



**ORIGINAL RESEARCH PAPER**

**General Medicine**

**STUDY OF LIPODYSTROPHY AND LIPOATROPHY IN HUMAN IMMUNO DEFICIENT VIRUS (HIV) PATIENTS ON ANTI RETROVIRAL THERAPY**

**KEY WORDS:** fat redistribution, lipodystrophy, waist circumference, HIV, anti retroviral therapy

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**ABSTRACT**

**Background:** Lipodystrophy (LD) or Lipoatrophy (LA) are the terms used to describe a metabolic complication of fat loss, fat gain, or a combination of fat loss and gain. This is often associated with some antiretroviral therapies (ART) given to HIV positive patients. Limited data is available on LD despite accounting for more than 95% of the burden of HIV/AIDS. **Aims and Objectives:** To study LD and LA in HIV Patients on ART. **Materials and Methods:** Two hundred HIV patients who were on ART were studied at the Department of Medicine & ART Centre, Gandhi Medical College and associated Hospitals, Bhopal from 2017-2020. Patients having Triceps skin thickness less than 10<sup>th</sup> percentile of normal were considered as having LA. Fat redistribution was considered among the patients who had waist – hip ratio (WHR) >0.95 for men and >0.85 for women and abdominal circumference >102 for men and >88 for women. **Results:** HIV was more prevalent in the age group of 31-40 years (39%) following 41-50 years (40%) with male preponderance (71%). LA was present in 162 (40.5%) patients. LA was more prevalent in age group of 41-50 years (57%) followed by 51-60 years (27.8%) (p<0.001). LA was more prevalent in female (69.6%) (p=0.728). LA was significantly increased to 60.34% after one year of follow up as compared to baseline (p<0.001). Fat redistribution was more common among males (68%). (P=0.003). **Conclusion:** LA is more prevalent in young HIV positive patients who are females. Fat redistribution was mainly observed in males. We recommend approaching the condition with targeted annual screening.

**INTRODUCTION**

Lipodystrophy (LD) or lipoatrophy (LA) is characterized by increased serum levels of cholesterol and triglycerides, increased glycaemia associated with insulin resistance, and changes in body fat distribution, is a syndrome associated with antiretroviral therapy (ART). (Viraben R et al, 1998)

Symptoms of lipodystrophy include adipose tissue hypertrophy with central fat distribution, fat accumulation in the abdomen, chest and viscera, emergence of a cervical curvature called "buffalo hump", and loss of adipose tissue in the face, buttocks and upper and lower limbs. (Carr A et al, 1998)

HIV-associated LD is an undesirable effect of ART that occurs in HIV-infected patients due to the redistribution of adipose tissue. The first reports of this condition were in 1997 among people taking ART. HIV-associated LD includes both fat accumulation (lipohypertrophy) and fat loss (lipoatrophy) or both. (Abel G et al, 2018)

LA occurs on the face, the buttocks, the arms, and the legs, whereas LD occurs in the truncal areas and manifests as abdominal obesity, mammary hypertrophy, accumulation of fat on the neck or lipomas. The body habitus, especially facial LA, has links to depression, decreased self-esteem, sexual dysfunction, and social isolation and can affect the HIV-infected patient's quality of life and adherence to ART. (Abel G et al, 2018)

The exact prevalence of HIV-associated LD has been challenging to establish due to differences in case definition, but estimates range from 10% to 80% among all people living with HIV worldwide. (Mallon PW et al, 2003) The present study is to attempt to study lipodystrophy and lipoatrophy in human immunodeficiency virus (HIV) patients on anti-retroviral therapy.

**MATERIALS AND METHODS**

Present observational cross sectional study was performed on 200 HIV positive patients at Department of Medicine & ART Centre, Gandhi Medical College and associated Hospitals, Bhopal from 2017-2020.

Consecutive ambulatory patients attending the HIV clinic of hospital were considered. Severely ill patients with multiple co-morbid states and who need hospital admission, were excluded from the present study.

A detailed sociodemographic parameters were recorded along with blood pressure, pulse, hemoglobin, TLC, serum creatinine, TSH, SGOT, SGPT and CD4 counts were measured. Lipid profile was measured and compared after 1 years of follow up with baseline. Skin thickness of abdomen, thigh, triceps and Subscapular were also measured.

Clinical assessment for LA was done by measuring the triceps skin fold thickness. If it was found to be less than 10<sup>th</sup> percentile of normal (according to National Health and Nutrition Examination Survey for sex and age) then the patient was said to have LA. For fat redistribution assessment waist – hip ratio (WHR) (>0.95 for men and >0.85 for women) and abdominal circumference (>102 for men and >88 for women). A follow up was performed after one year to observe the change in the prevalence of LA.

All the data analysis was performed using IBM SPSS ver. 20 software. Frequency distribution and Cross tabulation was performed to prepare the tables. Categorical data was expressed as percentage. Chi-square test was performed to compare the percentages. P value of <0.05 is considered as significant.

**RESULTS**

HIV was more prevalent in the age group of 31-40 years (39%) following 41-50 years (40%) and 51-60 years (20.5). HIV infection was more prevalent in the male patients (71%) followed by females (29%).

