

STUDIES ON THE DISTRIBUTION OF HEPATITIS B (HBV) AND HUMAN IMMUNODEFICIENCY VIRUS (HIV) - THEIR RELATION TO BLOOD GROUPS AND RHESUS (RH) FACTOR IN GUNTUR DISTRICT OF ANDHRA PRADESH, INDIA

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ABSTRACT

HBV and HIV infections are the most prevalent viral infections spreading in Indian population. In the present study, the distribution of HIV and HBV infection were examined in Guntur district of Andhra Pradesh. The data for the present study was collected from five hundred forty one and four hundred eighty eight individuals who underwent HIV and HBV test respectively are scripted in this research as materials. In continuation, the frequency of distribution of both HIV and HBV infection in various blood groups and Rh factor were also tested. The blood samples from infected individuals were used for examining the intensity of infection. Female individuals showed more HIV infection in comparison with male individuals, on the other hand, maximum HBV infections were found in males. In both cases, the infections were reported from rural residence place. 43.71% of HIV infection was reported at the age groups of 22 to 44 in female whereas 50.0% of infection in male had found at age groups of 21 years. The study was performed based on presence of Rh and ABO blood groups which could be used as an index for studying prevalence of infection. The highest prevalence of HIV and HBV infection were found in individuals with blood group O and Rh positive.

Keywords: Human Immunodeficiency Virus, Hepatitis B surface antigen, Blood groups, Rhesus (Rh) factor.

INTRODUCTION

With continuous advancements in study of blood groups, many researchers have tried to lay out the relationship between the infectious viral diseases and of these blood groups¹. Gerald demonstrated that demodulation of antibody responses; antigenic similarity and adherence through the specific receptors are responsible for viral infections in blood². Precisely, among the other viral infections associated with blood groups, diseases due to Human Immunodeficiency Virus (HIV) and Hepatitis B Virus (HBV) infection are probably major health problems throughout the world. Tragically, HIV has infected more than 33 million people thus far worldwide and infection rates continue to increase³, whereas about HBV, it was estimated that 170 million people are infected at worldwide and approximately 3 - 4 million are newly infected each year⁴. According to the report of World Health Organization, an estimated one million people annually die from HBV-related chronic liver disease, including cirrhosis and liver cancer. The HIV and HBV both are transmitted by exposure to infectious blood or body fluids such as semen and vaginal fluids. Parental infection is a major route of infection in most of the developing countries⁵. Therefore, due to the shared routes of transmission, at a worldwide co-infection with HBV was about approximately 7% to 15% found in the HIV-infected persons.

HIV and Hepatitis B are two major health problems in India. Most individuals infected by HBV viruses have no initial symptoms and do not know that they carry the virus, but all who are infected can transmit the virus to others. The joint report from UNICEF and the World Health Organization (2011) revealed that India serves as a home for 49 percent of Asia's total HIV infected population⁶. The HIV prevalence in India is declining from estimated level of 0.41% in 2000 through 0.36% in 2006 to 0.31% in 2009. HIV Infection in an individual could increase the risk twice to develop AIDS and even death if they are co infected with the hepatitis B virus (HBV)⁷. Adult HIV prevalence at a national level has declined notably in many states, but variations still exist across the states. The states with high HIV prevalence rates include Manipur (1.40%), Andhra Pradesh (0.90%), Mizoram (0.81%), Nagaland (0.78%), Karnataka (0.63%) and Maharashtra (0.55%) [8].

The hepatitis B virus is 50 to 100 times more infectious than HIV. It attacks the liver and can cause both acute and chronic disease^{9, 10}. Children who become infected with HBV are being most likely to develop chronic disease. World health Organization (WHO) has reported that about 25% of adults who become chronically infected during childhood die from HBV-related liver cancer or cirrhosis.

Based on the stage and prevalence of Hepatitis B virus in the general population, countries are classified as high (8% or more), intermediate (2-7%), or low (less than 2%) HBV endemicity¹¹. India has intermediate endemicity of Hepatitis B, carriers has been estimated to be over 40 million, predominantly due to poor hygiene condition and dense living. Poor awareness regarding the causes and initial symptoms of HBV infection attributes to the spreading of this infection in India. The statistical analysis on hepatitis vaccination programs in India has shown that vaccination would save 25 lives per 100,000 of population¹².

The present investigation is conducted to study the distribution of HIV and HBV infection in male and female population in Guntur. In continuation, the work has been carried out to understand the relatedness of ABO blood groups and Rh (Rhesus) factor among all these infected cases of HIV and HBV in comparison with control groups.

