Metabolic syndrome in HIV/AIDS in Manipur

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Abstract
Background: Metabolic syndrome is a complex disorder considered as a worldwide epidemic. A variety of endocrine and metabolic disorders are seen in the context of HIV infection which may be direct consequence of HIV infection, secondary to opportunistic infections or neoplasm, or related to medication side effects. **Aims and Objective**: To determine the prevalence of metabolic syndrome among HIV infected and the risk factors for the development of cardiovascular disease and other associated risk in patients on HAART. **Material and methods**: This is a cross sectional carried out in the Department of Medicine, Regional Institute of Medical Sciences (RIMS), Imphal to determine the prevalence of metabolic syndrome among HIV infected population and the risk factors for the development of cardiovascular disease and other associated risk in patients of HAART. **Results and conclusions**: Metabolic syndrome was present in 8 cases (5.4%) of which 2nd line HAART had 7 cases, 1case in alternative 1st line HAART and no case in 1st line HAART group. These difference is statistically significant (p<0.05). Hypertension was present in 6% of patients with ART. Males had more abnormal waist circumference than females and those on 2nd line HAART treatment group had more abnormal waist circumference. Fasting blood sugar was present in 10% cases. Increased triglyceride level was more among the 2nd line HAART group. Serum HDL level was low in 18 % of cases. Patients on HAART had mean risk of 2.2% with a standard deviation of 3.9 % and on comparing among HAART groups mean risk score was 3.0% among 2nd line, 2.9% among alternative and 1.2% among 1st line. This finding was statistically significant (p<0.05).
Key Word: Metabolic syndrome, Manipur.

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INTRODUCTION

Metabolic syndrome is a complex disorder with high socioeconomic cost that is considered a worldwideepidemic. Metabolic Syndrome (MS) increase the risk of coronary heart disease(CHD), other forms of cardiovascular atherosclerotic disease(CVD) and Diabetes Mellitus type 2 (DMT2)[1]. Increasing prevalence in both childhood and young adulthood and its implications to the global health burden has become a concern[1]. The HIV epidemic has occurred in "waves" is different regions of the world, each were having somewhat different characteristics depending on the demographics of the country and timing of the introduction of HIV. A variety of endocrine and metabolic disorders are seen in the context of HIV infection which may be direct consequence of HIV infection, secondary to opportunistic infections or neoplasm, or related to medication side effects. Between 33 and 75% of patients with HIV infection receiving Highly Active Anti retroviral Therapy [HAART] develop a syndrome often referred to as lipodystrophy, consisting of elevations in plasma triglycerides, total cholesterol and apolipoprotein B, as well as hyperinsulinemia and hyperglycemia. Many of the patients have been noted to have a characteristic set of the body habitus changes associated with fat redistribution, consisting of truncal obesity coupled with peripheral wasting. These changes many develop at any time ranging from ~ 6 weeks to several years following the initiation

HAART.[5]Approximately 20% of the patient with HIV association-lipodystrophy meets the criteria for the metabolic syndrome as defines by IDF or NCEP-ATPIII[5]. HAART has resulted in sustained reductions of morbidity and mortality associated with HIV infection. Unfortunately, HAART has also been associated with metabolic complications that many increase patients' risk of cardiovascular disease[3]. Specific antiretroviral therapies have been shown to increase proatherogenic lipid levels and contribute to the development of insulin resistance and visceral fat accumulation[4,5]Recent studies of HIV-infected persons have revealed a high prevalence of metabolic syndrome among patients receiving HAART[6,7]HIV treatment guidelines recommend screening patients for metabolic complications and providing their therapeutic intervention[3].

MATERIALS AND METHODS
This is a cross sectional study carried out in the Department of Medicine, Regional Institute of Medical Sciences (RIMS), Imphal.
Inclusion Criteria:
Age 18-60 Years; HIV infected persons on and not on HAART; HIV-infected persons on medications for metabolic syndrome.

Exclusion Criteria:
Pregnant ladies; Age < 18 Years and >60 Years; Patient not willing to participate in the study procedure; Chronic liver disease.

