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## RESEARCH ARTICLE

# HEPATITIS D VIRUS SEROPREVALENCE IN HEPATITIS B VIRUS POSITIVE INDIVIDUALS IN A TERTIARY CARE HOSPITAL TIRUPATI

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### ABSTRACT

**Introduction:** Hepatitis D virus is defective RNA virus dependent on Hepatitis B virus for its replication and expression. Hepatitis D virus also known as hepatitis delta virus is a small satellite virus that requires presence of HBsAg to propagate. Hepatitis B virus infection is a world wide health problem which is estimated that has infected more than 3.5 billion people globally more than 350 million individuals suffer from chronic infection with this virus. HDV is co infected in 2% of HBV positive individuals as per past studies. Co existent infection with HDV tends to accelerate the progress of chronic HBV infection to chronic hepatitis, cirrhosis, hepatocellular carcinoma. Fulminant hepatitis may develop in 20 to 30 percent of patients in coinfection with both HBV and HDV. This study about the prevalence of HDV (Hepatitis D Virus) in HBV (Hepatitis B Virus) positive individuals at SVRRGGH of SV Medical college Tirupati, will help us to aware medical practitioners of the risk of dual infection and also provides necessary emphasis on preventive measures. **Aims and objectives:** To know the seroprevalence of Hepatitis D virus (HDV) among Hepatitis B virus (HBV) seropositive individuals and to ensure necessary preventive measures. **Materials and methods:** After obtaining informed consent. The serological test will be performed using commercially available ELISA method according to the instructions provided in the manufacturers manual. ANTI HDV antibody is detected using ELISA method. **Results:** The present study was conducted in the Department of Microbiology, Sri Venkateswara Medical College, Tirupati after obtaining permission from the Institutional Ethical Committee. A total of 170 blood samples were collected from the patients who fulfilled the inclusion criteria of the study. The serum samples were tested for HBsAg and HDV antibodies using ELISA [Nova Tec, Germany]. The results were categorized under gender, age and source for obtaining the blood sample. Among the 170 samples collected which were positive for HBsAg, 5 (2.94%) were positive for HDV. **Conclusion:** Of 170 blood samples which were positive for HBsAg when tested for HDV antibodies 2.94 % are positive. Anti HDV antibodies are tested using ELISA kit for antibody detection. The age group commonly affected is 0-11 years age group and greater than 50 years. Family and society face lot of economic burden as dependent age group is affected more. Females are most affected age group for HDV more than males. The available way to prevent Hepatitis D infection is to avoid Hepatitis B infection by getting vaccinated, High risk individuals should get Hepatitis B vaccination by series of 3 injections over a period of 6 months, stopping usage of recreational drugs, practicing safe sex practices, and has to be cautious about tattoos, ear piercings. Co infection or super infection with HDV in Hepatitis B patients worsen the symptoms and fasten the liver damage and causes fulminant hepatitis and burden to the patient.

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## INTRODUCTION

Hepatitis D virus is defective RNA virus dependent on Hepatitis B virus for its replication and expression. Hepatitis D virus also known as hepatitis delta virus is a small satellite virus that requires presence of HBsAg to propagate. Hepatitis B virus infection is a world wide health problem which is estimated that has infected more than 3.5 billion people globally more than 350 million individuals suffer from chronic infection with this virus.

HDV is co infected in 2% of HBV positive individuals as per past studies. Co existent infection with HDV tends to accelerate the progress of chronic HBV infection to chronic hepatitis, cirrhosis, hepatocellular carcinoma. Fulminant hepatitis may develop in 20 to 30 percent of patients in coinfection with both HBV and HDV. This study about the prevalence of HDV (Hepatitis D Virus) in HBV (Hepatitis B Virus) positive individuals at SVRRGGH of SV Medical college Tirupati, will help us to aware medical practitioners

of the risk of dual infection and also provides necessary emphasis on preventive measures.

**Aims and objectives:** To know the seroprevalence of Hepatitis D virus (HDV) among Hepatitis B virus (HBV) seropositive individuals and to ensure necessary preventive measures

**Materials and methods:** After obtaining informed consent The serological test will be performed using commercially available ELISA method according to the instructions provided in the manufacturers manual. ANTI HDV antibody is detected using ELISA method

## RESULTS

The present study was conducted in the Department of Microbiology, Sri Venkateswara Medical College, Tirupati after obtaining permission from the Institutional Ethical Committee. A total of 170 blood samples were collected from the patients who fulfilled the inclusion criteria of the study. The serum samples were tested for HBsAg and HDV antibodies using ELISA [Nova Tec, Germany]. The results were categorized under gender, age and source for obtaining the blood sample. Among the 170 samples collected which were positive for HBsAg, 5 (2.94%) were positive for HDV.

