HIV/AIDS RESEARCH AND TREATMENT

Openventio PUBLISHERS

ISSN 2377-8377 Open Journal http://dx.doi.org/10.17140/HARTOJ-2-108

Research

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Volume 2 : Issue 2
Article Ref. #: 1000HARTOJ2108

Article History
Received: May 6th, 2015
Accepted: June 3rd, 2015
Published: June 3rd, 2015

Citation
Gupta R, Pathania A, Gupta A, Kumar N, Jatana SK. A Study of prevalence of lipid abnormalities in HIV infected children among Indian population. *HIV/AIDS Res Treat Open J.* 2015; 2(2): 51-54. doi: 10.17140/HARTOJ-2-108

A Study of Prevalence of Lipid Abnormalities in HIV Infected Children among Indian Population

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ABSTRACT

Introduction: With the universal availability of Highly active antiretroviral therapy (HAART), HIV is increasingly recognized as a chronic manageable disease, rather than terminal illness. However the cost of increased longevity has resulted in to various metabolic abnormalities, mainly lipids. These metabolic abnormalities could be due to the HIV disease itself or due to the effects of antiretroviral therapy. Data on the prevalence of these metabolic abnormalities particularly in the pediatric population is limited, hence this study was conducted to find out the prevalence of lipid abnormalities in HIV infected children among the Indian population.

Materials & Methods: This was a cross-sectional study conducted at Pediatric HIV clinic of a tertiary care hospital in western state of India from Sep 2010 to Aug 2012 among HIV infected children up to 18 years of age. After taking detail history and examination, fasting samples were taken for complete lipid profile. All enrolled HIV positive children were categorized according to clinical and immunological status as per WHO guidelines of 2010. The lipid abnormalities in HIV infected children on antiretroviral therapy & not on antiretroviral therapy were analysed. Statistical analysis was done by Z test for continuous variables and chi square test for dichotomous variables using Graph pad Prism 5 software.

Results: 140 HIV positive children were enrolled, of which 93 were on ART. Mean age of the study population was 8.8 years with male to female ratio of 1.1:1. The mode of HIV transmission was vertical in 137(97.8%) children. WHO clinical categories at the time of enrolment were cat I, II, III and IV in 40%, 39%, 20% and 1%, while immune cat 42%, 18%, 16% and 24% cases respectively. Ninety three (64%) children were on antiretroviral therapy. Of the total, 80(57%) children were found to have lipid abnormalities, of which most common was high triglycerides levels in 74(52.8%) children followed by low HDL in 64(46%), high cholesterol in 19(13.5%) and high LDL in 3(2%) children. Mean levels of cholesterol, triglycerides and LDL were higher in the ART group at 156, 126, 50 and 56 mg/dl as compared to ART naive group with levels of 129, 119, 39 and 50 respectively and the association between the mean levels of cholesterol and ART was statistically significant (P value=0.0002).

Conclusion: The prevalence of lipid abnormalities was higher in HIV infected children, mainly triglycerides and cholesterol. Also the prevalence was higher in HIV infected children on ART as compared to ART naïve children. These metabolic abnormalities may contribute to the increased risk of cardiovascular diseases in these children, who are likely to be facing a life time exposure to antiretroviral therapy, hence regular screening is recommended to identify and manage the abnormalities early.

KEYWORDS: HIV infected children; Anti-retroviral therapy; Lipid abnormalities.

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ISSN 2377-8377 Open Journal http://dx.doi.org/10.17140/HARTOJ-2-108

ABBREVIATIONS: HAART: Highly active antiretroviral therapy; NACO: National AIDS Control organization; ART: Antiretroviral therapy; HypoCHL: Hypocholesterolemia.

INTRODUCTION

Children are an ever-growing part of the human immunodeficiency virus HIV/AIDS pandemic. As per WHO and UNAIDS 2013 epidemiological update, globally at the end of 2010, an estimated 34 million people [31.6 million-35.2 million] were living with HIV.[1] In India, as per National AIDS Control Organization (NACO), an estimated 2.39 million Indians were infected with HIV in 2009, of which, 4.4% were children.[2]

With the universal availability of Highly active antiretroviral therapy (HAART), HIV increasingly is recognized as a chronic manageable disease, rather than a terminal illness. But the cost of longevity has resulted into various metabolic abnormalities, mainly lipids. These lipid abnormalities could be due to the HIV disease itself or due to the effects of antiretroviral therapy.[3,4] Data on the prevalence of these metabolic abnormalities particularly in the pediatric population is limited, hence this study was conducted to find out the prevalence of lipid abnormalities in HIV infected children among the Indian population

