



TO STUDY PREVALENCE OF DIABETES MELLITUS AND ITS RISK FACTOR IN HIV PATIENTS

General Medicine

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ABSTRACT

Diabetes mellitus complicating HIV/anti retroviral therapy is an area to be focused. An increase in glucose disorders has been observed in HIV patients receiving HAART. **Aim** of the study was to find out prevalence of diabetes mellitus and its risk factor in hiv patients. **Materials And Methods:** The study will be of cross sectional prevalence study include patient with confirmed status of HIV (ELISA) admitted in Medicine ward and attending medicine OPD 4no. and patient attended at ART CENTRE. A total of 120 HIV patients receiving anti retroviral therapy were enrolled in the study. **Results:** The prevalence of diabetes mellitus in our study population was found to be 8.33%. Statistically significant association was found between fasting blood sugar and ART regimen, blood pressure and ART regimen, triglyceride and ART regimen, LDL and ART regimen, HDL and ART regimen. **Conclusion:** Though anti retroviral therapy has significantly decreased the mortality and morbidity of HIV patients, it has its own metabolic complications, diabetes mellitus being one among them. Vigilant monitoring of HIV patients on anti retroviral therapy is imperative to detect and address potential metabolic derangements.

KEYWORDS

HIV , Diabetes mellitus, Anti Retroviral therapy, hyperglycemia

INTRODUCTION

Acquired Immunodeficiency Syndrome (AIDS), caused by the Human Immunodeficiency Virus (HIV), has been one of the largest pandemics and global health challenges(1). Approximately 39.0 million [33.1 million–45.7 million] people globally were living with HIV in 2022. Around 1.3 million [1 million–1.7 million] people were newly infected with HIV in 2022(2). Diabetes is a chronic metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to severe damage to the heart, blood vessels, eyes, kidneys, and nerves. About 422 million individuals worldwide have diabetes, with the majority residing in low- and middle-income countries, and 1.5 million deaths are directly attributed to diabetes each year. Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades(3).

An increase in glucose disorders has been observed in HIV patients receiving Highly Active Antiretroviral Therapy (HAART)(4). The effect of HAART on glucose metabolism resulting in Type 2 Diabetes Mellitus (DM2) is not clearly elucidated; however, thymidine-based Nucleoside Reverse Transcriptase Inhibitors (NRTIs) and Protease Inhibitors (PIs) are of significant concern. Thymidine NRTIs such as AZT combined with LPV/r were found to decrease insulin sensitivity by up to 25%, thereby increasing the risk for Insulin Resistance (IR). However, no IR was observed when combined with NVP as a backbone. Fleishman et al. (2007) proposed that NRTIs induce cumulative effects leading to the development of DM2, while PIs induce acute metabolic effects.

The effect of PIs on lipid metabolism is characterized by elevated levels of triglycerides (TG), total cholesterol (TC), and LDL-cholesterol, along with decreased levels of HDL-cholesterol. The use of ritonavir has been linked to significantly increased serum TC and TG levels in both seronegative and HIV-positive patients(6). High rates of lipid abnormalities have been detected in patients receiving PIs. The global burden of HIV individuals is increasing day by day, and diabetes remains the leading global disease, with its risk factors prevailing. As both HIV and Type 2 diabetes are immunocompromised states, our aim is to study the prevalence of the disease in HIV individuals and their outcomes.

AIM AND OBJECTIVES

1. To study the prevalence of Diabetes Mellitus in HIV Patients.
2. To study risk factors associated with Diabetes Mellitus in HIV Patients.

MATERIALS AND METHODS

The study was conducted at the Department of Medicine at LLRM Medical College and SVBP Hospital, Meerut, Uttar Pradesh, during the period of 2020-2021. The study was a cross-sectional prevalence study that included patients with confirmed HIV status (ELISA) admitted to the Medicine ward, those attending the Medicine OPD, and patients attending the ART Centre. Around 120 participants were selected randomly, and all patients were interviewed, with a detailed history taken about the duration of HIV, ART status, and other comorbid conditions such as Type 2 Diabetes mellitus or any other chronic illness. Participants underwent a detailed physical examination, and necessary blood investigations were performed. Informed consent was obtained from all patients for the study, and patient confidentiality will be maintained.

Inclusion Criteria:

Patients included in the study were required to meet the following criteria:

- Age of more than 18 years.
- Confirmed HIV-positive status determined by ELISA testing.

Exclusion Criteria:

Patients meeting any of the following criteria were excluded from the study:

- Use of drugs known to impair blood sugar levels, including Corticosteroids, Thiazides, Octreotide, and Anti-psychotics.

OBSERVATIONS AND RESULTS

Diabetes mellitus is one of the most common diseases affecting a large population. Diabetes mellitus complicating HIV/anti retroviral therapy is an area to be focused. In this study, the prevalence of diabetes mellitus in HIV patients receiving antiretroviral therapy has been evaluated. The study was conducted as a cross sectional prevalence study in which a total of 120 HIV patients receiving anti retroviral therapy were enrolled in the study. It includes 60.8% males and 39.2% females. In our study, majority (40.8%) fall under the age group of 31- 40 years, followed by 26.7% under 41-50 years, 15.8% under 18 – 30 years, 16.7% under the age group of 51-60 years. In our study, 9.3% received protease inhibitor containing regimen and 90.7% of the study population received non-protease inhibitor containing regimen. In our study, patients who took ART for 6 months to 2 years comprised the most (36.7%) followed by 2-4 years (30%), 4-6 years (18.3%), less than 6 months (13.3%) and more 6 years comprised 1.7% of the study population.

