

Contribution of Obesity and Cardiovascular Disease in Person Living with HIV

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Abstract

Obesity is one of the most serious public health challenges of the 21st century and a global prevalent public health issue as children and adult. Modernization of the society drastically affects the lifestyle of the individual, family and community especially the food habits, sedentary behavior like continuously engaging with screening, paucity of health care services and financially deprived. In the primitive age group of young adolescents who have had human immunodeficiency virus since infancy or childhood, few studies have looked at the cardiovascular risks. For better prognosis, human immunodeficiency virus infection treated with effective Antiretroviral therapy, this population is emerging. Due to expanded treatment options, the use of less toxic antiretroviral, and improved monitoring, risk of CVD comorbid of human immunodeficiency virus patients has pointedly decreased since couple of years.

Keywords: *HIV, CVD, Obesity, ART.*

INTRODUCTION

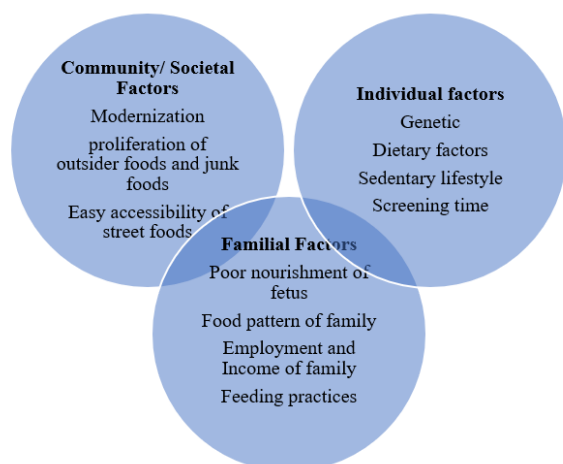
OBESITY:

Obesity is one of the most serious public health challenges of the 21st century and a global prevalent public health issue as children and adult. Modernization of the society drastically affects the lifestyle of the individual, family and community especially the food habits, sedentary behavior like continuously engaging with screening, paucity of health care services and financially deprived. Not only developed country, developing country are also equally contributed for facing obesity children as well

as adults.^{1,2} There are many factors that contribute to developing obesity in children like Ubiquitous high energy dense foods, digitalization, stress, prefer to have large portions of food and calories more than their requirements.³

The NFHS -5 data revealed that one individual found obese out of four which was stated one in four previously. The Body Mass Index is the parameter which reveals the obesity (BMI >30) and overweight (BMI 25-29.9).³

Multidimensional Factors of obesity in children

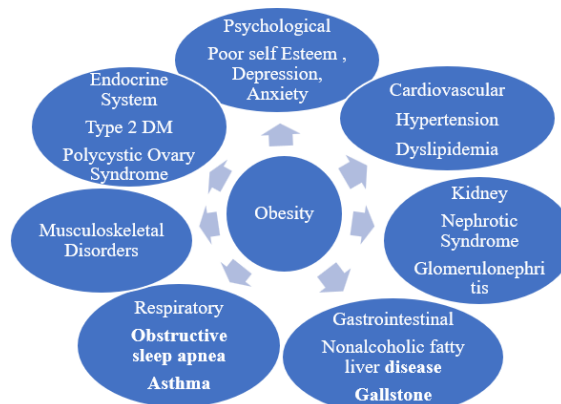


The burden of premature mortality is significant in Obesity due to CVD and other metabolic problems. Globally >1.9 billion & 650 million adults are overweight and obese respectively. In India, >135 million individual are reported obesity. These all lifestyle leads to higher risk of chronic disease. As compared to 2015-16, the prevalence of obesity in India is proliferated in 2019-21. The prevalence differs in Urban and Rural and also state wise as well. In urban habitat and high socio economic data recorded more obesity individual.⁴

Obesity has emerged during early childhood. The prevalence of childhood obesity may be stagnant in some developed countries whereas it is observed that sudden elevation in developing countries of Asia and Africa region. In Asia continent, the highest number of childhood obesity observed in China (15 million) and after that India reported 14 million cases.⁵

The World Health Organization states that worldwide around 340 million children and adolescents are Obese and overweight under the 5-19 years of age group. World Bank Income Classification 2017, the number of the cases increased in Middle Income countries due to economic status and differences in health status.⁷

Comorbidities due to Obesity



Children who are obese are more likely to grow up to be overweight adults with life-limiting comorbidities. Childhood obesity is associated to a variety of negative physical, mental health, and societal effects.⁸ Obesity during childhood gets impacted psychologically and is emotionally associated with poor scholastic performance. Attractive and constant bombardments of energy dense food advertisements are more susceptible for children than adults.⁹(NCD, 2017)

Childhood obesity is possibly to be continued till adulthood and develop comorbid diseases like diabetes, cardiovascular disease, musculoskeletal problems, metabolic disorders etc. During childhood, obesity profoundly affects children's health in terms of physical and psychological. Moreover, children bear the bullying at school due to obesity, withdraw themselves from the activities, poor academic performance and reduce their quality of life.⁹

