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Analysis of Non-HIV related NCDs among patients in a tertiary care hospital in an urban metropolis

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Abstract

The rate of non-communicable diseases among HIV patients appears to be increasing as compared to non-HIV infected people. Human Immunodeficiency Virus (HIV) and Non-Communicable Diseases (NCD) are considered major health problems among people in developing countries NCDs are becoming more common among the people suffering from HIV as their life is dependent on antiretroviral treatment. Various concerted efforts and actions are made to control the epidemic. Antiretroviral therapy (ART) has been introduced to reduce the mortality rate due to HIV. ART therapy enables the HIV patients to live longer with the existence of non-communicable disease. In the developing country like India rate of non-communicable disease (NCD) among the HIV patients have increased. ART has successfully controlled HIV-induced AIDs and HIV viremia; however, cardiovascular diseases become the reason for increased mortality rate among HIV patients. The complication of HIV infection has been increased due to the HIV patients suffering from cardiovascular diseases. General populations, as well as the HIV-infected patients both, have the same risk of cardiovascular diseases that increase the death rate among them. The quality and life expectancy of HIV-infected people can be improved through antiretroviral therapy.

Keywords: non-communicable diseases, Human Immunodeficiency Virus, Antiretroviral therapy, cardiovascular diseases, and Mortality rate

Introduction

The side effects of antiretroviral treatment introduced various NCDs among the HIV patients such as the risk of Diabetes Mellitus and various cardiovascular diseases. The patient who suffers from many non-communicable diseases and gets affected by HIV have more death probability, therefore proper care is needed by incorporating management for the person who enters from NCDs to HIV [1]. Non-communicable diseases are considered diseases that can not be transferred from an infected person to non-infected people such as cancer, lung disease, heart disease, and diabetes.

The major objective of the study is to analyze the socio-economic and clinical predictors of HIV patients suffering from non-communicable diseases. Both prevention and care are needed to address non-communicable diseases. Reducing salt, smoking, and alcohol intake can reduce the chances of NCDs among the patients as well as promotion of exercise, treatment of risk factors and weight loss can prevent no communicable diseases faced by the people.

Literature review

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Impact of NCD on the HIV patients

It has been expected that the burden of non-communicable disease can be dramatically increased in the upcoming years in developing countries like India (Sando et al. 2020). The study is important to find non-communicable diseases risk factors among HIV patients. Based on the assumption it has been found that every year 34 million deaths are caused by Non-communicable diseases (NCDs). Deaths due to NCDs cause a significant threat to the health and economy of societies and countries. The most common NCDs found among HIV patients are chronic respiratory diseases, cardiovascular diseases (CVDs), cancers, and diabetes [5]. These NCDs are targeted as risk factors among HIV patients and lead to increased mortality and morbidity rates.

Raised blood pressure, obesity, tobacco and alcohol consumption, cancer, salt intake, raised glucose and sugar level, blocked blood vessels that lead to heart attack and chest pain also leads to non-communicable diseases among HIV patients. A receptive, equipped, and accessible health system is the global priority as the development of this kind of health system can help in overcoming the challenges, prevention, and cure of non-communicable diseases among HIV patients [6]. This type of health system reduces multiple morbidities and helps in the management of people suffering from Non-communicable diseases. In the last three decades, HIV (Human Immunodeficiency Virus) has increased the rate of mortality in various countries and has become a matter of concern.

Factors responsible for NCDs among the HIV patients

In the present time, NCD has become common among the people suffering from HIV. The main cause found for rapidly increment of NCD among the HIV patients is the use of antiretroviral drugs. Antireyroviral treatment is provided to the HIV patient for the cure of diseases however some of the antiretroviral drugs increase the risk of non-communicable diseases including diabetes and heart diseases. HIV has itself capability to increase the risk of some cancer. Effective treatment is provided to the HIV patients for their survival and NCDs are common among the people with age. NCDs become worse among the HIV patients who suffer to it before diagnosis however they come to know after getting affected by the HIV. In the various studies it has been found that in county like India people don't understand the seriousness of NCDs and get to know after getting infected from the HIV.

