups. Moreover, the treatment of dental caries is also quite expensive. Despite the condition being easily preventable, it still is highly prevalent owing to its mode of prevention, which involves withdrawal from unhealthy eating habits which is a difficult task for many people. Dental caries affect both the primary (deciduous) and secondary (permanent) sets of teeth².

In the United States, the most widely spreading chronic condition is Early Childhood Caries (ECC). Multiple factors are responsible for the prevalence of dental caries in the USA, such as unhygienic food, bacteria and societal restrictions³.

Classification of dental caries is done via a grading indicator referred as DMFT indicator (decayed, missed and filled teeth index)⁴. This indicator measures the number of teeth which are filled, dislodged and decomposed. A similar type of indicator which is called DMFS (Decayed, missed filled tooth surfaces) is used to chart the same measurements. The use of these indicators occurs when there's a need to demonstrate the epidemiological analysis of dental caries and the degree of dental decay occurrence in individuals⁵.

Literature shows that higher prevalence of dental caries is seen among children who belong to lower income countries⁶. The given hypothesis is strengthened further by a UK based study, which goes on to show a close relationship between dental caries and low socioeconomic conditions⁷. A Scotland based survey which was conducted in 1999 on 5-year-old children showed that there is a direct relationship between the increased incidence of dental caries and usage of sugar, which is a fermented carbohydrate. A high incidence of untreated dental caries and

tooth decay is prevalent in children who are from an underprivileged background⁸. Thus, many factors seem to play a role in oral healthcare and its treatment, some of which include the patient's social status and area of residence⁹.

The present study aimed to assess the effectiveness of dental counseling for parents of young school-going children in increasing use of fluoride toothpaste and tablets thus, preventing dental caries.

METHODS AND MATERIALS

An intervention study was conducted at the Department of Operative Dentistry, HBS Dental Hospital, Islamabad between December 2018 and June 2020. A total of 378 school-going children aged 3 to 12 years were included in the study. The study was started after being approved by the institutional ethical committee of Jinnah Sindh Medical University.

Verbal and written consent was requested from all the parents and assent was taken from the children. The participants and the guardians were ensured about the confidentiality of the information. During the study, 113 could not be reached after six months of study.

For further comparison, a control group of 315 participants were also included. The control group included children between the ages of 3-12 years with similar demographics as the intervention group.

The participants were enrolled by inviting the parents to come for a free dental check up at the local Pediatric Health Center. The intervention group was counseled about the use of fluoride tooth brushing and tablets. The researchers narrated the harmful side effects of not maintaining oral health hygiene and reinforced the use of fluoride toothpaste and tablets which were provided by the dentist (dose of 0.25 mg/dl). Fluoride toothpaste was also provided to each participant to encourage use of fluoride toothpaste. In short the intervention involved encouragement to

use fluoride toothpaste, a free fluoride toothpaste, tablets, and toothbrush. At the final follow-up visit, the child's oral health status was assessed and DMFT score was assessed. Brushing instructions and training were reinforced at each visit. Parents were further dismayed from providing their child with sugary beverages and snacks.

Participants' lack of compliance was observed at each visit by assessing the self-reported oral hygiene habits by the parents. Frequency of fluoride tooth brushing, fluoride tablets, and nutritional/dietary habits were recorded in a predefined questionnaire. The design of the study did not permit a blinded examination procedure. The senior consultant performed the dental caries examination while wearing proper personal protective equipment (PPE), using a mouth mirror, explorer and CPITN probe. Dental caries were scored using the DEFT index. All findings were properly documented. The presence of visible plaque on the labial surfaces of the upper incisors was scored according to the visible plaque index¹⁰, and gingival health was scored as "bleeding" or "non-bleeding" after toothbrushing. Caries were recorded as manifest (cavitated) or initial (non-cavitated) decay, extracted or filled teeth (DEFT) according to the criteria described by Wendt et al¹¹. A child was scored as caries-free when neither manifest nor initial enamel lesions were registered.

All data were entered into the statistical package of social sciences (SPSS) version 26. The effectiveness of health counseling was assessed by comparing the dental practices of children at baseline and at six months of intervention. Moreover, the proportion of caries and severity of caries were compared between the intervention group and the control groups. A probability of 0.05 or less was set as the cut off for significance.

RESULTS

A total of 378 participants were included at baseline who underwent counseling.

After six months of study, 113 (29.8%) were lost to follow-up. It was found that after six months the frequency of consuming carbonated drinks ($p=0.0005$) and the rate of unsupervised toothbrushing ($p=0.017$) were statistically different (Table 1).

Table 1: Improvement in Dental Practices of Participants at Baseline and after six months of intervention

Parameter	Baseline (378)	After Six months (265)	p-value
Consumption of carbonated drinks	109 (28.8%)	45 (16.9%)	0.0005
Unsupervised toothbrushing	36 (9.5%)	12 (4.5%)	0.017
Lack of use of fluoride toothpaste	50 (13.2%)	36 (13.58%)	0.895

Similarly as illustrated in Table 2, consumption of carbonated drinks was significantly higher in the control group (who were not counseled about the maintenance of dental health ($p=0.0002$)). The proportions of unsupervised toothbrushing in the intervention group was significantly lower than the control ($p<0.0001$). The lack of fluoride toothpaste was significantly lower in the intervention group as compared to the control group ($p<0.0001$) (Table 2).