Patients fulfilling the inclusion criteria were clinically assessed. Detailed clinical history, examination and anthropometric measurements like weight (in Kg), height (in meter), waist circumference (in cm) and body mass index (BMI). Waist circumference was measured at the mid point between lowest costal rib and iliac crest by a non-metal and non-expandable measuring tape.

Plasma fasting glucose, serum lipid level in fasting state (T.chol., Triglyceride, HDL) and CD4 cell counts were done.

Ethical Approval was obtained by the Institutional Ethical Committee (IEC), Regional Institute of Medical Sciences, Imphal. Informed consent was taken from all the participants.

Statistical Analysis: Data were described using descriptive statistics like mean and percentages. Data was analysed using SPSS version 16. Fisher exact test and one way ANOVA was used for test of significance. Probability value of <0.05 was taken as significant.

RESULTS

Table 1: Age distribution of respondents stratified by HAART

Age in years	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
20-30	8 (16.0)	4 (8.0)	0 (0.0)	12 (8..0)
31-40	25 (50.0)	2 (4.0)	12 (24.0)	39 (26.0)
41-50	17 (34.0)	40 (80.0)	36 (72.0)	93 (62.0)
51-60	1 (2.0)	4 (8.0)	0 (0.0)	5 (3.0)
>60	0 (0.0)	0 (0.0)	2 (4.0)	2 (1.0)
Total	50 (100.0)	50 (100.0)	50 (100.0)	150 (100.0)
Mean ± SD	39.3 ± 4.9	44.6 ± 6.7	44.2 ± 5.2	43.3 ± 5.9

Table 2: Sex distribution of respondents stratified by HAART

Sex	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
Female	30 (60.0)	24 (48.0)	28 (56.0)	82 (54.6)
Male	20 (40.0)	26 (52.0)	22 (44.0)	68 (45.4)
Total	50 (100.0)	50 (100.0)	50 (100.0)	150 (100.0)

Table 3: Address distribution of respondents stratified by HAART

Address	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
Rural	23 (46)	18 (36.0)	14 (28.0)	55 (36.6)
Urban	27 (54)	32 (64.0)	36 (72.0)	95 (63.3)
Total	50 (100.0)	50 (100.0)	50 (100.0)	150 (100.0)

Table 4: Distribution of respondents by religion

Religion	Number	Percentage
Hindu	106	70.7
Christian	34	22.7
Muslim	10	6.6
Total	150	100.0

Table 5: Distribution of respondents by mode of transmission of HIV

Mode of transmission	Number	Percentage
IDU	118	78.6
Multiple sex partners	23	15.3
Blood transfusion	9	6.1
Total	**150**	**100.0**

Table 6: Distribution of respondents by history of alcohol consumption or smoking

History of alcohol consumption/smoking	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
Alcohol consumption				
Yes	7 (14.0)	6 (12.0)	2 (4.0)	15 (10.0)
No	43 (86.0)	44 (88.0)	48 (96.0)	135 (90.0)
Smoking				
Yes	8 (16.0)	10 (20.0)	6 (12.0)	24 (16.0)
No	42 (84.0)	40 (80.0)	44 (88.0)	126 (84.0)
Total	**50 (100.0)**	**50 (100.0)**	**50 (100.0)**	**150 (100.0)**

Table 7: Distribution of respondents by BMI stratified by HAART

BMI	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
Underweight <18.5)	15 (30.0)	12 (24.0)	4 (8.0)	31 (20.6)
Normal (18.5-24.9)	33 (66.0)	34 (68.0)	32 (64.0)	99 (66.0)
Overweight (25.0-29.9)	2 (4.0)	4 (8.0)	12 (24.0)	18 (12.0)
Obese (≥30)	0 (0.0)	0 (0.0)	2 (4.0)	2 (1.4)
Total	**50 (100.0)**	**50 (100.0)**	**50 (100.0)**	**150 (100.0)**

Table 8: Distribution of respondents based on presence of hypertension stratified by HAART