Various environmental risk factors that contributed to the occurrence of diabetes, obesity, cardiovascular disease, and Mellitus can be found in the general population and result in the increment of non-HIV-related mortality. A high burden of obesity, hypertension, and hypercholesterolemia has been found among HIV patients [7]. Early cardiovascular diseases casually link HIV and Antiretroviral therapy after controlling age and traditional risk factors. The risk factor of non-communicable diseases among HIV-positive people is understood through the study. It is important to evaluate the NCD risk factors among the people suffering from HIV as it helps in the planning and implementation of health programs.

The study tries to find the number of HIV patients suffering from NCD risk factors in rural as well as urban areas [9].

Method

Ethical Permissions

The Ethics Committee for Academic Research Projects has approved this project. ART center and Medicine Out-Patient Dept allowed enrolling Research Projects and Patients that involve (Cases and Control).

Table 1: Study Setting and Population

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(Source: created by author)

	Cases	Control
Inclusion Criteria	• Both male and female patients were chosen to belong to the age group from 30 to 65 years. These patients were diagnosed to be patients of Human Immunodeficiency Disease (HIV). Patients get HAART at the hospital ART clinic and participate in the study. • Patients suffering from Non-Communicable Diseases (NCD) and belong to the Out-Patient Department	Both the gender male and females belonging to the age group between 30 to 60 years who were HIV negative were allowed to participate in the study. • Patients who were socio-demographically similar to the cases and whose age-matched. • The OPD patients with non-communicable comorbidities as per the definition have been given.

Sample Size

300 cases and 600 controls have been chosen in this study. OpenERP has been used as a method for estimating the sample size in the study. The confidence limit of the method has been kept at 5% of the 100(95%) and 0.05 is considered as alpha error and 0.20 is considered as beta error.

Study Participants

For the cases

All the patients including new and old patients were selected and patients visiting ART clinics were selected for the study. In the study, the patients visiting for follow-up visits would be considered only one time.

For Controls

All the new and following patients of OPD whose age was matched with cases were chosen. The patients suffering from circulatory system diseases, chronic respiratory disease, Mellitus, and non-HIV cancer were selected.

Detailed research plan

a) Study procedure

The Ethics Committee for Academic Research Projects has provided approval for starting the study. ART Centre and Medicine OPD of the hospital allow for the enrollment of patients involved in Cases and ControlsThe medical history of the patients involve comorbid illness and treatment details of the illness. The current ART regimens will be documented in the case of the patients suffering from ART regimens. Compliance with medication will also be discussed.

Validation questionnaires can be done through MOS-HIV which helps in health-related Quality of Life assessment.

1) **Adults:** A standardized questionnaire- The participants of both the groups will get medical Outcomes Survey HIV (MOS-HIV). The survey questions will be made in English and later translated into Hindi as well as in the local language.
2) In both groups, the direct costs of management of non-HIV-related non-communicable diseases will be evaluated.

b) Data Analysis

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Both dependent and Independent variables have been used for the data analysis purpose. Dependent variables help in analyzing the Independent variable. HIV status, the severity of HIV infection, and Occurrence of non-communicable disease in both groups of patients were considered as independent variables. HRQL of patients in both groups of patients, drug use in both groups, the occurrence of opportunistic infections, and cost of management of HIV and /or no communicable diseases.

Result

900 patients have involved in the study out of which 300 patients belonged to cases and 600 patients were involved in controls. The patients involved in the study belonged to the age of 30 to 65 years. In the HIV group, 53.66% of the patients were male whereas 57.16% of male patients belonged to the Control group. 42.7 was considered as the mean age where mean in the HIV group was 8 and 41.8 years and 5.1 was the mean age among the HIV group and control group respectively.62.66 % of patients belong to the age group between 30 to 40 in HIV whereas 63.16% patients belonged to the control group.