**Table 1: Baseline parameters**

Baseline parameters	Minimum	Maximum	Mean	Std. Deviation
Weight (kg)	44	82	64.98	7.777
SBP (mmHg)	100	140	117.90	8.541
DBP (mmHg)	70	90	75.35	5.149

Pulse (/min)	60	88	71.92	5.657
Hb (g %)	7.60	19.20	10.44	1.763
TLC	3800	7200	4877.90	826.324
BUN	14	34	23.26	4.350
Serum Creatinine	.37	1.40	1.13	0.209
TSH	.74	6.50	3.32	1.323
SGOT	13	40	21.69	6.640
SGPT	13	43	23.70	7.958
CD4	270	590	377.45	64.388

SBP; systolic blood pressure, DBP; diastolic blood pressure, Hb; hemoglobin, TLC; total leukocyte count, TSH; thyroid stimulating hormone

In present study out of 200 patients, LA was present in 162 (40.5%) of the patients. LA was more prevalent in age group of 41-50 years (57%) followed by 51-60 years (27.8%) (p<0.001). LA was mainly observed in females (69.6%) followed by males (30.4%) (p=0.728).

Prevalence of LA was significantly increased to 60.34% after one year of follow up as compared to baseline (p<0.001).

Fat redistribution was more common among males (68%) as compared to females (32%) (P=0.003). Fat redistribution was more common in the age group of 31-40 (40.3%) and 41-50 years of age (40.3%). Fat redistribution was similar across all the age groups (p=0.289).

**DISCUSSION**

Similar to previous studies present study also considered presence of fat redistribution and LA in HIV patients on the basis of physical evaluation by the study doctors. Present study was an observational study and depends upon the subjective clinical evaluation in addition to body mass index (BMI), WHR, abdominal circumference and triceps skin fold thickness.

The global prevalence of lipodystrophy among HIV-infected adults on ART ranges considerably, from less than 1 to 84%. (Dube NM 2012, Mercier S 2009, Thiébaud R 2000, Nguyen A 2008, Chen D 2002, Dai Y 2006) Prevalence obtained in present study lies in the range of the global prevalence (40.5%). Previous studies have reported high prevalence of LA in patients with HIV. In a similar series from Madurai reported a prevalence of 28%. (Villarroya F 2010) A similar study from Thailand including 166 men and 112 women reported a prevalence of 21%.

In present study LA was more prevalent in females (69.6%). Contrary to present study a study from Thailand reported male preponderance (19%) than in women (12.5%) and the mean age of LD patients was 43.59. (Puttawong S 2004) Though the gender distribution was not comparable to present study findings, but majority of the LA patients were in the age group of 41-50 years (57%) which is in agreement to reports from Thailand. In a study of 180 HIV-infected adults from Brazil, sex-specific differences in the prevalence of different lipodystrophy syndromes were observed. Women were more likely to develop lipohypertrophy (43%) or mixed syndrome (40%), while men presented with a similar prevalence for all three lipodystrophy syndromes (34% lipoatrophy, 32% lipohypertrophy, and 34% mixed syndrome). (Diehl LA 2008) The propensity of women to lipohypertrophy has also been observed in high-income countries. (Andany N 2011)

Lipodystrophy may develop within four to six months of ART initiation, and increases considerably after 12 months. (van Griensven J, 2007, Phan V 2012, Pujades-Rodríguez M 2011) In present study we also found the similar pattern where LA was significantly increased to 60.34% after 1 year of follow up.

In a South African study in 2670 HIV-infected adults initiating HAART, the incidence of lipodystrophy was 1.4 per 100 person-years, but nearly doubled to 2.6 per 100 person-years when the follow-up period excluded the first six months of therapy. (Bouille A 2007) Thus, ART type and duration need to be considered when comparing rates of lipodystrophy across studies. Some studies have reported the prevalence of lipoatrophy, lipohypertrophy and a mixed syndrome separately. (van Griensven J 2007, Mercier S 2009, Zannou DM 2009)

LA is defined clinically by the physical findings of any wasting of extremities, face or buttocks along with a triceps skin fold thickness <10<sup>th</sup> percentile of normal. Fat redistribution is defined fat accumulation in the abdomen and dorsocervical spine along with an elevated waist hip ratio, increased abdominal girth and absence of “pinchable” fat in the waist line. The leading hypothesis is that ART subsequently leads to depletion of mitochondrial DNA in subcutaneous adipocytes and uncoupling of oxidative phosphorylation resulting in cellular dysfunction and increased fat cell apoptosis. The oxidative stress induced by NRTIs/PIs play a major role in setup of LD. (Caron-Debarle M 2010, Walker UA 2001)

Fat redistribution can be difficult to diagnose, particularly in settings where populations face the dual burden of obesity and undernutrition. (Smit E 2002, Kol i I. 2012) There is no universal definition for lipodystrophy or body fat redistribution; the term “lipodystrophy” is often used to categorize any form of fat redistribution. (Carr A 2003) As a result, the diagnosis, clinical management, and assessment of prevalence and etiology are challenging. There is also a lack of concordance in the methods used to diagnose and monitor fat redistribution. In present study fat redistribution was more common among males (68%) as compared to females (32%) (P=0.003). Fat redistribution was more common in the age group of 31-40 (40.3%) and 41-50 years of age (40.3%). Fat redistribution was similar across all the age groups (p=0.289) Small sample size and cross sectional nature were the main limitations of the present study. There is a need of large randomized clinical trial to provide strength to present study findings.

**CONCLUSION**

Our study showed that younger group of patients and females are the most commonly affected group with LA. This is also the group of patients who are more prone to stop drugs with these cosmetically important side effects. We recommend approaching the condition with targeted annual screening. In light of the absence of cost-effective measures to treat LD, prevention remains the best option.

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