

# Dental pain among 10–15 year old children attending oral health promoting schools: A cross-sectional study

Abdul Saheer, Pallavi Swami Kousalya, Rekha Raju, Radha Gubbihal

Department of Public Health Dentistry, Vokkaligara Sangha Dental College and Hospital, Bangalore, Karnataka, India

Corresponding author (email: <zaheer5475@gmail.com>)

Dr. Abdul Saheer, B-4, Alsa Palm springs, Beach (p.o), Calicut - 673 032, Kerala, India.

## Abstract

**Introduction:** Dental pain is a major public health problem and one of the consequences of oral diseases which requires significant adjustments in life management leading to decreased quality of life. **Objective:** To assess prevalence of dental pain and its impact on daily life and to explore its relationship with oral health behavior and clinical oral status among 10–15 year old school children attending oral health promoting schools. **Method:** This cross sectional study was conducted in 6 schools serving low -middle socio economic strata in Bangalore, India. A total of 1237 children were surveyed for history of dental pain during past 3 month. Participants who reported dental pain completed self-reported oral health behaviour and Child dental pain questionnaire. Clinical oral examination included assessment of dental caries, periodontal status. Data was analyzed using *t* - test, Chi-square test, ANOVA and Regression Analysis. **Results:** Prevalence of dental pain was 15.6% (*n* = 194). Among children with pain, 17%, 43% and 40% reported mild, moderate and severe pain. Impact on daily activities was reported by 66%. Mean DMFT and DMFS was 1.80 and 2.11 Mean deft and defs was 2.47 and 3.41. Multiple logistic regression revealed that severity and impact of dental pain was associated with gender, frequency of tooth brushing, consumption of sweets and deciduous dental caries experience. **Conclusion:** Prevalence of Dental pain is associated with brushing behavior, consumption of sweets and deciduous dental caries experience, showing need for further attention to these conditions and a need to strengthen preventive and therapeutic dental services.

**Key words:** Children, dental pain, oral health

## INTRODUCTION

Schools are an ideal setting where health promotion strategies can be used to enhance the oral health of children and an indirect channel to target community for promoting oral health.<sup>[1]</sup> Oral health promoting schools that incorporate health education, promotion, prevention, and curative services are effective in lowering the burden of oral disease among children. It is also reported that along with this, there is a significant

improvement in tooth brushing behavior and in the use of topical fluorides.<sup>[2-4]</sup>

Though research has suggested that oral disease burden is lower in the oral health promoting schools than elsewhere, dental problems such as dental pain still exist in certain risk groups, accounting for loss of school hours, difficulties in eating, speaking, and learning, and lower grades in children, and absence from work and financial burden for parents. The prevalence of dental

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pain varies from 5 to 71%,<sup>[2,5-7]</sup> and this oral health inequality hits the poor and deprived with the hardest impact. The outcome of oral health promotion in a school-based setting on dental pain experience and its impact on daily life on children has not been thoroughly investigated. This research will help in identifying and addressing the determinants of dental pain experience which impacts more significantly the risk groups, than merely treating the disease in those who present for care.

Thus, the present study was conducted to assess the prevalence of dental pain and its impact on daily life and to further explore the role of socio-behavioral and clinical oral health status in dental pain experience among 10–15-year-old school children attending school oral health promotion program.

## MATERIALS AND METHODS

Oral health promotion programs have been conducted for the last 8 years by Vokkaligara Sangha Dental College to improve the oral health of school children of Bangalore city. Bangalore south zone was randomly selected from the four zones of the city (north/southwest/east) with six geographic clusters and one school was selected randomly from each geographic cluster. The study protocol was approved by the institutional review board. Study duration was 3 months (June–August 2014). Children in the age group of 10–15 years were included in the study as the cognitive and language development is better in this age strata and they would be able to communicate their feelings better. Children who reported dental pain beyond 3 months period, those who were undergoing any medical treatment, and those who were mentally challenged were excluded from the study. Finally, a sample of 1237 school children in the age group of 10–15 years participating in the school oral health promotion program were screened for history of dental pain. Informed consent from parents or assent from the children was obtained.

