IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 1 Ver. 13 January. (2018), PP 01-06
www.iosrjournals.org

A Study on Dental Caries Status among 5-18 Years HIV And Healthy Children-A Comparative Study

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Abstract: *Aim of the study was to compare Dental caries status between children with HIV and healthy controls among 5-18 years old. Fifty children diagnosed with HIV and fifty healthy children were included in the study, Informed consent was taken .Examination was carried out by using ART kit, mouth mirror, explorer and CPI probe. DMFT and dmft index was recorded using WHO criteria. HIV children had higher mean DMFT score when compared to that of healthy children. Healthy children had higher mean dmft score when compared to that of HIV children. All the children and parents were educated and motivated about the importance of maintenance of good oral hygiene, severity and prognosis of dental aspects of HIV. During the study, children were given comprehensive dental treatment with emphasis on preventive measures.*

Keywords: *HIV; Dental caries; dmft/DMFT; Healthy children*

Date of Submission: 12-01-2018 Date of acceptance: 26-01-2018

I. Introduction

Since ancient time AIDS has been reported in civilizations around the world. According to a survey it is estimated worldwide that there are 2.3 million human immunodeficiency virus (HIV) positive children from 0 to14 years infected by mothers.[1] HIV was unknown until the early 1980s but since then has infected millions of persons in a worldwide pandemic. The result of HIV infection is relentless destruction of the immune system leading to onset of the acquired immunodeficiency syndrome (AIDS). The AIDS pandemic has already resulted in the deaths of over half its victims. All HIV-infected persons are at risk for illness and death from opportunistic infectious and neoplastic complications because of the inevitable manifestations of AIDS.[2]Before 1983, it was believed that AIDS was restricted to a specific group of people.[3] Although HIV was present from century, HIV infection in children was first reported in 1983. It is generally accepted that the known strain of HIV-1 are most closely related to the simian immunodeficiency viruses (SIVs) endemic in wild ape populations of West Central African forests. Using HIV-1 sequences preserved in human biological samples along with estimates of viral mutation rates, scientists calculate that the jump from chimpanzee to human probably happened during the late 19th or early 20th century. HIV 2 discovered in 1986 antegenically distinct virus endemic in West Africa., 30 million worldwide are infected. 3.2 million Children are living with HIV around the world at the end of 2013. 240,000 children became newly infected with HIV in 2013. 91 percent of children living with HIV live in sub-Saharan Africa. 190,000 children died of AIDS-related illnesses during 2013, out of 1.5 million people overall. Among children, most cases of infection by HIV are transmitted vertically, i.e., from mother to child. The immune system of newborn children is immature and hence the progression of the disease is rapid and severe.[4]Route of vertical transmission include transplacentally, during pregnancy, as the infant passes through the birth canal during delivery; or postnatally during breast feeding.[5] Sexual practices that have been associated with increased risk of transmission of AIDS virus (homosexuality and anal intercourse); and cultural practices that are possibly connected with increased virus transmission.[5]The chief mode of HIV transmission to children in India is through the vertical route.[6] Children who are vertically infected present under weight and delayed milestones due to under developed immunity which include weight loss and delayed development.[7] They may also present the following changes: delayed dental eruption, fewer permanent teeth, prolonged retention of primary teeth and a slightly larger number of dental anomalies.[8] Children living with HIV-1 may have an increased prevalence of dental caries and gingival problems as a result of liquid medications which contains high content of sucrose, antiretroviral, a sugar-rich diet, inadequate hygiene habits and reduced salivary flow.[9]The establishment of antiretroviral protocols has reduced the occurrence of oral changes.[10]

However, some authors have reported delayed development even with the use of antiretroviral drugs.[11]A study was done in Ugandan HIV-infected children who were on various medications including HAART, results reported a prevalence of 68.6% dental caries, 40% gingivitis and 8.6% pseudomembranous candidiasis in them.[12]In 1992 information about dental caries in HIV infected children was very limited.[13] In one of these studies, HIV infected adults had a lower prevalence of dental caries when compared to a group of healthy adults from the same region of Zaire .[14] Now around worldwide there is a awareness in population regarding HIV and its effects, The purpose of this study is to assess the status of dental caries in HIV positive children and to compare the same with healthy children.

