Original Article

Significance of HCV viremia in AntiHCV antibody positive high risk group people attending Tertiary Care Hospital, Salem District

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A B S T R A C T

Objective: The study aims to estimate the prevalence of antibody against hepatitis C virus (anti-HCV) and HCV viremia among anti-HCV positive patients who are attending the tertiary care Hospital, Salem District.

Materials & Methods: A total of 36541 patients attended OPD & IPD to Government Mohan Kumaramangalam Medical College Hospital, Salem, Tamil Nadu during the period January 2024 – December 2025. Among them 6548 belong to high risk group (HRG's) cases were selected for the study & subjected serological testing using rapid card (immunochromatography method) and Enzyme linked immunosorbent assay (ELISA). Once the patient detected positive for Anti HCV antibodies, viral load test was performed using Real Time Polymerase Chain Reaction (RT-PCR). Data was analyzed using SPSS software 20.0 with the level of significance $p < 0.05$. Chi-square test was used to correlate the age and gender distribution of patients with HCV viral load and found to be statistically insignificant.

Result: Out of 6548 HRG cases, 125 patients were detected positive for HCV in rapid card & ELISA. Among them, only 36 patients found to have HCV viremia in their blood using RT-PCR. The overall prevalence rate of HCV infection is 0.34 % as per our present study. Most commonly infected were male & highest prevalence was observed in 50-60 years of age group and about 9.9%. Data was analyzed using SPSS software 20.0 with the level of significance $p < 0.05$. Chi-square test was used to correlate the age and gender distribution with viral load and found to be statistically insignificant.

Conclusion: The present study reveals that overall prevalence of HCV infection in Salem district is at intermediate endemicity level (0.34%). Compared to WHO estimates and previous reports from India, this is low.

Keywords: Hepatitis C, Anti-HCV antibody, Viremia, High risk group.

INTRODUCTION

Infection with Hepatitis C virus (HCV) is a major global health challenge & leads to a significant rise in incidence of chronic hepatitis, hepatic fibrosis, cirrhosis and hepatocellular carcinoma (HCC). Prevalence of this infection varies according to the geographical region, mode & rate of transmission and other associated risk factors. Central and east Asia as well as Africa is the most affected regions in the world. [1] The incidence & prevalence of HCV infection in India is

slowly increasing. India belongs to intermediate endemicity as per WHO 0.09-15% (6-12 million population). Most of the HCV positive cases are detected accidently and often undiagnosed as the infection remains asymptomatic. Patient with infection are at risk of developing serious liver damage. WHO reveals that there are 8 million HCV infections worldwide and 2, 90, 000 deaths annually. Globally 1.5 million (Approx) new HCV cases are detected. [1] In 2021, World health assembly decided to eliminate viral hepatitis as a public health hazard by 2030. In India, National Viral Hepatitis Control Program (NVHCP) was developed in 2018 to achieve the same. [2, 3] However, due to the COVID 19 epidemic, most of the countries failed to meet the expected goal. In India, Chronic HCV infection accounts for 12-32% of HCC & 12-20% of cirrhosis. In 2023, overall prevalence rate of HCV in India range from 0.19% to 53.7%. In Tamil Nadu, the overall prevalence rate of HCV is 0.30%.[3,4] Due to the absence of relevant epidemiological data and many countries lack a complete disease surveillance system related to HCV infection, it is strenuous to formulate target. In India, viral hepatitis is found in the form of pockets of hyperendemicity.[2] Hence, the aim of the study was to determine the prevalence of anti HCV positivity (Hepatitis C virus infection) and HCV viremia among anti-HCV positive patients who are attending the tertiary care Hospital, Salem District.