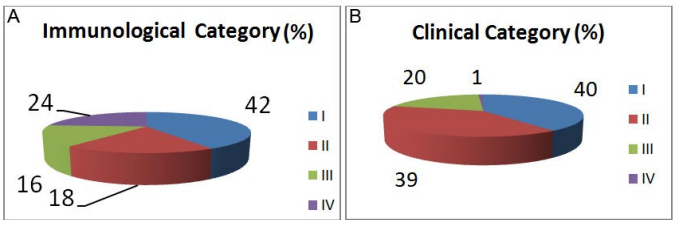
MATERIAL & METHODS

This was a cross-sectional study conducted at Pediatric HIV clinic of a tertiary care hospital in western state of India from Sep 2010 to Aug 2012 among HIV infected children up to 18 years of age. The detail history was obtained from the parents or care giver for the mode of transmission, morbidity data and antiretroviral therapy. Thorough clinical examination and CD4 count was done to categorize the subjects in to clinical and immunological category based on WHO guidelines of 2010. HIV positive children, below 2 years of age, on treatment with corticosteroids, lipid lowering agents, insulin, and growth hormone therapy and with co-morbidities like nephrotic syndrome, malignancy and Type I DM were excluded from the study. Fasting blood samples were obtained for lipid profile. Ethical clearance was obtained from institutional ethical committee of the hospital.

Cholesterol level of >200 mg/ dl, LDL >130 mg/dl, HDL <45 mg/dl and triglycerides > 95th percentile for the age and sex were taken as abnormal. The lipid abnormalities in HIV infected children on antiretroviral therapy & not on antiretroviral therapy were analysed. Statistical analysis was done by Z test for continuous variables and chi square test for dichotomous variables using Graph pad Prism 5 software.

RESULTS

140 HIV infected children were evaluated for lipid and glucose abnormalities. Mean age in the study population was 8.8 years with male: female ratio of 1.1:1. Mode of transmission was vertical in 137(97.8%) cases. WHO clinical categories at the time of enrolment were cat I, II, III and IV in 40%, 39%, 20% and 1%, while immune cat 42%, 18%, 16% and 24% cases respectively and distribution of cases is shown in Figures 1A and 1B. 93 children were on ART and 6 on second line ART. Average duration of ART was 1.9 yrs [range: 6 months-6 yrs].



Figures 1A and 1B: Immunological and clinical category of study population.

Lipid Abnormalities

Of the 140 HIV infected children enrolled, 80(57%) children were detected have lipid abnormalities, of which most common was high triglycerides levels in 74(52.8%) children followed by low HDL 64(46%), high cholesterol in 19(13.5%) and high LDL in 3(2%) children. Higher lipid abnormalities were observed in ART group as compared to non-ART group. Mean levels of various lipid abnormalities is shown in Figure 2.

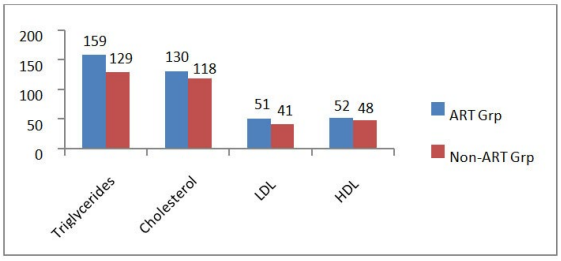


Figure 2: Mean lipid levels and effect of ART in study population.

Cholesterol Abnormalities

In our study higher cholesterol levels abnormalities were detected in 19(13.5%) children and mean cholesterol level were higher in ART group and the association between the two was statistically significant P value=0.0002 as shown in Table 1. Among the ART group, higher cholesterol abnormalities were observed in children on 2nd line ART as compared to 1st line ART and were also statistically significant (Table 2).

Group	No. of children n=140 (%)	Cholesterol Mean ± SD	Statistical analysis
ART	93(66.5)	159±76.47	P value=0.0002
Non-ART	47(33.5)	1.59±39.75	

Table 1: Mean cholesterol levels and ART.

LDL abnormalities were detected in 3(2%) children and all of them were on ART. The mean values of LDL in ART group were 51 mg/dl [range: 15-254] as compared to 40.56 mg/dl [range: 16-98] in children not on ART and the association between the two was statistically significant p<0.05 as shown in Table 3.

ISSN 2377-8377 Open Journal http://dx.doi.org/10.17140/HARTOJ-2-108

S. No	ART group	Cholesterol level Abnormal	Cholesterol level Normal	Statistical analysis (Fisher exact test)
1	2nd line ART(n=6)	3	3	OR- 6.25 95% CI=1.12-34.65 p<0.05
2	1st line ART(n=87)	12	75	

Table 2: Comparison of first and second line ART effect on cholesterol.

