

## Frequency of HIV in Obstructive Lung Disease Patients

Waqas Ahmed<sup>1\*</sup>, Qudrat Ullah<sup>2</sup>, Mughees Ahmad<sup>1</sup> and Asif Hanif<sup>3</sup>

1. Department of Molecular Biology, Gulab Devi Postgraduate Medical Institute Lahore, Pakistan
  2. Department of Surgery, Gulab Devi Postgraduate Medical Institute Lahore, Pakistan
  3. Department of Biostatistics, Gulab Devi Postgraduate Medical Institute Lahore, Pakistan
- \*Corresponding author: waqaschishti28@yahoo.com

### Abstract

**Background:** Obstructive lung disease (OLD) is one of the main causes of mortality and morbidity worldwide. Obstructive lung disease is the narrowing of bronchioles mainly due to excessive smooth muscle contraction. The objective of this study is to evaluate the Frequency of HIV in obstructive lung disease patients.

**Methodology:** Samples were collected randomly, and study was completed in almost six months. 100 samples were taken with an informed consent taken from all the patients. EDTA and Clotted blood was collected for HIV ELISA and HIV screening.

**Results:** In this study, 69% Males and 31% Females, 34% Smokers, 26% patients were Hypertensive, 10% patients were diabetic, 3% patients were diagnosed HIV positive by screening and ELISA.

**Conclusion:** The frequency of HIV in obstructive lung disease patients in this research is not very high as compared to the previous researches, showing high frequency and relationship between HIV and obstructive lung disease patients. The reason behind low frequency is due to low sample size so by increasing the sample size we can get better understanding of frequency of HIV in obstructive lung disease patients. Another reason of insignificant results is low prevalence of HIV in Pakistan as compared to the previous researches in certain countries.

**Keywords:** Human immunodeficiency virus, Obstructive lung disease, Asthma, HIV ELISA

### Introduction:

Obstructive lung disease (OLD), including chronic obstructive pulmonary disease (COPD), and asthma is related with considerable morbidity and mortality in USA (1, 2). Risk factors for the development of OLD such as tobacco use and unhygienic status are prevalent in individuals at risk or infected with HIV (3, 4). HIV belongs to lentivirus group of retrovirus family. There are two subtypes HIV-1 and HIV-2. HIV-1 is the most commonly occurring strain globally

(5). The retrovirus genome consists of two single stranded copies of RNA molecule (6). Non communicable pulmonary diseases are becoming increasingly common in HIV infected individuals (7). Patients with HIV infection have an increased expectancy of emphysema and abnormal computer tomography images of lung (8, 9). They may also have abnormal airway receptiveness (10). A contributing factor to this increase could be that HIV-infected patients in the advanced world have higher rates of smoking than the general population. Almost 75% of patients report a smoking

history and 40-50% are current smokers (11, 12). In one recent study, individuals with HIV infection had increased risk of COPD compared with combination antiretroviral therapy (cART) has resulted in decrease in communicable complications and death in persons living with human immunodeficiency virus (13, 14). The increase in life expectancy the incidence of non-opportunistic lung diseases such as chronic obstructive pulmonary disease (COPD) has become more common in these individuals(15). The nature of respiratory symptoms in HIV infected persons is not understood although data revealed that latent or chronic viral infection may be an important factor in the pathogenesis of lung infections in HIV negative smokers(16). As the pathogenesis of HIV infection is not well known in COPD patients(17). It may be due to smoking use of injection and inhalation drugs are some factors which can be very fatal for lung (13). Pulmonary infections such as bacterial pneumonia and colonization by pneumocystis jirovecii can be some factors which can help in the development of COPD (18). Cohort studies have found a relation between antiretroviral therapy and COPD, although the mechanism of this association is not well understood. The main reason behind these may be the direct effect of drugs, restoration of immune system resulting in increase in inflammatory response after the therapy is started or the development of autoimmune response (17). Spiro-metric measurements including FEV1 and FVC are measurement to confirm the prevalence of airway obstruction seen in asthma and COPD. The prevalence of obstructive ventilator defects (defined as

FEV1\FVC<0.70) in HIV infected people ranges from 7% to 21% despite the widespread use of ART (19, 20).