Table 2: Demographic Characteristics
(Source: created by author)

Characteristics	Case	%	Control	%
Gender				
Male	161	53.66	343	57.16
Female	164	44.66	257	42.83
Other	5	1.66	0	0
Age Distribution				
30-40 years	188	62.66	379	63.16
41-50 years	71	23.66	141	23.5
51-65 years	41	13.66	80	13.33
Marital Status				
Married	288	96	552	37
Unmarried	12	4	48	63
Smoking Status				
Yes	49	16.33	222	37
No*	251	83.66	378	63
Alcohol				
Yes	107	35.66	96	16
No**	193	64.33	504	84

* indicates the patients who have quitted the smoking and no smoking history was present for the 10 years and they were considered as non-smokers
** Patients who have no alcohol consumption history within 10 years were considered.

In the past 5 to 10 years, 65.66 patients belonging to the HIV groups were diagnosed with HIV infection. The CD4 count of the patients lying within the range of 131 to 1085 cells/mm3 had a mean count of 572.36 cells/mm3. The majority of the patient's CD4 counts lie in the range of 301 to 500 cells/mm3 whereas 35 patients had CD4 between 801 to 1100 cells/mm3.

Figure 1: CD4 cell count range of patients in HIV group
(Source: created by Author)

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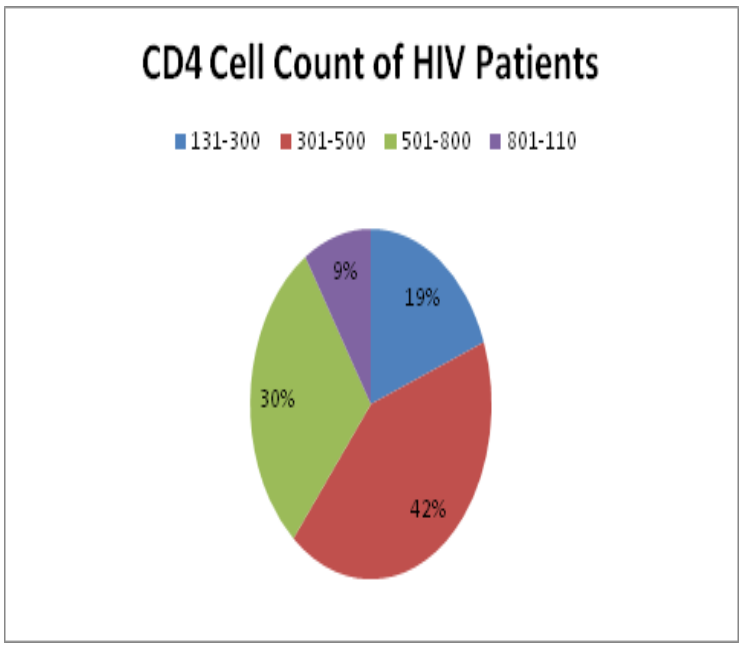
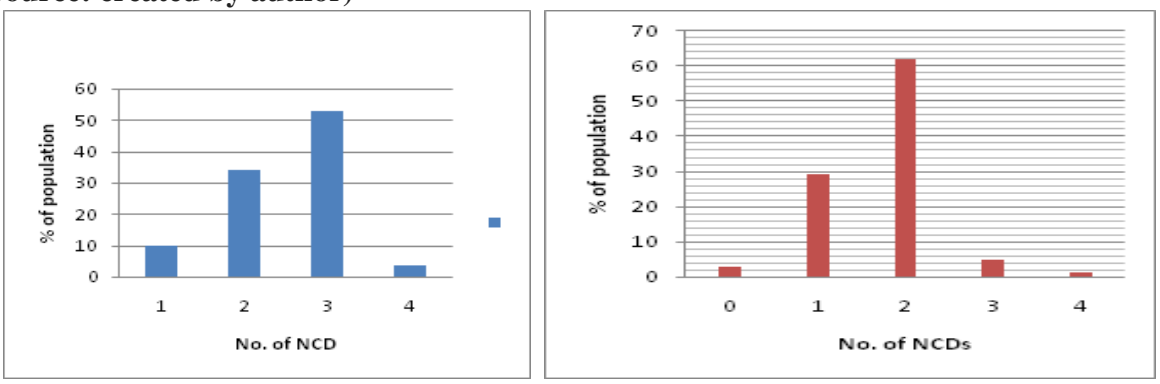