Data collection included questionnaire assessing socio economic status (Kuppuswamy scale),<sup>[8]</sup> oral health behavior and dental pain. Data on oral health behavior included brushing behavior and sugar intake. Dental pain was assessed by Child-Dental Pain Questionnaire (C-DPQ) given by Barretto *et al.*<sup>[9]</sup> that consists of six questions. The questionnaire measures the prevalence, severity, and impact of dental pain on children's quality of life with two items for each measure. Severity of dental pain was categorized as mild, moderate, and severe, and the measure impact on daily life was categorized into with and without impact. Questionnaires were translated to the local language and language validation was done.

Clinical oral examination was conducted in the classroom by a single investigator using mouth mirror and WHO CPI probe. Recording of clinical oral health status included dental caries status, periodontal status, and malocclusion using WHO oral health survey criteria, 1997.<sup>[10]</sup> The Community Periodontal Index (CPI) was used to record the presence of bleeding on probing (code 1) and calculus (code 2) on six index teeth (16, 11, 26, 36, 31, 46). The pilot study was conducted to find out the feasibility of the study, for training and calibration of the examiner and to check for the test-retest reliability of the questionnaire. Test-retest reliability of C-DPQ was 0.84 and the intra-examiner reproducibility of clinical measures was 0.87.

## Statistical analysis

Data were analyzed using the statistical package SPSS 19.0 with values <0.05 being significant. For statistical analysis, very mild pain and mild pain were categorized as mild pain, and severe and very severe pain as severe pain. statistical analysis was done by using Chi-square test and logistic regression was also used.

## RESULTS

Results of the study showed the prevalence of dental pain to be 15.6% (194). Also, 47.4% and 52.6% of the children were males and females, respectively, with a majority of them from lower middle class families [Table 1]. Twenty percentage of participants had their last toothache within last month and 76% ( $n = 147$ ) reported pain more than a month ago. 32% ( $n = 63$ ) of

**Table 1: Prevalence, reason of self-reported dental pain, and demographic factors of the study participants**

Category	Number of participants	Percentage
Number of school children screened	1237	100
Prevalence of dental pain	194	15.6
Age		
10-12 years	92	47.4
13-15 years	102	52.6
Gender		
Male	93	47.9
Female	101	52.1
Socioeconomic status		
Lower	1	0.1
Lower middle	188	96.9
Middle	5	3
Self-reported reason for the pain		
Dental caries	164	85
Gum problems	24	12
Trauma	6	3

participants cries during the worst pain attack and 37% ( $n = 78$ ) reported their pain as severe/very severe. 72% ( $n = 139$ ) of participants were awakened during night due to pain and 66% had reported normal daily tasks were affected due to pain ( $n = 128$ ) [Table 2]. Among the participants who reported severe pain, 47% were females ( $P < 0.05$ ). Among those who reported impact

of pain on daily activities, 52% brushed twice a day ( $P < 0.05$ ), 49% consumed sweets more than twice a day ( $P < 0.05$ ), 51% of participants with impact of pain had dmfs  $>2$  [Table 3]. Mean DMFT or DMFS did not show any association with severity of the pain ( $P > 0.05$ ) whereas dmft/dmfs was significantly more among severe pain group ( $P < 0.05$ ). Similarly dmft/dmfs was significantly higher among participants with impact of pain than who had no impact (2.84/3.60 v/s 2.10/3.22) [Table 4]. Regression analysis showed higher odds of pain severity among females (OR = 1.69, 1.12–1.88), in consumption of sweets (OR = 1.68, 1.33–1.89), and dmfs  $<2/>2$  (OR = 1.84, 1.10–3.78). Brushing twice a day was protective in nature (OR = 0.79, 0.53–0.85) [Table 5]. Impact of dental pain showed the risk of variables such as consumption of sweets (OR = 1.45, 1.28–1.68), dmfs  $<2/>2$  (OR = 1.25, 1.03–2.79), and presence of calculus (OR = 1.35, 1.02–1.85) [Table 6].

