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PREVALENCE OF HEPATITIS B AND/OR C VIRUS INFECTION AMONG PEOPLE WITH HIV (PWH): A STUDY FROM TELANGANA, INDIA.

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Abstract:

HIV still poses a serious hazard to public health, and co-infection with Hepatitis B and/or C virus adds another element of danger. When compared to a single/mono infection, this double/triple infection increases morbidity and mortality. Hence, the regular checking for HBV and HCV infections in People with HIV (PWH) will be helpful in proper patient care and management. To study the prevalence of HBV and HCV coinfection among PWH and people without HIV (Non-PWH). A total of 220 cases with HIV (n=110) and without HIV (n=110) infection were included in the study. Samples were tested for HBV and HCV infection by Enzyme Linked Immunosorbent Assay (ELISA) method. Odds ratios, 95% confidence interval was calculated and the relative risk factors were analysed. Among the 110 PWH, 4 patients shown, HIV-HBV co-infection (Odds ratio (OR):2.0377 with 95% Confidence Interval (CI): 0.3655 to 11.3620) and in 5 patients, HIV-HCV co-infection (OR: 5.190 with 95% CI: 0.5964 to 45.1758 was observed. In 110 Non-PWH, 2 were HIV-HBV co-infected (1.81%) and 1 was HIV-HCV co-infected (0.90%). None of the participant either from PWH or from Non-PWH is positive for Triple co-infection of HIV-HBV-HCV. Our study demonstrates the co infection of HBV and/or HCV in HIV patients that significantly associated with immunodeficiency. The prevalence of HIV-HCV co-infection is more than HIV-HBV con-infection. But the prevalence of HBV is more in non-PWH than HCV. These findings emphasis the necessity of improving integrated care approaches, especially for the population with immunodeficiency, in order to lower the risk of viral transmission.

Index Terms: HBV, HCV, Immuno deficiency, Cirrhosis, People with HIV, ELISA, HAART.

I. Introduction:

Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and Human Immunodeficiency Virus (HIV) are blood borne pathogens which share the same route of transmission such as blood transfusion, sexual contact, percutaneous exposure and mother to child through placenta during pregnancy (Kim, 2008). In spite of better HIV treatment and methods to prevent, detect, and treat opportunistic infections, the AIDS epidemic claimed a life every minute in 2021, resulting in 650 000 AIDS-related deaths (UNAIDS Global AIDS Update 2022). According to WHO estimates, 58 million people worldwide having a chronic infection of hepatitis C virus infection and 296 million people with chronic hepatitis B infection (https://www.who.int/news-room/fact-sheets/detail/hepatitis-b).

HBV and HCV interact and influence immunological responses, according to clinical and laboratory research and the coinfection of HBV and HCV is frequently found in injection drug users, patients on haemodialysis, patients undergoing organ transplantation, HIV-positive individuals, and beta-thalassemia patients (Chu and Lee, 2008, Liu and Hou, 2006). However, studies revealed that the prevalence of HBV, HCV and HIV coinfection varies by geographic region and in accordance with the behaviour of infected individuals (Huy et al, 2014). A faster liver disease progression is seen among HIV patients with hepatitis B and C infection (Chen et al, 2016). Introduction of Highly Active Retro Viral Therapy (HAART) has increased the life expectancy of people infected with HIV thereby allowing greater time to develop cirrhosis. The liver damage is more in coinfected patients with HBV and HCV (Thio et al, 2002). Previous reports hypothesised the hepatotoxicity is common to all classes of Anti-Retroviral medications, and in hepatitis virus infections (Monforte et al, 2001). HIV-positive individuals experience viral hepatitis at a higher rate of progression and with more liver-related health issues than HIV-negative individuals (CDC report, 2017). Our study aimed to evaluate the seroprevalence of HBV and HCV seropositivity within the HIV positive population who are on HAART and compare with non-PWH control group.

II. Material and Methods:

2.1.Study design and sample collection

A total of 220 serum samples (110 from PWH and 110 from people without HIV) were screened for HBs Antigen and HCV antibodies using ELISA. After obtaining proper consent from the participants, serum samples were collected from the consecutive confirmed cases of HIV who reported on a regular basis in the ART centre for treatment and from the non-PWH as well. The serum was obtained from the ART centre and analysed for HCV and HBV using ELISA at a Private Diagnostic Laboratory.

2.2.Date extraction and study population

A demographic data like age, gender and the clinical history with CD4 count of the subjects were collected retrospectively from medical records. Inclusion criteria: Only the HIV positive patients on HAART consented for this study with no prior history of HBV and/or HCV infection were included in the study. For control group, the people without HIV with no previous history of HBV and HCV were included. Exclusion criteria: For study group, persons who have not tested positive for HIV infection and the people who has previous history of HBV and/or HCV infection were excluded from the study. For control group, people with previous history of HIV, HBV and HCV were excluded.

2.3.Statistical analysis

The characteristics details of the study groups (PWH and Non-PWH) were presented as frequencies and proportions. The Chi-square and Wilcoxon tests were performed for the distribution normality. The Odds ratio with 95% CI was calculated for regression analyses. The statistical significance was set as $p< 0.05$.