Table 2: Comparison between intervention group and control group

Parameter	Intervention group (265)	Control group (315)	p-value
Consumption of carbonated drinks	45 (16.9%)	95 (30.2%)	0.0002
Unsupervised toothbrushing	12 (4.5%)	60 (19.0%)	<0.0001
Lack of use of fluoride toothpaste	36 (13.58%)	112 (35.5%)	<0.0001

The study found that dental health counseling was significantly associated with decreased dental caries among school-going children ($p=0.0018$).

Table 3: Improvement in Dental Health Hygiene after Counseling Among School-going Children

Outcome	Intervention Group (265)	Control group	p-value
Caries-free	75 (28.3%)	55 (17.4%)	0.0018
Caries	190 (71.7%)	260 (82.5%)	

Upon assessing the severity of dental caries in the intervention versus the control group, it was found that the rate of severe dental caries (DEFT > 12) in the intervention group after six months was 2.99% versus 7.94% in the control group ($p<0.0001$) (Table 4).

Table 4: Severity of caries in the Intervention and Control groups

Characteristic	After 6 months	Control group	p-value
Distribution of caries			<0.0001
0 DEFT	98 (36.9%)	44 (13.97%)	
1-3 DEFT	82 (30.9%)	129 (40.95%)	
4-6 DEFT	45 (17%)	63 (20%)	
7-9 DEFT	21 (7.9%)	38 (12.06%)	
10-12 DEFT	11 (4.2%)	16 (5.08%)	
>12 DEFT	8 (3%)	25 (7.94%)	

DISCUSSION

The treatment which proved to be effective for prevention of dental caries in children with a lower socio-economic and a diverse cultural background was the use of fluoride supplements. Strict adherence to the said treatment with decreased withdrawal rate showed satisfactory results among children belonging to an underprivileged background.

However, the patient's diet and proper oral hygiene cannot be downplayed when taking care of dental caries. Strict adherence to fluoride supplementation and persistent oral health care are effective in prevention of dental caries, moreover, timely removal of plaque also plays an important role in the prevention of dental caries¹². Dental decay can significantly reduce with appropriate use of Fluoride, which can be done by adding fluoride in water of those areas where the condition shows high prevalence. Fluoride treated water can also be used as rinses, varnishes and pastes. The application of fluoride-containing varnishes by dentists on primary or permanent teeth 2-3 per year can help in the release of fluoride in a fruitful way⁶.

Previously published research shows that the widespread presence of dental decay in the UK seems to be getting worse rather than getting better. The people who are more likely to develop dental health problems are specifically at a higher risk of being exposed to dental decay and are categorized as the 'at danger groups'¹³. Scottish children show a higher prevalence of tooth decay as proven by an RCT which included 5-years-old children from Dundee. The duration of the RCT was 2 years and it was evaluated that 33% of the Children by the age of 7 have experienced the ordeal of developing dental caries on their deciduous (primary) teeth¹⁴.

The mammoth cost of the treatment of dental caries, which is the most significant dental health problem, exceeds the amount required for the prevention of primary health problems such as cardiovascular disorders, cancers and bone disorders. The treatment cost and cost of prevention for dental conditions is highly expensive even for developed countries¹⁵, and hence the higher prevalence of decaying teeth in Low-Middle Income Countries (LMICS), where even after a proper diagnosis more than 90% of the dental disorders remain untreated¹⁶.

Raising awareness regarding the use of fluoride toothpastes and rinses and giving away free of cost fluoride toothpastes and brushes have proved to be an effective strategy in controlling this highly expensive dental disorder. Surprisingly, proper counseling of children guardians by experts about what diet and nourishment they should be giving to their child or infant has proved to be an unsuccessful method for the prevention of dental disorders.

The interconnection between the development of dental caries and absence of basic amenities required for dental hygiene

due to the socioeconomic demographics of a person is an important association which has been highlighted by the existing literature. Some researchers have shown an association between dental care and unavailability of some elements related to socio-demographic characteristics of a person that can possibly lead to the development of certain dental diseases like dental decay. For example, the residence of a person can determine the initiatives that must be taking place in that particular area to ensure dental hygiene and care. An accurate depiction of this is shown by the study carried out in rural Brazil, which showed that lack of access to safe primary healthcare services significantly added to the incidence of dental caries there¹⁷.

The awareness program which was employed to raise importance regarding the use of fluoride containing toothbrushes and toothpastes, conducted by primary school teachers, showed a 10.9% difference (relating to higher incidence of dental caries) between the control group and the intervention group. This justifies the importance of fluoride in the prevention of dental caries¹⁸. Similarly, a research by Pine, McGoldrick et al observed a difference of 16%¹⁹. Additionally, as endorsed by 95% of the parents, the use of fascinating dental health related charts by dentists can play a role in persuading children to brush teeth regularly. The employment of fluoride apparatus to manage dental caries in children above 2 years of age turned out to be a successful tool²⁰. Intervention group had significantly less DMFS in comparison to the control group. Hence, the use of fluoride apparatus under the supervision of skilled and competent staff can also prove to be an effective preventative measure for dental decay.