## DISCUSSION

This study is done to determine the seroprevalence of Hepatitis D virus (HDV) among Hepatitis B virus (HBV) seropositive individuals and to ensure necessary preventive measures in a SVRRGGH of SV Medical college, Tirupati, Andhra Pradesh. A total of 170 patients who fulfilled inclusion criteria were included in the study. Hepatitis D is a worldwide problem, as there are at least 15,000,000 people infected with this hepatitis D virus among the estimated 300,000,000 HBsAg carriers. Such infection could occur simultaneously or as a super infection in those HBs Aganemic individualities with different clinical courses and outcomes. Whereas HDV is reportedly endemic in the Mediterranean Basin countries which includes the equatorial Africa , Middle East, and the Amazon Basin in South America. It is rare across most parts of Asia, despite a high prevalence of HBsAg positivity in the Mediterranean Basin countries. Alavian and colleagues in their study reported that the hepatitis center in Tehran, Iran, stated that the serum antibody was present among 5.9% of HBV patients . Different study in different parts of Iran shows that HDV seroprevalence rate is diverse. Ataei and colleagues reported that the rate of HDV seroprevalence in Isfahan province, central Iran was 2.9%. Taghavi and colleagues from Shiraz, southern Iran proved a high rate of 9.7% anti HDV seropositivity 50.

**Table 2. HDV Sero prevalence among all HBV positives samples as per the Age**

Age	0-11 years	12-18 years	19-30 years	31-40 years	41-50 years	>50 years	Total
Number of HBV positive	18	15	25	54	22	36	170
Number of HDV positive	1	0	1	2	1	0	5
Percentage	5.55	0	4	3.7	4.54	0	2.94

**Table 3. Seroprevalence of HDV among Voluntary blood donors as per age**

Age	19-30 years	31-40 years	41-50 years	>50 years	Total
Number of HBV positive	12	24	10	17	63
Number of HDV positive	0	1	0	1	2
Percentage	0	4.1	0	5.8	3.1

**Table 4. Seroprevalence as per the sex in all samples**

Gender	Male	Female	Total
Number of HBV positive	74	96	170
Number of HDV positive	2	3	5
Percentage	2.70	3.12	2.94

**Table 5. Seroprevalence as per sex in voluntary blood donors**

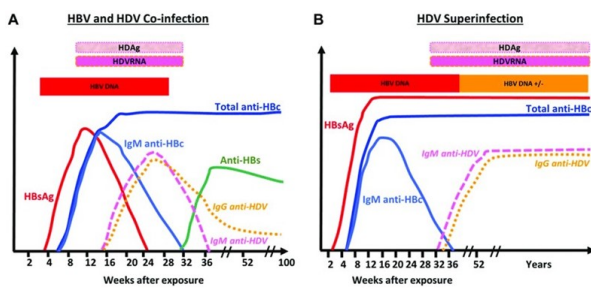
Gender	Male	Female	Total
Number of HBV positive	33	30	63
Number of HDV positive	1	1	2
Percentage	3	3.3	3.1

**Table 6. Seroprevalence based on age in samples received from other Departments for screening (Non-Donors)**

Age	0-11 years	12-18 years	19-30 years	31-40 years	41-50 years	>50 years	Total
Number of HBV positive	7	8	35	25	21	11	107
Number of HDV positive	1	0	0	1	0	1	3
Percentage	14.2	0	0	4	0	9	2.8

**Table 7. Seroprevalence based on gender in samples received from other Departments for screening (Non-Donors)**

Gender	Male	Female	Total
Number of HBV positive	43	64	107
Number of HDV positive	1	2	3
Percentage	2.3	3.1	2.8



**Image 14. Co infection and super infection between Hepatitis B and D**

	Co-infection	Superinfection
HBV infection	Acute	Chronic
Outcome	Usually recovery with viral eradication (<5% chronicity)	Usually persistent infection
HBsAg	Present, early, and transient	Preexisting and persistent
IgM anti-HBc	Positive	Negative
Anti-HBs	Appears during the convalescence phase	Negative
HDV infection	Acute	Acute or chronic
Outcome	Usually recovery with viral eradication (<5% chronicity)	Usually persistent infection (80% progress to chronicity)
Serum HDsAg	Early and short-lived	Transient and later undetectable because of complexing with antibodies
Liver HDsAg	Positive and short-lived	Positive but 50% sensitivity at late stages
Serum HDV RNA	Early positive and transient	Early positive and persistent
Anti-HDV	Late and low titered	Rapidly increasing titers and persistent
IgM anti-HDV	Positive, transient	Positive, high titered

