Review Article

Received : 11-09-14
Review completed : 29-11-14
Accepted : 30-11-14

ORAL HEALTH STATUS AND TREATMENT NEEDS OF INSTITUTIONALIZED HIV POSITIVE AND NON- HIV POSITIVE CHILDREN AND ADOLESCENTS BETWEEN 3 TO 17 YEARS OF AGE IN PUNE MAHARASHTRA, INDIA: A COMPARATIVE STUDY

Shrikanth M, * Arun Kumar A, ** Raman Gangakhedkar ***

* Post graduate Student, Department of Public Health Dentistry, Navodaya Dental College and Hospital, Raichur, Karnataka, India
** Professor & Head, Department of Public Health Dentistry, Navodaya Dental College and Hospital, Raichur, Karnataka, India
*** Scientist-F, Head, Division of Clinical Science, National AIDS Research Institute, Pune, Maharashtra, India

ABSTRACT

INTRODUCTION: The HIV/AIDS pandemic is presently a human disaster, with tedious and painstaking implications for individuals, communities, and countries at large. In HIV-infected children the oral infections are more persistent and severe than the general paediatric population. These act as makers for immunological incompetence. **AIM AND OBJECTIVE:** To assess the oral health status and the treatment needs of HIV positive individuals below 18 years of age, and comparing it with that of the non- HIV positive children and adolescents. **MATERIAL AND METHODS:** The study sample consisted of 234 children and adolescents, between 3 to 17 years of age of which, 78 were HIV positive and 156 were Non-HIV positive. The cases and the controls were age and sex matched (1:2 ratio). The oral health of the participants was evaluated along with details of past medical and dental history, oral hygiene practices, deleterious habits, diet and sweet consumption. The oral hygiene of the participants was evaluated using the oral hygiene index simplified. **RESULTS:** There was more prevalence of dental caries among the cases than the controls and this difference was statistically significant (p=0.009). There was no statistically significant association between the CD4 count and dental caries (p=0.48). There were more controls with 4-5mm of loss of attachment (1.9%) compared to the cases.

KEYWORDS: HIV; children; CD4; dental caries; periodontitis

INTRODUCTION

According to the UNAIDS report 2012, there are around 4 million adults and children in the South and the South East Asian region alone living with Human Immunodeficiency Virus (HIV), that has gone up from 3.7 million in 2001 and 280,000 adults and children have been newly infected. Globally 34 million adults and children are living with HIV and 2.5 million have been newly infected by the end of 2011. HIV progression is faster and more severe in children, due to the immaturity of the immune system. Oral lesions are among the earliest and most common clinical signs of infection with HIV, are important indicators and can predict its progression. The early diagnosis of these lesions will help in assessing disease progression especially in low income countries, where limited resources hamper disease specific interventions. According to the World Oral Health Report 2003 priority is given to effective prevention of oral manifestations of HIV/AIDS through additional action.[1] An assessment first of the situational needs of children affected by HIV and AIDS, including their proportion among all vulnerable children, is crucial in the design of programming to support them.[2] Study shows that, children with perinatally acquired HIV are more likely to have heavier oral burdens of lactobacilli and streptococci than uninfected children in the same household.[3] The integration of dentistry into these children's general medical care would help to ensure regular monitoring of oral health status and allow preventive care.[4] Further, the added burden of HIV in families to comply with dental treatment needs and ways of assisting families to obtain care requires investigation.[5] The findings of the study in rural China, suggest that HIV orphans under the care of different caregivers

Table 1: Number and percentage of HIV positive (cases) children and adolescents according to the gender and CD4count

CD4 count	Boys		Girls		Total	
	n	%	n	%	n	%
≤250	03	60.0	02	40.0	05	100
251- 500	07	50.0	07	50.0	14	100
501- 1000	22	51.2	21	48.8	43	100
1001- 1500	05	35.7	09	64.3	14	100
≥1501	00	0.0	02	100	02	100
Total	37	47.4	41	52.6	78	100

Table 2: Number and percentage of subjects with caries and without caries in HIV positive (cases) and Non HIV positive (controls) children and adolescents