II. Materials And Methodology

The present study was undertaken to compare the dental caries experience in HIV children and healthy controls among 5-18 years old in Bangalore. The study population consisted of 50 diagnosed cases of HIV at Indira Gandhi Institute of child health and the control group consisted of 50 healthy children who visited the department of Pedodontics and preventive dentistry for a routine dental check up and treatment needs. Children with other systemic disorder and special child were excluded from the study. Informed consent was taken from the concerned parents or guardian before conducting the study from both the groups. 50 HIV children were randomly selected and Examination for each subject was carried out using disposable ART kit, disposable mouth mirror and probe. Subjects were examined in a suitable room, seated on a dental chair and artificial light source was used for illumination**,** DMFT and dmft index were recorded. 50 healthy children were randomly selected; Examination was carried out by using plane mouth mirror, CPI probe. Subjects were examined in a suitable room, seated on a dental chair and artificial light source was used for illumination and data was recorded. Examination was done under standardized conditions by a single qualified examiner who was trained and calibrated to ensure uniform interpretation and application. DMFT and dmft index were recorded using WHO oral health assessment form. Each tooth was scored independently. No radiographic examination was done. Current recommendations and standards given by centre for disease control (CDC) were followed for infection control. Ethical clearance was obtained from the Institutional ethical committee of v .s .Dental College and Hospital. Permission was taken from Indira Gandhi Institute to conduct study on HIV children

III. Results

The present study was conducted to compare the dental caries experience in HIV children and Healthy children. The data was compiled and statistical analysis was done. Mann-Whitney test was used to check differences in proportions. SPSS (Statistical Package for Social Sciences) Version 20.1 (Chicago, USA Inc.) was used**.** 100 children participated in the study 50 HIV and 50 healthy (Table 1) out of which 44 were females and 56 were males (Table 2)

Table 1- Distribution of Study Population

Group	**N**	**%**
Healthy Children	50	50%
HIV +ve Children	50	50%
Total	**100**	**100%**

Table 2- Gender distribution in study population

Group	**Male**		**Female**	
	n	**%**	**N**	**%**
Healthy Children	22	39%	28	64%
HIV +ve Children	34	61%	16	36%
Total	**56**	**100%**	**44**	**100%**

In the present study age wise distribution of dmft was done in both the groups. (table 3)

Table 3- Age wise distribution of mean dmft

Dmft	**Group**	**Mean**	**Std Dev**	**SE of Mean**	**Mean Difference**	**Z**	**P-Value**
Age Group 5-7 Yrs	Healthy Children	6.44	4.64	1.55	3.944	-2.216	0.027*
	HIV +ve Children	2.50	2.17	0.89			

Age Group 8-10 Yrs	Healthy Children	3.47	2.85	0.74	-0.170	-0.711	0.477
	HIV +ve Children	3.64	4.95	1.49			
Age Group 11-13 Yrs	Healthy Children	0.60	1.26	0.40	-1.477	-1.836	0.066
	HIV +ve Children	2.08	2.29	0.64			

In Age group 5-7 Yrs, higher mean score was recorded in Healthy Children group compared to HIV Children and the difference between them was found to be statistically significant (p-0.027)

In Age group 8-10 Yrs, higher mean score was recorded in HIV Children when compared to that of healthy Children and the difference between them was not found to be statistically significant (P-0.477)n age group 11-13 Yrs, higher mean score was recorded in HIV Children compared to Healthy Children and the difference between them was not found to be statistically significant (P- 0.066). In the present study age wise distribution of DMFT was done in both the groups. (table 4)

Table 4- Age wise distribution of Mean DMFT

DMFT	Group	Mean	Std Dev	SE of Mean	Mean Difference	Z	P-Value
Age Group 5-7 Yrs	Healthy Children	0.00	0.00	0.00	-0.167	-1.225	0.221
	HIV +ve Children	0.17	0.41	0.17			
Age Group 8-10 Yrs	Healthy Children	0.93	1.39	0.36	0.388	-1.017	0.309
	HIV +ve Children	0.55	1.29	0.39			
Age Group 11-13 Yrs	Healthy Children	1.00	1.56	0.49	0.538	-1.171	0.242
	HIV +ve Children	0.46	0.97	0.27			
Age Group 14-16 Yrs	Healthy Children	2.38	1.67	0.42	-1.933	-0.133	0.894
	HIV +ve Children	4.31	5.99	1.66			
Age Group 17-19 Yrs	Healthy Children				-5.000	-	-
	HIV +ve Children	5.00	3.32	0.43			

