

Factors Associated with Overweight and Obesity among Adults Living with HIV

Introduction: The Human Immunodeficiency Virus (HIV), a huge pandemic has affected the lives of millions of people globally. In the recent antiretroviral therapy (ART) era, obesity has taken over the wasting syndrome, which is significant among people living with HIV/AIDS (PLHIV). The objective of this study is to find out the prevalence of overweight and abdominal obesity among adults living with HIV and determine the HIV and diet related factors associated with it.

India, being recognized as one of the countries with a growing prevalence of Non-communicable diseases (NCDs) and high rate of HIV infection, this study aims to examine factors related to overweight and obesity among adults living with HIV as there are not many studies in South India. As HIV infected patients on antiretroviral therapy experience body composition and metabolic changes, there is a need to alter the dietary pattern and emphasise on the need for therapeutic lifestyle changes at the time of HAART initiation to delay the risks associated with being overweight or obese in order to prevent chronic conditions such as diabetes mellitus, hypertension and cardiovascular diseases and improve their quality of life.

Methodology: A cross-sectional study was conducted at the YR Gaitonde Centre for AIDS Research and Education (YRGCARE), Chennai, a centre involved in the prevention of HIV, laboratory testing, counselling, medical care of patients with HIV/AIDS and research since 1993. The five-month study included three hundred HIV infected adult patients attending the Out-Patient clinic during the study period. Participants were recruited in the study after signing an informed consent in the local language.

Study methods: Anthropometric measurements, Body Electric Impedance Analysis (BIA) and Dietary intake were the methods used to assess the nutritional status. Personal information of the participants was collected through an interview schedule which was designed to elicit socio-demographic information such as age, gender, education, personal income and marital status. Information regarding the life-style pattern such as time spent in physical activity, type of physical activity performed, smoking, alcohol consumption and sleep pattern. Smoking and alcohol consumption were recorded as per the claim of the participant regardless of the frequency or duration of consumption at the time of data collection.

Dietary assessment was done using the 24-hour dietary recall method and the Food Frequency Questionnaire (FFQ). From the 24-hour dietary recall, the total caloric and macronutrient intake was calculated using the 'ANNAPURNA' software. HIV related information such as the duration of HIV infection, opportunistic infections, use of HAART, CD4 + T lymphocyte count, viral load values, blood glucose levels, lipid profile, CD4 and viral load counts were accessed from the patient records where available.

Definition of Overweight and Abdominal Obesity for the Purpose of the Study: A person with a BMI of 30 kg/m^2 or more was considered obese. A person with a BMI equal to or more than 25 kg/m^2 was considered overweight. The cut-off points used for waist circumference was $>102\text{cm}$ for men and $>88\text{cm}$ for women. In these study overweight and obese subjects were grouped as 'overweight' and those who had a higher-than-normal waist circumference were classified as 'abdominal obesity'.

Study population: The study included 300 consecutive patients attending the Out-patient clinic at YRGCARE medical centre, Chennai. Both male and female participants above 19 years of

age with a confirmed diagnosis of HIV infection on Highly Active Antiretroviral Therapy (HAART) at the time of data collection were solicited. The participants were recruited after obtaining study specific informed consent, which was translated into the local language. Pregnant women and those with life threatening diseases were excluded from the study.

Statistical Analysis: The prevalence of overweight and abdominal obesity outcomes and their respective 95% confidence intervals were calculated. A student's t-test was used to compare average consumption of risk and protective foods. Bivariate analysis was performed to verify the association between independent variables and outcomes by applying Pearson's chi-squared test or Fisher's exact test. Multiple regression analysis was carried out according to the hierarchical theoretical model, structured into three blocks of variables: (i) socio demographic factors (ii) dietary factors and (iii) HIV related factors. In the study, a p-value < 0.05 was considered statistically significant. All the statistical analysis were performed using SPSS Software "IBM SPSS Statistics 24" Version 24.0, IBM Corp; New York.

Result: Out of the 300 subjects assessed, the prevalence of overweight and abdominal obesity was 67% (23.4% males; 21.1% females) and 56% (15% males; 22.6% females) respectively. The mean Body Mass Index (BMI) of the participants was 25.0 ± 12.3 , which indicates that on an average the subjects were in the overweight category. The mean BMI at baseline (at the time of diagnosis) and at the time of initiation of therapy was 21.3 ± 4.6 kg/m² and 21.7 ± 4.7 kg/m² respectively. The mean waist circumference was 86.0 ± 11.6 cm. The mean percentage of fat mass lean body mass and extracellular mass was 19.9 ± 14.5 , 79.2 ± 15.6 and 42.7 ± 9.0 respectively.