	Cases		Control	
	n	%	n	%
Caries-free	05	06.4	32	20.5
Caries	73	93.6	124	79.5
Total	78	100	156	100

Table 3: Number and percentage of HIV positive (cases) and Non- HIV positive (controls) children and adolescents with malocclusion, by the level of severity

Severity of malocclusion	Cases		Controls	
	n	%	n	%
No abnormality /minor malocclusion	52	94.5	100	90.9
Definite malocclusion	03	5.5	09	8.2
Severe malocclusion	00	0.0	00	0.0
Very severe/ handicapping malocclusion	00	0.0	01	0.9
Total	55	100.0	110	100.0

deserve equal attention, protection, and support from the community regarding their psychological well being.[7,8] Children especially from the poor socioeconomic background showed a high incidence of periodontal and dental disease in Indian study due to poor oral hygiene practices.[9] In particular, these HIV infected children may need special care dentistry for oral health promotion. It is important, for these children to have home monitoring which is an effective resource in oral health promotion.[10] Study results show a significantly higher level of gingival inflammation in the antiretroviral untreated group of patients although these patients were younger and had a shorter duration of HIV infection.[11] Although preventive oral health measures cannot stop the progression of HIV disease in the absence of medications, improved diagnosis of the oral manifestations of HIV infections of HIV infection can enhance case management, ensure better oral health outcomes and improve quality of life for HIV- infected children.[12] The aim of the present study was to assess the oral health status and the treatment needs of HIV positive individuals below 18 years of age, and comparing it with that of the non-HIV positive children and adolescents, in the city of Pune, Maharashtra, India.

MATERIALS & METHODS

The ethical clearance for this study was obtained from the Institutional Review Board of Navodaya Dental College, Raichur, Karnataka and from the Child Welfare Committee (CWC), Pune, Ministry of Women and Child Welfare, Government of

Table 4: Mean of the CPI scores

Condition	Cases			Control		
	Boys Mean	Girls Mean	Total Mean	Boys Mean	Girls Mean	Total Mean
Healthy periodontal tissues	2.35	3.17	2.78	1.92	2.73	2.34
Bleeding	1.38	0.44	0.88	1.18	0.40	0.77
Calculus	0.81	0.34	0.57	1.42	0.81	1.10
Shallow pocket	0.0	0.0	0.0	0.02	0.01	0.02
Deep pocket	0.0	0.0	0.0	0.0	0.0	0.0
Excluded sextant	0.0	0.0	0.0	0.0	0.0	0.0
Not recorded	1.46	2.05	1.77	1.46	2.05	1.77

Table 5: Mean number of sextants with loss of attachment by score among the HIV positive (cases) and the Non-HIV positive (controls) children and adolescents

	Cases Mean			Controls Mean		
Loss of attachment	Boys	Girls	Total	Boys	Girls	Total
0- 3mm	1.62	1.61	1.62	1.59	1.60	1.60
4- 5mm	0.0	0.0	0.0	0.03	0.01	0.02
6- 8 mm	0.0	0.0	0.0	0.0	0.0	0.0
9-11 mm	0.0	0.0	0.0	0.0	0.0	0.0
12mm and above	0.0	0.0	0.0	0.0	0.0	0.0
Excluded sextants	0.0	0.0	0.0	0.0	0.0	0.0
Not recorded	4.38	4.39	4.38	4.38	4.39	4.38

Maharashtra for the study at the orphanage, since these were legally registered with the CWC. Prior to the beginning of the study, permission was obtained from the respective heads of the two orphanages Manavya and Mamta foundations in Pune that house the HIV positive children and adolescents below 18 years of age. The non- HIV positive controls were taken from three orphanages, after age and sex matching (ratio of 1:2 between the HIV positive cases and the non HIV positive controls). A written request was sent to different orphanages but permission was obtained from only the three:

1. Observation Home Boys, Shivajinagar, Pune, Maharashtra,
2. Girls Observatory Home, Pune and
3. Sarvesha Seva Sangh, Wadgaon Budruk, Pune.

