Original Article

Prevalence of common dental diseases and oral hygiene practices among orphanage children in Chennai, South India-health policy implications

Nanjireddypally Ramakrishnappa Somasekhara [1]*, Jerard Maria Selvam [2], Venkateshan [3]
1. Senior Epidemiologist and Doctoral Research Scholar, Madras Institute of Development Studies, Chennai
2. Deputy Director, Tamil Nadu Health Systems Project, Chennai
3. Senior Statistician, Madras Medical College, Chennai, Tamil Nadu , India.

Abstract

Background: Since children form a vulnerable group for oral diseases, this study was undertaken to understand the prevalence of common oral diseases and the oral hygiene practices among children in orphanages in Chennai. **Materials & Methods:** 393 children were examined from randomly selected Orphanages in South Chennai for prevalence of dental caries and gingival disease. The severity was determined by DMFT (Decayed missing Filled Index) / deft and gingival index of Loe and Sillness. The difference in disease pattern was observed in both male and female children separately and also in (3-6) and (7-12) years age group. The children were also assessed on oral hygiene practices. **Results:** Overall 73.3% and 66.66% of the children suffer from Dental Caries and gingival disease respectively. In (3-12) year age group, the prevalence of Dental caries was proportionately high in male children   (80% v/s 68%: $p<0.001$). The severity of dental caries was also high in male children (DMFT /deft scores – 2.08 among males & 1.91 among females), however gingival index showed a significant difference between (3-6) and (7-12) years age group ($p<0.001$). There is a fair positive correlation between DMFT/deft score and gingival index score (r= 0.45, p=0.001). The number of times teeth brushed was statistically significant in specific age group and gender ($p < 0.05$). **Conclusion:** This study indicates the need for enforcing oral hygiene practices and timely intervention for treatment of oral diseases for children in orphanages. The overall vulnerability of children in (7-12) age group for oral diseases calls for attention of the caretakers.

Keywords: Caries; gingivitis; DMFT; deft; oral hygiene Practice

Introduction

Rendering services in oral health care is definitely one amongst many other challenges faced by India with its huge population. However, oral health is gradually gaining importance in the minds of health planners because of its diverse relationships to the overall health of the individual. The majority of Indian population re-

sides in rural areas and 40% of them are children who cannot access dental facilities due to inaccessibility, financial constraints and lack of awareness among the parents.[1] The health professionals therefore need to have a more practical approach especially in the area of primary prevention of oral disease. The most viable solution seems to be a dental health education to make the community become aware of the common oral diseases and seek help for treatment. For doing so, the lack of baseline data for several oral conditions makes it difficult to set measurable and attainable goals. Efforts are being made all over the world to estimate the prevailing level of oral diseases and the coping level of the existing facilities to meet the dental health care needs of the community.

*Corresponding Author

Dr. Nanjireddypally Ramakrishnappa
Somasekhara
Senior Epidemiologist and Doctoral Research
Scholar, Madras Institute of Development Studies,
Chennai
 E-mail: d_reddy1976@rediffmail.com

Dental epidemiology, though relatively new development in dentistry, is gaining importance due to the public health implications of this branch of dental science.[2] Epidemiological studies of dental caries and periodontal disease in different parts of India have reported high prevalence of oral diseases in Indian population.[3,4,5] Studies on prevalence of common oral diseases among school going children have been conducted in and around Tamil Nadu. These studies report a prevalence of dental caries ranging from 38% to 73% and gingival diseases from 29% to 87.3%.[3,4,5] Children are vulnerable to oral diseases especially at the time of eruption of deciduous teeth. The early childhood caries which is a combination of child being infected with cariogenic bacteria and the frequent ingestion of sugar is one such disease. Despite improvements over several decades, oral disease among children remains a serious problem.[5]

Since children form a vulnerable group, this study has been undertaken to look for the presence of common oral diseases among the children in the specific setting of orphanages situated in Chennai, a Metropolitan capital city in South India.

Methods

This is a cross-sectional analytical study conducted between June and December 2009. Informed consent was obtained from the representatives of participating institutions. Those orphanages not willing to participate in the study were excluded. The list of orphanages and the approximate no of inmates was obtained from the social welfare department, Government of Tamil Nadu as a reference document. The Oral health survey tool advocated by World Health Organization was used as a reference for developing the questionnaire for data collection[6.] Children in the age group of (3-12) years were clinically examined for dental caries and periodontal diseases as per standard operating procedures and DMFT/deft dental caries index and gingival index of Loe and Sillness were used for scoring. The children were examined during early hours of morning and during weekends.