To prevent the prevailing condition of dental caries, governments and NGOs need to immediately employ those methods which have shown a higher success rate. Many of such measures include, raising awareness on dental hygiene, employment of dental health education in education institutes, industries and hospitals, free of cost distribution of fluoride rich toothbrushes and toothpastes, regular dental checkup and taking public health surveys to get an idea about the general awareness of dental hygiene among the local masses, so that appropriate measures can be taken accordingly.

CONCLUSION

The promotion of dental health hygiene requires establishment of health promoting strategies and dental health schemes. Healthy diet and eating habits can go a long way in the prevention of dental disorders. Along with all of this, dental care strategies like use of fluoride rich toothpastes, tablets and gels can lead to the adequate prevention of dental decay.

REFERENCES

1. Pitts NB, Zero DT, Marsh PD, Ekstrand K, Weintraub JA, Ramos-Gomez F, Tagami J, Twetman S, Tsakos G, Ismail A. Dental caries. *Nature reviews Disease primers*. 2017 May 25;3(1):1-6.

2. Baginska J, Rodakowska E, Milewski R, Kierklo A. Dental caries in primary and permanent molars in 7-8-year-old schoolchildren evaluated with Caries Assessment Spectrum and Treatment (CAST) index. *BMC Oral Health*. 2014 Dec;14(1):1-8.
3. Hooley M, Skouteris H, Boganic C, Satur J, Kilpatrick N. Parental influence and the development of dental caries in children aged 0–6 years: a systematic review of the literature. *Journal of dentistry*. 2012 Nov 1;40(11):873-85.
4. Denloye O, Ajayi D, Bankole O. A study of dental caries prevalence in 12–14 year old school children in Ibadan, Nigeria. *Pediatric dental journal*. 2005 Jan 1;15(2):147-51.
5. Clarkson JE. Development of a classification and index of dental treatment experience. The University of Manchester (United Kingdom); 1993.
6. Marinho VC, Worthington HV, Walsh T, Clarkson JE. Fluoride varnishes for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev*. 2013 Jul 11;(7):CD002279.
7. Currie RB, Pretty IA, Tickle M, Maupomé G. Letter from America: UK and US state-funded dental provision. *Community Dental Health*. 2012 Dec 1;29(4):315.
8. Sweeney PC, Nugent Z, Pitts NB. Deprivation and dental caries status of 5-year-old children in Scotland. *Community dentistry and oral epidemiology*. 1999 Apr;27(2):152-9.
9. Nations MK, Nuto SD. "Tooth worms", poverty tattoos and dental care conflicts in Northeast Brazil. *Social Science & Medicine*. 2002 Jan 1;54(2):229-44.
10. Indicator Metadata Registry Details [Internet]. Who.int2022 [cited 2022 Apr 17]; Available from: <https://www.who.int/data/gho/indicator-metadata-registry/imr-details/3812>
11. Wendt LK, Hallonsten AL, Koch G. Oral health in preschool children living in Sweden. Part II--A longitudinal study. Findings at three years of age. *Swedish Dental Journal*. 1992 Jan 1;16(1-2):41-9.
12. Maltz M, Jardim JJ, Alves LS. Health promotion and dental caries. *Brazilian oral research*. 2010;24:18-25.
13. Moynihan P. The British nutrition foundation oral task force report—issues relevant to dental health professionals. *British dental journal*. 2000 Mar;188(6):308-12.
14. Curnow MM, Pine CM, Burnside G, Nicholson JA, Chesters RK, Huntington E. A randomised controlled trial of the efficacy of supervised toothbrushing in high-caries-risk children. *Caries research*. 2002;36(4):294-300.
15. Sheiham A. Dietary effects on dental diseases. *Public health nutrition*. 2001 Apr;4(2b):569-91.
16. Moynihan P, Petersen PE. Diet, nutrition and the prevention of dental diseases. *Public health nutrition*. 2004 Feb;7(1a):201-26.
17. de Campos Mello TR, Antunes JL, Waldman EA. Prevalence of untreated caries in deciduous teeth in urban and rural areas in the state of São Paulo, Brazil. *Revista Panamericana de Salud Pública*. 2008 Feb 1;23(2):78-84.
18. Jackson RJ, Newman HN, Smart GJ, Stokes E, Hogan JI, Brown C, Seres J. The effects of a supervised toothbrushing programme on the caries increment of primary school children, initially aged 5–6 years. *Caries research*. 2005;39(2):108-15.
19. Pine CM, McGoldrick PM, Burnside G, Curnow MM, Chesters RK, Nicholson J, Huntington E. An intervention programme to establish regular toothbrushing: understanding parents' beliefs and motivating children. *International dental journal*. 2000 Dec 1;50(6):312-23.
20. Toumba KJ, Curzon ME. A clinical trial of a slow-releasing fluoride device in children. *Caries research*. 2005;39(3):195-200.