Oral hygiene and periodontal status among children and adolescents residing at an orphanage in Udaipur city, India

***Santhosh K, Jyothi A, Prabu D, Suhas K**
Department of Preventive and Community Dentistry,
Darshan Dental College and Hospital, Udaipur, India

***Corresondence: Santhosh K**
E-mail: santosh_dentist@yahoo.com

Abstract

Objective: To assess the oral hygiene and periodontal status; to analyze the influence of age, education, institutionalization and oral hygiene practices on oral hygiene status among children residing at an orphanage in Udaipur city, India.
Method: The total sample comprised of 256 male children and adolescents between the ages 5 to 16 years residing at an orphanage in Udaipur city, India. Clinical examination included assessment of oral hygiene and periodontal status using OHI-S (Oral Hygiene Index Simplified) and CPI (Community Periodontal Index) respectively.
Result: The overall prevalence of periodontal disease was 89.1%. Debris was the dominant expression of oral hygiene index in all the age groups. Mean OHI- S along with mean scores of its components increased with age. The proportions of subjects with gingival bleeding decreased significantly with age and those with calculus increased steadily with age. The overall mean number of healthy sextants was 3.5 and this decreased with age. Bivariate and multivariate analysis revealed that age, education, years of institutionalization, tooth cleaning frequency and substance used to clean teeth was significantly related to debris, calculus and oral hygiene status.
Conclusion: Oral hygiene status was generally good, with barely 12.9% subjects exhibiting poor oral cleanliness and the overall prevalence of periodontal disease was 89.1%. Age, level of education, years of institutionalization and oral hygiene practices were significantly related to oral hygiene status.

Key words: Adolescent, orphan, Children, Oral hygiene, Periodontal disease.

Introduction

In low income countries, the most prevalent oral disease of public health concern is dental caries followed by periodontal disease[1]. It is evident now that socioeconomic factors predispose to the development of dental caries and periodontal disease; furthermore, income and poor education have been reported to influence the oral hygiene and periodontal status [2, 3].
Poor oral hygiene is a known important predisposing factor to the occurrence of some oral diseases like cancrum oris, periodontitis, acute necrotizing ulcerative gingivitis (ANUG) and gingivitis [4, 5].The control of plaque formation and maintaining good oral hygiene constitutes the basic approach to the prevention of dental caries and periodontal diseases[6] .The influence of behavioural practices concering oral hygiene status feature prominently in the oral health literature reflecting the fact that much of dental disease is preventable. Moreover, previous studies have shown that oral health behaviors are significantly influenced by parental factors, and a past study observed that dental care habits of children were highly affected by dental visiting habits and level of education of parents [7].
Simply defined, disadvantaged children are those children who are physically, mentally or socially deprived[8]. Orphans can be categorized as socially disadvantaged. Many of the children in the orphanages in India are previously street children. The environment in which they live and the associated lifestyles of street children make them vulnerable to a wide range of health related and other problems including malnutrition, communicable and infectious disease, poor oral health such as dental caries and gingivitis, cognitive disorders and learning difficulties[9].
The children residing in orphanages differ from other children as they are under-privileged and do not receive as much care as other children receive from their parents. Assessment of the oral hygiene status and their determinants is an essential part of the process of planning appropriate and acceptable health services and dental health education programs in order to improve the dental health status of this population. Furthermore, literature is scarce on studies which explore the factors that are associated with the oral hygiene status of orphan children from India.
Hence, the present study aimed to assess the oral hygiene and periodontal status and to determine the influence of age, education, institutionalization and oral hygiene practices on oral hygiene status among children residing at an orphanage in Udaipur city, India.

Materials and Method

The target population comprised of institutionalized male orphan children residing at an orphanage in Udaipur city, India which was the only orphanage in the region with

exclusively male inmates. The total eligible sample comprised of 261children and adolescents aged 5 to 16 years. Informed consent of the subjects and permission from institution authorities was obtained before conducting the study. Ethical approval for conducting the survey was obtained from Ethical Committee for Research of Darshan Dental College and Hospital. Prior to the oral examination, demographic information (age, education level and years of institutionalization) and oral hygiene practices (tooth cleaning frequency and substance used for cleaning the teeth) were registered for each subject by personal interviews. Level of education was classified as primary (first to fifth standard), upper primary (sixth to eight standard) and secondary (ninth and tenth standard). Clinical examination was done by a single examiner (SK). Oral hygiene status assessment was performed using mouth mirror and No. 23 explorer according to the criteria of Simplified Oral Hygiene Index by Greene and Vermilion [10].
The average individual debris and calculus score were determined and were added together to obtain the OHI-S for each subject. Based on the OHI-S score, oral hygiene status was categorized as good (01.2), fair (1.33) and poor (3.16.0).
Periodontal status was assessed by Community Periodontal Index [11]. The registration for periodontal status included score 0 (healthy periodontium with no bleeding, calculus or periodontal pockets), score 1 (gingival bleeding observed directly or by using a mouth mirror after probing).
Periodontal pockets was not estimated in this population because of false pockets.
The intra examiner reliability for various recordings ranged from 0.87 to 0.94.