Sampling and data collection

The study was conducted in South Chennai, one of the five geographical divisions/zones in Chennai city in India.[7,8] Out of 17 Orphanages in the South Chennai, 4 orphanages were randomly selected. Since the studies on prevalence of dental caries and gingival diseases report a wide variation, it was decided in favor of assuming 50% prevalence in this study to get an optimum sample size.[9] A minimum sample size of 384 was calculated based on 50% prevalence of dental caries and gingival disease in (3-12) year age group with precision of 10% and 95 % confidence interval.

All the children in (3-12) year age group in these four orphanages were included for study. All 393 children were examined and none were missed. The tool for the survey was a structured pre-coded and pre-tested questionnaire covering socio-demographic variables and independent variables related to the oral hygiene practices. The dependent variables were the DMFT/deft scores for dental caries and gingival index of Loe and Sillness for gingival disease.

Statistical Analysis

The data were analyzed for specific parameters in both (3-6) years and (7-12) years age group. The index ages were taken based on the fact that Primary dentition happens in the (3-6) year age group and Mixed dentition in (7-12) years age group. Demographic variables and measures of oral diseases were presented in frequencies with their percentages. The mean and standard deviations of gingival index, DMFT/deft scores were given. Prevalence of dental carries and gingivitis were given in proportion with 95% confidence interval. Association between age groups, gender, oral hygiene habits with gingival index score and DMFT/deft score were analyzed using Pearson chi square test/Yates corrected chi square test. Risk of prevalence of DMFT/deft score and gingival index score were calculated using odds ratio with 95% confidence interval. Gender and age wise prevalence of DMFT/deft score statistical significance differences were analyzed using two sample proportion test. Correlation

between gingival index score and DMFT/deft score were analyzed using Karl Pearson correlation coefficient and graphically represented by scatter plot with regression estimate. Statistical data were analyzed using SPSS 11.5 and EPI-INFO 2002 software packages. All hypothesis testing was two tailed and p value below or equal to 0.05 was considered statistically significant.

Results

Gender and Education status of children:

The male: female ratio in the 393 children in (3 -12) years age group was 185:208 (47% vs. 53%). Within the (3-12) years age group, 96 (24.4 %) were in (3-6) years age group and the rest 297 (75.6 %) were in the (7-12) year age group.

In the (3-6) years age group, the male: female ratio was 42: 54 (43.75% vs. 56.25%) and in (7 -12) years age group, it was 143: 154 (48.15 % vs. 51.85%). In the education level, 18.8% were in Pre-primary, 50.2% in Primary and 31% were in Post- primary levels table 1.

Table 1. Demographic and Clinical profile

Oral hygiene practice:

Among the 393 children, 93.9 % brushed once and the rest brushed twice. All of them used soft tooth brush, tooth paste as a dentifrice and adopted horizontal mode of brushing table 2.

	Profile	No. of children (n=393)
Age	3 -6 yrs	96 (24.4%)
	7 -12 yrs	297 (75.6%)
Gender	Male	185 (47.1%)
	Female	208((52.9%)
Education status	Pre-primary	73 (18.8%)
	Primary	198 (50.4%)
	Post-primary	122 (31.0%)

Age group and gender versus oral hygiene practice Cross tabulating age group with demographic variable & oral hygiene practice shows statistically significant association be-

Table 2. Agewise Demographic And Clinical Variables

		Age group of Children (n=393)				Pearson chisquare test/ Yates corrected chisquare test
		3 -6 yrs		7 -12 yrs		
		N	%	N	%	
Gender	Male	42	43.7%	143	48.2%	$\chi^2=0.56$ P=0.45
	Female	54	56.3%	154	51.8%	
Number of times teeth brushed	Once	72	75.0%	297	100.0%	**$\chi^2=79.08$ P=0.001*****
	Twice	24	25.0%	0	0.0%	
Type of dentifrice	Paste	96	100.0%	297	100.0%	$\chi^2=0.00$ P=1.00
Type of brush	Soft	96	100.0%	297	100.0%	$\chi^2=0.00$ P=1.00
Mode of brushing	Horizontal	96	100.0%	297	100.0%	$\chi^2=0.00$ P=1.00

*Significant ** highly significant *** very high significant

tween number of times teeth brushed and the children in the specific age group. There is statistically significant association between number of times teeth brushed and the specific age group. None of the (7-12) years children brushed twice per day whereas 25% of the (3-6) years children brushed twice a day (P<0.001).