The HIV positive cases were examined from April 2013 to May 2013. After completing the formalities for obtaining permission for the controls, they were examined from August 2013 to October 2013. The samples for controls were drawn from the attendance registers of the institutions by simple random method, after matching for age and sex. Those not willing to participate were excluded from the study. All the 78 cases (25 from Mamta and 53 from Manavya) were included as a part of the study. After matching 156 controls were selected (76 controls from the boys and the girls' observatory home and 80 controls from Sarvesha Seva Sangh). Written consent was taken obtained from the legal guardians. Assent was taken from those above 7 years of age, as per the Indian Council of Medical Research (ICMR) guidelines for epidemiological survey. Clinical examination was carried out and the oral health status and treatment needs of these participants were recorded using the World Health Organization, Oral Health Assessment Form 1997.[13] Oral Hygiene Status of the participants was recorded using the Oral Hygiene Index-Simplified (Greene and Vermillion 1964).[14] The data collected was subjected to statistical analysis using SPSS 16.0. Comparison with proportions was done by Chi square test and the significance level was decided at p value 0.05.

RESULTS

There were 78 HIV positive children and adolescents staying in two orphanages in Pune, age ranging from 3-17 years, with the mean age of 12.60±2.79 years. Non- HIV positive children

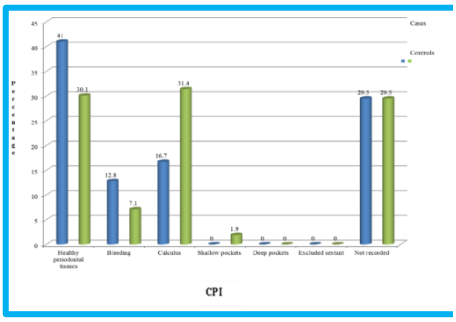

Fig. 1: Distribution of cases and controls with respect to the CPI score

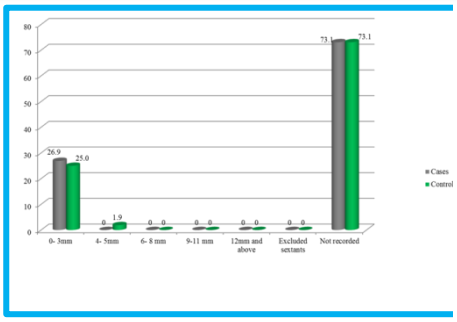

Fig. 2: Distribution of cases and controls with respect to loss of attachment

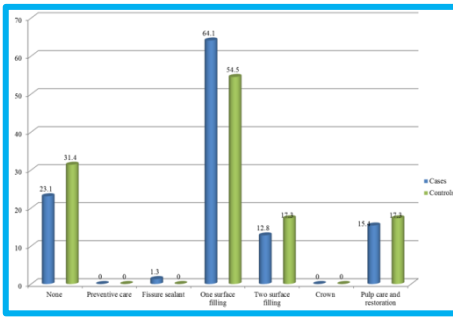

Fig. 3: Distribution of cases and controls based upon the treatment needs

and adolescents residing in three orphanages from the same locality were selected as controls in a ratio of 1:2 (case: control), after age and gender matching. The CD4 count and gender distribution is given in Table 1. There was statistically no significant difference between the gender and the CD4 count of the children. Percentage of HIV positive children with ART was higher among girls than the boys but difference was statistically not significant (X^2=0.68; df=1, P>0.05, non significant). There were more number of cases using toothbrush compared to the controls and this difference was statistically highly significant (χ^2 = 11.18, df=1, p<0.0001, Fisher's exact test). The number of cases using toothpaste to clean their teeth was more than the controls and this difference was statistically highly significant (χ^2 = 11.75, df=1, p<0.0001, Fisher's exact test). The sugar consumption was high among the cases than the controls and this was statistically significant (χ^2 = 39.25, df=1, p<0.0001 (Fisher's exact test)). Among two HIV positive children who had enamel opacity/hypoplasia, one (50.0%) had demarcated