HUMAN IMMUNODEFICIENCY VIRUS

In the primitive age group of young adolescents who have had human immunodeficiency virus since infancy or childhood, few studies have looked at the cardiovascular risks. For better prognosis, human immunodeficiency virus infection treated with effective Antiretroviral therapy, this population is emerging. Due to expanded treatment options, the use of less

toxic antiretroviral, and improved monitoring, risk of CVD comorbid of human immunodeficiency virus patients has pointedly decreased since couple of years.¹⁰ However, the cardio metabolic characteristics of young adults who contracted the virus as children may differ from those of adults who contracted the virus as adults for a number of different reasons. These include early HIV infection, which occurs during a time of physiological immaturity and a time when the body has a sturdy capacity for immunological regeneration through activity of thymus; prolonged exposure of HIV & lengthy histories of Antiretroviral therapy; but young adults' cardio metabolic characteristics There may be differences between HIV infections in children and adults for a variety of reasons. These include the, with the first-generation drug usage linked with the toxicity of metabolism in highly manner; in contrast, during the early years of infection, behavioral risk factors due to paucity of vulnerability, particularly tobacco smoking. Additionally, cardiomyopathy risk may rise if fetal exposure to ART.¹¹

United States has conducted a study among young adults (15–29 years old) who contracted HIV early in life had significantly thicker coronary artery vessel walls than uninfected controls who were matched by sex and race; this suggests that this cohort is prone to have subclinical CVD.¹² Further research revealed a high frequency of metabolic disorders, especially dyslipidemia and insulin sensitivity as well as abnormalities of coronary artery, in adolescents and young adults who acquired HIV infection early in life (most commonly via transfer from mother to child).^{13,14,15}

The managing of individuals with regulated human immunodeficiency virus who are receiving antiretroviral medication includes treating metabolic illness more and more frequently (ART). standard risk factors (including tobacco usage, genetics, and obesity

susceptibility) and HIV-specific and ART-specific contributions are likely to interact to cause metabolic disorders. The current state of knowledge about dysfunction of adipose tissue, homeostasis glucose- insulin, abnormalities of lipid, and risk of CVD in human immunodeficiency virus positive individuals on Antiretroviral therapy is included in this review. The lasting consequences of modern antiretroviral medications are not well appreciated, despite the fact that they are thought to cause fewer short-term metabolic disturbances than previous medications. Patients continue to have a higher prone of developing CVD and other metabolic syndrome. The discovery of new medicines to manage HIV patients' metabolic illness, using medications that reduce inflammation and boost the immune system, as well as the minimization of established risk factors for metabolic disease, should be the main areas of research and treatment.¹⁶

- Weight Gain during human immunodeficiency virus treatment

Obesity and weight increase risk factors are well-known in the uninfected human immunodeficiency virus population for premature mortality and diseases of cardio metabolic such diabetes and CVD ^{17–20}. However, obesity in cART recipients may have both positive and negative effects. Although being overweight or obese while receiving treatment of human immunodeficiency virus prone to develop DM²² & cardiovascular diseases²¹, being heavier has also been associated to highly effective of suppression of virus, higher CD4+ counts, a slower course of the illness, & lower death rate.

In considering in people living with HIV Infection, grows burden of comorbidity like CVD and metabolic disorders due to initiation of cART, proliferation of overweight and obesity. The most challenging clinical relevance is to tackle the weight of the individual during treatment of HIV infection.

So far studies indicate that overweight proliferate the great risk of metabolic disorders (DM) and CVD and mortality among cART recipients of HIV infected patients. However, there are currently few studies looking at how weight increase affects the risk of incident glucose problems (pre-diabetes and diabetes), Cardio Vascular Disease and death among HIV-infected cART recipients. Therefore, a review of the literature relating probability of occurrence metabolic disorders, Cardio Vascular Disease and death to increase weight or adiposity gain during treatment of cART was conducted. Unless otherwise specified, the majority of reports are from developed countries with initial cART availability and prevalence of rising obesity rate.^{23,24,25}

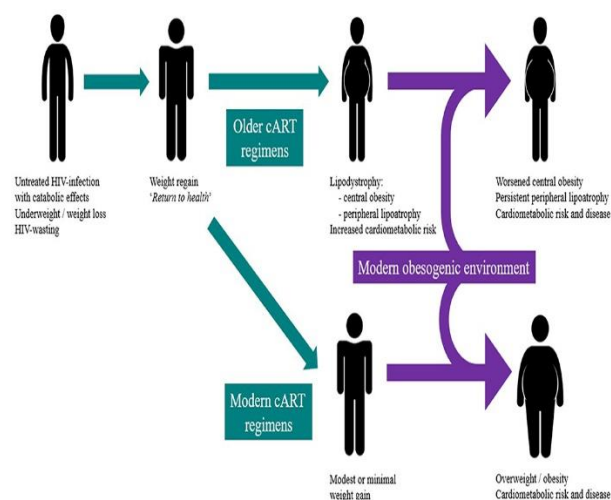
- The effect of Increased weight on recipients CART