In the association between Gender and oral hygiene habit, it is observed that more number of male children brushed twice than female children (P<0.05). Table 2 Cross tabulating gender with specific age group and oral hygiene practice shows that more number of male children are brushed twice than female children(P<0.05)Table3

Table 3. Genderwise Demographic And Clinical Variables

		Gender(n = 393)				Pearson chisquare test/ Yates corrected chisquare test
		Male		Female		
		N	%	n	%	
Age	3 -6 yrs	42	22.7%	54	25.9%	?2=0.56 P=0.45
	7 -12 yrs	143	77.3%	154	74.1%	
number of times teeth brushed	Once	169	91.3%	200	96.2%	**?2=3.94 P=0.05***
	Twice	16	8.7%	8	3.8%	
Type of dentifrice	Paste	185	100.0%	208	100.0%	?2=0.00 P=1.00
Type of brush	Soft	185	100.0%	208	100.0%	?2=0.00 P=1.00
Mode of brushing	Horizontal	185	100.0%	208	100.0%	?2=0.00 P=1.00

 * Significant ** highly significant *** very highly significant

Prevalence of dental caries and gingivitis
Dental Caries Prevalence and severity:

Overall, 73.3% of the children have dental caries (95% confidence interval = 69 - 78%) In (3-6) years age group, there is no statistically significant difference in the prevalence of dental caries between male and female. Whereas it is observed in (7-12) years age group (z=3.96, p<0.001). Table 4.

Table 4. Gender and Age wise Prevalence of Dental caries

		Percentage of prevalence		95%CI	Two sample binomial proportion test
3-6 yrs	Male	30/42	= 71.4%	63% - 91%	Z=0.28 p=0.77
	Female	40/54	= 74.1%	61% - 84%	
	Total	70/96	= 72.9%	63% - 91%	
7-12 yrs	Male	120 /143	= 83.9%	77%- 90%	Z=3.96 p=0.001***
	Female	98 /154	= 63.6%	56%- 71%	
	Total	218/297	= 73.4%	68% - 78%	
Overall	Male	150/185	=81.0%	75% - 86%	Z=3.29 p=0.001***
	Female	138/208	=66.3%	60% - 73%	
	Total	288/393	=73.3%	69% - 78%	

 * Significant ** highly significant *** very highly significant

The Odds ratio for the occurrence of dental caries shows that children in (7 -12) years age group are 1.93 times more at risk than (3-6) years age group in def/DMFT score as per Pearson chi-square test ($\chi 2 = 6.90$, p=0.001) and male children score 1.42 times more than the female children as per Pearson chi-square test ($\chi 2 = 6.90$, p=0.001). Table 5

Table 5: Gender and age wise significance for def/ DMF scores*.

		DMFT score				Pearson chi-square test	OR(95%CI)
		Very low		Low			
		n	%	N	%		
Age	3 -6 yrs	35	36.5%	61	63.5%	**2=6.90 P=0.001*****	1.93 (1.14 – 3.27)
	7 -12 yrs	68	22.9%	229	77.1%		
Gender	Male	37	20.0%	148	80.0%	**2=6.97 P=0.001*****	1.42(1.07 - 3.04).
	Female	66	31.7%	142	68.3%		

* Significant ** highly significant *** very highly significant

(* Note: DMFT/def score as per WHO classification – Very Low =0.0 to 1.1, Low = 1.2 to2.6, Moderate = 2.7 to 4.4, High = 4.5 to 6.5, Very High = >6.6)

Gingivitis prevalence and Indices:

This study reports mild, moderate and severe gingivitis of 79.2%, 3.1% and 17.7% in (3 -6) years age group and 49.8%, 9.4% and 40.7% in (7-12) years age group. The gingival index score is almost same for both males and females as per Pearson chi-square test ($\chi 2 = 2.66$, p=0.26). Table 6

Table 6. Gender and age wise significance for gingival index scores.

		gingival index score						Pearson chi-square test
		Mild		Moderate		Severe		
		n	%	n	%	n	%	
Age	3 -6 yrs	76	79.2%	3	3.1%	17	17.7%	**2=25.56 P=0.001*****
	7 -12 yrs	148	49.8%	28	9.4%	121	40.7%	
Gender	Male	101	54.6%	12	6.5%	72	38.9%	2=2.66 P=0.26
	Female	123	59.1%	19	9.1%	66	31.7%	