Data Analysis
Data were entered into the spread sheets and was analyzed using the statistical package for social sciences (SPSS version 15.0). In descriptive statistics, the means and standard deviations were used to describe the patterns of oral hygiene which were calculated for all groups.
Chi-square test was used to test the differences in proportions between the age groups for periodontal disease. One-way Analysis of Variance (ANOVA) was used to test the differences in the mean scores of oral hygiene indicators. Multiple linear step wise regression analysis was executed to analyze the associations of various independent variables with the oral hygiene indicators.

Results

Table 1 depicts the general characteristics of the study population. Age of the study subjects ranged from 5 to 16 years and was classified into three groups with equal class intervals (5 8 years, 9 12 years and 13 16 years). There were more subjects in the 9-12 year old age group and the youngest age group contributed the least for the total sample. Half the population (50%) exhibited fair oral hygiene status and nearly one eighth of the sample exhibited poor oral hygiene status. More than three quarters (78.1%) of the subjects cleaned their teeth at least once a day while one tenth of this population cleaned their teeth twice or more than twice a day. Almost, one third of the population (33.2%) used materials other than tooth powder and tooth paste with tooth brush for cleaning their teeth. However, tooth brush and tooth paste was used by only one fifth (19.1%) of the population.
Debris was the dominant expression of oral hygiene index in the study sample.

Table 1: Background information and general characteristics of the study population

Age	**Frequency**	**Percentage**
5 - 8	30	11.7
9 -12	122	47.7
13 -16	104	40.6
Oral hygiene status		
Good	95	37.1
Fair	128	50.0
Poor	33	12.9
		17.6%
Years of institutionalization		
1- 4 years	45	53.5%
5-8 years	137	28.9%
9 -12 years	74	
Education		
Primary	70	27.3
Upper primary	112	43.8
Secondary	74	28.9
Frequency of cleaning teeth		
Several times a week	30	11.7
At least once a day	200	78.1
Twice or more than twice a day	26	10.2
Substance used for cleaning teeth		
Tooth brush and tooth paste	49	19.1
Tooth powder	122	47.7
Other materials	85	33.2

There was a definite trend in the mean debris, calculus and OHI-S scores as presented in **Table 2**, mean OHI- S along with mean scores of its components increased with age and one way ANOVA revealed significant differences between the age groups for simplified debris and oral hygiene index. Besides, oral hygiene and debris scores significantly deteriorated as the number of institutionalization years increased and level of education progressed.
Table 3 demonstrates the mean scores of simplified oral hygiene index and its components among the study subjects with respect to oral hygiene practices. Both the tooth cleaning frequency and substance used for cleaning teeth were significantly related to oral hygiene status. Mean OHI-S among the subjects cleaning their teeth several times a week was more than 11 times greater than those cleaning twice or more than twice a day. Moreover, children using tooth cleaning materials other than tooth powder and tooth paste with tooth brush presented worst scores for debris, calculus and oral hygiene.
The overall prevalence of periodontal disease was 89.1% **(Table 4)**. Highest proportion of healthy subjects was observed in the youngest age group. The results showed that the proportions of subjects with gingival bleeding decreased with age and those with calculus increased steadily with age, highly significant difference was observed between the age groups (P = 0.000).
Gingival Bleeding was highest in the 5 8 year old age group (70.0%) and lowest in the oldest age group. Calculus was the greatest problem in subjects belonging to 13 to 16 year old age group (64.4%).