According to a recent study, the frequency of HIV in obstructive lung disease patients is 16-20% as poorly controlled infection can further increase or worsen the COPD and Asthma (21). The Frequency of HIV among obstructive lung disease patients is the basic objective of this study.

### **Materials and Methods:**

**Study design:** Descriptive study design was used in present study.

**Duration:** The duration of study was 4-6 months.

**Sample size:** The sample size was 100 according to calculated formula. Sample was calculated using  $p=09\%$  (22)  $d=3\%$  using the following formula:

$$n = \frac{Z^2_{1-\alpha/2} P (1-P)}{d^2}$$

### **Sampling Techniques and Processing:**

Non-probability sampling technique was used. The data was collected from chest ward of Gulab Devi Chest Hospital Lahore. An informed consent was taken from all the patients. EDTA and Clotted blood was collected for HIV ELISA and HIV screening.

**Inclusion criteria:** Patients not documented HIV positive but were suffering from OLD along with age above 18 years were fulfilling the criteria for current research.

**Data Collection Procedure:** The current study includes 100 subjects in which both male and female patients of Obstructive lung disease (OLD) were included. The patients were selected from Chest ward of Gulab Devi Chest Hospital Lahore. Patients having COPD and Asthma were selected. An informed consent was taken from all the

patients included in this study. Peripheral blood sample from all the subjects were collected in a vial.

**Methodology:** Blood samples were collected in 5ml syringes. Results were obtained using immunochromatography technique of blood samples through screening devices (HBsAg, anti-HCV and HIV Ag/Ab).

**HIV ELISA:** For detection of HIV through following steps:

1. Use the required number of wells and for each control and sample, format the microplates Leave well A1 as the blank well, add 100µl of negative control to wells B1, C1 and D1. Add 100µl of positive control to wells. Add 100µl of sample diluent to rest of the wells then 10µl of sample to the wells containing sample diluent.
2. To mix the liquid within the wells, shake on a plate shaker for 30 seconds.
3. Cover the plate with a lid and incubate at 37C for 30 minutes
4. Add 350µl of wash solution decant or aspirate. Repeat 5 times for total of 6 washes. At the end of washing insert the plate and tap out any residual solution on to absorbent paper.
5. Expect the blank well add 100µl of enzyme conjugate to each well.
6. Cover the plate with a lid and given incubation for 30 minutes at 37C
7. Repeat the step 4 that is add 350µl wash solution, decant and aspirate. Repeat 5 times for total 6 washes, at the end, invert the plate and tap out any residual wash solution onto absorbent paper.
8. Add 50µl of substrate A then 50µl of substrate B to each well including the blank well.
9. Gently mix for 15 sec and incubate in dark at 37C for 10 minutes without shaking.
10. Add stop solution 50µl to each well including blank well.
11. Gently mix for 15 seconds. It is very important to make sure that blue colour changed to yellow completely.
12. Read the absorbance at 450nm within 20 minutes in a microplate reader. To obtain the actual absorbance by subtracting the absorbance of each well at 450nm with absorbance of blank well at 450 nm.

**Data Analysis:** The data was analysed by using SPSS version 16. The qualitative data were presented in the form of graphs and tables along its percentage. The quantitative data were presented in the form of mean, range and standard deviation.

**Operational Definition:**

**COPD:** The condition among human beings in which pulmonary channels get obstructed.

**HIV:** Human immunodeficiency virus (13) causes viral disease AIDS among human beings.

**Asthma:** The condition among human beings in which shortness of breath occurs due to some allergic reactions.

**Results:**

**Age boundaries:** 100 patients were taken into study with minimum age of 18 and maximum age of 85. The mean age was  $47.85 \pm 1.56$ .