opacity and one (50.0%) had enamel hypoplasia. Among 11 (14.1 %) non- HIV children who had enamel opacity/hypoplasia, two (18.2%) had demarcated opacity, 07 (63.6%) had diffuse opacity and two (18.2%) had enamel hypoplasia. No dental fluorosis was seen among the cases while two (1.3%) among the controls had mild fluorosis. The prevalence of dental caries in cases and controls was found to be 93.6 % and 79.5% respectively. There was more dental caries among the cases than the controls and this difference was statistically significant (p=0.009) (Table 2). The mean DMFT was 3.06 overall and the mean dmft was 1.0 overall. The cases had more number of 4 or more DMFT than the controls and this difference was statistically significant (χ^2 =4.32, df=1, p=0.04). There was no statistically significant association between the CD4 count and dental caries (p=0.48). Definite malocclusion was seen more prevalent among the controls than the cases. The severity of malocclusion among the cases and the controls is shown in Table 3. Only one girl among the cases had a retention cyst in relation to the lower lip. The rest of the cases and the controls had normal/ healthy oral mucosa. Among the 78 cases, 32 (41.0%) had a healthy periodontal tissues, 10 (12.8%) had bleeding on probing, 13 (16.7%) had calculus. Among the 110 controls, 47 (30.1%) had healthy periodontal tissues, 11 (7.1%) had bleeding on probing, 49 (31.4%) had calculus and 03 (1.9%) had shallow pockets (Fig. 1). Among the cases, the mean number of sextants with healthy periodontal tissues was 2.78, bleeding was 0.88 and calculus was 0.57. Among the controls, the mean number of sextants with healthy periodontal tissues was 2.34, bleeding was 0.77, calculus was 1.10 and shallow pocket was 0.02 (Table 4). There were more controls with 4-5mm of loss of attachment (1.9%) compared to the cases (Fig. 2). Among the cases, the mean number of sextants with loss of attachment of 0-3mm was 1.62. Among non-HIV positive children and adolescents, the mean number of sextants with loss of attachment of 0-3mm was 1.60, 4-5mm was 0.02 (Table 5).

Percentage of girls with good oral hygiene was higher than that of boys in both the cases and controls. Percentage of boys with fair oral hygiene was higher than that of girls in both cases and controls. Among the cases, one (1.3%) required fissure sealant, 50 (64.1%) required one surface filling, 10 (12.8%) required two surface filling, 08 (10.3%) required pulp care and restoration, and 10 (12.8%) required extraction. Among the controls, 85 (54.5%) required one surface filling, 27 (17.3%) required two surface filling, 27 (17.3%) required pulp care and restoration, and 31 (19.9%) required extraction (Fig. 3). Among the 14 cases who were refused a treatment due to their HIV background, 07 (50.0%) were boys and 07 (50.0%) were girls. The percentage of controls who had reported to the dentist due to pain was more than that of the cases and this difference was statistically significant (p= 0.05).