METHODOLOGY
36541 patients who were attended OPD & IPD to Government Mohan Kumaramangalam Medical College Hospital, Salem, Tamil Nadu during the period January 2024 – December 2025. Among them 6548 belong to high risk groups (HRG's) cases and were selected for the study. HRG's include recipients of multiple blood /blood products transfusion, patients on hemodialysis, IV drug abusers, MSM, female sex workers, sexual partners, prisoners, migrants, truckers, close first degree relatives & those who have received blood and blood products before implementation of hepatitis c testing at a large scale. The approval from the Ethics committee of Institution has been obtained. The written informed consent was collected from all the participants of the study. Patients of all age groups who were detected positive for anti-HCV antibodies by rapid card test & ELISA were included in the study. Patients who refused to give informed consent were excluded from the study. Under aseptic precautions, 3ml of venous blood sample was collected in EDTA tube from these patients & sent to the Viral Research and Diagnostic Laboratory (VRDL) for further testing. Viral load test or quantitative test is done using Real Time Polymerase Chain Reaction (RT-PCR). Ribo-nucleic acid (RNA) from sample was extracted using Qi Amp-mini kit & RT- PCR was carried out using appropriate primers according to manufacturer's protocol and stored at -20° C until further processing.

Statistical Analysis
Data was analyzed using SPSS software 20.0 with the level of significance $p < 0.05$. Chi-square test was used to correlate the age and gender distribution with viral load and found to be statistically insignificant (Table 1).

RESULTS
In the present study, 36541 cases were screened and among them 6548 HRG's was identified. Among HRG's 125 cases detected positive for HCV in rapid card & ELISA. Out of 125, 36 patients were found to have HCV viremia in their blood. Hence, the prevalence of HCV infection in our study is 0.34 % (Table 2 & Figure 1) and rate of prevalence in male is higher than female in the present study (Table 3 & Figure 2). HCV prevalence in both genders is debatable. As few studies showed higher HCV incidence in male compare to female and other population based surveys presented with similar rate in both gender.

Our study showed highest prevalence of HCV infection about 9.9% in (50-60 years) of age group (Table 4) and explains that the significant trend of HCV seropositivity associated with increase in age.

Table 1: Correlation of the age and gender distribution with viral load (p<0.05)

	Age	Gender	Viral load
Chi-Square	18.229[a]	2.314[b]	.000[c]
DF	22	1	34
Asymp. Sig.	**0.692**	**0.128**	**1.000**

Table 2: Prevalence of Hepatitis C infection among patients in a tertiary care hospital
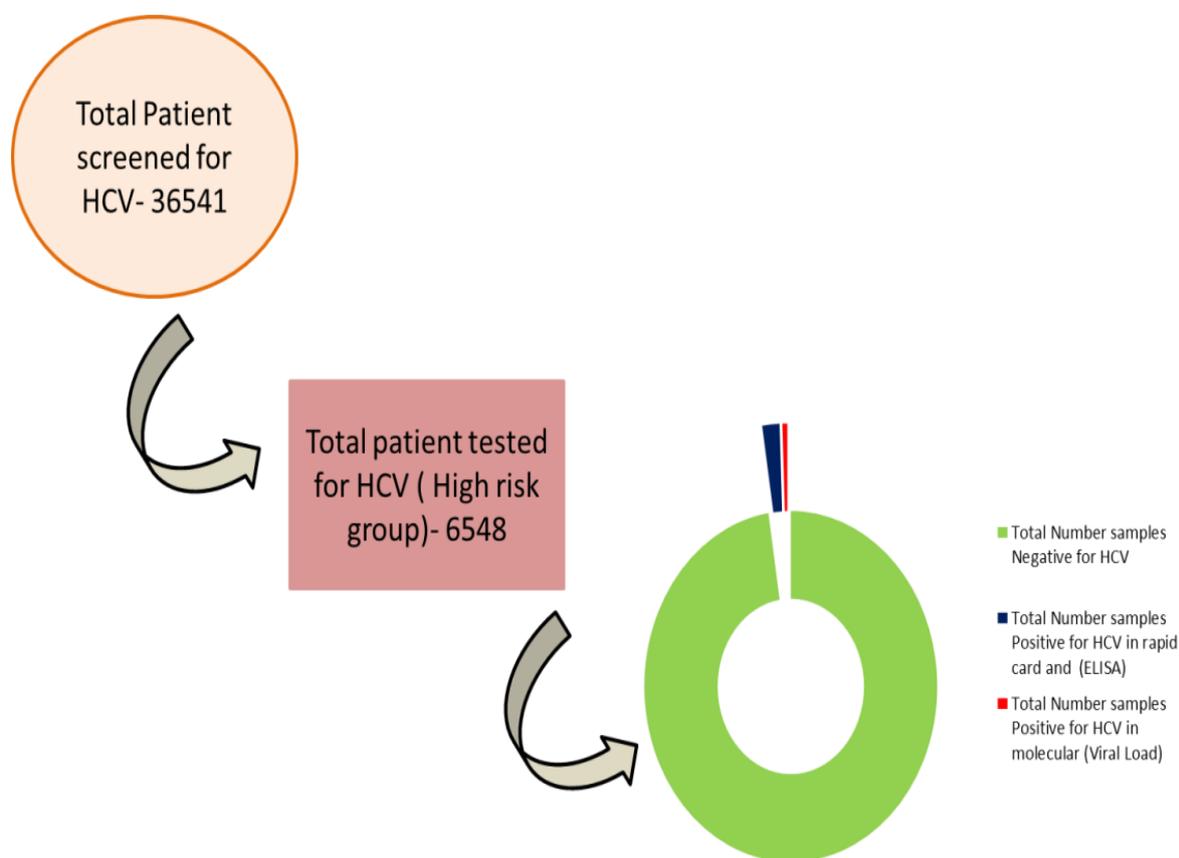
Total Number of patient visited	Total Number samples tested (serology) for HCV (High Risk group)	Total Number samples Negative for HCV	Total Number samples Positive for HCV IgG (Serology)	Total Number samples Positive for HCV viremia	Percentage of HCV positive samples	Percentage of HCV viremia
36541	6548	6423	125	36	0.34%	28.8%