In Age group 5-7 Yrs, higher DMFT mean score was recorded in HIV Children when compared to that of Healthy Children and the difference between them was not found to be statistically significant (P-0.221).where has in age group 8-10 Yrs, higher mean score was recorded in Healthy Children group when compared to that of HIV Children and the difference between them was not found to be statistically significant (P-0.309) and with the age group 11-13 Yrs, higher mean score was recorded in Healthy Children group when compared to HIV children and the difference between them was not found to be statistically significant (p-0.242). In 14-16 Yrs old higher mean score was recorded in HIV Children when compared to that of Healthy Children and the difference between them was not found to be statistically significant (p-0.894) .In age group 17-19 yrs no healthy children participated in the study, whereas the mean DMFT for HIV group was found to be 5. On comparison of dmft between both the groups, higher mean score was recorded in healthy Children compared to HIV Children and the difference between them was not statistically significant (p-0.301).(Table 5)

Table 5- Comparison of dmft score between the groups

dmft	Group	Mean	Std Dev	SE of Mean	Mean Difference	Z	P-Value
	Healthy Children	2.36	3.44	0.49	0.640	-1.033	0.301
	HIV Children	1.72	2.97	0.42			

On comparison of DMFT between both the groups, higher mean score was recorded in HIV Children when compared to that of healthy Children and the difference was not statistically significant (0.976)(Table 6)

Table 6 – Comparison Of DMFT Score Between The Groups

DMFT	Group	Mean	Std Dev	SE of Mean	Mean Difference	Z	P-Value
	Healthy Children	1.24	1.61	0.23	-0.840	-0.030	0.976
	HIV Children	2.08	3.86	0.55			