In the study, the diagnosis of non-communicable diseases within 6 months has been considered. From the observation, it has been found that 62% of the HIV patients had 2 non-communicable diseases and only 3% of the HIV patients were non-non-communicable diseases. In the control group, 600 patients were involved out of which 316 patients were diagnosed with 3 non-communicable diseases and 4 patients were under consideration. 204 patients were diagnosed with two noncommunicable diseases whereas 21 patients were suffering from four non-communicable diseases.

Figure 2: NCD prevalence in patients of HIV group and Control group
(Source: created by author)



From the study, it has been found that in the HIV group maximum number of patients suffering from hypertension was 52.87% where n=46 were suffering from hypertension. In the control group, the majority of the patients (45.76% where n=27) suffered from Type 2 Diabetes Mellitus (T2DM). 37.93% of the patients in the HIV groups were suffering from T2DM and 9.19% of the patients in HIV groups were suffering from bronchial asthma. Additionally, in the control group, Hypertension was common among the patients as 30.50% of patients were suffering from hypertension, 5.08 percent of the patients were suffering from bronchiectasis and 18.64 patients were suffering from BS in control groups.

Figure 3: No of patients with 1 NCD in HIV Group and Control Group
(Source: created by author)

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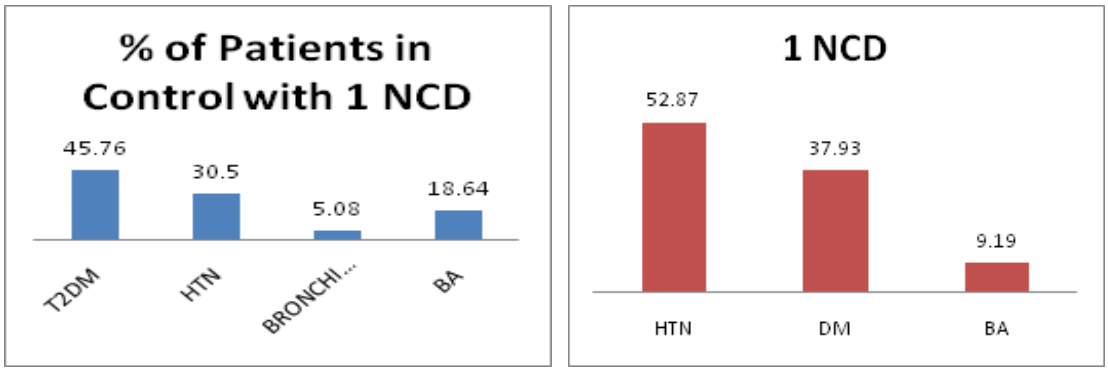
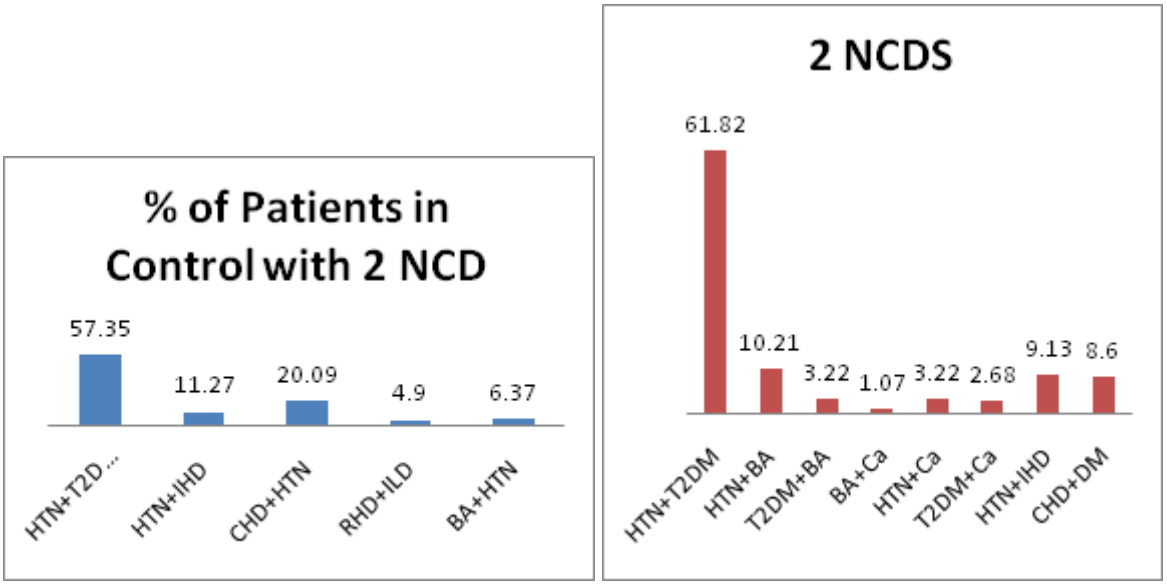
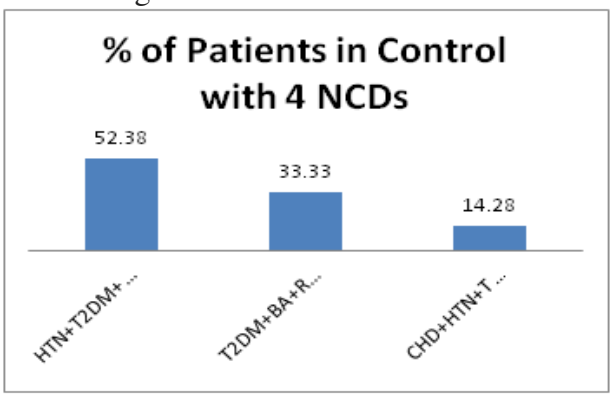


Maximum Patients suffering from HIV as well as the patients of the control group who have 2 NCDs was about +T2DM(61.86%, n=115) and 57.35% of patients belonged to HTN. In the HIB group, HTN +BA follows this whereas n=19.

Figure 4: No of Patients with 2 NCDs in HIV Group and Control Group (Source: Created by Author)



From the figure, it has been clear that In the HIV group only four patients were suffering from 4 NCDs were in the control group majority of the patients were suffering from the NCD combination that can be seen in figure4.



It is clear from the figure that 51.49% of patients from the HIV groups were suffering from circulatory system diseases whereas 35.32 patients were suffering from T2DM.

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Table 3: HIV group Patients with NCDs
(Source: created by author)

