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Evaluation of Oral Health Status as an Indicator of Disease Progression in HIV Positive Children

Avaliação da Condição de Saúde Bucal como um Indicador de Progressão da Doença em Crianças HIV Positivas

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RESUMO

Objetivo: Avaliar a condição de saúde bucal (condição gengival, cárie dentária, lesões na mucosa oral) em um grupo de crianças HIV positivas em relação à contagem de CD4.
Método: Um total de 234 crianças HIV positivas com idades entre 2 e 15 anos foram examinadas. A cárie dentária foi avaliada segundo os critérios da OMS. Os tecidos gengivais foram analisados sendo empregado o índice de sangramento gengival. Para a presença de biofilme dental empregou-se o índice de Sillness e Loe. As crianças encontravam-se sob terapia antiviral e a contagem de CD4 de cada um dos pacientes foi obtida por meio dos prontuários hospitalares.
Resultados: Os escores máximos ceo-d/ceo-s foram observados nas crianças cuja contagem de CD4 estava entre 200 - 500. Entretanto, as médias mais altas do cpo-d/cpo-s foram vistas nas crianças com contagem de CD4 menor de 200. As médias de placa, sangramento gengival foram mais elevados nos indivíduos com contagem de CD4 menor que 200, sem diferença estatisticamente significante. Candidíase pseudomembranosa foi a lesão oral mais observada. A língua foi o local mais comum de ocorrência de lesões bucais em todos os grupos.
Conclusão: A condição de saúde bucal em crianças HIV positivas deteriora-se com o declínio da contagem de células CD4.

DESCRITORES

HIV; Contagem de linfócito CD4; Síndrome de Imunodeficiência Adquirida; Saúde bucal.

ABSTRACT

Objective: To evaluate the oral health status i.e., gingival condition, dental caries, oral mucosal lesions progression in a group of HIV positive children in relation to CD4 count.
Method: A total of 234 HIV positive children in the age group of 2-15 years were included in the present study. Dental caries status was evaluated as per the criteria devised by WHO. Gingival condition index was used to assess and criteria given by Muhlemann was used for Papillary Bleeding scores. Plaque was assessed using the Sillness and Loe Index. The children were under active antiretroviral therapy the CD4 count of each patient was available from the hospital records.
Results: Maximum dmft/defs, score was observed in individuals with CD4 count 200 - 500. Whereas highest mean DMFT/DMFS score was seen in children with CD4 count less than 200. The mean plaque, gingival and papillary bleeding score were highest in individuals with CD4 count less than 200 but the difference was statistically insignificant. Pseudomembranous candidiasis was the most observed oral lesion. Tongue was the most common site of occurrence of oral lesions in all groups.
Conclusion: The study confirms that the oral health status in HIV positive children deteriorates with the decline in CD4 count.

KEYWORDS

HIV; CD4 Lymphocyte count; Acquired Immunodeficiency Syndrome; Oral health.

INTRODUCTION

Profound immunosuppression caused by HIV/AIDS renders the host susceptible to a plethora of opportunistic infections[1-4]. Significant but often ignored aspect of HIV/AIDS is its oral manifestations. Oral health care is an important component of all round care for people with HIV infection.

The lack of healthy, functioning dentition can adversely affect the quality of life, complicate the management of medical conditions, and create or exacerbate nutritional and psychosocial problems[5].

Oral lesions are a source of substantial HIV associated morbidity. In addition certain oral lesions are markers for progressive immunologic dysfunction and HIV disease progression[6-9].

Hence the present study was planned with the aim to ascertain the status of periodontal disease, dental caries and oral mucosal lesions in HIV infected children in relation to CD_4 count.

MATERIALS AND METHODS

The study was carried out at HIV/AIDS Centre of King Edward Memorial Hospital and Seth G.S. Medical College, Parel, Mumbai as well as Ashraya, the Institute for destitute children, Mumbai, India. Before the start of the project, the Ethical Committee Clearance was obtained from Ethics Committee of Seth G.S. Medial College and KEM Hospital.

The concerned authorities, parents and caretakers were informed about the purpose of the study and an informed consent was obtained.