MATERIALS AND METHODS

The present study was carried out with the clinical data obtained from ZED Research Lab. Pvt. Ltd., situated at Guntur. During the period of March 2011 to January 2012, data collected from five hundred forty one and four hundred eighty eight individuals tested for HIV and HBsAg were used for this study. Blood samples collected from these patients were tested in the laboratory for the presence of HIV and HBV infection. The study was designed based on the HIV and HBV co infection prevalence in Guntur District. A set of questionnaires were designed to obtain the demographic status of the study, including cause of infection, reasons for undergoing HIV and HBsAg, place of residence area and others. The control groups were obtained from the uninfected individual.

RESULTS

The observations for HIV test on male and female are mentioned in table 1 and table 2. Among 541 individuals tested, one hundred sixty seven individuals were reported for HIV positive where 43.75% of infected individuals were male, rest 56.26% being females. About one third of HIV infected population (77.64%) was of rural residence. Based on the age group distribution of HIV in male and female individual, it was observed that 43.29% of infection in female was found between 22 to 44 years whereas 50% of infection in male was observed at <21 years of age. Table 3 and table 4 represent the distribution of HBV in male and female candidate in the range of 10 years to 82 years. One hundred forty five of HBV infection cases

were identified after testing 488 individuals. Among the infected, majority were the male individuals (62.08%). Maximum HIV infections in both male and female were observed in between the

age group of 24 to 47 years (55.55% and 50.90% respectively). High HBV prevalence in both sex were reported from rural areas.

Table 1: Prevalence of HIV among male population in the age groups of <21 to 65 with place of residence

Objects	Categories	No. of sample	Male(n= 245)Control		HIV positive patients	
			Number	Percentage	Number	Percentage
Age Groups (Years)	<21	97	62	35.42	35	50.0
	22-44	80	59	33.71	21	30.0
	45-65	68	54	30.85	14	20.0
Residence	Rural	165	117	66.85	48	68.57
	Urban	80	58	33.14	22	31.42

Table 2: Prevalence of HIV among female population in the age groups of <21 to 65 with place of residence

Objects	Categories	No. of sample	Female (n=296)Control		HIV positive patients	
			Number	Percentage	Number	Percentage
Age Groups (Years)	<21	66	42	21.10	24	24.74
	22-44	129	87	43.71	42	43.29
	45-65	101	70	35.17	31	31.95
Residence	Rural	206	136	68.34	70	72.16
	Urban	90	63	31.65	27	27.83

Table 3: Prevalence of HBV among male population in the age groups of 10 to 82 with place of residence

Objects	Categories	No. of sample	Male(n= 346)Control		HBsAg positive patients		HIV Infection
			Number	Percentage	Number	Percentage	
Age Groups (Years)	7-23	53	37	14.45	16	17.77	-
	24-47	198	148	57.81	50	55.55	2
	48-70	77	54	21.09	23	25.55	-
	71-82	18	17	6.64	1	1.11	-
Residence	Rural	217	149	58.20	68	75.55	2
	Urban	129	107	41.79	22	24.44	-

Table 4: Prevalence of HBV among female population in the age groups of 10 to 82 with place of residence

Objects	Categories	No. of sample	Female(n=142)Control		HBsAg positive patients		HIV Infection
			Number	Percentage	Number	Percentage	
Age Groups (Years)	10-23	27	18	20.68	9	16.36	-
	24-47	73	45	51.72	28	50.90	-
	48-70	35	18	20.68	17	30.90	-
	71-82	7	6	6.89	1	1.8	-
Residence	Rural	118	69	79.31	49	89.09	-
	Urban	24	18	20.68	6	10.90	-

Out of total 145 reported for HBsAg positive, two were male having the age of 35 and 39 years respectively being co-infected with HIV. Further studies revealed that both co-infected individuals were of blood group B with Rh positive.

Out of 167 HIV positive individuals, the distribution of blood groups and Rh were as follow: Group A 13.09%, B 28.09%, AB 0.59%, and O

57.14%. 98.80% were Rh positive and 1.19% was Rh negative (Table 5). Whereas, in case of 145 HBV infected patients, high prevalence was found in O blood group (46.20%), followed by B (35.17%), A (15.17%) and AB (3.44%). In total of 488 tested individuals, one hundred forty two HBV infected individual were reported as Rh positive (97.93%) (Table 6).