Hypertension	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
Yes	2 (4.0)	2 (4.0)	4 (8.0)	9 (6.0)
No	48 (94.0)	48 (94.0)	46 (92.0)	28 (18.6)
Total	**50 (100.0)**	**50 (100.0)**	**50 (100.0)**	**150 (100.0)**

Table 9: Distribution of respondents by waist circumference stratified by sex

Waist circumference (cm)	Number	Percentage
Male		
≥90	11	16.1
<90	57	83.9
Female		
>80	9	10.9
≤80	73	89.1
Total		
Increased	20	13.3
Normal	130	86.7

Table 10: Distribution of respondents by waist circumference stratified by HAART

Waist circumference	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
Increased	1 (2.0)	5 (10.0)	14 (28.0)	20 (13.3)
Normal	49 (98.0)	45 (90.0)	36 (72.0)	130 (86.7)
Total	**50 (100.0)**	**50 (100.0)**	**50 (100.0)**	**150 (100.0)**

Table 11: Distribution of respondents by fasting blood sugar level stratified by HAART

Fasting blood sugar level (mg/dl)	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
0-99	50 (100.0)	45 (90.0)	40 (80.0)	135 (90.0)
≥100	0 (0.0)	5 (10.0)	10 (20.0)	15 (10.0)
Total	**50 (100.0)**	**50 (100.0)**	**50 (100.0)**	**150 (100.0)**

Table 12: Distribution of respondents by serum triglyceride level stratified by HAART

Serum triglyceride	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
0-150	46(92.0)	26 (52.0)	12 (24.0)	84 (56.0)
≥150	4 (8.0)	24 (48.0)	38 (76.0)	66 (44.0)
Total	**50 (100.0)**	**50 (100.0)**	**50 (100.0)**	**150 (100.0)**

Table 13: Distribution of respondents by serum total cholesterol stratified by HAART

Serum total cholesterol	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
0-199	47 (94.0)	40 (80.0)	28 (56.0)	115 (76.6)
≥200	3 (6.0)	10 (20.0)	22 (44.0)	35 (23.4)
Total	**50 (100.0)**	**50 (100.0)**	**50 (100.0)**	**150 (100.0)**

Table 14: Distribution of respondents by serum HDL cholesterol stratified by HAART

Serum HDL cholesterol	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
≥40	47 (94.0)	43 (86.0)	33 (66.0)	123 (82.0)
<40	3 (6.0)	7 (14.0)	17 (34.0)	27 (18.0)
Total	**50 (100.0)**	**50 (100.0)**	**50 (100.0)**	**150 (100.0)**

Table 15: Distribution of respondents by presence of metabolic syndrome stratified by HAART

Metabolic syndrome	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
No	50 (100.0)	49 (98.0)	43 (86.0)	142 (94.6)
Yes	0 (0.0)	1 (2.0)	7 (76.0)	8 (5.4)
Total	**50 (100.0)**	**50 (100.0)**	**50 (100.0)**	**150 (100.0)**

Table 16: Distribution of respondents by latest CD4 count stratified by HAART

Latest CD4 count (cells/cumm)	1st line (%)	Alternative 1st line (%)	2nd line (%)	Total (%)
0-99	7 (14.0)	4 (8.0)	0 (0.0)	11 (7.3)
100-199	11 (22.0)	6 (12.0)	0 (0.0)	17 (11.3)
200-299	15 (30.0)	4 (8.0)	2 (4.0)	21 (14.0)
300-399	6 (12.0)	2 (4.0)	6 (12.0)	14 (9.3)
400-499	6 (12.0)	6 (12.0)	14 (28.0)	26 (17.3)
500-599	2 (4.0)	10 (20.0)	12 (24.0)	24 (16.0)
≥600	3 (6.0)	18 (36.0)	16 (32.0)	37 (24.6)
Total	**50 (100.0)**	**50 (100.0)**	**50 (100.0)**	**150 (100.0)**