The subjects considered were 234 confirmed positive cases of HIV in the age group of 2 to 15 years under anti retroviral therapy (HAART). The history confirmed that the children acquired the infection through vertical transmission. Individuals were excluded if they had any physical or mental condition that would preclude cooperation or performance of oral hygiene procedures.

The patients were seated comfortably on a dental chair and examined under adequate illumination. The oral examination included dental, soft and hard tissue examination using mouth mirrors, graduated probes, disclosing solution (Erythrosine dye, Plak-See, ICPA labs India) and an HIV kit comprising of a disposable head cap, mouth mask, apron, eye glasses, gloves and shoe covers.

Oral examination started with the examination of teeth. Dental caries was recorded as per the WHO criteria[10].

Dental plaque was assessed as per the criteria described by Sillness and Loe[11]. A disclosing agent was applied to the teeth and the level of plaque was scored as per the specified criteria.

The gingival health was assessed as described by Loe and Silness[12]. To describe the clinical severity of gingival inflammation buccal, lingual, mesial and distal surfaces of the specified teeth were examined and scored. For further assessment papillary bleeding on probing was recorded using the Papillary Bleeding Index[13].

After assessing the gingival health status a detailed examination for mucosal lesions was carried out starting with the perioral tissues, lips, labial mucosa, buccal mucosa, alveolar mucosa, gingiva, floor of mouth, tongue, hard palate and finally soft palate. No radiographs were taken during the study. Demographic data included age and gender of the children. CD_4 count and other relevant medical data (health history) was obtained from the hospital records. No dental or oral treatment was undertaken on any of the patients during the course of the study. However the treatment plan was discussed with the caretakers and an appointment was made for routine dental treatment. All the individuals were examined by a single examiner, following universal infection control procedures, and the clinical findings were recorded on a proforma by a trained assistant.

The data was tabulated and analyzed to obtain the descriptive statistics and frequency distribution of the demographic data according to the clinical variables. The data collected on periodontal disease, dental caries and oral mucosal lesions was tabulated and analyzed by Chi Square Test, One Way Annova Test and McNemar Bowker Test.

RESULTS

A total of 234 children, belonging to the age group 2-15 were examined. At the time of oral examination, 66 children had CD_4 count less than 200, whereas 106 children had CD_4 count in the range of 200 to 500 and 62 children had a count greater than 500.

Mean deft Score of 6.00, 7.15 and 5.26 was observed in individuals with CD_4 count less than 200, 200 to 500 and more than 500 respectively (Table 1). Maximum mean deft score was observed in individuals with CD_4 count less than 200. The difference was statistically significant (F value = 2.9, p value = .05). The mean defs score of 18.33, 21.33 and 13.08 was noted in individuals with CD_4 count less than 200, 200 to 500 and more than 500 respectively (Table 1). Maximum defs score was observed in individuals with CD_4 count 200 – 500, followed by

individuals with CD_4 count below 200 and more than 500 respectively. The difference is highly significant (F value = 3.7, p value = 0.026).

Table 1. Mean deft/defs scores according to CD4 count.

CD4 count	Mean deft	P Value	Mean defs	P Value
<=199	6.0179		18.3333	
200-499	7.1548	0.05	21.3333	0.026
>=500	5.2600		13.0800	
Total	6.3211		18.2766	

The maximum mean DMFT of 4.34 was observed in individuals with CD_4 count less than 200. The score was 3.76 and 3.44 in individuals with CD_4 count 200 – 500 and more than 500 respectively (Table 2). The difference of DMFT score in individuals with CD_4 count less than 200 and others was slightly insignificant (F value = 2.63, p value = 0.072). Similar results for DMFS were recorded (Table 2).

Table 2. Mean DMFT/DMFS scores according to CD4 count.

CD4 count	Mean deft	P Value	Mean defs	P Value
<=199	4.3436		10.6834	
200-499	3.7692	0.072	8.4551	0.05
>=500	3.4490		9.3125	
Total	4.0560		9.7905	

Table 3. Oral mucosal lesions.