III. RESULTS AND DISCUSSION

The mean age of PWH was with 18.3± whereas the mean age of non-PWH was with 18.3±2.8. A total of 220 samples were tested for HBsAg and anti-HCV Ab using ELISA (J Mitra. Pvt., Ltd., India). Out of these 110 samples from PWH, 56 were males and 44 were females between the age group of 4-60 years whereas in 110 sample from non-PWH, 51 were females and 49 were males. Among the PWH, 4 (3.63%) were tested positive for HBV infection while 5 (4.54%) were positive for HCV infection ($p<0.05$). In the control group, 2 (1.81%) were positive from HBV and 1 (0.90%) was positive for HCV infection ($p<0.05$). No sample was positive for all the three viruses both in PWH and Non-PWH groups. The is represented for PWH and non-PWH in the table 1 and table 2 respectively.

Table 1. Demographic data and seropositivity in PWH.

VARIABLE AGE GROUP	N%	Hbs Ag%	HCV%
0-10	19(17.27%)	-	-
11-20	17(15.45%)	-	1(0.90%)
21-30	20(18.18%)	-	1(0.90%)
31-40	16(4.54%)	-	-
41-50	20(18.18%)	4(3.63%)	3(2.72%)
51-60	18(16.36%)	-	-
GENDER			
Male	61		4(3.63%)
Female	49	4(3.63%)	1(0.90%)

Table 2. Demographic data and seropositivity in non-PWH.

VARIABLE AGE GROUP	N%	Hbs Ag%	HCV%
0-10	17(15.45%)		
11-20	19(17.27%)		
21-30	21(19.09%)	1(0.90%)	
31-40	15(13.63%)		
41-50	22(20%)	1(0.90%)	1
51-60	16(14.54%)		
GENDER			
Male	59		
Female	51	2(1.81%)	1(0.90%)

The age-specific sero prevalence of HBV and HCV co-infection were high in the age group of 41-50 (In PWH, HIV-HBV-4 positives; HIV-HCV-3 positives; In Non-PWH, HIV-HBV-1 positive; HIV-HCV-1 positive). In the PWH, coinfection of HIV and HCV was more amongst male than females whereas all HIV and HBV co infected patients were females. The difference is very significant and indicates that these viruses are more frequently associated and co-infected in PWH. The results for Chi-square and Wilcoxon test were significant with the p value less than 0.05 and zero, respectively.

The present study is envisaged to estimate the prevalence of the HBV and/or HCV co-infection among the PWH on HAART in Telangana State, India. We observed a significant prevalence of HBV and/or HCV co-infection in PWH i.e., 6.07%. Among these, 2.7% were HBsAg and 3.37% were Anti HCV Ab sero-positive in the 110 serum samples collected from a cohort of PWH. Due to risk factors, the research population's geographic dispersion, and the type of exposure they received, there are significant differences in the prevalence of Hepatitis B, Hepatitis C, and HIV among various studies (Sarvaiya and Desai, 2013). In a study from Maharashtra, among 110 PWH, 30.4% and 7.27% were positive for HBV and HCV, respectively (Tankhiwale et al, 2003). In the present investigation HIV-HCV co-infection (5%) is slightly more (1.25 times) than the HIV-HBV co-infection (4%). A previous report from the Northern India also reported higher prevalence (8.3%) of HIV-HBV co-infection (Jindal et al, 2008, Garg, 2022). The gender ratio in HIV-HCV co-infection was 4:1 (Male:Female) whereas in the HIV-HBV co-infection all the were females in the present study.

HIV, hepatitis B and C virus infections are spread through similar channels. These three infections can coexist or co-infect the same patient simultaneously due to their shared path of infection, which might exacerbate the patient's health (Chandra et al, 2013). According to the previous reports, the co-infection of HBV and/or HCV viruses with HIV significantly impairs cell-mediated responses and speeds up viral replication/multiplication in the liver which leads to severe morbidity (Saravanan et al, 2017). Dual infections differ from mono infections in terms of the characteristics and course of the disease. Comparatively, co-infection with three viruses increases the risk of acute and chronic liver insufficiency, hepatic failure and mortalities when infected with one virus. Through the exchange of genetic material over time, there is a possibility that new strains will emerge during the co-infection (Shrestha et al, 2022, Fuster et al, 2004, Sah et al, 2022).

It is apparent that, in addition to other diseases, HIV-infected patients have a high risk of being co-infected with HBV and/or HCV. The natural history and pathogenesis of these infections are directly affected by HIV disease progression and increased immunosuppression. It is consequently vital to monitor HIV-infected patients for concomitant HBV and HCV infection. A cohort study done by WP Law et.al in described despite the fact that co-infection with HIV-HBV and HIV-HCV had little to no impact on how patients respond to antiretroviral therapy, the risk of hepatotoxicity was increased three-fold among the patients co infected with viral hepatitis (Law et al, 2004). Although effect of HBV infection on HIV is uncertain, HIV has marked influence on HBV because it affects the quality and quantity of cytotoxic T lymphocytes response which has a bearing on outcome of liver damage in HBV infected patients a study done by Sanjiv Ahuja et.al (Ahuja et al, 2013).

HIV infected patients have high probability of getting HBV/HCV infection due to enhanced immunodeficiency by HIV. Thus, routine screening of HIV infected patients for concurrent infection with HBV and HCV should be made mandatory because co-infection with these hepatitis viruses will increase the risk of cirrhosis, liver deficiency and mortalities in comparison to when a person is infected with only one of these viruses.

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Author's contribution: Conceptualization: WS, MS; Sample collection: MK; Sample processing: MK, WS, SPK; Literature collection: WS, SPK, MDS; Manuscript preparation: WS, MS; Critical review of the manuscript: SFM, KSN. All the authors read and agreed the manuscript for publication.

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