On assessment of the lifestyle characteristics of the participants, about 6% of the subjects were smokers and consumed alcohol at the time of data collection. Most of the participants who were previous smokers had stopped after the diagnosis of HIV. Majority (81%) of the subjects lead a sedentary lifestyle with no physical activity pattern. The HIV related factors showed that unsafe sex was the major cause of HIV transmission in the study. About 66.7% of the subjects had HIV infection for more than five years, among which 59% of the subjects were on Highly Active Antiretroviral Therapy (HAART) for the same. All the enrolled participants were on HAART of which 68% of the subjects were on Protease Inhibitors (PIs). The results showed that 33.7% of the subjects had a CD4 count of >300 cells/mm³.

On comparing the socio-demographic characteristics between the overweight and abdominal obesity group, female gender, age above 50 years and an income of more than Rs 30,000 per month showed statistical significance. The risk factors for overweight were female gender, age above 50 years and a monthly income between Rs 30,000 and Rs 50,000 whereas abdominal obesity was having a monthly income of more than Rs 30,000.

The HIV related factors which could be contributing factors to the risk of overweight and abdominal obesity were being on ART medications for a longer duration, especially if it includes Protease Inhibitors.

Studies in the past have shown that poor lifestyle and dietary practises have been contributing factors to overweight and abdominal obesity in the general population. Results obtained from this study have shown values similar to the general population. Cigarette smoking, alcohol consumption, physical activity, meal skipping, type and quantity of cooking oil, reuse of cooking oil and frequency of eating outside were the factors found to be statistically significant.

On assessing the risk, alcohol consumption, meal skipping, use of palm oil for cooking and use of more than three litres of oil per month were associated with overweight while meal skipping, increased monthly oil consumption and reuse of cooking oil were associated with abdominal obesity. However, consumption of more than two litres of water per day was found to be associated as a protective factor in both the groups.

The lipid parameters did not show any statistical significance. However, it can be noted that the mean triglyceride was higher in those with Normal BMI and the mean total cholesterol, LDL and HDL showed a borderline risk. The mean total cholesterol was greater for subjects who were overweight (193.4 ± 55.3 mg/dl) and obese (192.8 ± 53.6 mg/dl) compared to those who were normal (168.7 ± 38.4 mg/dl) and the mean triglycerides for the subjects with abdominal obesity (275.0 ± 246.5 mg/dl) was greater than the normal (204.6 ± 104.8 mg/dl) subjects.

Discussion: Subjects were categorised as normal, overweight and abdominal obesity based on BMI and waist circumference and analysed to identify associated factors. The two groups – overweight and abdominal obesity were analysed using the multivariate analysis method. The common factors associated with overweight and abdominal obesity based on socio demographic characteristics were female gender, age above 40 years and having a monthly income higher than Rs 30,000. Smoking, alcohol and physical activity were the associated lifestyle factors. The HIV related factors include those on PIs and with a CD4 cell count less than $350\text{cells}/\text{mm}^3$. Meal skipping and reuse of cooking oil were the associated dietary factors.

In our study, being overweight was associated with being on HAART for more than five years and use of palm oil for cooking. Abdominal obesity was associated with being on ART for more than three years and use of NNRTIs along with PIs. The use of PIs and NNRTIs have been associated with higher BMI in other studies too suggesting that HAART has some long-term effects on weight gain. Dietary factors such as use of more than three litres of oil per month for cooking especially groundnut oil, frequently eating outside home (once in two weeks) and consumption of foods higher than the Required Dietary Allowance (RDA).

Dietary Factors: The study found an association between overweight and abdominal obesity and the use of more than three litres of oil per month and the reuse of cooking oil which is similar to a study done among Asian Indians on heating/frying and reuse of edible fats/oils showing that they induce chemical changes such as formation of trans fatty acids (TFAs), which are injurious to health. The lipid parameters did not show any significance. However, the triglyceride level was found to be higher than the normal value in all the three groups. The use of PIs and NNRTIs have been associated with higher BMI in other studies too suggesting that HAART has some long-term effects on weight gain.

Our study findings were consistent to previous studies done among different populations. However, obesity is associated with several co-morbidities including dyslipidemia, hypertension, cardiovascular disease, insulin resistance, elevated levels of LDL-cholesterol and lower levels of HDL-cholesterol. Studies done in Asian countries have also shown the importance of regular screening for non-communicable diseases in these patients as it has shown that in the later follow-up years persons with overweight and obesity has been increased with systematic inflammation, type 2 diabetes mellitus, cardiovascular diseases and dyslipidemia. As individuals age, the complications of obesity may increase. Management of co-morbidities if present is also of vital importance to prevent morbidity and mortality.

Targeted weight loss can help in reducing the complications of the co-morbidities associated to obesity.

Conclusion: It can be concluded that there are many factors that could be responsible in subjects being overweight and having abdominal obesity. Studies have shown that physical activity has numerous benefits among HIV infected adults including better neurocognitive functioning, while resistance training (RT) appears to be efficacious to improve muscular strength and CD4 cell count, but not muscle mass. Therefore, maintaining a healthy BMI at ART initiation by having a regular physical activity pattern and a healthy diet throughout the treatment can help in preventing comorbidity with non-communicable diseases and promote a good quality of life among people living with HIV/AIDS.

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