**Gender frequency** showed 31 patients were female and 69 were male patients out of total sample size. **Smoking history** revealed 34% patients were smokers while 66% patients were non-smokers. **Hypertension evaluation** was 26 (26%) hypertensive in comparison to 74 (74%) non-hypertensive

patients in present study. Only 10 (10%) patients were **diabetic patient count** while 90 (90%) patients were non-diabetic. Out of 100 patients, 4 (4%) patients had **family history of asthma** whereas 96 (96%) had no family history of asthma. **Frequency of COPD and Asthma** include 60 (60%) COPD patients and 40 (40%) patients were affected by asthma. **Frequency of HIV** in this study is evaluated in **Figure**. Detail related to HIV ELISA and cross tabulation is available in Table . **Socioeconomic status** of 65 (65%) patients was low and 29 (29%) patients were with average socioeconomic status and 6 (6%) patients were there who reported high socioeconomic status. **Distribution of BMI** was as: 20 (20%) patients were showing BMI 19-25, 42 (42%) patients showed BMI 25.1-30 and 38 (38%) patients had BMI 30.1-35.

### **Discussion:**

Obstructive lung disease is characterized by airway obstruction COPD and Asthma are further subtypes of OLD. The signs and symptoms are usually coughing and wheezing. HIV human immunodeficiency virus is a lentivirus family virus that causes HIV infection and can also cause Acquired immunodeficiency syndrome (AIDS).

In this study, 100 patients were taken: out of which 60 patients were suffering from COPD and 40 patients among them were asthma patients. majority of the patients in current study were non-smokers, non-hypertensive, non-diabetic and majority of them with no family history of asthma and other respiratory diseases. In this study 31 (31%) patients were female and 69 (69%) were male patients, among them 34 (34%) patients were smokers and 66 (66%) were non-smokers, 26

(26%) patients were hypertensive and 74 (74%) patients were non-hypertensive, 10 (10%) patients were diabetic and 90 (90%) patients were non-diabetic, 4 (4%) patients had family history of asthma and 96 (96%) patients had no family history of asthma. Majority of the patients had low socioeconomic status as 65% patients had low socioeconomic status 29% had average whereas 6% had high socioeconomic status. A recent study indicated that 16-20% HIV patients had COPD and Asthma and poor management can worsen these diseases(21). In a recent study the association between higher HIV viral load and OLD persisted after accounting for antiretroviral therapy use (OR 4.06, 95% CI 1.41 to 11.7;  $p < 0.01$ )(23). In another recent study they found out ( $p = 0.018$ ) significant (24).

In this study 3 patients were HIV positive after testing all patients' blood samples through HIV screening and HIV ELISA method. In this research, the Pearson's chi square value is 2.06 and p value is 0.26 and frequency is 3% overall in both COPD and asthma and in COPD patients alone is 6% so it is insignificant.

### **Conclusion:**

The frequency of HIV in obstructive lung disease patients in this research is not very high as compared to the previous researches, showing high frequency and relationship between HIV and obstructive lung disease patients. The reason behind low frequency is due to low sample size so by increasing the sample size we can get better understanding of frequency of HIV in obstructive lung disease patients. Another reason of insignificant results is low prevalence of HIV

in Pakistan as compared to the previous researches in certain countries.