DISCUSSION

The present study consisted of 234 children and adolescents of which, 78 were HIV positive (cases) and 156 were Non- HIV positive (controls). The study in US,[5] Hyderabad, India,[6] Sau Paula, Brazil[10] involved larger number of cases, compared to the present study. The study in California US,[12] the study in US,[15] in New Jersey,[16] had a comparatively lesser number of samples. Another study in New Jersey,[17] had 147 children in all of which 90 were HIV positive and 67 were Non-HIV positive. The London study had only 30 HIV positive patients.[18] A comparative study in US,[19] comprised of 104 HIV positive children and 67 Non- HIV positive children. In the present study, 61.5% of the cases were on ART while the study in Nigeria,[20] involved 61.95% participants on HAART. Another study in Hyderabad, India[9] and in Romania[21] involved less of cases on ART. All the cases consumed sugar in one or the other form in between meals, lesser than the controls, among which only 60.9% consumed sugar. The study in London,[3] found no such difference in the carbohydrate intake between the cases and the controls. In contrast to our study where all the cases consumed sweets once daily, in the Kampala study,[22] 6.6% consumed sugary snack once daily, 0.5% twice and 1.1% more than two times. A decreased carbohydrate rich snack compared to the reports in the other studies in between meals in the present study is due to the strict diet regime of the orphanages. Among the cases, 21.8% gave a history of visit to the dentist, comparatively lesser than the study in London,[18] where 75.0% had reported to the dentist before. In another study in Kampala,[22] only 16.9% had reported to a dentist before, comparatively lesser than the present study. Also there was a statistically significant difference between the cases and the controls in our study, cases had reported more to the dentist than the controls. In the present study, among the cases, 82.4% gave a history of being refused by the dentist due to their HIV background. Since in most of the countries, an anti-discriminatory law currently exists, literature data is not available for comparison. This implies as one of the reasons for increasing the oral disease prevalence among the HIV positive children and adolescents since lack of a positive attitude from the professionals exists. This could lead to a negative impact on the already compromised immunological profile of the cases and render them more vulnerable to rehabilitative forms rather than preventive and curative levels of prevention. Only one girl among the cases had a recurrent history of retention cyst. No other oral diseases or lesions were present either in the cases or the controls. The study in Hyderabad, India,[9] and in Great Ormond Street Hospital, South London,[4] and in Northern Thailand,[23] had more soft tissue lesions than our present study. The caries prevalence overall was 93.3% in the cases and 79.5% in the controls. The studies in Hyderabad, India,[9] London,[18] Brazil,[10] Uganda,[22] Northern Thailand[23] and in Bangalore, India,[24] had lesser caries, as compared to the findings of our present study. In the study in London.[4] 98.6% of the HIV positive children had caries, higher than the present study. Also in the present study, no significant association could be established between the CD4 count and dental caries among the cases, unlike the study in Brazil,[25] where the caries was found to increase with a decrease in the immunological profile of the individual. In the present study, 12.8% of the cases had gingivitis and 16.7% had calculus. In the studies in London,[4] and in Brazil,[25] and in Kampala, Uganda,[22] had gingivitis, higher than the present study. Paucity of literature limits any comparison with respect to the treatment needs of

the present study, but the findings suggest the need for a dental intervention for both the cases as well as the controls.

CONCLUSION

More than ninety percent of the cases and three-fourth of the controls had caries overall. More than three-fourth among the cases had never been to a dentist before and an even higher percentage of controls had not visited a dentist before. This could be attributed to a number of factors like economy, lack of proper care and a neglect of the care takers towards the oral health of the children. Among those cases who had visited a dentist before, more than three-fourth faced discrimination for being HIV positive. The mean DMFT was 3.06 among the cases and 2.17 among the controls, higher than the set goals of the WHO (<2 DMFT). Thus to conclude, these orphans are at the point of being vulnerable to deteriorating oral health. Proper counselling and education of the care takers is also essential as a part of primary prevention of oral diseases among this population. Though this study is one of it kinds, it still has limitations. This opens further doors to see the impact of health education and treatment with a regular follow up especially for the cases over a long time period. Since referrals were made as a part of the protocol of the study and some reported back with a positive response by getting the necessary treatment done, it was not 100%. This calls for a more intensive and focussed target group intervention for these orphanage children and adolescents. One of the important factors that were not a part of the protocol was to equate even the carbohydrate present in the medications of these children with the oral findings. The present study was a cross sectional one and there is a need for longitudinal comparative study especially related to the accessibility, affordability and the sustainability of oral health care for these neglected children and adolescents.

CONFLICT OF INTEREST & SOURCE OF FUNDING

The author declares that there is no source of funding and there is no conflict of interest among all authors.