Oral Mucosal Lesions	n	%
Perioral Area/Lips	3	6.4
Perioral Area/Lips+Buccal Mucosa	0	0.0
Perioral Area/Lips+Buccal Mucosa +Palate	0	0.0
Perioral Area/Lips+Buccal Mucosa+Floor of the Mouth+Gingiva	0	0.0
Perioral Area/Lips+Buccal Mucosa+Vestibule+ Palate	0	0.0
Perioral Area/Lips+Floor of the Mouth+ Gingiva	2	4.3
Perioral Area/Lips+Gingiva	1	2.1
Perioral Area/Lips+Alveolar Mucosa,Tongue	1	2.1
Perioral Area/Lips+Tongue	4	8.5
Palate	1	2.1
Oropharynx	8	17.0
Others	6	12.8
Buccal Mucosa	0	0.0
Buccal Mucosa +Palate	0	0.0
Buccal Mucosa+Gingiva	1	2.1
Buccal Mucosa+Gingiva+Tongue	0	0.0
Buccal Mucosa+Alveolar Mucosa,Tongue	0	0.0
Buccal Mucosa+Vestibule	0	0.0
Vestibule+Tongue	0	0.0
Labial Mucosa	2	4.3
Sublingual Mucosa	0	0.0
Gingiva+Tongue	0	0.0
Alveolar Mucosa	1	2.1
Alveolar Mucosa+Tongue	1	2.1
Vestibule	1	2.1
Tongue	15	31.9
Total	47	100.0

On examining the oral mucosal lesions, it was observed that tongue was the most common site of involvement in individuals with CD_4 count less than 200. Pseudomembranous candidiasis was the most common oral lesion observed (Table 3).

Mean plaque score of 1.22 was recorded in children with CD_4 count less than 200, 1.23 in children with CD_4 count between 200 and 500 and 1.26 in children with CD_4 count more than 500 (Table 4). This difference was insignificant statistically. Mean gingival score of 1.22 in individuals with CD_4 count less than 200, 1.20 in individuals with CD_4 count between 200 and 500 and 1.19 in individuals with CD_4 count more than 500 was observed. The mean gingival score was highest in individuals with CD_4 count less than 200 (Table 4) but the difference was statistically insignificant (F value = .487, p value = .615). Mean papillary bleeding score recordings were 1.18 in children with CD_4 count less than 200, 1.17 in children with CD_4 count between 200 and 500 and 1.16 in children with CD_4 count more than 500 (Table 4). The maximum mean papillary bleeding score was observed in individuals with CD_4 count less than 200. However, the difference between groups was statistically insignificant. (F value = .128, p value = .879).

Table 4. Depicting mean plaque score, mean gingival score and mean papillary bleeding score according to CD4 count.

CD4 count	Mean deft	P Value	Mean defs	P Value	Mean Papillary Bleeding Score	P Value
<=199	1.22168		1.22157		1.1874	
200-499	1.23092	.525	1.20839	0.05	1.1748	.879
>=500	1.26193		1.19211		1.1629	
Total	1.23049		1.21294		1.1796	

DISCUSSION

It has been reported that 40 to 50% of HIV infected people suffer from oral or dental problems. Oral lesions are a source of substantial HIV associated morbidity even in those who are on modern HIV therapy. In addition certain oral lesions are markers for progressive immunologic dysfunction and HIV disease progression[14-16]. It has been observed that oral lesions are the first and foremost indicators of HIV/AIDS[7].

Some common problems associated with HIV/AIDS are development of fever, blisters, Kaposi's sarcoma, oral warts, canker soars, oral hairy leukoplakia, gingival and periodontal diseases, thrush, swelling in salivary glands, enlarged lymph nodes, dry mouth, viral oral lesions and herpes simplex lesions etc[5,18,19]. The side effects of medications commonly used may also affect the oral health. Salivary flow may be diminished by anticholinergics or adrenergic inhibitors resulting in xerostomia. Gingival hyperplasia may be caused by phenytoin. Oral candidiasis may be exacerbated by antibiotics. Didanosine (ddI) and zalcitabine (ddC) may cause painful oral ulcers. Other side effects of medications commonly used in the treatment of HIV, such as anaemia, thrombocytopenia, and neutropenia may be manifested in the oral cavity through bleeding or infection[20-22]. The sweetners used in pediatric syrups contribute to development of dental caries.

A number of studies have been reported in India pertaining to the general health status of HIV positive children but no exclusive study has been carried out to ascertain the oral health status as an indicator of disease progression.