Table5: Distribution of ABO and Rh blood groups among control and HIV positive patients

Blood groups	No. of sample (n=541)	Control		HIV positive patients	
		Number	Percentage	Number	Percentage
A	77	56	14.97	22	13.09
B	290	242	6.87	48	28.57
AB	12	11	2.94	1	0.59
O	162	65	17.42	96	57.14
Rh ⁺	522	357	95.45	165	98.80
Rh ⁻	19	17	4.54	2	1.19

Table6: Distribution of ABO and Rh blood groups among control and HBsAg positive patients

Blood groups	No. of sample (n=488)	Control		HBsAg positive patients	
		Number	Percentage	Number	Percentage
A	58	36	10.49	22	15.17
B	230	179	52.18	51	35.17
AB	17	12	3.49	5	3.44
O	183	116	33.81	67	46.20
Rh ⁺	469	327	95.33	142	97.93
Rh ⁻	19	16	4.66	3	2.06

The causes for undergoing test for HIV and HBV have been shown in fig. 1 and fig. 2. The most common reasons for HIV test were carried

out on doctor advice for illness (74%) during pregnancy (15% of woman) and in HBV infection, 89% of HBsAg test were performed

on doctor advice for illness (fig. 2). The primary counseling revealed that in most cases males were infected due to unsafe sexual habits, injectable drugs (IDU) and in females, infection was carried on from mother to child and unsafe sexual habits with infected person, and in other hand the common ways to HBV infection were found to be less hygienic life style, unsafe sexual intercourse, shared needle, improper use of blood and blood products and others including the infection through body fluids such as semen, vaginal fluid and breast milk.

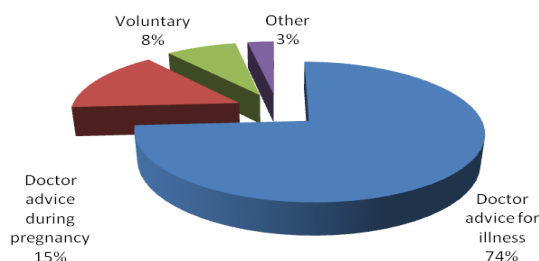


Fig 1: The Reasons for undergoing HIV test

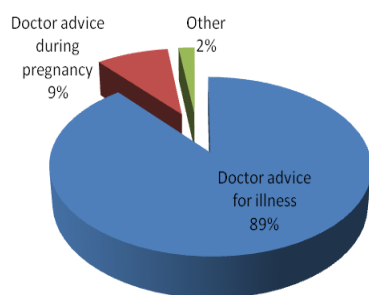


Fig 2: The Reasons for undergoing HBsAg test

DISCUSSION

According to government survey (2003) Guntur was one of the high HIV prevalence district in India, but the recent concerted effect of government and non-government organization, HIV prevalence in Guntur is reduced approximately 1.75% within 2 years of time. Moreover, the statistics has shown that Guntur is the only district in India where the number of HIV infections came down dramatically within short period.

It was found that vast majority of the populations with HIV infection were from rural area. The maximum percentage of HIV infected individuals were at the age of 21 or less in male and 22 to 44 years in case of female. The study was continued to find out the HBV prevalence in Guntur. In similarity to increased HIV prevalence in rural areas, increased incidence HBV was also reported from the same. The age groups of 24 to 47 had the highest positive cases for HBV. Awosere et al. reported that this younger age group is an adolescent age involved in active sexual activity¹³. This may be primary cause for recent spreading of HBV infection. In case of the HBV and HIV co-infection the age was of 35 and 39 in male individuals.

Furthermore, the results showed that patients with the blood group O and Rh positive were most susceptible towards the HIV infection, and the same result was found in case of HBV infection too. With the help of scientific evidence it can be correlated that the level of natural antibodies resistance against the viral antigens depends on the individual's blood group^{14, 15} that can be attributed as the main cause for natural resistance towards the infection. Similarly, Rh negative individuals are more resistance to certain pathological conditions in comparison to Rh positive group individuals. This finding was in agreement with previous studies. Sayal et al. (1996) has reported the high prevalence of HIV in O blood group and lowest

in AB blood group. Alaoddolehei et al. (2007) showed that the adherence of HBV is more towards the Rh positive and O blood group¹⁶. Therefore, it has concurred that certain inherited immunological characters in blood groups play an initial as well as a vital role in influencing the development of viral infection¹⁷.

Effective campaigning program targeted against the HIV and HBV infection along with large scale study in more number of individuals would strengthen the counseling and media campaigning undertaken in focused rural areas will enhance the prevention activity and awareness in common population. Various government and non-government organizations are involved in awareness campaigning program, still there is a need to strengthen the counseling and media campaigning in rural areas to enhance HIV and HBV prevention activity as well as awareness in common population should be promoted.

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