* Significant ** highly significant *** very highly significant

Though both male and female children scored equal in gingival index (t=1.59, p= 0.11), (7-12) years age group children had statistically higher gingival index score (1.46) than (3-6) years age group (1.17) (t = 5.19, p= 0.001). Table 7

Table 7. Age and Gender wise distribution of def/ DMFT and Gingival index scores

		DMFT/ deft scores Mean ± SD	Student's independent t-test	Gingival index score Mean ± SD	index Student's independent t-test
Age	3 -6 yrs	1.87 ± 0.90	t=2.38 P=0.02*	1.17 ± 0.43	t=5.19 P=0.001***
	7 -12 yrs	2.03 ± 0.42		1.46 ± 0.47	
Gender	Male	2.08 ±0.49	t=2.99 P=0.001***	1.42 ±0.49	t=1.59 P=0.11
	Female	1.91 ±0.61		1.34 ±0.48	

* Significant ** highly significant *** very highly significant

Age and gender wise distribution of deft/DMFT and gingival index scores

In (7-12) years age group children a DMFT score of 2.03 is statistically significant when compared with the 1.87 def score in (3-6) years age group children (t= 2.38, p= 0.02). Male children scored high in dental caries index (DMFT = 2.08) compared with female children (DMFT = 1.91) 9 t= 2.99, p=0.001). The overall score of DMFT obtained (2.03) falls under the category of low (1.2-2.6 DMFT) according to WHO classification [3].

Correlation of dental caries and gingival indices score

Correlation between the DMFT/deft score and gingival indices scores shows a significant positive moderate correlation. Figure I
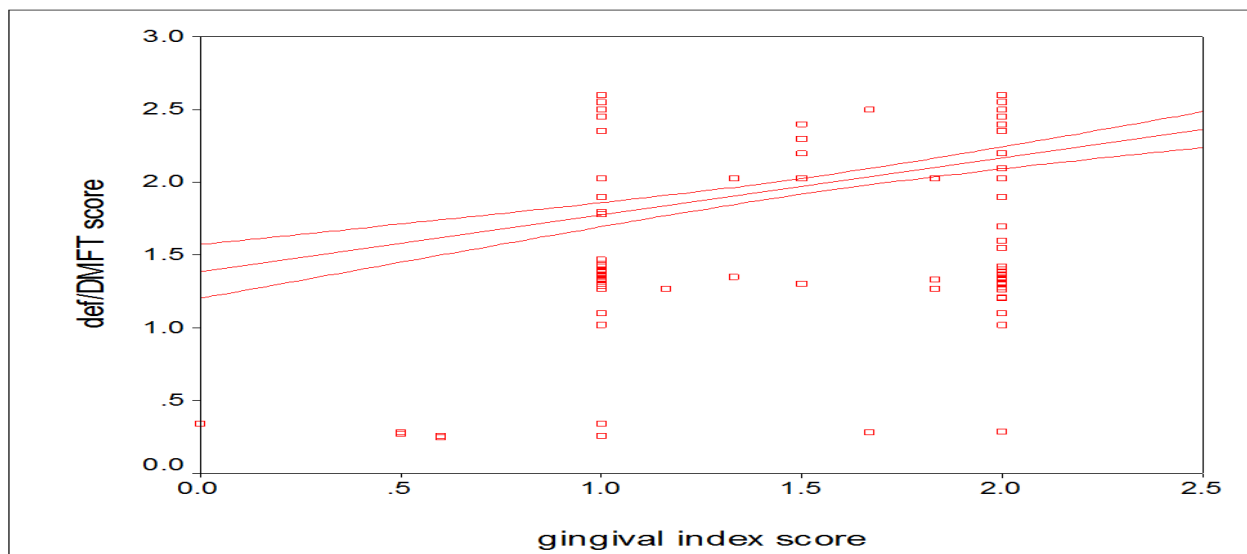

Fig 1: Scatter diagram with regression estimate shows there is a significant, positive, moderate correlation between DMFT/deft score and gingival index score(r=0.45, p=0.001)