**Table 2: Distribution of study participants according to Child-Dental Pain Questionnaire (C-DPQ) response**

Question	Response	No	Percentage
Have you had dental pain in last 3 months?	Present	194	100
	Absent	0	0
When was your last toothache?	More than a month ago	147	76
	Last month	38	20
	Today	9	4
Did you cry at the worst moment of a toothache?	No	131	68
	Yes	63	32
How was it when the pain was at its worst?	Very mild pain	6	2
	Mild pain	28	13
	Moderate pain	82	43
	Severe pain	58	29
	Very severe pain	20	8
Were you awakened at night by the pain?	No	55	28
	Yes	139	72
Were you unable to carry out any normal tasks because of toothache?	1 = No	66	34
	2 = Yes	128	66

## DISCUSSION

Despite great achievements made globally in the oral health of the population, problems still remain in many communities all over the world, particularly among the underprivileged groups in developed and developing countries.<sup>[1,11]</sup> The present study assessed the outcome of these oral health promotion activities

**Table 3: Comparison of severity and impact of dental pain and independent variables**

Category	N=194	Severity of dental pain				Impact on daily life		
		Mild (n=34) (%)	Moderate (n=82) (%)	Severe (n=78) (%)	P	With impact (%)	Without impact (%)	P
Age	10-12 years	13 (14)	38 (41)	42 (45)	0.30 ( $\chi^2=2.213$ )	61 (66)	32 (34)	0.459 ( $\chi^2=0.069$ )
	13-15 years	21 (21)	44 (44)	36 (35)		67 (66)	34 (34)	
Sex	Male	23 (24)	40 (43)	30 (33)	0.033* ( $\chi^2=9.414$ )	58 (66)	35 (34)	0.308 ( $\chi^2=1.09$ )
	Female	11 (11)	42 (42)	48 (47)		70 (70)	31 (30)	
Socioeconomic status	Middle	1 (20)	3 (60)	1 (20)	0.226 ( $\chi^2=5.118$ )	2 (50)	3 (50)	0.360 ( $\chi^2=2.041$ )
	Lower middle	33 (17)	79 (42)	77 (41)		126 (67)	63 (33)	
Brushing frequency	Once in a day	28 (18)	60 (38)	70 (44)	0.004* ( $\chi^2=11.56$ )	107 (68)	51 (32)	0.021* ( $\chi^2=7.96$ )
	Twice or more in a day	6 (17)	22 (61)	8 (22)		21 (48)	15 (52)	
Change of tooth brush	<3 months	17 (29)	19 (33)	22 (38)	0.023* ( $\chi^2=14.68$ )	40 (69)	18 (31)	0.039* ( $\chi^2=10.28$ )
	3-6 months	9 (19)	23 (49)	15 (42)		29 (62)	18 (38)	
	Bristle frays	8 (9)	40 (45)	41 (46)		63 (71)	26 (29)	
Sweets consumption	Once a day	9 (15)	22 (36)	30 (49)	0.004* ( $\chi^2=22.49$ )	45 (74)	16 (26)	0.039* ( $\chi^2=11.07$ )
	$\geq 2$ /day	16 (19)	35 (42)	32 (39)		44 (51)	40 (49)	
	$\geq 1$ /week	9 (18)	25 (50)	16 (32)		39 (80)	10 (20)	
Highest CPI code	Bleeding	11 (55)	7 (35)	2 (10)	0.457 ( $\chi^2=0.452$ )	5 (56)	4 (44)	0.326 ( $\chi^2=2.25$ )
	Calculus	23 (13)	75 (43)	76 (44)		123 (67)	62 (33)	
DMFT	<2	21 (17)	54 (44)	50 (39)	0.959 ( $\chi^2=0.637$ )	80 (67)	39 (33)	0.728 ( $\chi^2=0.635$ )
	>2	13 (19)	28 (41)	28 (40)		48 (64)	27 (36)	
dmfs	<2	29 (25)	48 (40)	41 (35)	0.003* ( $\chi^2=15.93$ )	85 (77)	25 (23)	0.031 ( $\chi^2=6.985$ )*
	>2	5 (7)	34 (45)	37 (48)		43 (51)	41 (49)	