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1219

Table 3: Prevalence of Hepatitis C infection in molecular (Viral Load) - Gender wise

Total Number of samples positive for HCV in molecular (Viral Load)	Total Number of samples positive for HCV in molecular (Viral Load) – Male	Total Number of samples positive for HCV in molecular (Viral Load) - Female
36	23	13

Table 4: Prevalence of Hepatitis C infection in age wise distribution (in years) in Viral load positive cases

Age group (in years)	Total Number of HCV Positive samples	Percentage of HCV positive samples
0-10	0	0
11-20	2	1.8
21-30	6	5.4
31-40	2	1.8
41-50	10	9
51-60	11	9.9
> 60	5	4.5

Figure 1: Prevalence of Hepatitis C infection among patients in a tertiary care hospital
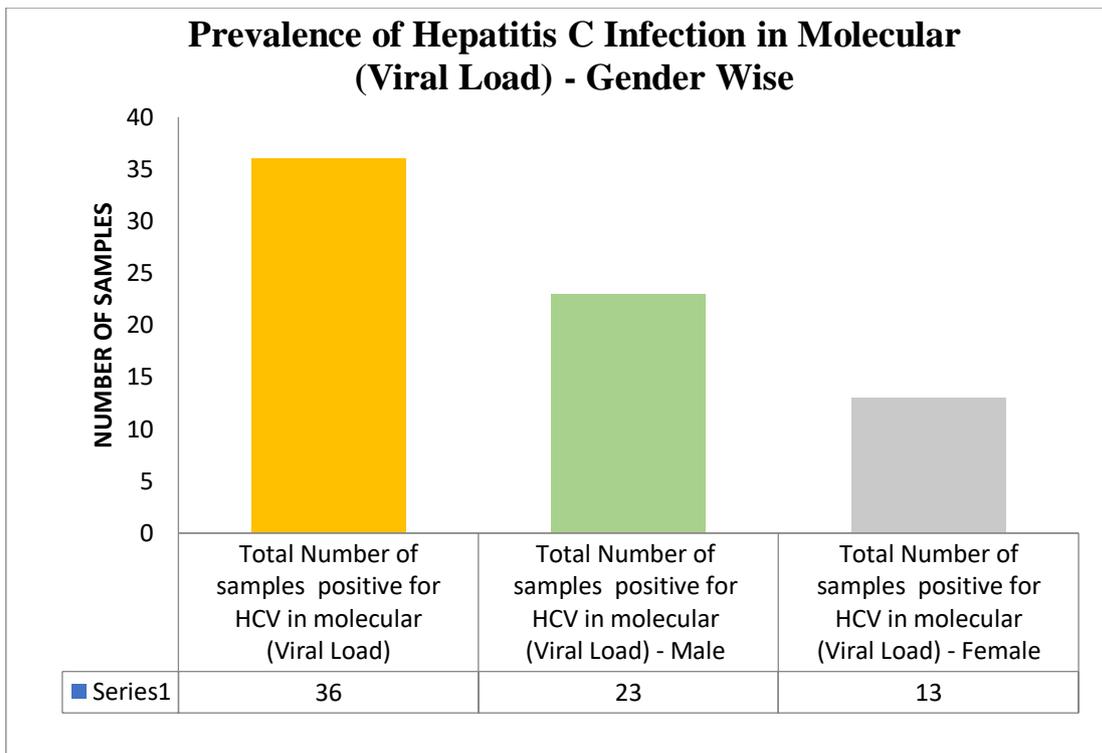
Figure 2: Prevalence of Hepatitis C infection in Molecular (viral load) - Gender wise