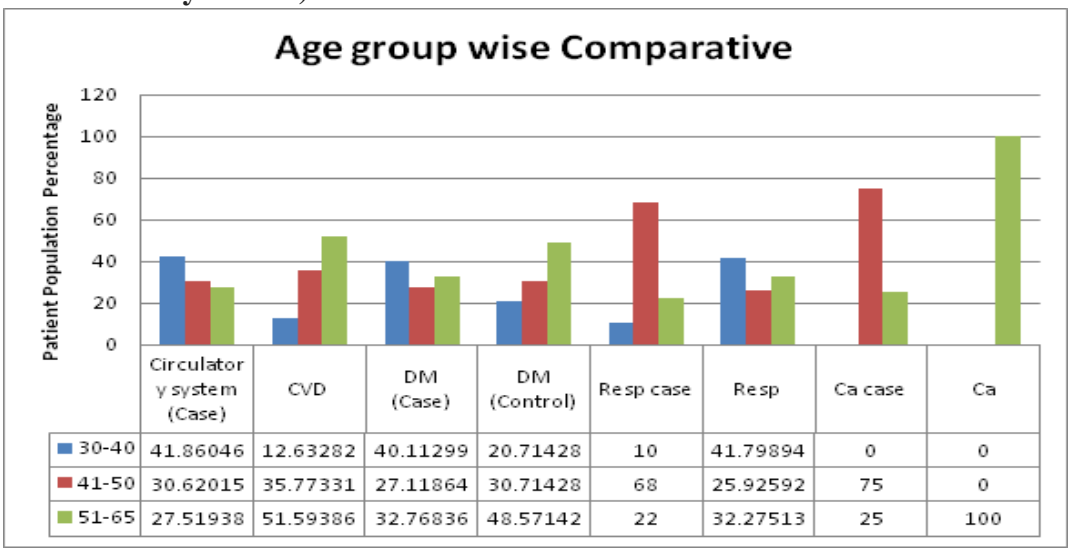
NCDs	No. of Patients (n)	Percentage (%)
Diseases of the circulatory system	258	51.49
T2DM	177	35.32
Diseases of the respiratory system	50	9.98
Non-AIDS defining cancers	16	3.19

57.73% of the patients from the control group were suffering from circulatory system diseases where 28.62% of the patients were suffering from T2DM.

Table 4: Patients with NCDs in Control group
(Source: Created by Author)

NCDs	No. of Patients (n)	Percentage (%)
Diseases of the circulatory system	847	57.73
T2DM	420	28.62
Diseases of the respiratory system	189	12.88
Non-AIDS defining cancers	11	0.74

Figure 5: ODDs RATIO
(Source: created by author)



Sr No.	Co-Morbidity	OR	Z Value	P-Value
1	Non-AIDS defining cancers	4.366, 95% CI 2.0127-9.4737	3.730	0.0002
2	Diseases of the circulatory system	0.777, 95% CI 0.6340-0.9526	2.427	0.0152
3	Diabetes Mellitus	1.3618, 95% CI 1.0980-1.6891	2.811	0.0049
4	Diseases of the respiratory system	0.7497, 95% CI 0.5391-1.0424	1.713	0.08647

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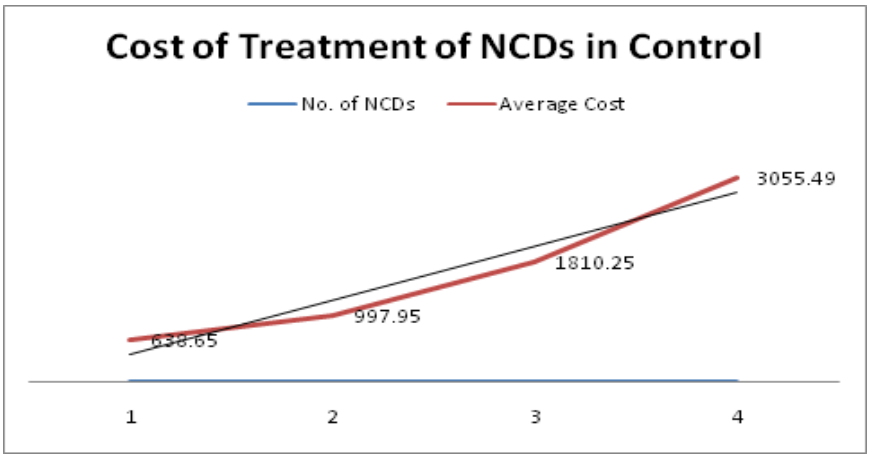