$\chi^2$ =Chi-square test. \*Significant value ( $P < 0.05$ ). CPI=Community periodontal index; DMFT/dmfs=Decayed missing filled tooth/surface

**Table 4: Comparison of DMFT, DMFS, dmft, dmfs based on severity and impact of dental pain**

Category	Severity of pain <sup>†</sup>				P	Impact of pain <sup>‡</sup>		
	Mean	Mild	Moderate	Severe		With impact	Without impact	P
Mean DMFT	1.80	1.35	1.79	2.24	0.794	1.93	1.66	0.911
Mean DMFS	2.11	2.09	2.01	2.23	0.584	2.20	2.02	0.169
Mean dmft	2.47	1.68	2.82	2.41	0.001*	2.84	2.10	0.043*
Mean dmfs	3.41	2.68	3.50	4.03	0.015*	3.60	3.22	0.036*

<sup>†</sup>ANOVA test. <sup>‡</sup>Independent t-test. \*Significant value (P<0.05). DMFT/dmfs=Decayed missing filled tooth/surface

**Table 5: Logistic regression of severity of dental pain and independent variables**

Category	Adjusted odds ratio	Confidence interval	P
Sex			
Male	1		0.033*
Female	1.69	(1.12-1.88)	
Frequency of tooth brushing			
Once	1		
Twice or more	0.79	(0.53-0.85)	0.032*
Change of toothbrush			
<3 months	1		
3-6 months	1.21	(0.87-1.23)	0.661
When bristle frays	1.36	(0.88-1.46)	0.438
Sweets			
>1/week	1		
Once a day	1.23	(1.02-1.57)	0.032*
>2/day	1.68	(1.33-1.89)	0.029*
dmfs			
<2	1		
>2	1.845	(1.10-3.78)	0.023*

\*Significant value (P<0.05)

**Table 6: Logistic regression of impact of dental pain and independent variables**

Category	Adjusted odds ratio	Confidence interval	P
Frequency of tooth brushing			
Once	1		
Twice or more	0.86	(0.57-0.92)	0.029*
Change of tooth brush			
<3 months	1		
>3 months	1.27	(0.88-1.34)	0.641
>2	1.151	(0.07-1.72)	0.197
Sweets			
>1/week	1		
Once a day	1.13	(1.02-1.43)	0.013*
>2/day	1.45	(1.28-1.68)	0.039*
dmfs			
<2	1		
>2	1.254	(1.03-2.79)	0.026*
Calculus			
No calculus	1		0.038*
Calculus	1.35	1.02-1.85	

\*Significant value (P<0.05)

on the prevalence, severity, and impact of dental pain, which further serves as an adjunct to normative need assessment for oral health care.

Prevalence of dental pain was found to be 15.6% in the present study. Various studies on prevalence of dental pain reported different values: 50% was reported in a Ugandan study,<sup>[7]</sup> whereas the study by Pau *et al.*<sup>[12]</sup> reported 37.4% prevalence among Greek school children. Markedly higher prevalence of 70% was reported by Naidoo *et al.*<sup>[13]</sup> and 71.4% was reported by Kiran Kumar *et al.*<sup>[3]</sup> in Indian children of similar age group. Our study found the prevalence of mild, moderate, and severe pain to be 2%, 7%, and 6%, respectively, which is very low compared to other previous studies. Kumar *et al.*<sup>[14]</sup> in their study observed a prevalence of 14.3%, 8.8%, and 11.7% for mild, moderate, and severe pain, respectively. The low prevalence of dental pain and severity observed in the present study could be attributed to systematically organized oral health care given in these health promoting schools. The oral health program comprised regular dental screening, oral prophylaxis, restoration and extraction procedures using a specially equipped mobile dental clinic and referral for complex treatment modalities to the dental hospital.