DISCUSSION

In 1970s, physicians repeatedly reported cases with history of chronic, progressive clinical presentations which are associated with blood transfusions and they named as "Transfusion associated Hepatitis". The researchers also doubted the infection neither to the hepatitis A & B virus nor to any other known cause. Then this phenomenon was called as "Non A, Non B Hepatitis (NANBH). After elaborative research, the investigators identified that the Hepatitis C Virus as a causative agent for NANBH which could be a transmission by parenteral route. HCV belongs to the family Flaviviridae and genus Hepacivirus. [6, 7]

Still today, HCV infection remains a global health burden with high morbidity & mortality worldwide. It plays important role in development of chronic liver diseases, cirrhosis and hepatocellular carcinoma. Survey in 2019 proposed that, about 57.8 million people globally are chronically infected with HCV with the greater number of people undiagnosed and 1.1 million people died due to HCV induced liver disease and cancer.[6,7,8]

69th world health assembly supported the global health sector strategy on viral hepatitis to target 65% reduction on mortality rate of viral hepatitis B & C by 2030. Based on that, the Government of India launched the NVHCP in 2018 with the goal to prevent and treat viral hepatitis. But still, the mortality due to HCV infection is booming at alarming rate. Early detection of the HCV in hepatic disorders is considered to be an essential factor to improve the prognosis. [6, 9]

The present study showed 0.34% seroprevalence rate of HCV infection among the patients attending IPD & OPD to our hospital. In 2015, Mindolli, P.B. and Salmani, M.P studied seroprevalence of HCV infection among hospital based general population in Karnataka and found 2.6% which is very high when compared to our study.[10] Al-Mohani, S.K. & Gacche, R.N in 2012 revealed that the 30- 50% HCV infected patients participated in their study were known about the disease.[11] Similarly, a study conducted by Kumar, K. and Ho Lal, M in 2019 in primitive tribes of Eastern India (Odisha) and reported high prevalence rate mainly in 2 groups (Mankidia & Juanga). According to their study, the usage of unsterile needles, sharing razors and shaving blades and tattoos can be considered as high risk factors for parenteral transmission. [12]

In 2018, Mitrovic, N. estimated the prevalence of anti-HCV positivity in the general population of Serbia and detect the risk factors for this infection & showed higher prevalence of HCV infection in their population, with intravenous drug usage. The authors also stated that invasive dental procedure is a threatening factor for increasing the incidence of HCV infection in Serbia. Globally, high risk individuals including patients requiring multiple blood transfusion, patient undergoing hemodialysis, individuals with human immunodeficiency virus (HIV) infection with high risk sexual behaviour presented with higher prevalence rate of HCV infection ranging from 3.5% to 44.7%. Therefore, it is important to provide HCV infection screening as routine in these diverse high risk groups. [13]