Discussion

In the present study children in or-phanage settings were assessed for common oral diseases. Overall caries prevalence was found to be 73.3%, a finding similar to other studies [3,10]. The caries prevalence was significantly high in (7-12) year age group compared to (3-6) years (76.2% vs. 64.5%), an observation similar to that of Dhar.V. et.al who observed higher prevalence in (8-14) years age group compared to (5-7) years age group (50% vs. 18.6%)[11]. This is to be understood based on the fact that prevalence is high in higher age group due to the mixed dentition. Although gender difference in dental caries was not significant in (3-12) years, higher prevalence was observed in (7-12) years age group (p = 0.001) a finding comparable with that of Dhar.V et.al.[6]

As observed in other studies the DMFT/deft scores indicating severity of dental caries is significantly high in (7-12) years age group and also specifically among male children in the same age group. [10,11] The study has fewer observations similar to other studies on prevalence of gingival diseases. The prevalence of gingival disease is 66% in the study population. Jamil David et.al reported 87.3% prevalence of gingival disease in 5 years and 37.5% in 12 years old children.[3] Mahesh et.al. report 29% prevalence of gingival disease among 12 years old children [12]. This study however obtained 66% prevalence when considering all the children in (3-12) year age group.

The fact that one fifth of the children in (3-6) years and one half of the children in (7-12) years age group suffer from moderate to severe gingivitis calls for careful monitoring of oral diseases in the younger population in the community. Jamil David also observed 29% prevalence of severe gingivitis in 12 years old children which calls for special attention in children in mixed dentition group. Our study did not find any significance between oral hygiene practice and severity of oral diseases since all the children brushed once a day with horizontal mode of brushing and tooth paste as dentifrice.

Conclusions and recommendations

This study throws light on the importance and usefulness of early detection and treatment of dental caries and gingival diseases among children especially in the mixed dentition group (7-12) years. Residential settings like orphanages and boarding schools should focus on creating awareness among the inmates, ensuring proper oral hygiene practices among (3-12) year age group, early detection and timely intervention of oral diseases by frequent dental checkups. It also has broader implications for bringing necessary strategic modifications in the ongoing school health programme across nation by policy makers. The strength of this study is that it looked at the Oral diseases among the children staying in Orphanages for the first time. The limitation is that there were constraints to perform other supportive tests needed to confirm the provisional diagnosis made during the oral health survey in the orphanages. The study findings could serve as a base for carrying out other similar studies in Tamil Nadu and in other states in India to estimate the prevalence levels of dental diseases for larger population.

References

1. Naseem Shah. Oral and dental diseases: Causes, Prevention and treatment strategies. NCMH Background papers – Burden of Diseases in India 2005:275-298.

2. Soben Peter. Epidemiology, Etiology and prevention of dental caries. In: Essentials of Preventive & community Dentistry: 3rd ed: Arya (medi) Publishers, 2003.

3. Jamil David.Prevalence and correlates of self reported state of teeth among school children in Kerala, India. BMC Oral Health 2006; **6**:10.

4. Sarvanan S, Madiavana I, Subashini B, Felix JW. Prevalence patterns of dental caries in the primary dentition among school children. Indian J Dent Res 2005; 16:140-6.

5. Mahejabeen R, Sudha P, Kulkarni SS, Anegundi R. Dental caries prevalence among preschool children of Hubli: Dharwad city. J Indian Soc Pedod Prev Dent 2006; 24:19-22.

6. World Health Organization. Oral health surveys – Basic methods. 4 th Edn. Geneva, WHO:1999.

7. www.mapsofindia.com accessed on 15 th June 2008

8. www.chennai.gov.in/images/maps.gif accessed on 15 th June 2008

9. V. Kasiulevicius, V. Sapoka et.al: Sample size calculation in epidemiological studies. J Gerontologija 2006;7(4):225-237

10. Joshi.N. Rajesh. R. Sunitha M: Prevalence of dental caries among school children in Kulakshetram village, a correlated prevalence survey. J Indian Soc Pedo Dent 2005; 23:138-140

11. Dhar V, Jain A, Van Dyke TE, Kohli A. Prevalence of dental caries and treatment needs in the school going children of rural areas in Udaipur District. J Indian Soc Pedod Prev Dent 2007; 25:119-21.

12. Mahesh Kumar P, Joseph T, Varma R.B, Jayanthi M. Oral health status of 5 years and 12 years school going children in Chennai city – An epidemiological study. J IndianSoc Pedo Prev Dent - 2005; 23:17-22