### References:

1. Jemal A, Ward E, Hao Y, Thun M. Trends in the leading causes of death in the United States, 1970-2002. *Jama*. 2005;294(10):1255-9.
2. Mannino DM, Homa DM, Akinbami LJ, Moorman JE, Gwynn C, Redd SC. Surveillance for asthma—United States, 1980–1999. *MMWR Surveill Summ*. 2002;51(1):1-13.
3. Kirk GD, Merlo CA. HIV infection in the etiology of lung cancer: confounding, causality, and consequences. *Proceedings of the American Thoracic Society*. 2011;8(3):326-32.
4. Marshall MM, McCormack MC, Kirk GD. Effect of cigarette smoking on HIV acquisition, progression, and mortality. *AIDS Education and Prevention*. 2009;21(3\_supplement):28-39.
5. Haleyur Giri Setty MK, Hewlett IK. Point of care technologies for HIV. *AIDS research and treatment*. 2014;2014.
6. Howley PM. Papillomavirinae: the viruses and their replication. *Fields virology*. 1996:2045-76.
7. Hull MW, Phillips P, Montaner JS. Changing global epidemiology of pulmonary manifestations of HIV/AIDS. *Chest Journal*. 2008;134(6):1287-98.
8. Diaz PT, King MA, Pacht ER, Wewers MD, Gadek JE, Nagaraja HN, et al. Increased susceptibility to pulmonary emphysema among HIV-seropositive smokers. *Annals of internal medicine*. 2000;132(5):369-72.
9. Guillemi S, Staples C, Hogg J, Le A, Lawson L, Schechter M, et al. Unexpected lung lesions in high resolution computed tomography (HRCT) among patients with advanced HIV disease. *European Respiratory Journal*. 1996;9(1):33-6.
10. O'Donnell CR, Bader MB, Zibrak JD, Jensen WA, Rose RM. Abnormal airway function in individuals with the acquired immunodeficiency syndrome. *Chest*. 1988;94(5):945-8.
11. Crothers K. Chronic obstructive pulmonary disease in patients who have HIV infection. *Clinics in chest medicine*. 2007;28(3):575-87.
12. Niaura R, Shadel WG, Morrow K, Tashima K, Flanigan T, Abrams DB. Human immunodeficiency virus infection, AIDS, and smoking cessation: the time is now. The University of Chicago Press; 2000.
13. Rahmanian S, Wewers ME, Koletar S, Reynolds N, Ferketich A, Diaz P. Cigarette smoking in the HIV-infected population. *Proceedings of the American Thoracic Society*. 2011;8(3):313-9.
14. Palella Jr FJ, Delaney KM, Moorman AC, Loveless MO, Fuhrer J, Satten GA, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. *New England Journal of Medicine*. 1998;338(13):853-60.
15. Crothers K, Huang L, Goulet JL, Goetz MB, Brown ST, Rodriguez-Barradas MC, et al. HIV infection and risk for incident pulmonary diseases in the combination antiretroviral therapy era. *American journal of respiratory and critical care medicine*. 2011;183(3):388-95.
16. Retamales I, Elliott WM, Meshi B, Coxson HO, Pare PD, Sciruba FC, et al. Amplification of inflammation in emphysema and its association with latent adenoviral infection. *American journal of respiratory and critical care medicine*. 2001;164(3):469-73.
17. Morris A, George MP, Crothers K, Huang L, Lucht L, Kessinger C, et al. HIV and chronic obstructive pulmonary disease: is it worse and why? *Proceedings of the American Thoracic Society*. 2011;8(3):320-5.

18. Yearsley MM, Diaz PT, Knoell D, Nuovo GJ. Correlation of HIV-1 detection and histology in AIDS-associated emphysema. *Diagnostic Molecular Pathology*. 2005;14(1):48-52.

19. Gingo MR, George MP, Kessinger CJ, Lucht L, Rissler B, Weinman R, et al. Pulmonary function abnormalities in HIV-infected patients during the current antiretroviral therapy era. *American journal of respiratory and critical care medicine*. 2010;182(6):790-6.

20. Drummond MB, Kirk GD, Astemborski J, Marshall MM, Mehta SH, McDyer JF, et al. Association between obstructive lung disease and markers of HIV infection in a high-risk cohort. *Thorax*. 2012;67(4):309-14.