Table 2: j É~å=a ÉÄêáëI=Å~äÅìäìë=~åÇ=çê~ä=ÜóÖáÉåÉ=áåÇáÅÉë=áå=êÉä~íáçå=íç=~ÖÉI=ÉÇìÅ~íáçå ëí~íìë=~åÇ=Çìê~íáçå=çÑ=áåëíáíìíáçå~äáò~íáçå=~ãçåÖ=ÅÜáäÇêÉå=êÉëáÇáåÖ=~í=íÜÉ=çêéÜ~å~ÖÉK

	DI-S	F	CI-S	F	OHI-S	F
Age						
RJUG	NKMO EMKTRFGGG	ORKPNM	MKQV=EMKRMF	NKVOM	NKRN ENKMRFGGG	VKMTQ
	NKRT=EMKUUF OKNO=EMKTNF		MKQR=EMKSMF MKOT=EMKRNF		OKMO=ENKORF OKPV=ENKMOF	
Years of institutionalization						
N=J=Q	NKMQ EMKTMFGGG	NUKTNQ	MKRN=EMKRSFG	PKPMQ	NKRR=ENKNRFGG	RKQMS
R=J=U	NKQO=EMKUUF		MKQT=EMKRTF		NKUV=ENKOMF	
V=J=NO	OKMN=EMKRQF		MKOS=EMKQRF		OKOS=ENKMQF	
qçí~ä	NKQN=EMKUVF		MKQR=EMKRRF		NKUS=ENKNUF	
Educational level						
mêáã~êó	NKMQ EMKTMFGGG	PMKPPM	MKRN=EMKRSF	OKMNM	NKRR= ENKNRFGGG	NUKNMV
r ééÉê mêáã~êó	NKOT=EMKTVF		MKPT=EMKPTF		NKSP=EMKVSF	
pÉÅçåÇ~êó	OKMP=EMKVNF		MKRN=EMKRSF		OKRQ=ENKOUF	

***P<0.05, **P<0.01, ***P<0.001**

Table 3: j É~å=a fJpI= fJp=~åÇ= e fJp=áå=êÉä~íáçå=íç=íççíÜ=ÅäÉ~åáåÖ=éê~ÅíáÅÉë=~ãçåÖ ÅÜáäÇêÉå=~åÇ=~ÇçäÉëÅÉåíë=êÉëáÇáåÖ=~í=íÜÉ=çêéÜ~å~ÖÉK

	DI-S	F	CI-S	F	OHI-S	F
Frequency of cleaning teeth						
pÉîÉê~ä=íáãÉë=~= ïÉÉâ	OKRN EMKQMFGGG	SPKRPV	NKQQ=EMKSSFGGG	NMSKNQP	PKVREMKVSFGGG	>QUKMVT
^í=äÉ~ëí=çåÅÉ=~ Ç~ó	NKPV=EMKUMF		MKPREMKPUF		NKTQ=EMKUPF	
qïáÅÉ=çê=ãçêÉ íÜ~å=íïáÅÉ=~=Ç~ó	MKPMEMKORF		MKMQEMKNNF		MKPR=EMKONF	
Substance used for cleanin g teeth						
qççíÜ=Äêìëü=~åÇ íççíÜé~ëíÉ	NKMTEMKSUF=GGG	QUKMQU	MKOTEMKOTFGGG	UTKNQN	NKPPEMKSUFGGG	NNRKTVN
qççíÜ=éçïÇÉê	NKOT=EMKUTF		MKOUEMKPRF		NKRREMKVRF	
l íÜÉê=ã~íÉêá~äë	OKPR=EMKRQF		NKNTEMKTOF		PKRPEMKUVF	
qçí~ä	NKQNEMKUVF		MKQREMKRRF		NKUSENKNUF	

***P<0.05, **P<0.01, ***P<0.001**

Table 4: Periodontal status assessed by Community Periodontal Index in relation to age group of study subjects

Age	No periodontal disease	Bleeding	Calculus	Shallow pockets
5-8	6 (20%)	21 (70.0%)	3 (10.0%)	0 (0%)
9-12	12 (9.8%)	47 (38.5%)	63 (51.6%)	0 (0%)
13-16	10 (9.6%)	16 (15.4%)	67 (64.4%)	11(10.6%)
Total	28 (10.9%)	84 (32.8%)	133 (52%)	11 (4.3%)

Chi square value- 55.393(6), p =0.000

Table 5: Mean number of sextants with specific CPI scores in the study population

Age	No periodontal disease	Bleeding	Calculus	Shallow pockets
5-8	4.5	1.4	0.1	0
9-12	3.2	1.7	1.1	0
13-16	3.5	1.3	1.0	0.2
Total	3.5	1.49	0.93	0.08

The mean number of sextants per person with periodontal status variables is presented in **Table 5**. The overall mean number of healthy sextants was 3.5 and the mean number of healthy sextants decreased with the increase in age. Three fourth of the sextants (4.5) in 5 to 8 year old age group were healthy and calculus contributed for only 0.1 mean sextants. In the oldest age group, bleeding on probing contributed for a major part of periodontal disease followed by calculus and shallow pockets.