DISCUSSIONS

This study was conducted among 150 patients on HAART Medicine, RIMS hospital, Imphal. Majority of the patients were from the age group 41-50 years which was same in the alternative 1st line and 2nd line HAART patients but younger in 1st line HAART patients (31-40 years). Mean age was 43.3 years with a standard deviation of 5.9 years. This finding is similar with the study by Idiculla J et al[8] and Tadewos et al[9] where mean age was 41.63 years and 37.2 years respectively. But in a study conducted by Sanjay MK[10], mean age was lower compared to our study (35 years). Majority of the patients had normal BMI (66.0%) followed by underweight (20.6%). This finding is similar with the study by Tadewos et al[9] where most patients had normal BMI . Hypertension was present in 6% of patients with ART. Hypertension is equally distributed among the first line (4%) and alternative first line group (4%) but it is slightly more among 2nd line group (6%). Waist circumference was increased in 13.3% of cases. Males had more abnormal waist circumference than females (16.1%

vs. 10.9%). 2nd line HAART treatment group had more abnormal waist circumference. Fasting blood sugar was raised in 10%. This is consistent with the finding by Idiculla J et al[8] where diabetes was prevalent in 11.6% of cases. But in study done in Eastern India by Sanjay MK et al[10], 31.2% of the HIV patients had diabetes which is higher than our study. Abnormal serum triglyceride and total cholesterol was present in 44% and 23.4% respectively. Majority of the patients had CD4 count more than 400 cells/mm^{3} which is similar to study by Tadewos et al[9]. CD4 level was on the higher side in the alternative 1st line and 2nd line HAART group. 1st line HAART group had CD4 level in lower range (100-299 cells /cumm). Metabolic syndrome was present in 8 cases (5.4%) of which 7 cases (4.6%) were from the 2nd line HAART patients, one case (1.3%) and no case had metabolic syndrome from the 1st line HAART patients. A higher prevalence was found in South India study done by Idiculla J et al[8] (26.6%). But in studies conducted by Kalra S et al[11] prevalence of metabolic syndrome was in the range

between 14-18% in patients living with AIDS (PLHA). Framingham risk score was 2.3% i.e. ART patients have 2.3% risk of cardiovascular disease in 10 years. In this study there is increased risk of cardiovascular disease among 2nd line HAART group (3.0%) than alternative 2nd line (2.9%) and 1st line (1.2%). The low prevalence of MS may reflect the differing demographic characteristics of study participants. The influence of age and race on MS has been well described; the potential contribution of underlying HIV wasting to be considered. Uncontrolled HIV replication as well as HAART affects serum lipid concentrations (reducing HDL and low-density lipoprotein cholesterol but increasing triglycerides). Importantly, the lower rates of MS in this population suggests that HIV infection per se probably does not contribute to MS or may perhaps confer protection from components of the syndrome. Although the prevalence of metabolic syndrome has been assessed in several populations [3,6,7,12-15], and show an impressively high prevalence. Potential explanations for these dissimilar results include differences in study design, methodological aspects, and differences in the patient populations studied. In this respect, the present study has a relatively high proportion of intravenous drug users with a low prevalence of the metabolic syndrome. On the other hand, when the present HIV-infected group was reanalyzed by the Framinghams risk score Study criteria for age and sex, obesity, hypertension, hypercholesterolemia, low HDL, hypertriglyceridemia, and diabetes, prevalence's of these cardiovascular risk factors were relatively low.

CONCLUSION

Metabolic syndrome was present in 8 cases (5.4%) of which 7 cases were in 2nd line HAART, 1case in alternative 1st line HAART and no case in 1st line HAART group. These difference is statistically significant (p<0.05 Hypertension was present in 6% of patients with ART. Males had more abnormal waist circumference than females and those on 2nd line HAART treatment group had more abnormal waist circumference. Increased fasting blood sugar was present in 15 cases. Increased triglyceride level was more among the 2nd line HAART group. Serum HDL level was low in 18 % of cases. Results from this study showed that CD4 count was on the higher side in case of HAART alternative 1st line and 2nd line group than of 1st line HAART group. Patients on HAART had mean risk of 2.2% with a standard deviation of 3.9 % and on comparing among HAART groups mean risk score was 3.0% among 2nd line, 2.9% among alternative and 1.2% among 1st line. This finding was statistically significant (p<0.05).

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