Malekzadeh had reported a different rate of 13.9 percent from the same province, though in a different time frame. Rezvan and colleagues from Iran reported that the rate of anti-HDV seropositivity in asymptomatic HBV carriers was 2.5 percent, while in HBsAg positive dialysis patients, the seropositivity rate reaches up to 44.5%. In 2009, a mathematical model for the transmission of HBV and hepatitis D was introduced where individuals with dual HBV and hepatitis D infection transmit both viruses. They calculated the reproduction numbers of single HBV infections and dual HBV and hepatitis D infections and examined the endemic prevalences of the two viruses. The results showed that hepatitis D virus modulates not only the severity of the HBV epidemic but also the impact of interventions for HBV. It was also found that hepatitis D virus may hamper the eradication of HBV. Interventions that aim to reduce the basic reproduction number of HBV below one may not be sufficient to eradicate the virus, as control of HBV depends also on the reproduction numbers of dual infections. For populations where hepatitis D is endemic, plans for control programs ignoring the presence of hepatitis D may underestimate the HBV epidemic and produce overoptimistic results. The current HBV surveillance should be augmented with monitoring of hepatitis D, in order to improve accuracy of the monitoring and the efficacy of control measures.

Hepatitis B and Hepatitis D. In a study conducted in South India, the anti-HDV positivity in AVH patients was relatively low (6.6%) compared with other Indian studies 83,84,85 in which reports varied from 10.7% to as high as >30%. In 1992, a study from Mumbai reported delta positivity in 16% (23/148) of HBV-related AVH patients 83. Another study, from Chandigarh, reported anti-delta antibodies in 10.7% of cases with HBV-related AVH disease 86. A very high HDV prevalence of 33% (6/18) was reported from Ludhiana 85 in which, however, was from the pediatric population, with a very small number of subjects. Some countries have witnessed a declining trend in the prevalence of HDV infection 87. HDV had been responsible for a high proportion of cases of HBV-related acute and chronic liver disorders in southern Europe during the 1970s. However, by the 1990s its seroprevalence had substantially declined. The HDV declining trend has also been observed in various countries irrespective of the risk behaviours involved 88,89. The reduction in HDV seroprevalence has been postulated to result from various factors, such as active preventive measures directed against sexually

transmitted diseases, promotion of disposable needles and better control of HBV infection. Studies conducted in Europe, Africa, South America, and Asia proved that the prevalence of HDV among HBV-coinfected patients ranges from 1.2 to 2.8 percent. No studies have evaluated the prevalence of HDV infection among hepatitis B viral infected patients in the USA. HDV infection increases the risk of hepatic decompensation and hepatocellular carcinoma. A study from Bangalore 90 reported that the prevalence of hepatitis B ranges from 4.2 percent from two urban populations in that area. While in a present study, the prevalence from the same community was 2.18 percent. The difference between these two is almost two folds and this is due to the increasing knowledge and awareness about hepatitis B. Mass media played a vital role in raising the level of awareness among the population which is otherwise known as HB sensitization. According to the age wise distribution, Out of 170, 5 patients were tested positive and 1 patient from the age group of 0-11, 1 from 19-30 years, 2 patients from 31-40 years, 1 from 41-50 years. The maximum percentages of positive cases were found in the age group of 31 – 40 years.

## CONCLUSION

Of 170 blood samples which were positive for HBsAg when tested for HDV antibodies 2.94 % are positive. Anti HDV antibodies are tested using ELISA kit for antibody detection. The age group commonly affected is 0-11 years age group and greater than 50 years. Family and society face lot of economic burden as dependent age group is affected more. Females are most affected age group for HDV more than males. The available way to prevent Hepatitis D infection is to avoid Hepatitis B infection by getting vaccinated, High risk individuals should get Hepatitis B vaccination by series of 3 injections over a period of 6 months, stopping usage of recreational drugs, practicing safe sex practices, and has to be cautious about tattoos, ear piercings. Co infection or super infection with HDV in Hepatitis B patients worsen the symptoms and fasten the liver damage and causes fulminant hepatitis and burden to the patient.

### Limitation of the study

The main limitation of this study is it is conducted in a single tertiary care hospital so results obtained cannot be helpful in making generalized recommendations and epidemiological profile of the HDV seroprevalence. Failure to perform specific serological tests and other liver enzymes tests to detect the patient disease progression and outcome. Failure to perform specific molecular characterization tests. Specific individual tests for Co infection or super infection of HDV have not been studied in the present study.

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