All the independent variables that were entered in the stepwise multiple linear regression analysis significantly influenced debris and calculus scores. However age was excluded from the analysis in which dependent variable was OHI-S .

Duration of institutionalization was the first major predictor for debris and oral hygiene index though it explained greater variance in OHI-S (65%) than DI-S (54.9%).The best predictors in the descending order for debris scores were duration of institutionalization, education, tooth cleaning frequency, age, substance used to clean teeth which provided a variance of 71.3% in debris level.

All the independent variables included in the analysis together explained 52.2% of the variance in calculus but the first best predictor was tooth cleaning frequency that exerted an influence of 36.8%.

However, the predictors of OHI-S were different from those of DI-S and comprised of duration of institutionalization, tooth cleaning frequency, level of education and substance used to clean teeth which together explained a variance of 82.8%.

Discussion

The present study population was drawn from a single orphanage located in Udaipur city, thus the study results could not be generalized to all the orphan children of India Moreover, the cross-sectional nature of the study prevents from drawing inferences about causal relationships.

More than four fifth (88.3%) of the population brushed their teeth at least once daily, however tooth paste usage was reported by only one fifth of the study subjects while 92.4% of institutionalized street children in Jordan reported brushing at least once a day and using tooth paste[8].

It should be noted that the circumstances and the financial resources available differs from institution to institution within the nation and between the countries therefore only

tentative comparisons could be made with other studies.
Data from National Oral Health Survey, India suggests that 98.7% of 12 year and 99.6% of 15 year old children brush their teeth at least once daily whereas tooth paste usage has been reported by 68.3% and 67.6% of 12 and 15 year olds respectively.
Debris component of the oral hygiene index was dominant in accordance with previous studies[3, 12].Good oral hygiene was exhibited by 37% of the subjects while there were 50% and 12.9% subjects with fair and poor oral hygiene respectively. The corresponding figures among a group of physically disadvantaged hearing impaired children in Udaipur city was 24%, 64% and 12% respectively which is in accordance to the present study results[13]. This suggests that the oral hygiene status of the socially disadvantaged children of the present study is in no way different from that of physically disadvantaged hearing impaired children.
The general increase in OHI-S scores with increase in age conforms to the previous findings[12, 14] and this was found by Grants and Stern[15] to be due to cumulative effect of plaque and calculus with increase in age.
The overall prevalence of periodontal disease was 89.1% while results from a previous survey in Udaipur district revealed a prevalence of 22.6% and 46.6% among 12 and 15 year old general population respectively[16]. Moreover, 64.4% and 10.4% of the 13 16 year old subjects presented calculus and shallow periodontal pockets respectively while the corresponding figures among 15 year old children of the whole nation were 45.6% and 0.9% respectively[17] .The subjects of the present study are under privileged and do not receive as much care as other children receive from their parents which could be an explanation for their poor periodontal status in comparison to general population of Udaipur district.
However, the overall mean number of healthy sextants in the present study is in accordance with findings from national survey where 12 years and 15 years old presented a mean of 3.1 and 3.0 healthy sextants respectively. Age, level of education, years of institutionalization and oral hygiene practices showed a significant influence on debris and calculus scores both in bivariate and multivariate analysis. Tesini[18] observed that variables such as age and institutionalization had an influence on the prevalence and severity of oral disease among mentally retarded children.
In the present study, the oral hygiene status deteriorated as the duration of institutionalization increased; however it is apparent that subjects with greater period of institutionalization belong to older age groups.
Level of education of the participants influenced oral hygiene status which is consistent with existing literature where higher level of education has been associated with a better level of oral cleanliness[15]. In addition, a study[19] has observed that tooth cleaning frequency was significantly related to plaque, gingivitis and thus oral hygiene status in concurrence with the present study. Furthermore, substance used for cleaning teeth was significantly related to oral hygiene status, children using tooth cleaning materials other than tooth powder and tooth paste with tooth brush presented greater OHI-S scores. Similar findings were observed among 5 year old children of Chennai city, India[20].

Conclusions

Oral hygiene status was generally good with only 12.9% subjects exhibiting poor oral cleanliness. Mean score of OHI-S and its components increased with age. The overall prevalence of periodontal disease was 89.1%. Age, level of education, years of institutionalization and oral hygiene practices were significantly related to oral hygiene status.
It is recommended that, dental education should be executed in order to bring about behavior changes in addition to implementation of preventive strategies with the help of local authorities.

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