The prevalence of diabetes mellitus was found to be 8.33%. Around 16.66% of the population were found to have insulin resistance or prediabetes taking antiretroviral therapy in our study (table no 1). In our study, fasting blood glucose was elevated in 24.9 % of the population, of which 9% are diabetics and 15.83% fall under the category of insulin resistance.

Table (1) : Frequency Of Insulin Resistance And Diabetics Among Study Participants. Prevalance Of Diabetes Among Study Participants Found To Be 8.33%

	Frequency(n)	Percentage (%)
Diabetic	10	8.33
Insulin Resistance	20	16.66
Normal	90	75
Total	120	100.0

In our study 7 people were hypertensive in which 3 were diabetic and 4 were pre diabetic . About 26 study participants (21.66%) were found to have decreased HDL in which 2 participants were diabetics and 6 were of insulin resistance. 30 patient were having raised LDL in which 03 were diabetics and 04 were of insulin resistance. 26 patient were having increased total cholesterol and in which 01 patient were diabetic and 04 were having insulin resistance or pre diabetic. In 29 patient raised triglycerides were there , 01 were diabetic and 04 were having insulin resistance . Among comparison of risk factors with groups suggest highly significance with p value less than 0.001 the association between the above parameters and blood sugar values were found to be statistically significant.

Table (2) : Comparison of Risk factors (BP, HDL, LDL, TC, TGL) Among Groups Found To Be Highly Statistically Significant

Status	Variables					Total	χ^2 - value	p-value
	↑BP	↓HDL	↑LDL	↑TC	↑TGL			
Diabetic	3	2	3	01	01	12	20.589	0.0005**
Insulin resistance	04	06	04	04	04	22		
Normal	0	18	23	21	24	86		
Total	7	26	30	26	29	120		

** Highly Statistical Significance at $P < 0.01$ level

Statistically significant association was found between fasting blood sugar and ART regimen, blood pressure and ART regimen, triglyceride and ART regimen, LDL and ART regimen, HDL and ART regimen whereas the association between BMI and ART regimen, waist circumference and ART regimen, OGTT and ART regimen were found to be statistically insignificant. This goes along with the study by Ryan et al., 2010 which says, the prevalence of patients who develop IR due to the use of PIs are as high as 80%, compared to approximately 2% prior to the advent of HAART; thus indicating the exacerbated metabolic disorders associated with HAART[5]. The association between the duration of ART, BMI and glycaemic status was statistically significant in the underweight, normal and overweight range, but not in the obese range. Statistically significant association was found between the duration of ART and parameters like ↑blood sugar, TGL, LDL, TC, AND decreased HDL

Table (3)- Comparison of Blood sugar of Groups with Duration of ART, association between blood sugar values and the duration of ART is statistically significant with p value 0.0005

RBS level	Variables					Total	χ^2 - value	P-value
	< 6 M	6M to 2 yrs	2 to 4 yrs	4 to 6 yrs	≥ 6 yrs			
High	0	6	12	11	1	30	51.72	0.0005**
Border	1	17	22	7	1	48		
Line High								
Normal	15	21	2	4	0	42		
Total	16	44	36	22	2	120		

** Highly Statistical Significance at $P < 0.01$ level

Limitations Of The Study

Only a small number of population is taken for the study. This is a hospital based study and hence it may not be the representative of the general population.

CONCLUSION

The duration of HAART in HIV patients correlates with increased odds of hypertension, obesity, and hyperglycemia. Despite reducing HIV

mortality, HAART brings metabolic complications, including diabetes. Regular assessment ensures early detection and management, preventing additional metabolic disease burdens. Population awareness of prolonged HAART risks is crucial. Implementing lifestyle interventions for HIV patients on HAART is necessary. Vigilant monitoring is imperative to address potential metabolic issues.

Recommendations

Education the HIV population on the importance of eating healthy and emphasising on the complications associated with unhealthy eating and physical inactivity. Weight loss interventions should be strictly emphasized with a priority on exercise and diet.

Scope For Future Studies

Future studies are needed to estimate the incidence of diabetes mellitus and metabolic syndrome with antiretroviral therapy and also to assess whether prompt diagnosis and treatment of the metabolic complications would improve the disease status.

REFERENCES

- (1) Hu, Frank B. "Globalization of Diabetes The role of diet, lifestyle, and genes." *Diabetes* 54.6 (2005): 1249-1257.
- (2) Global HIV & AIDS statistics — Fact sheet <https://www.unaids.org/en/resources/fact-sheet>
- (3) diabetes - WHO <https://www.who.int/news-room/fact-sheets/detail/diabetes>
- (4) Cohen, P., H. G. Nimmo. and C. G. Proud. "How does insulin stimulate glycogen synthesis?." *Biochemical Society Symposium*. No. 43. 1977.
- (5) 27.Maher, D., et al. "Research needs for an improved primary care response to chronic non-communicable diseases in Africa." *Tropical Medicine International Health* 15.2 (2010&): 176-181.
- (6) Stevenson, Catherine R., et al. "Diabetes and the risk of tuberculosis: a neglected threat to public health?." *Chronic Illness* 3.3 (2007): 228-245.