Group	No. of children n=140(%)	LDL Mean±SD	Statistical analysis
ART	93(66.5)	51±31.80	P value =0.023
Non- ART	47(33.5)	1.56±21.40	

Table 3: Mean LDL level in ART/ Non- ART group.

Low HDL levels were detected in 64(45.7%) children, of which 42/93(45%) in ART group and 22/47(47%) in non-ART group and there was no statistical difference between two groups.

DISCUSSION

During the course of HIV disease, disturbances of lipid metabolism have been observed long before the introduction of highly active Antiretroviral therapy (ART) and include Hypocholesterolemia (HypoCHL; <150 mg/dl) during early stages of the disease and hypertriglyceridemia in late phases.[1-6] However, the relationship between lipids and HIV is complex, dynamic, and bi-directional. The results from this cross-sectional study suggest that the lipid abnormalities were associated with treatment with combination antiretroviral therapy.[5,6]

In our study, of the total 140 HIV infected children, 80(57%) children were detected to have lipid abnormalities. Most common lipid abnormality was high triglycerides levels seen in 74(52.8%) cases followed by low HDL in 64(46%), high cholesterol levels in 19(13.5%) and high LDL in 3(2%) children, consistent with similar studies.[7-10] Using a cut off point of 200 mg/dL for cholesterol, we observed 19(13%) abnormalities, of which 15 out of 93(16%) were in ART group and 4 out of 47(8.5%) in non-ART group and the association between the two was not statistically significant. However, we got significantly high mean cholesterol levels in ART group (p value<0.05) and also 3 out of 6 children on 2nd line ART had higher mean levels of cholesterol, as compared to 1st line ART. This shows that administration of ART, more so with 2nd line ART leads to increase in cholesterol level. In a similar study done by Farley J, et al. found elevated cholesterol in 13% and Aldrovandi M, et al. found the incidence of abnormal cholesterol in 29% in HIV infected children with PI based ART.[10,11] High triglyceride levels were found in 74/140(52.8%) children. There was no statistically significant association between ART and non ART group and cases were distributed in all clinical and immunological categories. Grunfeld C, et al. found the prevalence of hypertriglyceridemia in 50% cases in their study and concluded that hypertriglyceridemia was related to disease per se rather than effect of ART.[12] Aldrovandi, et al. found the incidence of abnormal triglycerides in 52% and 20% of HIV infected children in the PI and non-PI groups, respectively.[13]

In our study 3 (2%) LDL abnormalities were detected, which were not statistically significant in ART/ non ART group. However, mean level of LDL was high in ART group which was statistically significant. Aldrovandi, et al. observed incidence of abnormal LDL in 19% cases in the PI group. Dyslipidemia, particularly LDL-C >130 mg/dL, has been associated with an elevated risk of cardiovascular disease.[13]

We found low HDL-cholesterol values in 64(46%) cases in our study. 42 out of 93(45%) were in ART group and 22 out of 47(47%) in non-ART group. These abnormalities were equally distributed in all clinical and immunological categories. Also we did not find significant difference in 1st line ART compared to non-ART population. These abnormalities were higher compared to other studies. Jane C, et al. found the incidence of abnormal HDL(10%) in the PI group and Caroline J. Chantry, et al. did not find any HDL abnormality in their study.[11,12] Honor Rose, et al. found lower HDL levels in untreated HIV patients and patients on ART/PI boosted group suggesting that hypo-alpha-lipoproteinemia in patients with HIV was likely to be secondary to HIV infection itself.[14]

CONCLUSIONS

The prevalence of lipid abnormalities was higher in HIV infected children, mainly triglycerides and cholesterol. Also the prevalence was higher in HIV infected children on ART as compared to ART naïve children. These metabolic abnormalities may contribute to the increased risk of cardiovascular diseases in these children, who are likely to be facing a life time exposure to antiretroviral therapy, hence regular screening is recommended to identify and manage the abnormalities early.

ACKNOWLEDGEMENTS

RG & AP conceived the study and involved in data collection. AG & NK helped in evaluation of cases. SK supervised the study and revised the manuscript.

ISSN 2377-8377 Open Journal http://dx.doi.org/10.17140/HARTOJ-2-108

ETHICAL CLEARANCE

Obtained from the Institutional Ethical Committee.

FUNDING

There was no funding or any type of financial support from any agency.

COMPETING INTERESTS: None stated.

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