Gender distribution of HCV infection prevalence in the present study was found higher in male compared to female. The gender was correlated with viral load and found to be statistically insignificant (p= 0.128) in the present study. Several

studies have reported the higher prevalence in male compared to female. The exact pathogenesis is unknown, but lower infection rate in female is due to spontaneous clearance of acute infection with presence of genetic factors like IL28B genetic variant or possible role of female sex hormone in viral infections.[14] Abdel-Gawad, M et al in 2023 proposed that, HCV RNA positivity is substantially more in males than females in adults, while in children there are no gender differences in Egypt. [14]

A study by Niu, Z., Zhang, P. and Tong, Y in 2016 reported highest prevalence rate in males compared to females. The authors of the study also stated that higher rate of infection found in older age group (>50years) and the lowest detected in young age group (0-9years). [15] Similarly, our study also presented with highest in older age group (>50 years). The reason for differences in prevalence rate both in age and gender distribution is due to the health resources and awareness about the infection in various geographic areas. In the present study, age was correlated with viral load and found to be statistically insignificant (p= 0.692).

In the past two decades, the co-infection of HCV, HBV & Human immunodeficiency virus (HIV) has emerged as a leading cause of morbidity throughout the world. Specifically, HCV & HBV infections are more prevalent in the HIV positive patients due to higher replication of hepatotropic viruses in these patients. Researchers also stated that, HIV infection can increase the HCV viremia by 2 -8 fold & results in chronic liver disease which can worsen the prognosis.[16] Akhtar, A et al in 2022 proposed a study about HIV –HCV co-infection in Malaysian population and reported that CD4 count cells was lower in co-infected patients than HIV mono-infected. The cause for decrease in CD4 cells count is due to uncontrolled HIV & HCV replication, representing immunosuppression state.[17] Behzadifar, M et al in 2019 published a systematic review about the HCV infection in tuberculosis (TB) patients and stated that hepatoxicity is very common side effect of first line Anti-tuberculosis drugs. He also highlighted that the TB patients must be screened for HCV.[18] Olaru, I.D., et al in 2023 in his review, revealed that chronic HCV & HBV infection was higher in TB patients compared to general population.[19]

There are very few recent studies with data on prevalence & related to the general population or high risk population. Hence forth, the countries & territories require robust, timely and in depth knowledge of HCV prevalence and incidence in both the general and high risk populations. This may help in developing a support to the WHO in HCV elimination program by 2030. [6, 20]

The limitation of the present study is the relatively small number of subjects which hold back the detailed knowledge and analysis of the risk factors associated with HCV infection. The present study also doesn't have data about the HCV genotypes of the selected subjects. No questionnaire was used to enquire about risk factors and other high-risk habits in patients detected to have HCV infection. In the present study, out of 125 cases 36 were positive for viral load and an undetected viral load indicates that those patients no longer have HCV present in their bloodstream.

Hepatitis B & C infections have long gestational periods before disease progresses to advanced stage, resulting in liver cirrhosis & HCC if treatment is not provided in time. As reliable treatment for HCV infection is now possible with new medicines. Rapid diagnosis facilitates timely treatment and reduction of mortality & morbidity.

A recent cost benefit analysis of treating hepatitis C infection demonstrated that during the HCV with 12-24 weeks of directly acting antivirals (DAA's) is substantially more cost effective than managing the sequels and has better health outcomes. The advent of newer and safe drugs for treatment of HCV ensuring cure makes it easier to combat it. [6, 20].

CONCLUSION
In the present study prevalence of HCV infection in Salem district is at intermediate endemicity level (0.34%). Since hepatitis C infection is a deadly disease which affects commonly the low economic status and medically underserved patients, our study results highlighted that there is concerned lack of knowledge about prevention and transmission of HCV among public in the Salem district and indicating a need for targeted education campaigns to bridge this gap. Long lasting servicing through NVHCP and tele-consultation based regular follow up of patients will provide successive care.

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1223