While, Cardio Vascular Disease and the percentage of mortality attributed to Cardio Vascular Disease is proliferating in persons with treatment of human immunodeficiency virus infection, the advent of cART has been associated with a notable decrease in mortality rate of AIDS living with human immunodeficiency virus.^{26,27,28} It is crucial to remember that elevated rates of metabolic disorder and Cardio Vascular Disease in people with human immunodeficiency virus who had received treatment appeared even before the current obesity pandemic. increased expectancy of life and resulting greater exposure to aging-related cardiovascular disease risk factors, such as DM, HTN, dyslipidemia, Overweight and obesity may be partially to blame for this. The D:A:D study group evaluated 33,347 HIV-positive individuals with a total of 160,000 PYFU and found that duration-dependent risk variables for CVD in HIV-infection included old age, prior history of CVD, smoking, dyslipidemia, lipodystrophy, and DM.^{29,30}

Across many areas, people with human immunodeficiency virus infection are regular

contact with the hospital and opportunities for screening and diagnosis of CVD, hence it is important to carefully review studies reporting CVD during HIV therapy. Nevertheless, the research findings are in accordance with an elevated CVD risk in treated HIV-infected individuals compared to the general population. Traditional CVD risk factors do not fully account for possibilities, which seems to be much higher in young and feminine populations. This raises the possibility that factors associated to HIV infection or cART use may be at play. Development of HIV disease, inflammation and abnormal coagulation, decreased elasticity of artery, and dysfunction of endothelium are some possible HIV-specific processes.^{30,31,32}

HIV interferes with the transport of cholesterol in microglial cells in human and stimulates the release of pro-inflammatory cytokines, such as TNF, which affects free fatty acid metabolism and lipolysis, increasing the risk of atherosclerosis and hence diabetes.³³ Additionally, the previously described side effects of cART, such as lipodystrophy and insulin resistance, raise the risk of diabetes and cardiovascular disease. By interfering with the hydrolysis of lipase and triglyceride-rich lipoproteins, postprandial catabolism of free fatty acids and lipoproteins, and peripheral fatty acid absorption, CART contributes to dyslipidemia.³⁴



The antiretroviral therapy (ART) development and use in the 1990s considerably increased the life expectancy of HIV-positive individuals (PWH). These have happened because PWH have fewer AIDS-related comorbidities and are living similar lifespans to HIV-negative people. The most common cause of death in the United States is cardiovascular disease (CVD), and its comorbidities, such as high cholesterol (CHOL) and increased triglycerides (TG), add to the disease burden among PWH.^{35,36}

According to several systematic reviews, HIV may play a role in CVD and its comorbidities, including high CHOL, hypertension (HTN), and type II diabetes mellitus (DM), as PWH live longer. Shah et al. meta-analysis of 80 longitudinal studies revealed that PWH had a twofold increased risk of CVD compared to those without HIV. This demonstrates the rising CVD impact on public health among PWH.^{37,38}

With the advent of combination antiretroviral medication, the incidence of HIV-related wasting has decreased (ART). Nevertheless, this has been correlated with an increase in the percentage of obese and overweight HIV-positive people (PWH).³⁹⁻⁴¹ The shifting rates of obesity are influenced by the unhealthy environment of wealth nations^{42,43}, reversal of the catabolic state associated with uncontrolled viremia⁴⁴, and directly effects of ART.⁴⁵ While excessive adipose is related with an elevated risk for metabolic disorders such diabetes, neurocognitive impairment, liver problems, and cardiovascular disease,^{46,47} it is also connected with a decreased risk of death in underweight and normal weight individuals.⁴⁸ Additionally, PWH have a higher risk of metabolic disorders than HIV-negative people when they gain weight.^{49,50}

The percentage of obese people at ART beginning grew from 9% to 18% between 1998 and 2010 according to a multi-cohort investigation of more than 14,000 PWH in the United States and Canada. Additionally, within

three years of starting ART, 22% of people with normal BMI turned overweight, and 18% of people who were already overweight turned obese.^{51,52}

Conclusion:

In the years ahead, the expanding problems of weight gain, obesity, diabetes, and Cardio Vascular Disease in people with human immunodeficiency virus infection will certainly intersect with the rising usage of cART in the effort to eradicate AIDS and globally epidemic of obesity. These elements must be separated from the crucial replenishment of the body's nutritional reserves during Return to health; that occurs after cART commencement. Then latter may become less common as global efforts to start cART at diagnosis spread and fewer patients experience the debilitating consequences of advanced HIV infection and AIDS before cART is started.

Over the past 20 years, obesity has been more prevalent and more common in PWH, which is likely a result of population-wide trends, greater survival rates, and the development of new ART drugs. Although the implications on cardiovascular disease are less evident, the burden of metabolic disorders such as insulin resistance, neurocognitive decline, and hepatic disease has increased along with the rise in obesity. Therapeutic approaches to prevent and treat metabolic problems in PWH may result from an understanding of the effects of ART and HIV on fat partitioning and adipose tissue metabolic function.

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