BIBLIOGRAPHY

1. Oral health (WHO) [Internet] 2014. http://www.who.int/topics/oral_health.
2. Waghmare PF, Chaudhari AU, Karhadkar VM, Jamkhande AS. Comparative evaluation of turmeric and chlorhexidine gluconate mouthwash in prevention of plaque formation and gingivitis: A clinical and microbiological study. The Journal of Contemporary Dental Practice 2011;12(4):221-4.
3. Malhotra R, Grover V, Kapoor A, Saxena D. Comparison of the effectiveness of a commercially available herbal mouthrinse with chlorhexidine gluconate at the clinical and patient level. Journal of Indian Society of Periodontology 2011;15(4):349-52.
4. Paraskevas S, Versteeg PA, Timmerman MF, Van der VU, Van der Weijden GA. The effect of a dentifrice and mouthrinse combination containing amine fluoride/stannous fluoride on plaque and gingivitis: a 6-month field study. J Clin Periodontol 2005;32:757-64.
5. Marchetti E, Mummolo S, Mattia JD, Casalena F, Martino SD, Mattei A, *et al*. Efficacy of essential oil mouthwash with and without alcohol: a 3-day plaque accumulation model. Trials 2011;12:262-8.
6. Haq MW, Batool M, Ahsan SH, Sharma G. Efficacy of antiplaque mouthwashes: A five-day clinical trial. General Dentistry 2011:110-5.
7. Arunakul M, Thaweboon B, Thaweboon S, Asvanund Y, Charoenchaikorn K. Efficacy of xylitol and fluoride mouthrinses on salivary mutans streptococci. Asian Pacific Journal of Tropical Biomedicine 2011:488-90.
8. Peter S. Essentials of Preventive Community Dentistry. New Delhi: Arya (Medi) Publishing House;2008.
9. Addy M, Jenkins S, Newcombe R. The effect of some chlorhexidine-containing mouthrinses on salivary bacterial counts. J Clin Periodontol 1991;18:90-3.
10. Halawany HS. A review on miswak (Salvadoraperisca) and its effect on various aspects of oral health. The Saudi Dental Journal 2012;24:63-9.
11. Mohammed SG. Comparative study of antibacterial activity of miswak extracts and different toothpastes. American Journal of Agricultural and Biological

aspects of oral health. The Saudi Dental Journal 2012;24:63-9.
12. Mohammed SG. Comparative study of antibacterial activity of miswak extracts and different toothpastes. American Journal of Agricultural and Biological Sciences 2013;8(1):82-8.
13. Balappanavar AY, Sardana V, Singh M. Comparison of the effectiveness of 0.5% tea, 2% neem and 0.2% chlorhexidine mouthwashes on oral health: A randomized control trial. Indian Journal of Dental Research 2013;24(1):26-34.
14. Khezri HD, Gorji MAH, Morad A, Gorji H. Comparison of the antibacterial effects of matrica, perisca and chlorhexidine mouthwashes in mechanically ventilated ICU patients: a double blind randomized clinical trial. Rev Chilena Infectol 2013;30(4):368-73.
15. Mehta S, Pesapathy S, Joseph M, Tiwari PK, Chawla S. Comparative evaluation of a herbal mouthwash (Freshol) with chlorhexidine on plaque accumulation, gingival inflammation and salivary Streptococcus mutans growth. Journal of Indian Society of Preventive and Community Dentistry 2013;3(1):25-8.
16. Söderling EM. Xylitol, Mutans streptococci and dental plaque. Adv Dent Res 2009;21:74-8.
17. Ghiraldini B, Furushima ET, Casarin RCV, Villalpando KT, Pimentel SP, Cirano FR. Effect of cetylpyridinium chloride with xylitol on the formation of biofilm and development of gingivitis. Braz J Oral Sci 2012;11(3):392-5.
18. Featherstone JDB. Delivery Challenges for Fluoride, Chlorhexidine and Xylitol. BMC Oral Health 2006;6:1-5.
19. Ernst CP, Prockl K, Willershausen B. The effectiveness and side effects of 0.1% and 0.2% chlorhexidine mouthrinses: A clinical study. Quintessence International 1998;29:443-8.
20. Biswas G, Anup N, Acharya S, Kumawat H, Vishnani P, Tambi S. Evaluation of the efficacy of 0.2% chlorhexidine versus herbal oral rinse on plaque induced gingivitis- A randomized clinical trial. Journal of Nursing and Health Science 2014;3(2):58-63.