A higher odds of having severe dental pain was observed in girls compared to boys, but this sex difference was not observed for impact of dental pain on daily life. This could be because generally boys have higher pain thresholds and tolerance and lower pain ratings than girls. Association between social gradient and severity of dental pain was not observed as most children belonged to low-income families suggesting social homogeneity of children. Oral hygiene practice of participants revealed that once a day brushing and not changing the tooth brush for more than 3 months had higher odds of causing severe dental pain. This finding revealed that inspite of having knowledge through the education program, children at risk were not able to follow recommendations. There could be other contributory factors which could have played a role, such as low-income families of these children fail to maintain



regular oral hygiene or are often unable to afford oral hygiene aids as their priority will be basic necessities such as food, shelter, and clothing.

Everyday consumption of sweets has shown higher odds of causing severe dental pain and impact on daily life. Similar observation was reported by Petersen *et al.*, Zhu *et al.*, Aurelius and Lindström, Johansson *et al.*, Slade *et al.*, and Shepherd *et al.*<sup>[15-20]</sup>

Decayed/missing and filled teeth measured by mean DMFT/S was 1.8/2.11 and mean dmft/s was 2.47/3.4. This is similar to Iranian study<sup>[21]</sup> (DMFT = 1.8), but higher value was observed in the study by Begzati *et al.* in Kosovo (DMFT = 5.8),<sup>[22]</sup> Tsanidou *et al.* in Greece ( $2.3 \pm 2.5$ ),<sup>[23]</sup> and Alvarez-Arenal *et al.* in Austria and Spain (3.30).<sup>[24]</sup> Compared to our study, higher dmft/dmfs was observed in the study of Alvarez-Arenal *et al.* (dmft 4.27),<sup>[24]</sup> Gathecha *et al.* (dmft  $3.3 \pm 3.6$ ),<sup>[25]</sup> and Alsumait *et al.* (dmfs 6.94).<sup>[21]</sup>

Research suggests that presence of decayed teeth is the most important influencing factor for dental pain. Results of the present study suggest that children with more than two deciduous caries index score have higher odds of having severe dental pain and impact on daily life. This could be explained by the observation of Levine *et al.*<sup>[26]</sup> which suggested that the earlier a tooth decays prior to natural exfoliation, the longer it is in the mouth and the greater the likelihood of pain. Traebert *et al.*,<sup>[27]</sup> Mitropoulos,<sup>[28]</sup> and Shanbhog *et al.*<sup>[29]</sup> also reported similar observation. DMFT/S index as an independent variable failed to show association with severity/impact of dental pain. In the present study, it is unlikely that mortality of the permanent dentition could be observed considering the age of the participants and, at the same time, deciduous dentition was at the peak period of their life expectancy.

The study included a comparatively large population of a particular age group in Bangalore city and used a validated questionnaire (C-DPQ) for assessment of dental pain.

Dental pain and its magnitude may differ across populations with different cultural backgrounds and settings, especially like our sample population where oral health promotion activities exist. Thus, direct comparison with other studies should be done cautiously.

One of the limitations of our study is that assessment of dental pain was based on self-reported data and its

cross-sectional nature. Pain is subjective in nature, and hence, self-reported pain measures are considered to be gold standard for assessing children's perceptual or psychological experiences of pain. Another limitation of the study was that we did not consider the number of years the child has participated in oral health promotion program. The phenomenon of student mobility is less likely to be observed in these schools; therefore, we did not take this into account.

## CONCLUSION

From the present study it is concluded that dental pain and its impact in children from low-income families is associated with gender, brushing behavior, consumption of sweets, and deciduous dental caries experience, thus necessitating further actions to be taken to alleviate the pain.

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## Conflicts of interest

There are no conflicts of interest.

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