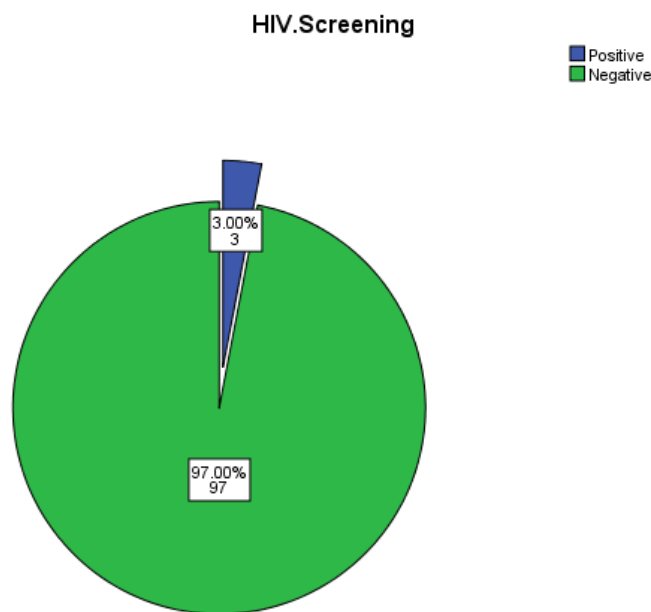
21. Drummond MB, Kirk GD. HIV-associated obstructive lung diseases: insights

and implications for the clinician. *The lancet Respiratory medicine*. 2014;2(7):583-92.

22. Mujeeb S, Khatri Y, Khanani R. Frequency of parenteral exposure and seroprevalence of HBV, HCV, and HIV among operation room personnel. *Journal of Hospital Infection*. 1998;38(2):133-7.

23. Drummond MB, Kirk GD, Astemborski J, Marshall MM, Mehta SH, McDyer JF, et al. Association between obstructive lung disease and markers of HIV infection in a high-risk cohort. *Thorax*. 2011;thoraxjnl-2011-200702.

24. Madeddu G, Fois A, Calia G, Babudieri S, Soddu V, Becciu F, et al. Chronic obstructive pulmonary disease: an emerging comorbidity in HIV-infected patients in the HAART era? *Infection*. 2013;41(2):347-53.



**Figure 1.** HIV Prevalence

**Table 1. HIV ELISA cross tabulation with COPD and Asthma**

	HIV.ELISA		Total
	Detected	Not Detected	
Diagnosis COPD	3	57	60
ASTHMA	0	40	40
Total	3	97	100

**Table 2: Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2- sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.062 <sup>a</sup>	1	.151	.273	.212
Continuity Correction <sup>b</sup>	.702	1	.402		
Likelihood Ratio	3.127	1	.077		
Fisher's Exact Test					
Linear-by-Linear Association	2.041	1	.153		
N of Valid Cases	100				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.20.

b. Computed only for a 2x2 table

**$\chi^2$  –square value = 2.062**

**p-value =0.212**

**Supplementary File 1:**

**Study Questionnaire**

Name:(confidential): \_\_\_\_\_

S/O, D/O, W/O: \_\_\_\_\_

Age: \_\_\_\_\_ years

Gender: Male  Female

Address: \_\_\_\_\_  
 \_\_\_\_\_

Hospital: \_\_\_\_\_

Date: \_\_\_\_/\_\_\_\_/\_\_\_\_ .

Marital status: Married  Unmarried

Smoking: Yes  No

Blood transfusion: Yes  No

If yes: Screened  Unscreened

Disease: Asthma  COPD

Have you any tattoo on your body: Yes  No

Saliva exchange (using same utensils): \_\_\_\_\_ per year

Unprotective sex: Yes  No

If yes then: Less then 5 times:  More than 5 times:

Socioeconomic Status: \_\_\_\_\_

BMI: \_\_\_\_\_

Final results:

HIV Ag/Ab: Positive  Negative

HIV ELISA: Positive  Negative

**CONSENT:** It is informed me that a research is going to be conduct on Frequency of HIV among COPD and asthma patients to improve health facilities related to these infection and ensured me that my data will not be misused. So I am agreed to give my personal data to him.

Name: \_\_\_\_\_  
 \_\_\_\_\_

Signature: \_\_\_\_\_  
 \_\_\_\_\_