Available information suggests that HIV infected children have many of the oral manifestations observed in HIV infected adults, but distinguishing features have been noted[23]. A vast majority of children with HIV infection present oral manifestations among the first signs of illness[24]. They observed that the oral lesions which appear in the infected children differ in prevalence from those seen in sero positive adults. Parotid hypertrophy is present more exclusively in children whereas periodontal bacterial infections and Kaposi's sarcoma predominate in adult population. Prospective studies are needed to determine the prevalence and natural history of oral lesions to examine the relationships between immunologic and virologic markers of HIV disease status and the occurrence of oral manifestations, to evaluate changes in oral microbial flora of HIV-infected individuals over time, and to assess the causative nature of oral lesions comprehensively.

The findings of the present study are similar to those reported in other developed and developing countries and emphasize the need for education on the appropriate management and referral of patients presenting with oral manifestations of HIV infection[25-29]. In the present study, 234 HIV children attending the ART Centre of infectious diseases were studied, 6.4% of HIV positive children showed an association with perioral lesions. The lesions most commonly occurred on tongue and buccal mucosa. Candidiasis Linear gingival erythema and apthous mucosal stomatitis were common. Children with CD_4 count less than 200 cells/mm3 were more susceptible to develop these lesions. At the time of oral examination 66 patients had CD_4 count less than 200 whereas 106 children had CD_4 count in the range of 200 to 500. Caries occurrence rate was seen to be high and most of it was untreated.

deft/DMFT, defs/DMFS scores in the HIV positive children recorded in the current study were high possibly due to high intake of carbohydrate, sweetened medicines as well as xerostomia. It is vital to ensure that whenever possible sugar free medications are prescribed to children and also they must receive appropriate advice and necessary support to access dental care services.

Oral manifestations are common in children infected with HIV and are associated with serious immunosuppression and AIDS. They are indicators of the infection with a predictive value of its progression. In the present study oral candidiasis was present in 20.6% of the cases. Pseudomembranous candidiasis was the most common type.

The frequency of gingivitis was high, this could be attributed to dryness of mouth. Ulceration and painful oral lesions were frequently observed which interfered with the performance of daily oral hygiene procedures. The average CD_4 percentage was low for children with gingivitis and most of them had serious immunosuppression. More lesions were present in the oral cavity in immunologically compromised patients. A low value for CD_4 characterizing the presence of immunosuppression, is a predisposing factor for the development of opportunistic infections. The study also verifies a relation between increased immunosuppression and the presence of candidiasis. Even though the children in the present study were on antiretroviral therapy it was seen that some of them exhibited candidiasis. A possible explanation for this could be their low CD_4 count and their immunocompromized status.

The introduction of HAART is associated with a significant decrease in the prevalence of opportunistic diseases including oral mucosal lesions. HAART is also associated with a significant decrease in the prevalence

of oral candidiasis and oral hairy leukoplakia coupled with an improved CD_4 count[30-32].

Seemingly in contradiction with these findings, an increased prevalence of oral warts has been noted by some investigators despite a marked improvement in CD_4 count. This observation may not reflect true increased prevalence in the population. However, because of the link between human papilloma virus and cancer, it suggests that, with increased life expectancy of HIV-infected patients, oral cancer may become a clinically significant long-term complication.

Results of studies conducted by other authors[33] confirmed a decline in prevalence of oral mucosal lesions in industrialized countries with the introduction of better anti retroviral therapies. However, an increase in salivary gland disease, xerostomia and oral warts was observed.

Taken together, the occurrence rate of Oral mucosal lesions in the post HAART era indicates that Oral mucosal lesions are less frequent, but new and poorly understood paradigms are emerging[34].

The authors emphasize a need for further longitudinal studies with frequent oral examinations of children to establish a relation between HIV and oral health status of HIV positive children, particularly in relation to the progression of the disease as estimated by the depletion of CD_4 counts in blood.

CONCLUSION

People tending to children with HIV are aware of general issues related to HIV/AIDS but are not aware of the oral manifestations of the syndrome. It is recommended that the dental professionals focus on spreading awareness amongst the medical counterparts and thereby improving their knowledge of the oral manifestations of HIV/AIDS.

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