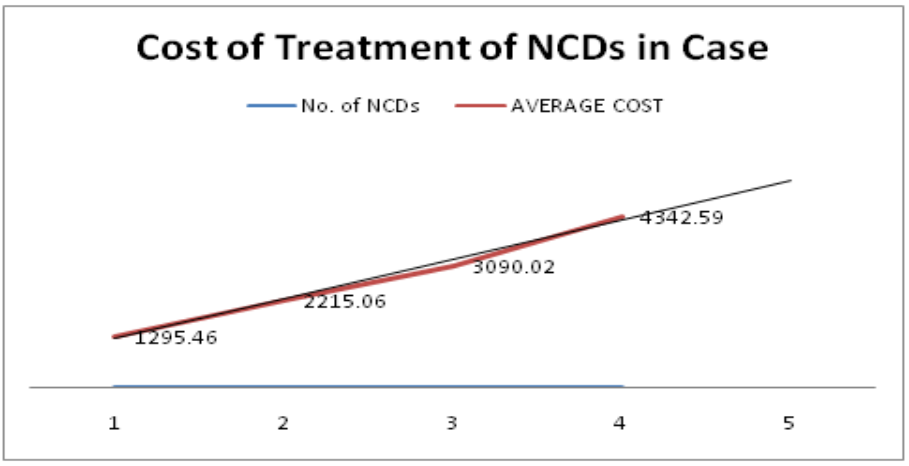
Regression Statistics	
Multiple R	0.961696
R Square	0.924859
Adjusted R Square	0.887289
Standard Error	359.8519
Observations	4

ANOVA

	df	SS	MS	F	Significance F
Regression	1	3187709	3187709	24.61676	0.038304
Residual	2	258986.8	129493.4		
Total	3	3446696			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-68.209	385.8982	-0.17675	0.875981	-1728.6	1592.177	-1728.6	1592.177
X Variable 1	564.598	113.7952	4.961528	0.038304	74.97687	1054.219	74.97687	1054.219

Cost of Treatment of NCDs in HIV Case



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Regression Statistics	
Multiple R	0.952583
R Square	0.907414
Adjusted R Square	0.876552
Standard Error	549.2181

ANOVA

	df	SS	MS	F	Significance F
Regression	1	8868952	8868952	29.40239	0.012306
Residual	3	904921.5	301640.5		
Total	4	9773874			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	330.7297	586.9977	0.563426	0.612512	-1537.36	2198.818	-1537.36	2198.818
X Variable 1	412.9852	76.16284	5.422397	0.012306	170.601	655.3694	170.601	655.3694

Discussion

Cost of Treatment of NCDs in HIV and Control Group

The study provides information regarding the economic cost perspective of the health care sector for the provision of the direct cost of treatment on non-HIV-related NCDs and ART. The registered patients under the ART center were 15431 and it was till December 2018. 6347 were active cases. The overall cost of HAART was considered as 6184.12**.** Calculation of procurement of drugs other than one that has been used in HAART was done.

HRQL of Patients with NCDs in HIV and Control Group

Anxiety, fatigue, and cough were considered major symptoms of the HIV groups. 88% of the patients were facing fatigue, 68% of the patients were suffering from anxiety and 59% of the patients were suffering headaches. In the control group, 71% of the patients were suffering from headaches and 69% of the patients were suffering from fatigue. There has been a strong association of HRQL with the symptom score ($r2=0.57$; Pearson $p=0.758$; $p< 0.001$).

Conclusion

From the study it can be concluded that non-communicable diseases are common among the people surviving with HIV. In the developing countries like India, severeness of HIV and AIDS are at the peak level and disproportionately affects the population of India. Non-communicable disease is not only spreading due to the health implications however, socio-economic status is also considered as main reason for increasing NCDs rate. There is need to aware the people regarding the importance of early diagnosis and treatment of the non-communicable disease.

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