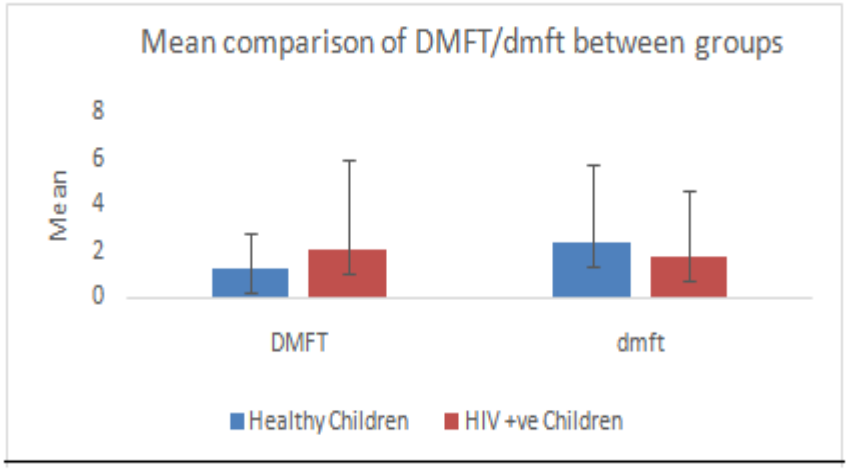

Fig 1 - Comparison of DMFT/ dmft score between the groups

IV. Discussion

HIV/AIDS is currently the fourth leading cause of death worldwide. It is estimated that more than 38 million people worldwide were living with HIV infection in 2003,2/3rd of people who live in sub-Saharan Africa.HIV related deaths and illness have crippled economic growth of several sub-Saharan countries and have strained the health care systems of many nations.[15] HIV progression is faster and more severe in children, due to the immaturity of the immune system. Most children born with HIV infection are symptomatic at birth; however time between birth and initial symptoms and signs varies considerably. The median age of pediatric patients at the time of an AIDS diagnosis is 12 months, Majority of pediatric HIV infections are the result of vertical transmission from Mother to Child.[16]The present study consisted of total 100 children ,50 HIV and50 Healthy children of age 5-18 years with the aim to compare dental caries experience amongst them, for the ease of examination they were further divided into 5 groups ,group1: age 5-7 Yrs, group2: age 8-10yrs,group3:age11-13yrs, group4:age14-16yrs,group5:age17-19yrs.In the present study 61% HIV children were males and 36% were females whereas in healthy children 39%were males 64% were females. In the present study lower mean dmft score was observed in HIV children as compared to healthy children. The difference between them was not found to be statistically significant. In Age group 5-7 Yrs, lower mean dmft score was observed in HIV Children group compared to healthy Children and the difference between them was found to be statistically significant. (p-0.027) reason being, healthy children who stay at home are taken care by their family members and have frequent snacking, along with increased intake of processed food. While HIV children mostly stay in orphanage and do not have such habits. Their diet is restricted, which might be a reason for lower dmft in HIV children as compared to healthy children. In age groups 8-10 yrs and11-13 yrs HIV children had higher mean dmft score when compared to that of healthy children. Which could be because, the parents of healthy children will be more concerned regarding their oral hygiene and brushing habits as compared to that of HIV children This finding was in accordance to the study done by **Srinath S et al**[1] were they observed that dmft in children with Perinatal HIV infection was low when compared with that of normal children. They concluded that as the study was conducted in Calvary chapel home of hope which had a favorable dental behavior and so the caries experience was low. `The above findings were in contrast to a study conducted by **Oliveira CA et al**[17] were they revealed higher caries scores in primary teeth in the HIV-infected patients as compared to that of control group. No differences in caries index were found for permanent dentition. The meta-analysis excluded caries data of permanent teeth and showed a significant association between caries experience in primary dentition and HIV infection considering cavitated and non-cavitated lesions or only cavitated lesions. Evidence exists that suggests HIV-infected children/adolescents have an increased caries experience in primary dentition. A study was conducted by **Madigan A et al**[18] in which they compared the oral status of perinatally HIV-infected children with their uninfected siblings living in New york. They observed that children with perinatally acquired HIV are at greater risk for caries than their sibling and children with more advanced diesease stage had significantly more cariesIn present study higher mean DMFT score was recorded in HIV children compared to Healthy children and the difference between them was not found to be statistically significant. In age groups 5-7yrs and 14-16yrs mean DMFT score was observed to be higher in HIV children when compared to that of healthy children, reason might be most of the antiretroviral drugs are sucrose based in the form of syrup or suspension which may lead to decreased salivation, which makes them potentially cariogenic and HAART could be considered as a factor for dental caries prevalence in children with HIV. In accordance to the study conducted by **Naidoo S et al**[19] they observed that for both the permanent and primary teeth, the mean DMFT was considerably higher in the hospital population reason being the use of chronic medications, and to receive

inappropriate care in terms of both treatment and services. A study was performed by **Vieira AR et[20]** to determine gingival health and caries levels in HIV-infected children they observed a greater DMFT/dmf index and also showed greater gingival inflammation. It was concluded that, children with greater caries experience showed more gingival inflammation. In age group 8-10yrs and 11-13yrs higher mean DMFT score was observed in healthy children when compared to that of HIV children but the results were not statistically significant. In the present study there was no statistically significant difference between the incidence of dental caries and HIV. In accordance to the study conducted by **costa LR[21]** et al they observed that there was no statistically significant difference in mean values of dmft/DMFT among HIV and Healthy children, they concluded that dental caries could not be associated primarily with AIDS , Accordance to the study done by **Soufi LR et al[22]** the mean and standard deviation of DMFT, DMFS were not significantly different compared to those without this treatment. It was concluded that HAART could not be considered as a single factor for dental caries prevalence in HIV-infected patients, more research is recommended to evaluate the cariogenic potential of these medicines**.** The finding of the present study was in contrast to a study conducted by **Tofsky N et al[23]** It was observed that HIV infected cases had lower DMFS scores and higher dmfs score than their house hold peer controls, the fewer mean number of permanent teeth among the HIV infected cases suggests that this delayed tooth eruption pattern in permanent teeth contributed to the lower DMFS scores seen in the HIV infected case. Similar study done by **Hicks MJ**[24] et al study to determine primary and permanent dentition caries status in HIV-infected children, and to compare caries status with the CD4 percentage and immune suppression category, there was an almost two-fold increase in primary tooth surface caries for the 2 to 9 year-olds they concluded that Primary dentition caries status in HIV-infected children is considerably greater than that for the US pediatric population, and increases with decreasing CD4 percentage and moderate to severe immune suppression. In the present study diet history of the children was not recorded. And also the duration for which the HIV children have been on ART was not taken into consideration, which might affect the caries experience in those children. Routine screening for oral health status of the HIV children should be given importance which will help the dental practioner initiate prophylactic treatment for those children.

V. Conclusion

The group score was the average scores of 100 children included in the group. HIV children had higher mean DMFT score when compared to that of healthy children. .Healthy children had higher mean dmft score when compared to that of HIV children; In the present study diet history of the children was not recorded. And also the duration for which the HIV children have been on ART was not taken into consideration, which might affect the caries experience in those children. Each child and parent were educated and motivated about the importance of maintenance of good oral hygiene, severity and prognosis of dental aspects of HIV. During the study, children were given comprehensive dental treatment with emphasis on preventive measures. All children were advised regular check up once in three months.

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Dr Thejashwini E."A Study on Dental Caries Status Among 5-18 Years Hiv And Healthy Children-A Comparative Study." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 1, 2018, pp. 01-06